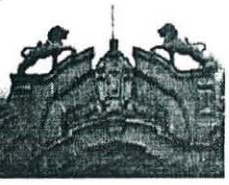

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Levels, Differentials and Determinants of Malnutrition Among Women in Ethiopia

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CONTENTS **page**

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

ACC/SCN	Administration Committee on Coordination Sub-Committee on Nutrition
AIDS	Acquired Immune Deficiency Syndrome
BMI	Body Mass Index
CED	Chronic Energy Deficiency
CSA	Central Statistical Agency
DHS	Demographic and Health Survey
EDHS	Ethiopian Demographic and Health Survey
MDG	Millennium Development Goals
MOPED	Ministry of Planning and Economic Development
SNNPR	Southern Nations, Nationalities and Peoples Regions
SPSS	Statistical Package for Social Sciences
TGE	Transitional Government of Ethiopia
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
WHO	World Health Organization

ABSTRACT

The millennium development goal (MDG 5) of reducing maternal mortality by three quarters between 1990 and 2015 is highly related with poor women's nutritional status. Poor maternal nutrition is directly associated with mother's resistance to infection or maternal ill health during pregnancy and child birth. Therefore providing obstetric care alone is not going to be enough solution for the problem, unless otherwise poor women's nutritional status is resolved. In depth understanding women's nutritional status is therefore crucial in any attempt to attain the goal of reducing maternal mortality level and food security. In this regard, this study examines the levels, differentials and determinants of malnutrition among women in Ethiopia.

The main purpose of the study is to assess the levels, socio-economic and demographic differentials and to analyse their determinants. The paper uses the large data set from the 2005 Ethiopian demographic and health survey on 4080 non pregnant and non lactating women aged 15-49 in rural and urban parts of the country. Women's body mass index (Kg/m^2) is used for the purpose of analysing women's nutritional status and those with BMI value less than 18.5 are at risk of chronic energy deficiency (CED). Logistic regression model was employed at multivariate analysis to identify important determinant factors of women's malnutrition.

The study reveals that 27.6 percent of the women are malnourished of which 23.1 percent are moderately and 4.5 percent are severely deprived. Levels were almost 2 times higher in rural areas than urban areas. The study identifies women's age, parity, current marital status, place of residence, region, house hold economic status, occupation and women decision making autonomy as important factors in explaining the variation in women's nutritional status. In rural areas non educated women in the age group 15-19 and 45-49, living in regions Tigray ,Gambella Amhara Ben-shangul Gumuz and Somali are found to be under nourished. In urban areas where as never married and divorced women, with poor and very poor household economic status living in regions Tigray and Gambella are at risk.

Hence to improve the situation the Policy should focus on creating mechanisms and opportunities to increase agricultural production and women's education as well as providing better access to health care, particularly, in rural areas.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Nutrition and health are important dimensions which are used to asses the well being of an individual. Malnutrition and sickness represent the main health problems in developing countries and often result from causes on the individual, household or community level. Malnutrition among women is likely to have a major impact on their own health and their children. Besides her own health, a mother's nutritional status affects her capacity to successfully care for her children.

The World Health Report, 2003 states that, around the world more attention should be given to maternal health and nutrition by governments and non governmental organizations. The United Nations meeting in 2006, on the critical role of nutrition for reaching the millennium development goal, also clearly established that poor maternal nutritional status has to be improved in order to achieve the MDG 5 (reducing maternal mortality by three quarters in the years between 1990 and 2015).

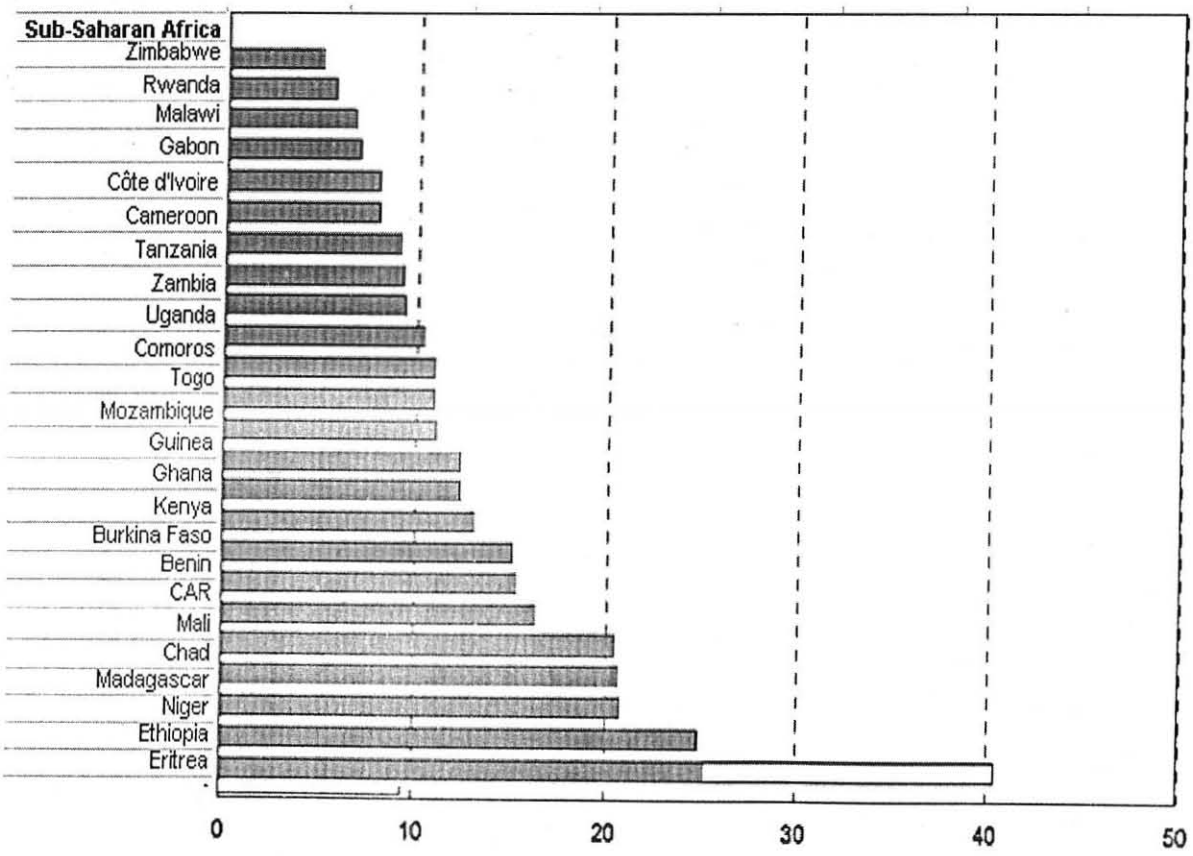
Women in the reproductive age group and children are most vulnerable to malnutrition due to low dietary intakes, inequitable distribution of food within the household, improper food storage and preparation, dietary taboos, infectious diseases and care. Particularly for women the high nutritional costs of pregnancy and lactation also contribute significantly to their poor nutritional status (Woldemariam and Timotiwos, 2002).

There are generally accepted standards for indicators of malnutrition among adult women that can be applied. Anthropometric measures such as birth weight, weight for age, height for age, weight for height, arm circumference and body mass index (Victoria Quinn, 1999). Body mass index (BMI) is defined as a weight in kilograms divided by the square of a height in meters. Thus, BMI = kg/m^2. When the BMI falls below the suggested cutoff point of 18.5, this indicates chronic energy deficiency and if it is greater than 30 which is an indicator of obesity.

Both chronic energy deficiency and obesity are measures of malnutrition for non pregnant and non lactating women (Premananda, et al, 2008).

Malnutrition is a serious problem in Ethiopia in which women and children are highly affected by the condition. When we compare women's nutritional status with other Sub-Saharan African countries, the average moderate and severe malnutrition in sub-Saharan Africa shows 13.3 percent (A. Mukuria, et.al, 2005). As of the 2005 EDHS report the condition of malnutrition in Ethiopia (26.5 percent) seems almost double when it is compared with other sub-Saharan African countries. A comparative study done based on Demographic and Health Surveys (DHS) in 2005 data also revealed that, the prevalence of chronic energy deficiency in Ethiopia was among the highest from all Sub-Saharan African countries next to Eritrea (Figure 1.1).

Figure 1.1: Percentage of women age 15-49 with a Birth in the Three Years Preceding the Survey whose BMI is Less than 18.5 in Sub-Saharan-Africa



Source: DHS Comparative Reports No. 11, 2005

1.2 Problem Statement

The goal related to maternal health (MDG 5, target of reducing maternal mortality by three quarters between 1990 and 2015) and MDG related to promoting gender equality and empowering women (MDG 3) are related with women's nutritional status. Poor maternal nutritional status forms an important part of these linkages, and is an area that should receive more attention (UN, 2005).

Eventhough maternal mortality (deaths per 100,000 live births) seems to be reducing in Ethiopia from 871 in 1994 -2000 to 673 in the periods 1998-2004. Since both rates are subject to high sampling error, it is not possible to conclude that there has been a decline in maternal mortality (CSA/ORC Macro, 2006). Therefore as things stand, the MDG 5 target of reducing maternal mortality by three quarters between 1990 and 2015 does not seem likely to be met in Ethiopia.

In order to resolve the problem of maternal mortality, most researches recommend that providing emergency obstetric services (skilled attendant at birth and effective referral) are very essential for lessening the problem. But providing obstetric care alone is not going to be enough solution for the problem, unless problems associated with it like poor women's nutritional status are resolved.

The issue of poor nutritional status of mothers and maternal health are interrelated to each other. Poor maternal nutrition is directly associated with mother's resistance to infection or maternal ill health. Poor nutrition contributes to mother's resistance to infection and infections in turn are factors for poor nutritional status of the mother (UN, 2005). Hence unless the problem of poor nutritional status is controlled, mothers and her fetus are vulnerable to increased risk of their health.

Limited researches have been conducted to understand the levels and determinants of maternal nutritional status in Ethiopia (Lindet and Tadesse, 1997, Woldemariam 2001; Woldemariam and Timotiwos, 2002; Teller and Yimer, 2000). This is due to lack of relevant data at the national level and limited number of researchers in the area. As a result some of the studies

rely on poor data sources (Woldemariam, 2001), while others rely on small geographical settings like rural/urban (Lindet and Tadesse, 1997) and some others take one region (Teller and Yimer, 2000) others take limited number of variables (Woldemariam and Timotiwos, 2002).

The 2005 EDHS data indicate that proportion of short stature women (height < 145 cm) are 3.2 percent in Ethiopia which is higher than most sub-Saharan African countries (A. Mukuria, et.al, 2005). The prevalence of chronic energy deficiency in Ethiopia is 26.5 percent, compared with the 2000 EDHS, chronic energy deficiency has declined by 3 percent (from 30 percent to 27 percent) where as the percentage of short stature women show only a 0.4 percent decline from 3.6 to 3.2. But all of the national surveys on women nutrition were descriptive in nature and limited to analysis of associations between nutritional status with certain nutrition-related variables.

An attempt has been made by Woldemariam and Timotiwos in 2002 to asses the determinants of maternal malnutrition in Ethiopia, but they consider all types of women (including pregnant and lactating) for analyzing women's nutritional status. Moreover variables related with partner's characteristics (partner's education and occupation) and women's decision making autonomy which have a significant effect for women's nutritional status were not assessed.

In order to avoid the impact of fetus and lactation on body mass index (BMI), the present study is therefore entitled to be done by considering only non pregnant and non lactating women aged 15-49 who were measured for anthropometric measurements. To assess the level, differentials and determinants of women's malnutrition, the study was done using chronic energy deficiency as an indicator of women's malnutrition.

1.3 Significance of the Study

Since under nutrition in women is a serious problem in Ethiopia, actions to improve women's nutritional status should be foreseen at any time in the reproductive life of women. This study is therefore done to in-depth analyze the EDHS-2005 data in assessing the levels, differentials and identifying some of the basic determinants of malnutrition among women in Ethiopia.

Thus, the findings of the study will serve as base line information, for the area in activities related to women empowerment to minimize the risk of food insecurity, access to health care services and poverty. In general, the result of this study aimed to be used for policy makers, planners and other interested researchers, to design appropriate interventions in the areas related to health and nutrition.

1.4 Objectives of the Study

1.4.1 General Objective

The general objective of this study is to asses the levels, differentials and determinants of malnutrition among women in Ethiopia.

1.4.1 Specific Objectives

1. To investigate the demographic and socio-economic differentials of malnutrition among women in Ethiopia.
2. To examine the magnitudes of rural–urban disparity in malnutrition among women and its variation across regions.
3. To identify some of the determinant factors associated with women's malnutrition in Ethiopia.

1.5 Review of Related Literature

Women's nutrition

Nutritional status is an indicator of health as well as the level of a society's development, and malnutrition is one of the most serious health and development problem facing women and children in developing regions of the world. Malnutrition poses a variety of threats to women. It weakens women's ability to survive childbirth, makes them more susceptible to disease, and makes them not heal from illness. In addition, malnutrition in women weakens their productivity, capacity to generate income, and ability to care for their families. Above all, the malnutrition leads to economic losses for families, communities, and countries. Women are more likely to suffer from nutritional deficiencies than men are, for reasons including women's reproductive biology, low social status, poverty, and lack of education (A.K. Ravishankar, 2004). Socio- economic and cultural reasons in the household work patterns and disparities in household work patterns can also increase women's chances of being malnourished. Some of

the socioeconomic and demographic factors explaining women's nutrition according to studies done in different places are reviewed below.

CED is defined as a "steady state" where an individual is in energy balance, i.e. the energy intake equals the energy expenditure, despite the low body weight and low body energy stores. Thus, by never growing to a normal size or having experienced one or more stages of energy deficiency, the individual has arrived at a reduced body weight with possibly limited physical activity, which have allowed the energy demands of a lower basal metabolic rate (BMR) and reduced amounts of activity to balance the lower intake (Shetty, et al., 1994).

1.5.1 Socio-Economic Factors

Household Economic Status

Household wealth is strongly associated with women's malnutrition. The household wealth status is an important factor which enables women to loose or gain basic necessities for their own health and nutritional status. The type and amount of food that people eat are largely determined by socioeconomic factors, especially the price of food relative to income. Increased household wealth is meant to help improve the human nutrition and health status of individual household members in a sustainable manner, and especially the most vulnerable members of the society, women and children (Tsegaye and Alemu, 1997). Women in the wealthiest household have lower risk of chronic energy deficiency but higher risk of obesity. On the other hand women in the poorest wealth category have high risk of chronic energy deficiency and low risk of obesity. Different studies also show that women from low economic status households were most affected by under nutrition (Loaiza, 1997; Teller and Yimer, 2000; Woldemariam and Timotiwos, 2002; Woldemariam, 2001, et al).

Educational Status of Women

Women's education is one of the strongest correlates of maternal malnutrition because education provides women decision making power, making them more aware of their nutritional status. Women who receive even a minimal education are generally more aware than those who have no education of how to utilize available resources for the improvement of their own nutritional status and that of their families. The study done in Limu Wereda of

Hadiya Zone, southern region of Ethiopia shows that education is significantly associated with women's nutritional status and the level of malnutrition among women is higher for illiterates than literate women (Tsegaye, Yared, Jemal, 2003). A comparative study on maternal malnutrition in ten sub-Saharan African countries (Loaiza, 1997) and a study in the SNNPR of Ethiopia (Teller and Yimar, 2000; Woldeldemariam, 2001) showed that the higher level of education is associated with lower proportion of under nutrition.

Type of Place of Residence

The level of malnutrition among women also depends on the type of place of residence. In developing countries like Ethiopia where there is high level food insecurity and lack of social services such as health and education rural women are more vulnerable to under nutrition than their urban counterparts. Different researches also confirm this idea. Although urban poverty is a growing problem due to rapid urbanization, up to 80 percent of extreme poverty is in rural areas (Cathy Toroitich-Ruto, 1999). A comparative study on women's nutritional status in 16 out of the 18 DHS conducted countries (Loaiza, 1997); a study in the SNNPR of Ethiopia (Teller and Yimar, 2000) and a research done in Ethiopia (Woldemariam and Timotiwos, 2002); showed that rural women are more likely to suffer from chronic energy deficiency than women in urban areas.

Region of Residence

Region of residence is generally believed to be associated with women's nutritional status. Women who live in regions where there is insufficient food security and inadequate social services like education and health have a higher chance to be affected by chronic energy deficiency. The prevalence of under nutrition in women of Ethiopia varied from 15% in Addis Ababa to up wards of 40 % in the Gambella and Afar regions (Aryeh D., Paul G. and Daniel W. ,2004). The region of residence was found to be the most important determinant factor for women's nutritional status in Ethiopia, women who reside in Affar, Gambella and Somali regions were more than 1.6 times more likely to be under nourished than women in Harari (Woldemariam and Timotiwos ,2002). Results from comparative studies found out that, level of malnutrition, that is, chronic energy deficiency (CED) or obesity differs from region to region and from country to country. The African pattern shows high levels of chronic energy deficiency and low levels of obesity (Edilberto Loaiza, 1997).

Women's Employment and Control over Income

Women employment status is also another important socio-economic factor in explaining the variation in maternal malnutrition. Employment may increase women's status and power, and may promote a woman's preference to spend her earnings on health and nutrition. Studies in Africa have indicated that, at similar levels of income, households in which women have a greater control over their income are more likely to be food secure (Kennedy and Haddad, 1991).

Because of low agricultural productivity in Sub-Saharan Africa and higher work load problem in women agricultural women are most affected by the condition of under nutrition. In Zambia for instance more women in agricultural work have CED than women in other occupations or unemployed women (Hindin, 2005).

Partner's Characteristics

Partner's characteristics such as education and health are important factors for indicating maternal nutritional Status. In developing countries where there is low status of women and high level of gender inequality, women have little or no chance of getting education opportunities and participating in income generating activities. Hence most of the women will rely on their partner's occupation and educational status. A research done in sub-Saharan Africa (Zimbabwe, Zambia and Malawi) show that, the prevalence of chronic energy deficiency was highest among married women who have no educated and not working partners. In Zambia and Malawi, partner's educational level was found to be the determinant factor in explaining the variation in chronic energy deficiency. Partner's occupation was also the major determinant factor for chronic energy deficiency (Hindin, 2005).

Women's Decision Making Autonomy

Women decision making autonomy is also one of the determinant factors in explaining the variation in women's nutritional status. There has been some evidence to suggest that women who have lower levels of autonomy and status within in the household are more likely to experience under nutrition (Hindin, 2005) or have a lower BMI (Bindon and Vitzthum, 2002;). The theoretical rationale for why this may be the case is outlined in a paper on Zimbabwe by Hindin (2005), who suggests that women's health can be adversely affected if they are unable

to negotiate for themselves, particularly in resource-constrained settings. A combination of factors suggests that women with less autonomy and status will have poorer health, based on having a higher prevalence of CED.

1.5.2 Demographic Factors

Age of Women

Women's age is identified as one the basic determinant factor which affects maternal nutritional status. Early motherhood (women in the age group 15-49) is a situation which forces most women in developing countries to be illiterate. This is a condition which leads young mothers to loose their decision making power and employment opportunities that finally expose them to chronic energy deficiency. Similarly mothers in the age group 40-49 have relatively high parity and because the low economic status in Ethiopia as a developing country. They become responsible about taking care of their children rather than their own nutritional status. In supporting this idea, different DHS surveys conducted in Burkina Faso, Ghana, Malawi, Namibia, Niger, Senegal, and Zambia and local studies in Ethiopia show that greater proportion of women age 15-19 and 40-49 exhibit chronic energy deficiencies. (Edilberto Loaiza, 1997; Teller and Yimer, 2000; Woldemariam and Timotiwos, 2002, Tsegaye. et al., 2003).

Parity

The risk of malnutrition among women could be affected by the number of children they have. High parity is a feature of poor developing countries like Ethiopia which again is associated with having low access to their health and nutritional status. Researches done in southern Ethiopia and in whole regions of Ethiopia indicate that the highest rate of malnutrition is observed among women with highest parity (Woldemariam, 2001; Woldemariam and Timotiwos, 2002). But the researches done in developing countries showed that some chronic energy deficiency can be seen at higher parities but, for most countries, the highest mean BMIs and the lowest levels of chronic energy deficiency are found at the highest parities. In Burkina Faso, Ghana, Niger, Zambia, Morocco, Bolivia, Colombia, the Duminican Republic and Peru also showed that chronic energy deficiency by women's parity shows as U shaped curve with high values at parity 1 and 6+ and low values at parity 4-5 (Edilberto, 1997).

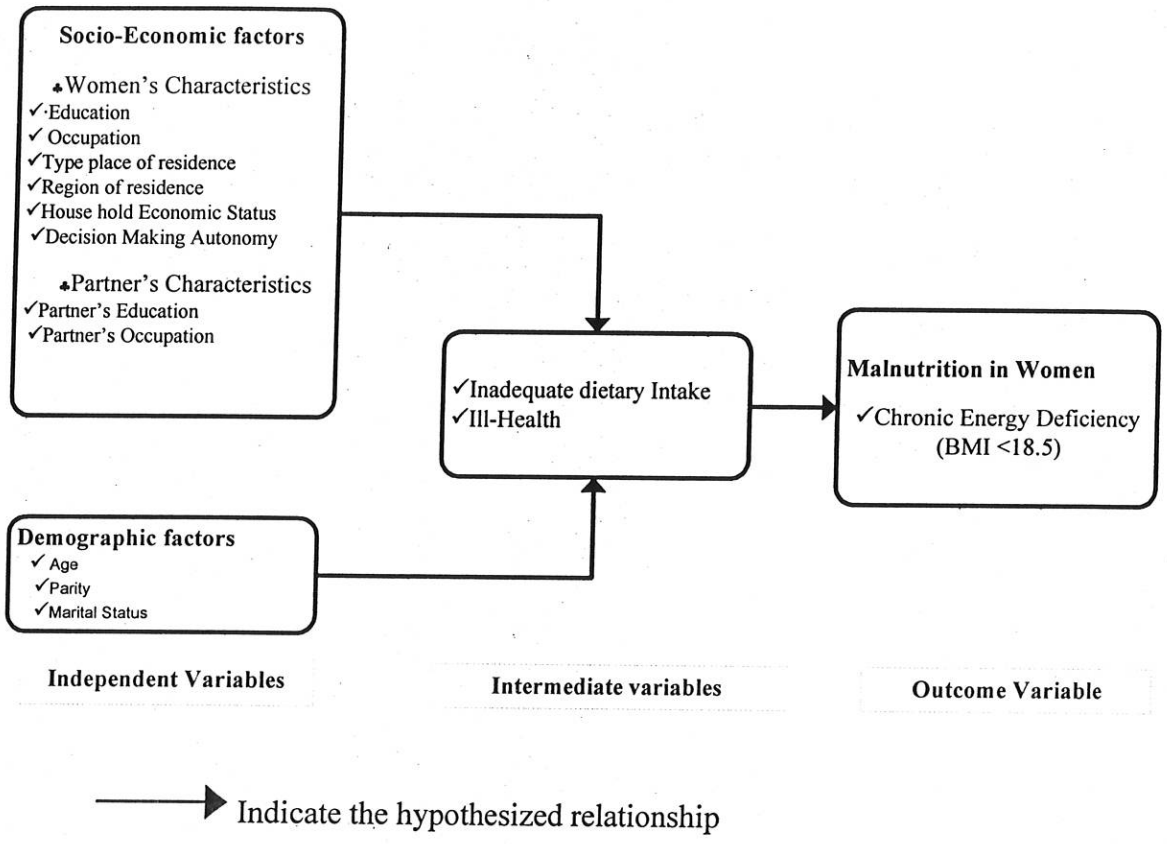
Marital Status of Women

Marital status of the women is associated with household headship and other social & economic status of the women that affects their nutritional status. In developing countries like Ethiopia where there is higher dependency ratio on their partners. Married women have an advantage of sharing possible income from her husband, which can affect their own nutritional status than those who are not married. Hence divorced/widowed/separated and never married women lack the benefit which could be from their partners. A study on the SNNPR Region of Ethiopia showed that women's malnutrition is significantly associated with marital status indicating that compared to married women malnutrition is higher among unmarried rural and divorced/separated urban women compared to married ones (Teller and Yimar, 2000).

1.6 Analytical Framework

Based on the review of the Literature and objectives of the study the analytical frame work of the research will be:

Figure 1.2 Analytical Framework



Source: Developed by the Researcher, 2008

Description about the Frame work

Malnutrition in women is immediately caused by inadequate dietary Intake and Ill health (Simon Maxwell, 1991). But these two factors in turn are the result of the above listed Socio-economic, demographic and other environmental factors.

Therefore for the purpose of analysis the researcher analyses the levels, differentials and determinants of malnutrition among women using the above listed independent variables.

1.7 Hypothesis

The working hypotheses are the following

1. Never married women in the age group 15-19 need adequate nutrients that support the fast physical, mental and emotional growth. Therefore, never married women in the early age group are at a higher risk of under nutrition than married /living together women in the age group 25-29.
2. Accesses to heath care services which have an immediate impact for women's nutritional status are relatively rare in rural areas of the country. There fore, women living in the rural areas are more affected by chronic energy deficiency than women living urban areas.
3. Because of high dependency ratio on their partners in Ethiopia, women who have lower status partners (in terms of education and occupation) are highly affected by chronic energy deficiency than women who have higher status partners.
4. Previous studies confirm that women who have lower decision making power are believed to have lower control over income and lower access to household assets. Therefore, lower decision making power is associated with higher risk of under nutrition in women.

CHAPTER TWO

METHODOLOGY

2.1 Source of Data

This study was done using the data from the 2005 Ethiopian Demographic and Health Survey (EDHS). The 2005 EDHS is the second comprehensive survey designed to provide estimates for the health and demographic variables of interest for the following domains: Ethiopia as a whole; urban and rural areas of Ethiopia (each as a separate domain); and 11 geographic areas (nine regions and two city administrations), namely: Tigray, Affar, Amhara, Oromiya, Somali, Benishangul-Gumuz, Southern Nations, Nationalities and Peoples (SNNP), Gambela, Harari, Addis Ababa and Dire Dawa. In general, a DHS sample is stratified, clustered and selected in two stages. In the 2005 EDHS a representative sample of approximately 14,500 households from 540 clusters was selected. The sample was selected in two stages. In the first stage, 540 clusters (145 urban and 395 rural) were selected from the list of enumeration areas (EA) from the 1994 Population and Housing Census sample frame. A total of 14,717 eligible women were identified in these households and interviews were completed for 14,070 women, yielding a response rate of 96 percent.

Three types of questionnaires administered under EDHS were the Household, the women's and the men's questionnaire. In the women's questionnaire information was collected regarding women fertility history, maternity care, nutritional status of women and young children maternal mortality, knowledge and use of family planning and some aspects of their demographic and socio-economic background. From 14,070 women aged 15-49, 4,082 of them are non pregnant measured and non lactating who were measured for anthropometric measurements height and weight.

The current study therefore used the data from women's questionnaire by considering 4082 women aged 15-49 (measured non pregnant and non lactating women age 15-49).

2.2 Data Quality

A major issue of concern before analyzing any data is to check the quality of the data. The sampling and non sampling errors for the 2005 EDHS have already been evaluated by the central Statistical Authority (CSA and ORC Macro, 2006). An attempt was therefore made to check the consistency and quality of the data by using information on age of women, mean parity by age of women and accuracy of measurements for height and weight measurements of women.

2.2.1 Evaluation of Age Data

Age is an important items collected in all demographic inquiries. The precision of age reporting is an important issue in determining the accuracy of estimates in the demographic analysis.

The tendency of the respondents and/or enumerators to report certain ages such as 0 and 5 at the expense of others is termed the age heaping or age preference or digit preference. Myers blended index is usually used to measure degree of index preference for each digit and it provides summary index for all terminal digits. A summary index of preference for all terminal digits is derived as one half of the sum of the deviations from ten percent, each taken with out regard to sign. If age heaping is not existent, the index would approximate to zero. The theoretical value of Myre's summary index ranges between 0 and 90, while value would be 90 if all ages are reported as numbers ending in the same digit (Siegel and Swanson, 2004). Table 2.1shows the Myer's Blended index computed for ages ranging from 15-49 years. The value of the summary index is found to be 22.9 which indicate that there is digit preference in the study population. Table 2.1 also shows that there is a tendency of reporting ages ending with 0, 5, and 8 (higher frequency distribution).

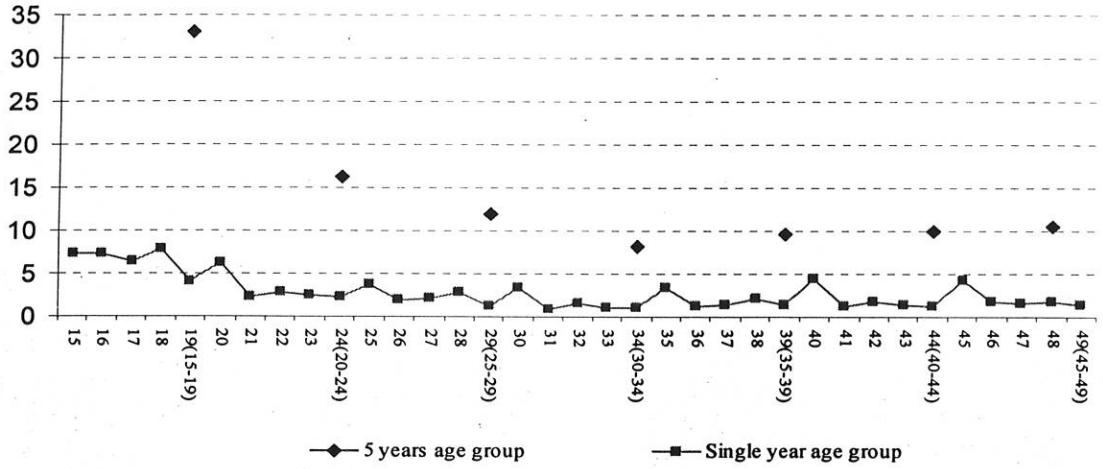
Table 2.1 Myer's Blended Index of Terminal Digit of non Pregnant and non Lactating Women in Ethiopia

Terminal Digit	Frequency	Deviation from 10 Percent
0	574	0.53
1	184	-6.74
2	253	-4.84
3	208	-5.59
4	188	-5.70
5	767	9.68
6	501	2.49
7	475	2.84
8	600	7.25
9	332	0.09
Total	4082	45.8
Summary Index		22.9

Source: EDHS 2005

The evaluation of age data shows that there is a tendency of reporting ages ending with 0,5 and 8. Figure 2.2 also shows that there is a heaping of age graph in the digits ending with 0 or 5 which confirms that a single year age data are subjected to digit preference or there is a tendency of reporting ages ending in 0 and 5. The five years age group graph shows a smooth curve which implies that the effect of reporting digits ending with digits 0 and 5 were controlled by taking the 5 years age group graph. The effect of age heaping is therefore reduced in the study since the study considers women's 5 years age group.

Figure 2.2 Distribution of Women's Age in Ethiopia

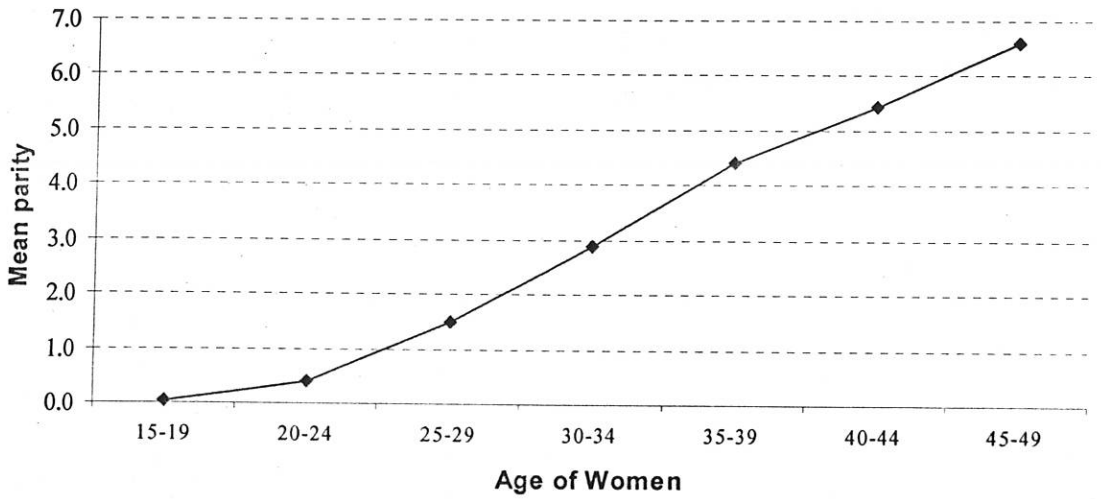


Source: EDHS 2005

2.2.2 Average Parity

The average parity of women in 5-years age group presents by 5-year age group shows an increasing trend with women's age. In other words as age of women increases the parity also increases (Figure 2.3). This indicates that the data is not affected by omission of children ever born when broader age group of women was considered.

Figure 2.3 Mean Parity by Age of Women



Source: EDHS 2005

2.2.3 Accuracy of the Measurements

It is possible that a systematic bias in reading or recording the height and weight measurements could occur. Even though it is difficult to assess the accuracy of the recorded measurements height and weight, the data could be examined to determine the existence of digit preference (i.e. heaping) on the commonly preferred decimals 0 and 5. If no heaping occurs, about 20 percent of measurements should end in 0 and 5. The heaping ratio is therefore calculated as the sum of the percentages of measurements that end with 0 and 5 divided by the expected value (20 percent). If the measurements are accurate the heaping ratio is expected to be round 1 (Adopted from Edilberto Loazia, 1997).

Table 2.2 and 2.3 show the percentage of height and weight readings ending with terminal digits 0-9 and their corresponding heaping ratio. The tables indicate that high percentage of height readings end with 0 and 5 where as the proportion of weight readings that end with 0 and 5 are relatively fair. The over all heaping ratio for weight and height measurements for non pregnant and non lactating women are 1.1 and 1.9 respectively. The indicator shows that there was no heaping in weight readings, but the heaping ratio for height measurements shows 1.96 which indicates there was heaping of height readings. Heaping of height measurements on the digits 0 and 5 may indicate systemic under measurement. This could be because of numbers on the scale above women's height may not be seen in the design of the measuring board since the top part of the measuring board could cover the numbers. Concerning weight measurements, there is no reason which biases the direction of weight measurements to digit preference since the scales are indicated both at the top and bottom parts of the measuring board.

In this analysis since BMI measures (which consider height and weight measurements, kg/m^2) were taken, heaping of height measurements is therefore reduced to be minimal.

Table 2.2 Heaping of Weight Readings

Terminal digits for weight readings	Percent
0	12.0
1	9.6
2	11.6
3	9.7
4	9.0
5	10.1
6	10.2
7	10.1
8	9.3
9	8.5
Heaping Ratio	1.1

Source: EDHS 2005

Table 2.3 Heaping of Height Readings

Terminal digits for height readings	Percent
0	21.3
1	6.8
2	10.2
3	10.5
4	8.8
5	18.1
6	7.2
7	7.1
8	6.0
9	4.0
Heaping Ratio	1.96

Source: EDHS 2005

♣The heaping ratio is calculated as the sum of the percentages of measurements that end with 0 and 5 divided by the expected value (20 percent).

2.3 Limitations

- Since the EDHS data were collected at one point of time (cross-sectional data), the direction of the causal relationship between women's nutritional status and out come variables (Chronic energy deficiency) is unclear.
- Information about food security and disease which are immediate causes of women's nutritional status are lacking in the EDHS data, therefore demographic and socio-economic factors which are related with the two factors are taken for analysis.

2.4 Data Organization and Analysis

The women data from EDHS-2005 were taken for analysis. The data were cleaned; organised and analysed using statistical packages SPSS .15. The study considers 4082 non pregnant and non lactating women who were measured for anthropometric measurements (weight and height). In this study only non pregnant and non lactating women were taken for analysis. This is because maternal BMI was related to the birth weight of the infant for pregnant women improving the mean BMI of women as the birth weight (in kg) increases. And lactation requirements will impose further demands on mothers with chronic energy deficiency this may be an even greater imposition in the young adolescent mother whose pubertal development of fat stores is incomplete (Shetty, et al, 1994).

There are four anthropometric indicators to assess women's malnutrition (chronic energy deficiency): height less than 145 cm, body mass index (BMI) < 18.5 (thinness), weight less than 45 kg and mid arm circumference (MUAC) < 22.5 cm (Victoria Quinnin, 1999).

The classification of BMI by WHO (2003) to assess the nutritional status is as follows:

Classification of BMI (kg/m^2)

Underweight (CED) <18.5

Normal 18.5–24.9

Overweight 25.0–29.9

Obsese 30+

In this study, the indicator used to assess chronic energy deficiency analysis is body mass index (BMI) also know as Quetlet index. BMI for measuring malnutrition among women is were chosen for the following basic reasons.

1. It is the commonest way of assessing malnutrition in women in developing countries.
2. BMI-for-age is the measure that is consistent with the adult index so it can be used continuously from 2 years of age to adulthood.
3. BMI-for-age compares well with both weight-for-stature measurements and measures of body fat (R. G. Whitehead, 1983).

For the purpose of analysis chronic energy deficiency was taken as a dichotomous measure based on the standard BMI cutoff of <18.5 (James et al., 1988).

Univariate (simple descriptive statistics of all variables) and bivariate association of the dependent variable with each of the independent variable were performed. For the bivariate analysis statistical significance at P<0.1, P<0.05 and P<0.01 was performed based on the chi-square statistics. Logistic regression model was employed at multivariate analysis to identify the relative contribution of each selected variable to the total variance in women's nutritional status. The analyses focused on the outcome of nutritional status for women; whether they are undernourished or not. Since the interest is in identifying women at risk of malnutrition, the dependent variables were coded as 1 if the woman was undernourished (BMI<18.5) and coded as 0 if not. This model is applied to see the relative importance of each predictor variable to the outcome variable (chronic energy deficiency).

The logistic regression model for k independent (x_1, x_2, x_3 ...x_k) variables is therefore given by:

$$\text{Logit } P(x) = a + \sum_{i=1}^{k} \beta_i x_i ; i = 1,2,...k$$

Where, β_i 's are regression coefficients

a = constant, Exp (β_i) = Odds ratio

The Exp (B) or Odds ratio is determined from the logistic regression which shows the increase or decrease chance of malnutrition in women for each predictor variables controlling the effects of others. An odds ratio gives an estimate of the magnitude of association between the dependent variable (CED) and predicator variable. In this analysis an odds ratio of 1.0 indicates no difference, a ratio below 1 indicates a negative association and a ratio above 1.0 indicates a positive association between the independent variable and the dependent variable (CED). P-values (* P < 0.1, ** P <0.05, *** P <0.01, **** P< 0.001) were considered to be significant.

2.5 Working Definition of Variables

Dependent Variable

CED is taken based on an internationally derived standard. It is a dichotomous measure based on the standard BMI cutoff of <18.5 (James et al., 1988).

Independent variables

Socio-demographic factors

Women's age: was divided in to four categories and coded as 15-19, 20-29, 30-39 and 40-49.

Parity: women's parity (total children ever born) was divided in to four and coded as 0,1, 2-3, 4-5 and 6+.

Marital Status: was categorized into three categories: never married, married or living together and Widowed/divorced/separated.

Residence: is a dichotomous variable (urban/rural) based on the woman's place of usual residence.

Region: all the nine regions and two administrative zones of Ethiopia were taken for analysis: Tigray, Afar, Amhara, Oromia, Somali, SNNP, Gambella, Benshagul-Gumuz, Harari, Addis Ababa and Dire Dawa.

Education: (for both the respondent and her partner) was coded in three levels: no schooling, completed primary school and completed secondary or higher.

Occupation: (for both the respondent and her partner) was coded in three levels: unemployed, agricultural, manual (skilled/unskilled), non manual (clerk, sales and services and services and household and domestic) and Professional (Professional technical managerial).

House Hold Economic Status: In the survey, a different set of domains was included in terms of household economic status: The domains included for them were based on a series of six questions on the possession of house hold properties.

Do you have radio/television/refrigerator/bicycle/ motor cycle or scooter /car or track?

For each of the above question the women were responded as yes/no. Based on the above questions an index has been performed. Those who have no any of the identified household properties were identified as 'very poor', those who have only one of them were categorized as 'poor' and those who have 2-6 of the above properties were categorized as 'medium or higher'.

Decision making autonomy: In the survey, a different set of domains was included in terms of decision making for only women in union (married/living together). The domains included for them are based on a series of three questions about who makes the decisions.

Who in your family usually has the final say on the following decisions?

Your own health, large household purchases, daily household purchases.

For each of the above questions, the women were given the following response options: 1) themselves (respondents), 2) husband/partner, 3) respondent and husband/partner jointly, 4) someone else, and 5) respondent and someone else jointly.

By considering the above questions women an index has been performed as:

Women who have the power to decide by themselves in at least two of the above questions were considered as they have 'high' decision making power. Women who have the power to decide jointly in all of the above questions jointly or have power to decide by them selves in at least one of the questions were considered as they have 'medium' decision making power and the rest of the women were taken as women have 'low' decision making power.

CHAPTER THREE

GENERAL BACKGROUND OF THE STUDY POPULATION

3.1 The Study Area

Ethiopia lies in the north-eastern part of Africa, in the Horn of Africa, between 3^{O}N and 15 ^{O}N latitudes and 33^{O}E and 48^{O}E longitudes. The country is land locked and is surrounded by Djibouti to the east, Somalia to the east and Southeast, Kenya to the South, the Sudan to the West and Eritrea to the north and north east. Ethiopia is estimated to have a total area of 1,127,127 Km^2 with a topographic diversity encompassing high and rugged mountains, flat-topped plateau, deep gorges with rivers, and rolling plains (CSA, 2007).

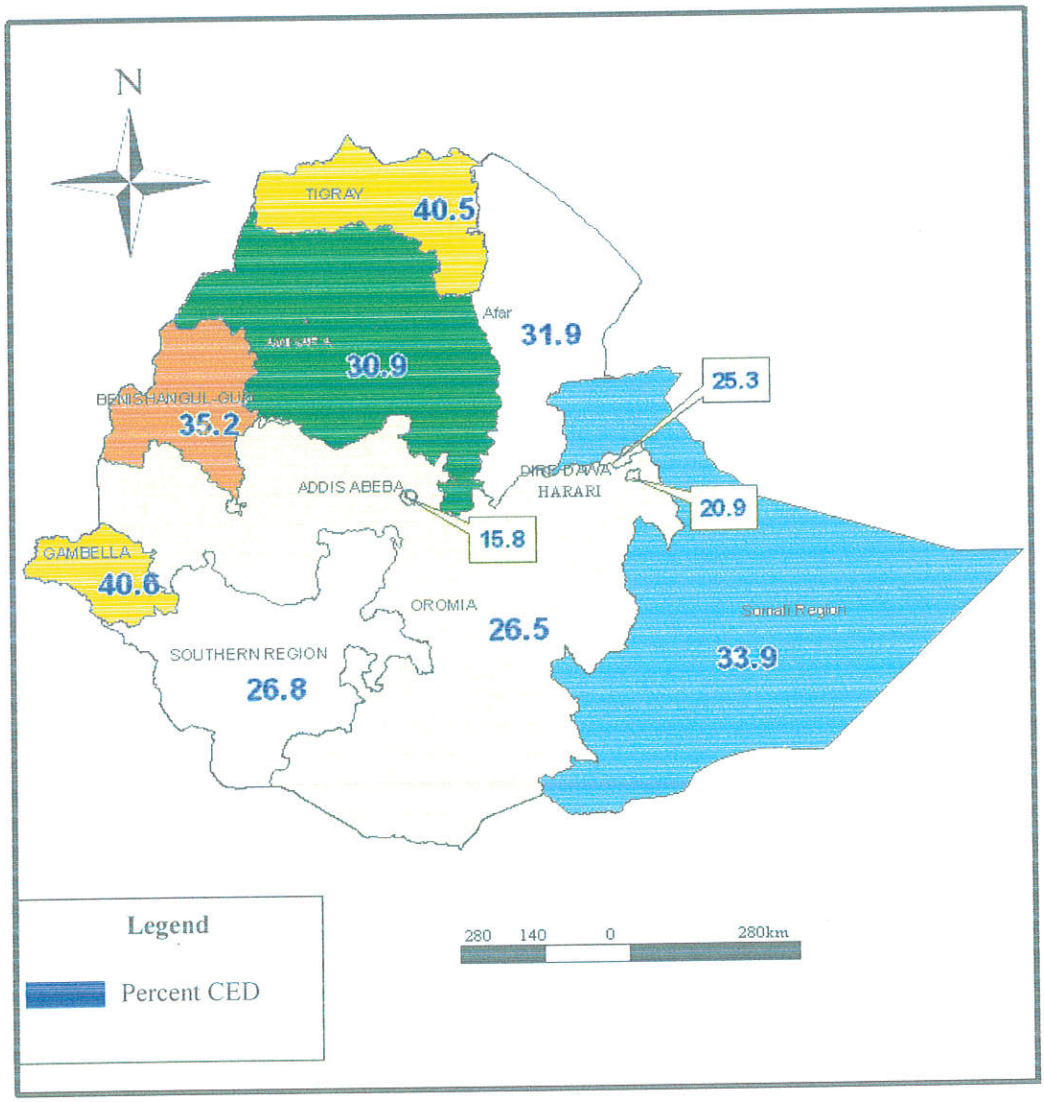
Ethiopia constitutes huge amount of population which reaches to 77.13 million (July 2007 projected population) and it is predominantly rural (85 % of the population is residing in rural areas) and depends on subsistence agriculture. The agricultural sector is the main income generating sector for the majority of the rural population and also serves as the main source of household food consumption. The sector also accounts for about 46% of the GDP and 85% of total export (CSA, 2007).

The present government system is federal and the country is administratively structured into nine regional states, namely: Tigray, Afar, Amhara, Oromia, Somali, Benshangul-Gumuz, Southern Nations Nationalities and Peoples, Gambela, and Harari regional states and two city administrations, Addis Ababa the capital and Dire-Dawa Administration council (CSA, 2007).

One of The major challenges that Ethiopia is facing currently is Poverty. A crucial mechanism, which has perpetuated poverty in Ethiopia, is the interaction of poverty and population pressures with the unproductive resource base. Unprecedented population pressures have diminished the plot of size per person. (average landholdings declined from 0.5 hectares per person in the 1960s to 0.11 in 1999), making an increasing number of households dependent on inadequately small and unproductive plots of land, and more vulnerable to the vagaries of unpredictable rainfall, and rendering some traditional farming practices unsustainable (CSA, 2007).

The health system in Ethiopia is underdeveloped, and transportation problems are severe. The majority of the population resides in the rural areas and has little access to any type of modern health institution (CSA/ORC Macro, 2006). As it is sited by EDHS 2005 report from TGE, 1995, it is estimated that about 75 percent of the population suffers from some type of communicable disease and malnutrition, which are potentially preventable.

Figure 3.1 Percentage Distribution of CED in Ethiopia by Regions



Adopted from: Ethio-GIS

3.2 Background Characteristics of the Respondents

This section shows the basic demographic and socioeconomic characteristics of non pregnant and non lactating women in Ethiopia who were interviewed in the 2005 Ethiopian Demographic and Health Survey (EDHS) and measured with anthropometric measurements (height and weight) by selected demographic and socio-economic characteristics.

Table 3.1. Distribution of Women Age 15-49 by Background Characteristics in Rural, Urban and Total Women in Ethiopia.

	Rural		Urban		Total	
Background characteristics	Number of women	Percent	Number of women	Percent	Number of women	Percent
Residence						
Rural					2369	58.0
Urban					1713	42.0
Region						
Tigray	262	11.1	74	4.3	336	8.2
Afar	160	6.8	44	2.6	204	5.0
Amhara	411	17.3	88	5.1	499	12.2
Oromiya	434	18.3	124	7.2	558	13.7
Somali	123	5.2	48	2.8	171	4.2
Ben-Gumz	174	7.3	36	2.1	210	5.1
SNNP	470	19.8	86	5.0	556	13.6
Gambela	178	7.5	39	2.3	217	5.3
Harari	79	3.3	213	12.4	292	7.2
Addis Abeba	20	0.8	719	42.0	739	18.1
Dire Dawa	58	2.4	242	14.1	300	7.3
Education						
No Education	1648	69.6	368	21.5	2016	49.4
Primary	600	25.3	427	24.9	1027	25.2
Secondary and Higher	121	5.1	918	53.6	1039	25.5
Occupation						
Not working	1540	65.0	937	54.7	2477	60.7
In Agriculture	476	20.1	10	0.6	486	11.9
Unskilled/Skilled Manual	88	3.7	135	7.9	223	5.5
Non Manual	244	10.3	536	31.3	780	19.1
Professional	13	0.5	89	5.2	102	2.5
House Hold Economic Status						
Very poor	1631	68.8	192	11.2	1823	44.7
Poor	648	27.4	517	30.2	1165	28.5
Medium or higher	42	1.8	939	54.8	981	24.0
Age						
15-19	835	35.2	515	30.1	1350	33.1
20-29	529	22.3	625	36.5	1154	28.3
30-39	415	17.5	314	18.3	729	17.9
40-49	590	24.9	259	15.1	849	20.8
Parity						
0	1101	46.5	1027	60.0	2128	52.1
1	144	6.1	170	9.9	314	7.7
2-3	277	11.7	249	14.5	526	12.9
4-5	270	11.4	151	8.8	421	10.3
6+	577	24.4	116	6.8	693	17.0
Marital Status						
Never married	853	36.0	911	53.2	1764	43.2
Married/Living together	1179	49.8	510	29.8	1689	41.4
Widowed/divorced/Separated	337	14.2	292	17.0	629	15.4
Total	**2369**		**1713**		**4082**	

Source: EDHS 2005

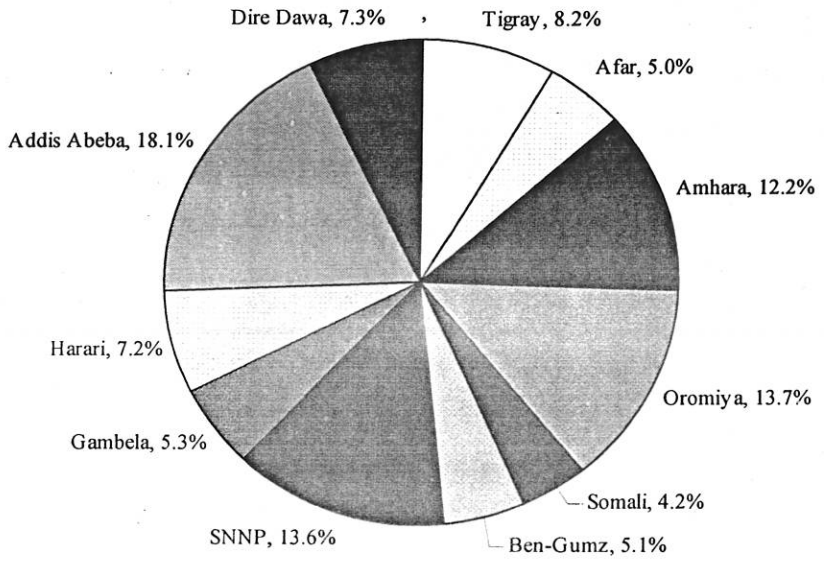
Type of Place of Residence

The proportion of women who reside in Urban and rural centers differs based on the type of place of residence. Accordingly, large proportion of women (58 percent) resides in rural areas while the smaller proportion of women (42 percent) is from urban centers.

Region of Residence

The region wise variation in mothers region of residence show that, the majority of women reside in Addis Ababa (18.1 percent) followed by Oromia, which constitutes 13.7 percent of women. Women in SNNP and Amahara constitute 13.6 percent and 12.2 percent respectively. The rest of women who reside in Gambella, Harari, Addis Ababa Dire-Dawa, Tigray, Afar and Somali constitute less than 10 percent of the mothers (Figure 3.2). The region wise urban rural difference in Ethiopia shows that in all regions, except Addis Ababa, Harari and Dire dawa more number of women are found in rural parts than urban centers.

Figure 3.2 Distribution of Women by Region of Residence in Ethiopia.



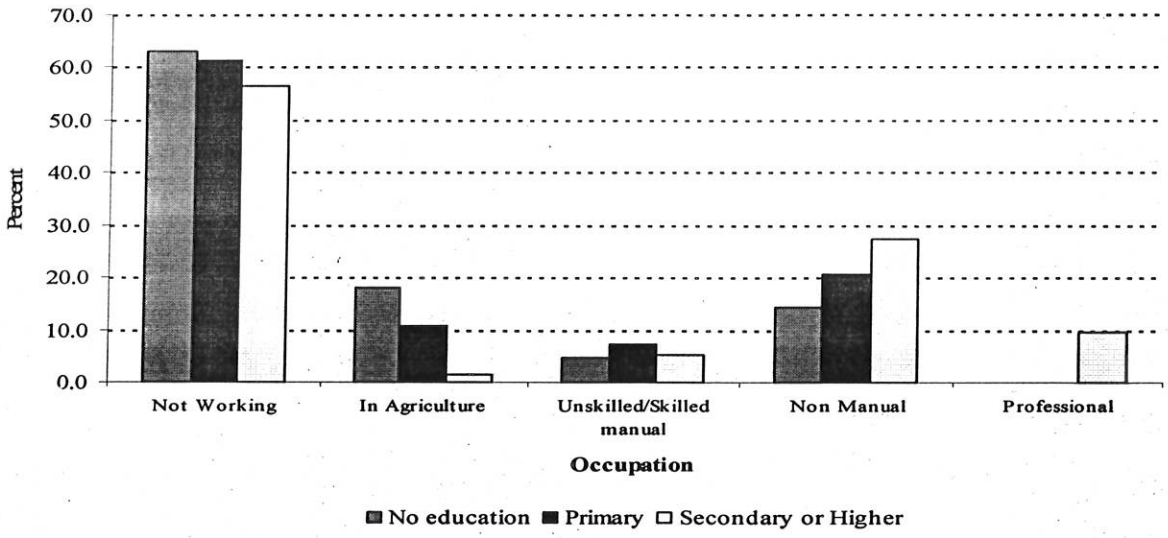
Source: EDHS 2005

Education and Work Status

Educational level is defined as the highest level of schooling attended by the women and majority of women (49.4 percent) are women with no education, 25.2 percent are women with primary education and the remaining 25.2 percent are women with secondary or higher education. The rural/urban difference in women's educational status shows that, women education is lower in rural areas than urban areas. Majority of women in rural areas are non educated (69.6 percent) on the contrary only 21.5 percent of the women in urban areas were illiterate. While the majority of women with secondary and higher education were found in urban centers (53.6 percent) and only 5.1 percent of the women in rural areas have secondary or higher education.

The overall occupational status shows that large proportion of women (60.7 percent) are unemployed, 19.1 percent are non manual workers (sales and services, clerical , household and domestic) ,11.9 percent are agricultural workers, 5.5 percent of the women are skilled/unskilled manual workers and only 2.5 percent of the women are professionals. The rural urban difference in occupational status shows that, majority of women in both rural (65 percent) and urban (54.7 percent) have no any job. As it is expected the percentage of women who involved in agricultural job are higher in rural (20.1 percent) residents, only 0.6 percent of the women found in urban areas were agricultural workers. On the contrary most of the women who have non manual and professional job are found in urban areas than corresponding rural counterparts. Table 3.1 demonstrates that from 60.7 percent of unemployed women the majority of them were illiterates or agricultural workers and most of non manual and professional workers have secondary and higher education.

Figure 3.3 Distribution of Women by Education and Occupation in Ethiopia

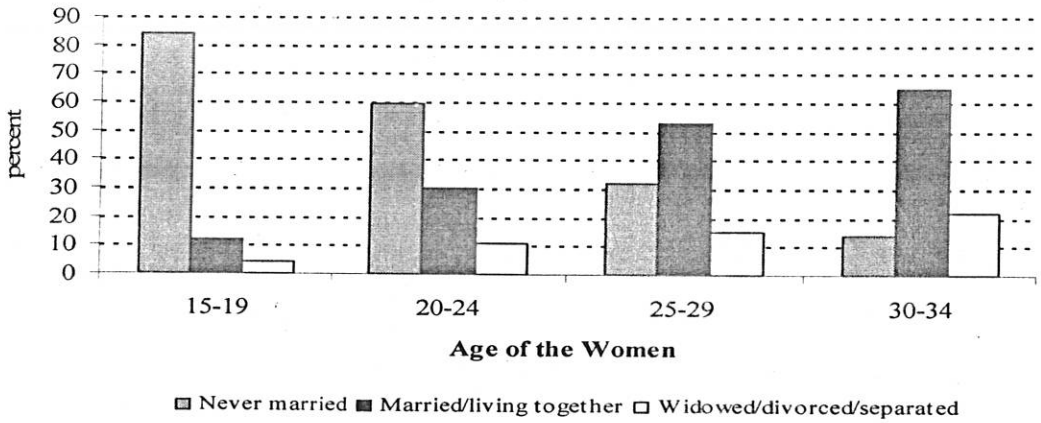


Source: EDHS 2005

Age and Marital Status

The majority of the women (33.1 percent) belong to age group 15-19 followed by the age group 20-29 (28.3 percent). Women in the age group 30-39 and 40-49 constitute 17.9 and 20.8 percent respectively. Referring to marital status most of the women are (43.2 percent) are never married followed by married and living together (41.4 percent); the rest 15.4 percent are widowed/divorced or separated. Figure 3.4 demonstrates that most of never married women are in the age group 15-9 and the majority of women in the age group 30-39 and 40 -49 are married.

Figure 3.4 Distribution of Women by Age and Marital Status in Ethiopia



Source: EDHS 2005

Parity

The parity distribution showed that the majority of the women (52.1 percent) had had no children followed by women who had 6+ numbers of children which constitutes only 17 percent. Women with parity 2-3 and 4-5 constitute12.9 percent and 10.3 percent respectively and the rest 7.7 percent of the women have only one child. The rural/urban variation in parity shows that women with highest parity are concentrated in rural centers and women with lowest parity were found in urban centers. For example 24.4 percent of the women in rural areas have 6 or more number of children; where as the corresponding percentage in urban centers were 6.8 percent. Figure 3.5 demonstrates that parity among women is associated with women marital status. Most of the women who have children were married/living together with their partner followed by divorced/separated and widowed women. Never married women have less relative number of children.

Figure 3.5 Distribution of Women by Parity and Marital Status in Ethiopia

Source: EDHS 2005

Decision Making Autonomy

The women decision making power on their own health, large household purchases and purchases for daily use were asked in the 2005 EDHS. Table 3.2 presents that the majority of married/living together women (43 percent) have medium decision making autonomy, followed by women with low decision making autonomy (30.7 percent) and the rest 26.2

percent of the women have high decision making autonomy. The Table also shows that there was variation in women decision making autonomy in Ethiopia. Most of the women with lower decision making autonomy were found in rural areas and higher decision making autonomy was a characteristic of urban women. For example 41 percent of urban married/living together women have high decision making autonomy and only 10.8 percent of them have low decision making power. On the contrary 39 4 percent of the women in rural area have low decision making power and 20 percent of the women have high decision making power. The majority of the women in both urban and rural centers have medium decision making autonomy.

Partner's characteristics

The Table 3.2 presents that majority of partner's of currently married/living together women have no education (55 percent), 20.2 percent have primary education and 24.2 percent of the women have secondary or higher education. It is also observed that partner's education is lower in rural residents than urban residents. The majority of partner's in rural areas are illiterate (71 percent) and only 7.5 percent of them have secondary or higher education. On the other hand most of the urban resident partners have secondary or higher education (62.5) and only 17.6 are illiterate.

Regarding partners occupation, most of the partners are agricultural workers (63.6 percent), 10.2 percent are unskilled /skilled manual workers, 16.2 percent are non manual workers, 7.2 percent are professionals and only 1.8 percent of partners were unemployed. As it is expected the majority partners in rural areas are agricultural workers (88.5 percent) and only 6.1 percent of the partners in urban centers participate in agricultural jobs. The majority of partners who participate in non manual (40.8 percent) and professional (20 percent) jobs are from urban areas and less proportion of partners in rural areas has non manual (5.6 percent) and professional (1.6 percent) jobs.

Table 3.2 Distribution of Women Age 15-49 by Partner's Characteristics and Decision Making Autonomy in Rural, Urban and Total Ethiopia

Background characteristics	Rural		Urban		Total	
	Number of women	Percent	Number of women	Percent	Number of women	Percent
Partner's education						
No Education	838	71.1	90	17.6	928	54.9
Primary	248	21.0	94	18.4	342	20.2
Secondary and Higher	89	7.5	319	62.5	408	24.2
Partner's Occupation						
Not Working	15	1.3	15	2.9	30	1.8
In Agriculture	1043	88.5	31	6.1	1074	63.6
Unskilled/Skilled manual	30	2.5	142	27.8	172	10.2
Non Manual	66	5.6	208	40.8	274	16.2
Professional	19	1.6	102	20.0	121	7.2
Decision Making Autonomy						
High	234	19.8	209	41.0	443	26.2
Medium	481	40.8	246	48.2	727	43.0
Low	464	39.4	55	10.8	519	30.7

Source: EDHS 2005

CHAPTER FOUR

LEVELS AND DIFFERENTIALS OF MALNUTRITION AMONG WOMEN

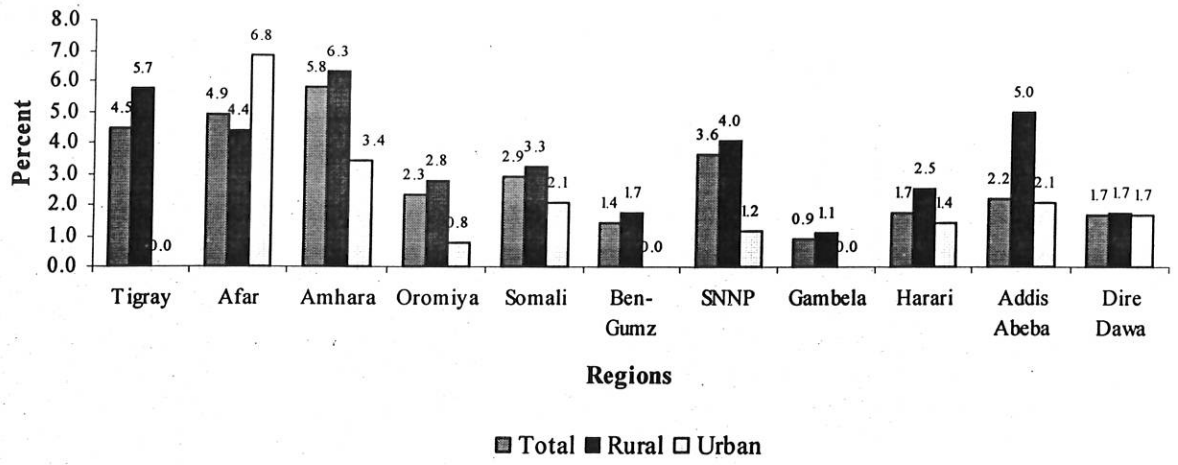
4.1 Levels of Malnutrition among Women

The anthropometric measurements height and weight are used to estimate maternal nutritional status. Maternal height is commonly associated with birth weight, child survival, maternal mortality, pregnancy and birth complications, and length of breast feeding (Krasovec and Anderson, 1991). Women whose height is less than 145 cm are frequently found in high risk categories for chronic energy deficiency. Given the relationship between weight and height, use of the BMI is preferred over other indicators. Table 4.2 presents mean BMI by different cutoff points for women aged 15-49 by region of residence for the anthropometric indicators of women malnutrition. BMI values less than 16 represent women who were very affected by chronic energy deficiency (thinness); BMI values greater than 30 represent obesity and BMI values between 18.5 and 25 show normality for women.

4.1.1 Height

The over all level of stunting (height<145cm) among non pregnant and non lactating women in Ethiopia is 5.7 percent of which 3.9 percent are in rural areas and 1.8 percent are in urban centers. Figure 4.1 presents the patterns of stunting among women in all regions of Ethiopia by type of place of residence. Stunting among women is highest in Amhara (5.8 percent) followed by Afar (4.9 percent) and Tigray (4.5 percent) and is the lowest in women who live in Gambella (0.9 percent). Women living in Ben-Gumuz, Gambella, Harari and Dire-Dawa regions have the pattern of tall women and low proportion of stunted women. On the other hand women living in Amhara, Ben –Gumuz and SNNP have a pattern of short women and low proportion of tall women. The rural/urban variation shows that, stunting among women is higher in rural areas than the corresponding urban counterparts. In all regions except Afar the presence of stunting among women are higher in rural areas than the corresponding urban counterparts.

Figure 4.1 Stunting among Women aged 15-49 by Region of Residence



Source: EDHS 2005

4.1.2 BMI

Two basic indicators of women malnutrition obtained from the body mass index (BMI): Chronic energy deficiency, the percentage of women with BMI <18.5 and Obesity the percentage of women with BMI 30+. The overall level of chronic energy deficiency in Ethiopia was 26.7 percent of which 72.4 percent of them were from rural areas and the rest 27.6 percent were from urban areas (Table 4.1). On the other hand the over all level of obesity in Ethiopia among non pregnant and non lactating women in Ethiopia was only 1.7 percent among which most (90 percent) of them were urban women. This finding indicates that obesity among women was not a problem of women in Ethiopia like most sub Saharan African countries.

Table 4.1 Mean BMI and BMI Measures by Different Cutoff Points of Women Aged 15-49 by Region of Residence in Ethiopia.

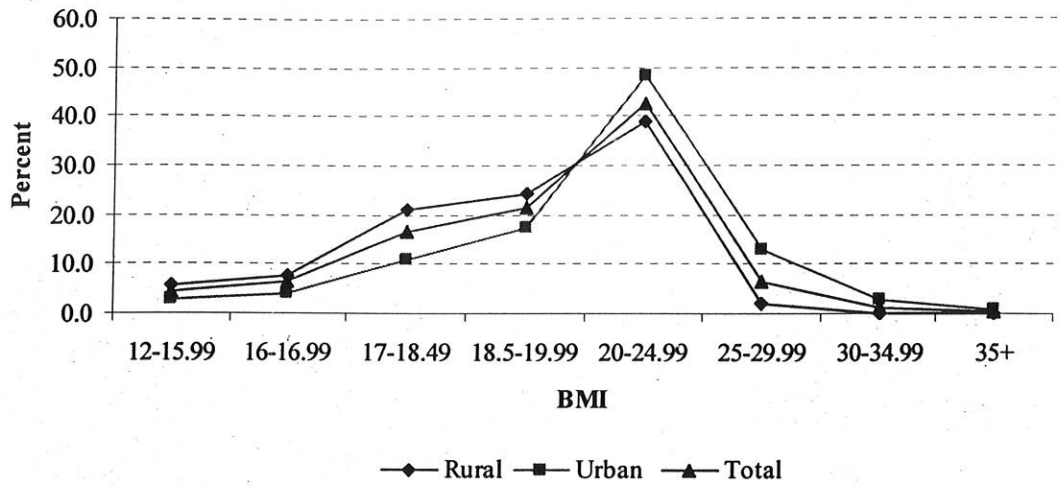
Place of Residence	Number of women	BMI (kg/m^2)					
		Mean BMI	Sever malnutrition (BMI<16)	16-18.4	Percent CED (BMI<18.5)	18.5-24.9	Percent overweight or obese (BMI 25 +)
Residence							
Rural	2369	19.7	5.5	28.9	34.4	63.3	2.3
Urban	1713	21.9	3.0	15.2	18.2	65.4	16.4
Region							
Tigray	336	19.7	7.4	33.0	40.5	57.1	2.4
Afar	204	20.2	5.4	26.5	31.9	62.7	5.4
Amhara	499	20.0	6.4	24.4	30.9	65.3	3.8
Oromiya	558	20.3	2.9	23.7	26.5	68.5	5.0
Somali	171	20.2	11.1	22.8	33.9	54.4	11.7
Ben-Gumz	210	19.6	4.3	31.0	35.2	61.0	3.8
SNNP	556	20.3	3.2	23.6	26.8	68.9	4.3
Gambela	217	19.7	8.3	32.3	40.6	57.1	2.3
Harari	292	21.0	2.1	18.8	20.9	68.8	10.3
Addis Abeba	739	22.2	2.4	13.4	15.8	66.0	18.1
Dire Dawa	300	21.4	3.3	22.0	25.3	58.7	16.0
Total	**4082**	**20.62**	**4.5**	**23.1**	**27.6**	**64.2**	**8.2**

Source: EDHS 2005

4.1.2.1 Distribution of BMI by Residence in Ethiopia

The distribution of BMI in Figure 4.2 revealed that for all three levels, they show an increasing trend on BMI values between 12 and 25 and then shows a decreasing trend on BMI values above 25. But by taking into account the cutoff point 18.5, the level below 18.5 is higher among rural women than urban women where as the trend is diverted and it becomes higher among urban women than rural women when we see the level above the cut point off 18.5. This indicates that lower BMI values in Ethiopia are characteristics of rural women and urban women are characterized by relatively higher BMI values.

Figure 4.2. Distribution of Women's Body Mass Index (BMI) in Ethiopia Rural, Urban and Total

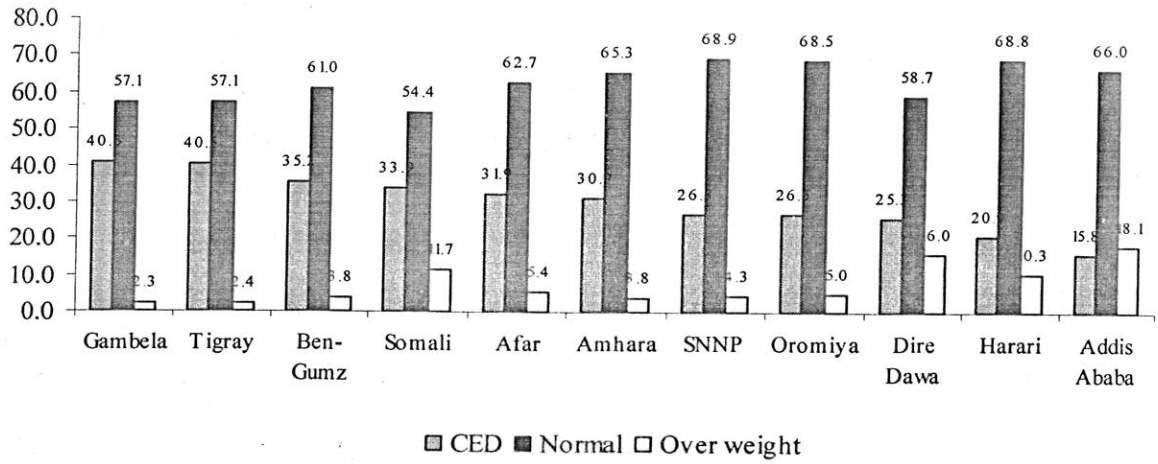


Source: EDHS 2005

4.1.2.2 The Level of Chronic Energy Deficiency, Normal and Over Weight by Region in Ethiopia

The level of malnutrition in women shows that, in all regions the level of chronic energy deficiency is higher than the level of over weight except those women living in Addis Ababa. The following figure reveals clearly the chronic energy deficiency in which BMI is less than 18.5; normal in which BMI is 18.5 up to 24.9; and overweight in which BMI is 25 and above.

Figure 4.3. Percentage of Chronic Energy Deficiency, Normal and Over weight among Women Aged 15-49 by Region of Residence in Ethiopia

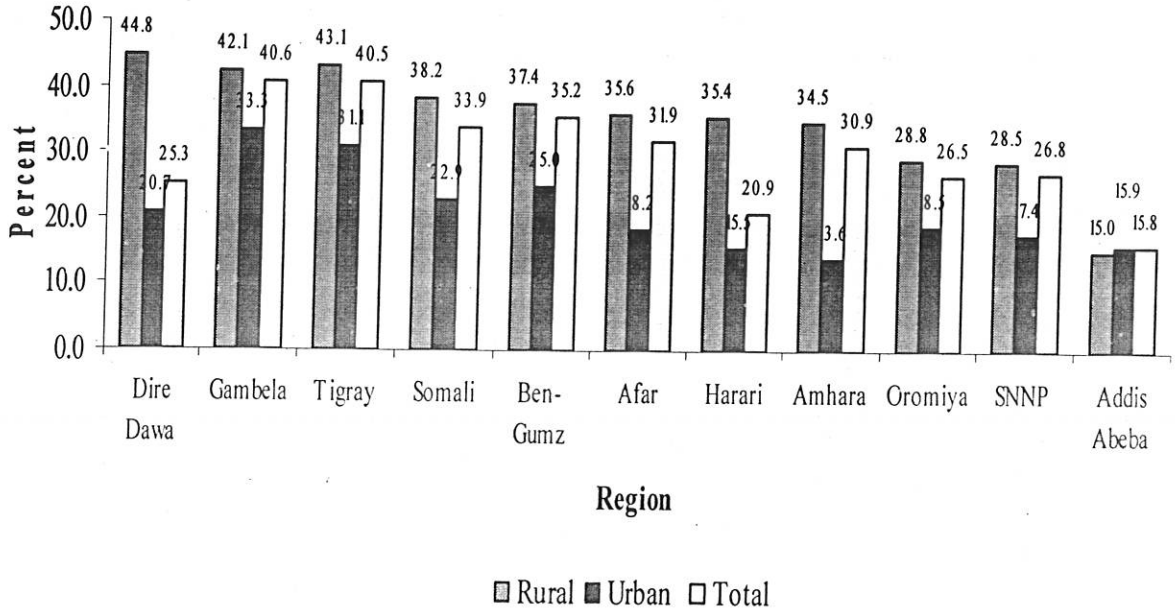


Source: EDHS 2005

The Level of Chronic Energy Deficiency by Region of Residence

Table 4.1 shows Mean BMI and BMI measures by different cutoff points of women aged 15-49 by region of residence. Accordingly the level of chronic energy deficiency in women was highest among women who live in Gambella (40.6 percent) followed by women who live in Tigray (40.5 percent) and Ben-Gumuz (35.2 percent). On the other hand the prevalence of chronic energy deficiency among women was lowest among women who live in Addis Ababa (15.8 percent) followed by Harari (20.9 percent) and Dire Dawa (25.3 percent). Moreover more than 30 percent of the women who live in Afar, Amhara, and Somali were chronically malnourished. The rural urban variation in the prevalence of chronic energy deficiency showed that, in all regions except Addis Ababa the prevalence of chronic energy deficiency in women was higher in rural areas than their corresponding urban counterparts.

Figure 4.4 The Level of Chronic Energy Deficiencies among Women Aged 15-49 in Rural, Urban and Total by Region of Residence in Ethiopia.



Source: EDHS 2005

4.2 Differentials of Malnutrition among Women

The 2005 Ethiopian demographic and health survey (2005 EDHS) data presents the basic information about the effect of demographic and socio-economic variables on CED. But the overall effect explanatory variables on women's nutritional status were assed for all types of women including pregnant and lactating women. Moreover, the effect of variables related with partners characteristics and women's decision making power on women's nutritional status was not assessed. Hence in order to address the objective of this paper, to assess socio-economic and demographic differentials in malnutrition among women. The bivariate analysis using X^2 test has been done between the dependent variable (chronic energy deficiency) and explanatory variables for all non pregnant and non lactating women aged 15-49. The bivaraite analysis was also performed for married/living together in order to see the impact of partner's characterstics and women's decision making power on women's nuitritional status. Moreover, to see the rural urban variation in chronic energy deficiency the bivariate analysis has been performed separately for rural and urban women.

4.2.1 Demographic and Socio- economic Differentials in Women Malnutrition (For All and Married/Living Together Women Aged 15-49)

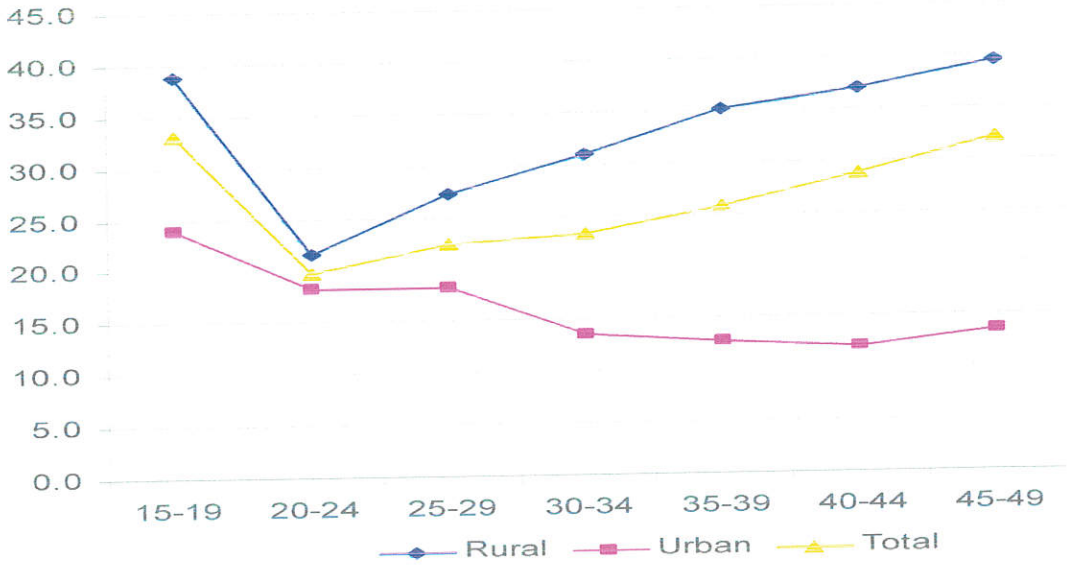
Table 4.1 presents the results of the bivariate analysis of socio-economic and demographic characteristics and chronic energy deficiency among all and married /living together (non pregnant and non lactating) women aged 15-49 in Ethiopia. Moreover, to assess rural/urban variation in maternal malnutrition, Table 4.2 shows the socio-economic and demographic differentials of chronic energy deficiency for all non pregnant and non lactating women in rural and urban Ethiopia. Accordingly, among non pregnant and non lactating women age (all women only), parity, residence, region, education, household economic status and occupation, partner's occupation (married/living together only), partner's education (married/living together only) and decision making autonomy (married/living together only) were significantly associated with chronic energy deficiency.

Age

The distribution of chronic energy deficiency by age of the women shows a V-shaped curve which indicates that women in the age group 15-19 and 45-49 were most affected by chronic

energy deficiency and women in the age group 20-24 were less affected. Similar pattern of chronic energy deficiency by age of the women was observed in rural and the whole women; which showed a decreasing level in chronic energy deficiency in the age groups between 15-19 and 20-24 and increasing level of chronic energy deficiency in the age groups between 20-24 and 45-49; where as the urban level showed the level of chronic energy deficiency was decreasing with women's age except the age group 25-29 (Figure 4.4.).

Figure 4.5. The Level of Chronic Energy Deficiency by Age of the Women Aged 15-49 in Rural, Urban and Total in Ethiopia



Source: EDHS 2005

Parity

Results of Tables 4.2 and 4.3 show that among non pregnant and non lactating women with a child or children the occurrence of chronic energy deficiency increases with parity; those with highest parity (6+) were found to be most (33.8 percent) affected by chronic energy deficiency and those with lowest parity (1) was found to be least (20.4 percent) affected for all types of women (in union/not in union). Women who have no any child were also highly affected by chronic energy deficiency even those it was lower than those with more than 6 children. The same pattern was observed among women with a child or children who live in rural areas where as different pattern was observed among women who live in urban areas. the percentage of women with chronic energy deficiency were not evenly distributed by children ever born;

those with 0 parity was found to be most affected by chronic energy deficiency and those with 4-5 children were least affected. The rural/urban variation in chronic energy deficiency by parity indicate that among rural residents those with highest parity (6+) were most affected by chronic energy deficiency followed by women who had no any child. Where as the reverse was occurred in urban parts of Ethiopia women with 0 parity was most affected followed by women with 6+ parity.

Marital Status

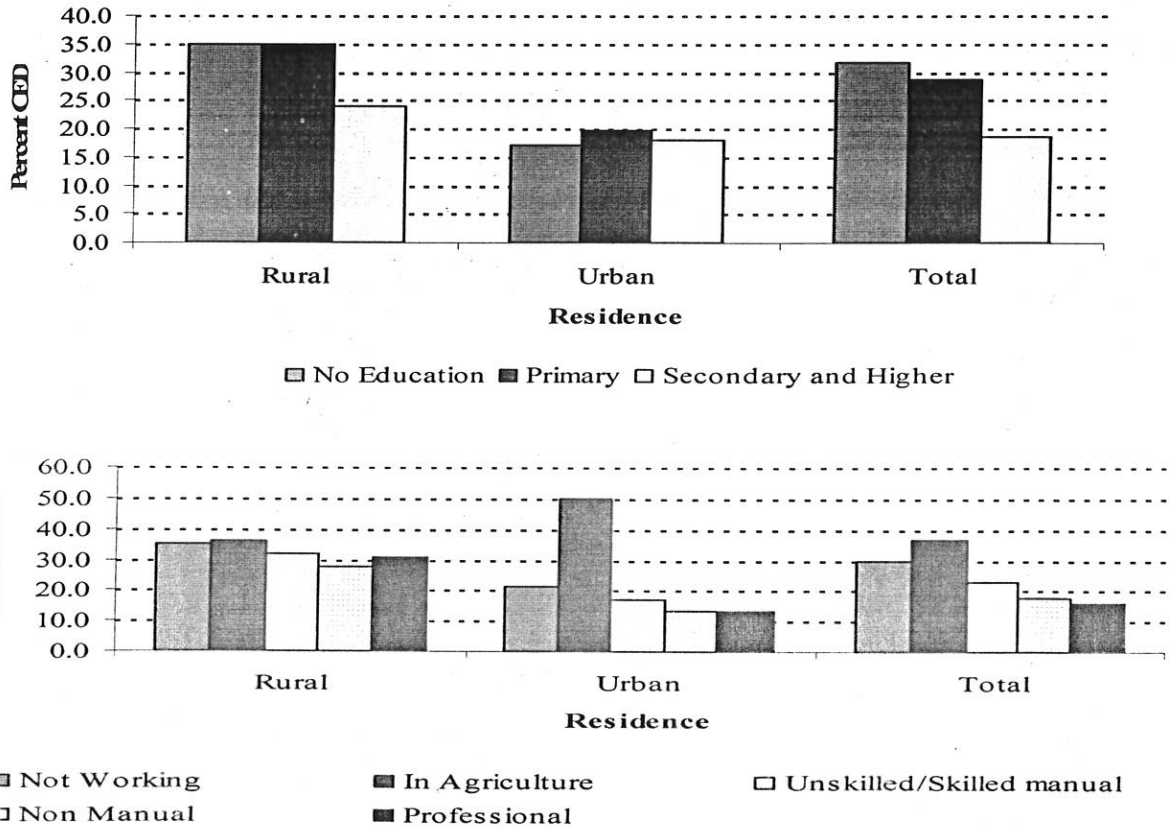
According to the 2005 EDHS, among non pregnant and non lactating women marital status was not significantly associated with chronic energy deficiency in Ethiopia. This may be because of the confounding factors associated with it (see the explanation in chapter 5). Similar pattern of chronic energy deficiency was observed among women in union and widowed/divorced and separated. Among women who live in urban areas marital status was significantly associated with chronic energy deficiency. The finding also show that women in union (married/living together) were least affected by chronic energy deficiency in both rural and urban residents even though the level differs by residence. Among urban women the percentage of women with chronic energy deficiency in never married women was twice that of married/living together.

Education and Occupation

Women education and occupation have been identified as the most important socio-economic determinants of women's malnutrition. The result in Table 4.2 and 4.3 indicates that, the proportion of women with chronic energy deficiency was highest among mothers who have 'no education' (31.6 percent) and lowest among women who have secondary or higher education (18.6 percent). Regarding women's occupational status among non pregnant and non lactating women in Ethiopia agricultural workers (36.6 percent) were found to be the most affected groups of the population with chronic energy deficiency followed by unemployed women (29.9 percent). Small amount of Professionals (15.6 percent) and non manual workers (17.7 percent) were affected by chronic energy deficiency (Table 4.2 and 4.3).

Figure 4.6 also demonstrates that, the percentage of women with malnutrition decreases as women's educational level increases. In rural areas being non educated and learning to primary education has no effect on the level of malnutrition, only learning to secondary or higher education has an influence on reducing the level of malnutrition. In urban areas where as, the effect of education on women's nutritional status was not observed. The prevalence of under nutrition in agricultural and unemployed women was higher than others and those who engage in non manual and professional jobs are found to be less affected by under nutrition on the whole types of women. The level of under nutrition among agricultural women was also highly observed among urban women. But almost similar pattern on the level under nutrition was observed among rural women who have different types of work status.

Figure 4.6 Percent CED (BMI <18.5) by Educational Level and Occupational Status of Women in Rural, Urban and Total in Ethiopia



Source: EDHS 2005

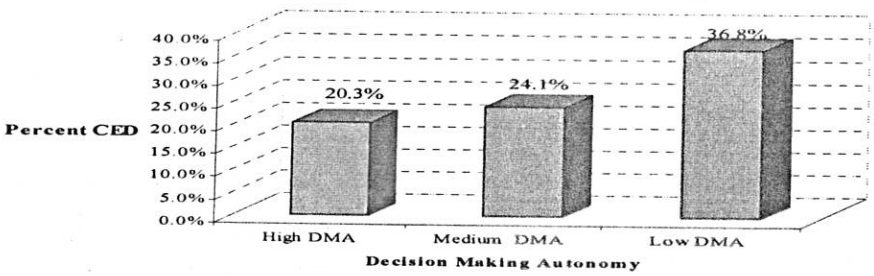
Household Economic Status

Possession of household properties (radio, television, refrigerator, bicycle, motorcycle/scooter and car/track) was identified to be the most important factors for explaining the variation in chronic energy deficiency. The result from Table 4.2 and 4.3 also reveals that, there was a direct relationship between household economic status and the prevalence of chronic energy deficiency in Ethiopia. Among non pregnant and non lactating women in Ethiopia those in the very poor category were found to be the most affected groups with chronic energy deficiency followed by poor women. Women in the medium or higher household economic status have better household economic status. For instance, among all under nourished women 35 percent were from very poor, 26.2 percent were from poor women and 16 percent of medium or higher household economic status. The same pattern was observed both in urban and rural Ethiopia although the level of chronic energy deficiency among rural women was higher than the corresponding urban counterparts.

Decision Making Autonomy

The finding from Table 4.2 also reveals that women decision towards their own health, large house hold purchases and daily household purchases have a significant effect in identifying the variation in women's malnutrition. The result also shows that there was an inverse relationship between women's decision making autonomy and chronic energy deficiency among women in union (married/living together). The percentage women with chronic energy deficiency were higher among women with low decision making autonomy and higher among women with low decision making autonomy (Figure, 4.6).

Figure 4.6 Percent CED (BMI <18.5) by Decision Making Autonomy of Women in Ethiopia



Source: EDHS 2005

Partner's Characteristics

Another important finding related with partner's characteristics showed that partner's education and partner's occupation have significant effect in explaining the variation in chronic energy deficiency. The finding also tells us exposure to the risk of chronic energy was reduced as partner's educational level increases. For instance among non pregnant and non lactating women in union the percentage of women with chronic energy deficiency were highest (33.8 percent) on those who have non educated partners and was lowest (12.5 percent) on those who have secondary or higher educated partners.

Regarding partner's occupation like respondent's occupation women who have agricultural worker partners were found to be highly vulnerable (34.8 percent) to the risk of chronic energy deficiency. Low risk of chronic energy deficiency was observed on those who have professional partners (8.3 percent). Followed by women with agricultural partner women who have unemployed partners have also extremely affected by under nutrition.

Table 4.2 Socio-economic and Demographic Differentials of Chronic Energy Deficiency for all non Pregnant and non Lactating Women and Married /Living together Women Age 15-49 in Ethiopia.

	Total				Married/Living Together		
Background characteristics	Number of Women	Mean BMI	Percent CED (BMI <18.5)	X^2 value and Level of Significance	Number of women	Percent CED (BMI <18.5)	X^2 value and Level of Significance
Age				51.9***			0.502
15-19	1,350	20.0	33.1		158	28.5	
20-24	666	20.9	19.8		198	23.2	
25-29	488	20.7	22.3		259	26.6	
30-34	332	21.8	23.2		215	24.2	
35-49	1246	20.8	29.0		859	28.4	
Parity				24.6***			12.8**
0	2128	20.4	27.8		279	25.4	
1	314	21.1	20.4		189	20.6	
2-3	526	21.7	24.7		377	24.4	
4-5	421	21.1	25.4		296	26.4	
6+	693	19.9	33.8		548	32.1	
Marital Status				0.678	Na		
Never Married	1764	20.3	28.2				
Married/Living together	1689	20.9	27.0				
Widowed/Divorced/Separated	629	20.9	27.3				
Residence				131.3***			95.1***
Rural	2369	19.7	34.4		1179	33.9	
Urban	1713	21.9	18.2		510	11.0	
Region				119.2***			54.8***
Tigray	336	19.7	40.5		141	34.0	
Afar	204	20.2	31.9		140	32.1	
Amhara	499	20.0	30.9		236	27.5	
Oromiya	558	20.3	26.5		223.	28.3	
Somali	171	20.2	33.9		106	28.3	
Ben-Gumz	210	19.6	35.2		117	34.2	
SNNP	556	20.3	26.8		198	27.8	
Gambela	217	19.7	40.6		115	40.9	
Harari	292	21.0	20.9		120	18.3	
Addis Abeba	739	22.2	15.8		174	9.2	
Dire Dawa	300	21.4	25.3		119	21.0	
Education				60.1***			78.0***
No Education	2016	20.1	31.7		1152	33.1	
Primary	1027	20.4	28.5		262	20.2	
Secondary and Higher	1039	21.8	18.6		275	8.0	
House hold Economic Status				120.1***			81.1***
Very Poor	1823	19.8	35.3		826	35.0	
Poor	1165	20.6	26.2		528	25.0	
Medium or Higher	981	22.2	16.0		306	8.5	
Occupation				74.4***			51.2***
Not Working	2477	20.3	29.9		1037	29.1	
In Agriculture	486	19.7	36.6		274	37.2	
Unskilled/Skilled manual	223	20.9	22.9		68	19.1	
Non Manual	780	21.8	17.7		261	14.2	
Professional	102	22.6	15.7		42	4.8	
Partners Education	Na						66.0***
No Education					928	33.8	
Primary					342	25.4	
Secondary and Higher					408	12.5	
Partner's Occupation	Na						91.4***
Not Working					30	20.0	
In Agriculture					1074	34.8	
Unskilled/Skilled manual					172	14.0	
Non Manual					274	14.6	
Professional					121	8.3	
Decision Making Autonomy	Na						38.5***
High					443	20.3	
Medium					727	24.1	
Low					519	36.8	
Total	**4082**	**20.6**	**27.6**		**1689**	**27.0**	

Note: Na : Not Applicable; *** Significant at P< 0.001level ,** Significant at P<0.05; Unmarked = Not Significant

Source: EDHS 2005

Table 4.3 Socio-economic and Demographic Differentials of Chronic Energy Deficiency for all non Pregnant and non Lactating Women in Rural and Urban Ethiopia.

Background charcaterstics	Rural			Urban		
	Number of Women	Percent CED(BMI <18.5)	X^2 value and Level of Significance	Number of women	Percent CED(BMI <18.5)	X^2 value and Level of Significance
Age			38.5***			22.0***
15-19	835	38.8		515	23.9	
20-24	305	21.6		361	18.3	
25-29	224	27.2		264	18.2	
30-34	184	31.0		148	13.5	
35-49	821	37.4		425	12.7	
Parity			3.8			17.9***
0	1101	33.9		1027	21.2	
1	144	29.2		170	12.9	
2-3	277	34.7		249	13.7	
4-5	270	33.3		151	11.3	
6+	577	37.1		116	17.2	
Marital Status			0.275			27.5***
Never Married	853	34.7		911	22.2	
Married/Living together	1179	33.9		510	11.0	
Widowed/Divorced/Separated	337	35.3		292	18.2	
Residence	Na			na		
Rural						
Urban						
Region			34.5***			22.1***
Tigray	262	43.1		74	31.1	
Afar	160	35.6		44	18.2	
Amhara	411	34.5		88	13.6	
Oromiya	434	28.8		124	18.5	
Somali	123	38.2		48	22.9	
Ben-Gumz	174	37.4		36	25.0	
SNNP	470	28.5		86	17.4	
Gambela	178	42.1		39	33.3	
Harari	79	35.4		213	15.5	
Addis Abeba	20	15.0		719	15.9	
Dire Dawa	58	44.8		242	20.7	
Education			6.1**			0.98
No Education	1648	35.0		368	17.1	
Primary	600	34.8		427	19.7	
Secondary and Higher	121	24.0		918	17.9	
House hold Economic Status			7.5**			13.8***
Very Poor	1631	36.4		192	26.0	
Poor	648	30.9		517	20.3	
Medium or Higher	42	26.2		939	15.5	
Occupation			6.7			23.3***
Not Working	1540	35.1		937	21.3	
In Agriculture	476	36.3		10	50.0	
Unskilled/Skilled manual	88	31.8		135	17.0	
Non Manual	244	27.5		536	13.2	
Professional	13	30.8		89	13.5	
Total	**2369**	**34.4**		**1713**	**18.2**	

Note: Na : Not Applicable ;
*** Significant at P< 0.001level ,** Significant at P<0.05,
Unmarked = Not Significant

Source: EDHS 2005

CHAPTER FIVE

DETERMINANTS OF WOMEN MALNUTRITION: A MULTIVARIATE ANALYSIS

In the previous chapter the bivariate association between some background characteristics of women on the one hand and the BMI measures for chronic energy deficiency (BMI< 18.5) has been assessed. In such type of analysis, there is always lack of estimating the net effect of a particular variable separately, and together as a group on the dependent variable; it is also more difficult to know which factor is more important. The objective of the study can only be achieved by applying multivariate analysis, and in this chapter the binary logistic regression model was applied in order to examine the net effect of each independent variable on malnutrition in women by controlling the effects of other variables. The analysis is restricted to women aged 15-49 who were non pregnant and none lactating while the survey was collected.

Four different models were fitted in this study to see the basic determinants of malnutrition among non pregnant and non lactating women aged 15-49 in different approach. The first model (Rural Model) was fitted to identify the determinants of women's malnutrition for rural women. The Second model (Urban Model) demonstrates the socio-economic and demographic determinants of malnutrition (chronic energy deficiency) among women living in urban Ethiopia. The third model was fitted for identifying the basic determinant factors for chronic energy deficiency for all types women in Ethiopia. Finally the fourth model were fitted for only women in union (married/living together) in order to see the effect of partners characteristics and women's decision making power on women's nutritional status. Since questions related with partner's characteristics and women's decision making power in EDHS 2005 were asked for only women in union.

5.1 Goodness of Fit of the Models

There are different ways to assess the goodness of fit for the models: one way of assessing the goodness of fit for the data is using the Hosmer and Lemeshow test, and this is a goodness-of-fit test of the null hypothesis that shows whether the model adequately fits the data. If the

significance of the test is small (i.e., less than 0.05) then the model does not adequately fit the data. Accordingly in the analysis the Hosmer and Lemeshow test the four models show a significance value greater than 0.05 (0.21, 0.939, 0.36 and 0.59 respectively), which tell us all the models adequately fit the data.

5.2 Determinants of Malnutrition among Selected Rural Women in Ethiopia

The first model (Rural Model) Table 5.1 demonstrates that, among non pregnant and non lactating rural women age, region of residence and education are found to be the most important determinants in explaining the variation in malnutrition among rural women.

Age

The gross effect of women's age on under nutrition shows that women in the age group 15-19 and 45-49 have higher risk to be affected by chronic energy deficiency as compared with women in age group 25-29. Similar pattern was observed in the multivariate analysis. For instance, the odds of finding chronically malnourished woman in the age group 15-19 is more than two times higher than the corresponding odds of finding chronically malnourished woman in the age group 25-29. In addition women in the age group 35-49 are more than 1.5 times more likely to be affected by chronic energy deficiency than women in the age group 25-29.

Region of Residence

The single effect of rural women's region of residence on chronic energy deficiency showed that women living in regions Tigray, Amhara, Ben–Gumuz, Gambella, Harari and Dire Dawa are at a higher risk than women living in Oromia region. The Rural Model also revealed that, women living in rural areas of Tigray, Amhara, and Ben –Gumuz, Gambella and Dire Dawa were more than 1.5 times more likely to be chronically malnourished than women who live in rural parts of Oromia region. Furthermore, the risk of under nutrition among rural women living in Somali is 1.46 times higher as compared to women living in rural parts of Oromia region.

Education

After controlling the effects of other independent variables women educational status of secondary and higher was found to be one of the important determinant factor for explaining malnutrition among rural women in Ethiopia at P<0.1.The finding showed that rural women with secondary and higher education were less likely (OR=0.65) to be affected by chronic energy deficiency than women who have completed their primary educational level.

In general the rural model confirmed that, non educated women in the early and late age group (15-19 and 45-49) living n regions Tigray, Amhara, Ben –Gumuz, Gambella, Harari and Dire Dawa are more likely to be affected by chronic energy deficiency. On the other hand educated women aged 20-24 living in Addis Ababa are less affected by under nutrition.

5.3 Determinants of Malnutrition among Selected Urban Women in Ethiopia

The Urban Model in Table 5.1 confirmed that among socio-economic and demographic factors marital status, region of residence, household economic status and occupation were most important determinant factors for explaining the variation in chronic energy deficiency within non pregnant and non lactating women living in urban Ethiopia. The direction of association in the multivariate analysis between the dependent and the independent variables is similar to the one which was observed in the bivariate analysis.

Marital Status

Table 5.1 provides evidence that urban women not in union (never married and widowed/divorced/separated) were at higher risk of chronic energy deficiency than women in union (married/living together). For instance, the odds of finding chronically malnourished woman among never married and divorced/separated/widowed women was more than two times higher than the corresponding odds of finding malnourished woman among married/living together.

Region of Residence

The gross effect of women's nutritional status in urban women showed that women living in Tigray and Gambella were at a higher risk of under nutrition than urban women living in

Oromia region. Urban women living in Tigray and Gambella were more than two times more likely to be affected by chronic energy deficiency than women who live in Oromia region.

Household Economic Status

The result from the bivariate association showed that women in the very poor and poor household economic status are most affected by under nutrition than women in the medium or higher house hold economic status. Similar association was also observed in the multivariate analysis, urban women in the very poor and poor house hold economic status were 1.9 and 1.3 times more likely at risk of under nutrition than women in medium or higher household economic status respectively.

Women's Occupation

Urban women who engaged in agricultural job were most affected by under nutrition. The risk of under nutrition is almost five times higher in agricultural workers than unemployed urban women, whereas the risk is lower (OR=0.64 times) than women who have non manual or professional job.

Generally, among selected urban women never married and widowed/separated/divorced women who engaged in agricultural jobs living in Tigary and Gambella are more likely to be affected by chronic energy deficiency.

Table 5.1 Estimate(β),Standard error (SE) and Adjusted odds ratio(Expβ) of Chronic Energy Deficiency for Rural and Urban non Pregnant and non Lactating Women Aged 15-49 by Background Characteristics in Ethiopia

Background characteristics	Rural			Urban		
	Estimate	SE	Odds Ratio	Estimate	SE	Odds Ratio
Age						
15-19	0.79	0.22	2.2***	-0.03	0.23	0.97
20-24	-0.05	0.23	0.95	-0.16	0.23	0.85
25-29(ref)			1.00			1.00
30-34	0.19	0.23	1.20	-0.27	0.31	0.77
35-49	0.45	0.20	1.57**	-0.44	0.28	0.65
Parity						
0	-0.23	0.25	0.79	0.25	0.32	1.29
1(ref)			1.00			1.00
2-3	0.27	0.24	1.31	0.24	0.32	1.27
4-5	0.09	0.26	1.09	0.16	0.39	1.17
6+	0.14	0.25	1.16	0.51	0.40	1.66
Marital Status						
Never Married	0.28	0.17	1.33	0.76	0.27	2.14***
Married/Living together(ref)			1.00			1.00
Widowed/Divorced/Separated	0.02	0.14	1.02	0.72	0.22	2.05***
Residence	Na			Na		
Rural						
Urban(ref)						
Region						
Tigray	0.60	0.17	1.82**	0.79	0.36	2.20**
Afar	0.34	0.21	1.40	0.19	0.47	1.21
Amhara	0.27	0.15	1.32*	-0.29	0.40	0.75
Oromiya(ref)			1.00			1.00
Somali	0.38	0.22	1.46*	0.59	0.44	1.81
Ben-Gumz	0.43	0.20	1.53**	0.12	0.49	1.12
SNNP	-0.04	0.15	0.96	-0.04	0.40	0.96
Gambela	0.64	0.19	1.9***	1.07	0.44	2.91**
Harari	0.26	0.27	1.29	0.13	0.32	1.14
Addis Abeba	-0.77	0.67	0.46	0.07	0.27	1.07
Dire Dawa	0.64	0.30	1.9**	0.48	0.30	1.61
Education						
No Education	0.05	0.12	1.05	-0.12	0.21	0.89
Primary(ref)			1.00			1.00
Secondary and Higher	-0.43	0.24	.65*	0.01	0.17	1.01
House hold Economic Status						
Very Poor	0.18	0.39	1.19	0.62	0.22	1.86***
Poor	0.01	0.39	1.01	0.28	0.16	1.32*
Medium or Higher(ref)			1.00			1.00
Occupation						
Not Working(ref)			1.00			1.00
In Agriculture	0.00	0.12	1.00	1.57	0.72	4.82**
Unskilled/Skilled manual	-0.15	0.25	0.86	-0.26	0.26	0.77
Non Manual/Professional	-0.25	0.16	0.78	-0.45	0.16	.64***
Constant			0.215			0.10
Hosmer and Lemeshow test			0.21			0.939

Note: Na : Not Applicable ;
*** Significant at P<0.01,** significant at P<0.05, * significant at P<0.1,
Unmarked = Not Significant

Source: EDHS 2005

5.4 Determinants of Malnutrition among Selected Married/Living Together Women in Ethiopia

In developing counties like Ethiopia where there is low social status of women and high dependency ratio on their partner's socio-economic status, it is quite important to see factors associated with partner's characteristics. In the EDHS 2005 data some important socio-economic characteristics which are found to be vital in explaining the variation in women's nutritional status data set were collected from women in union (married/living together women). These factors include partner's characteristics (partner's educational level and partner's occupational status) and women's decisions on different types of house hold economy and their own health status. Accordingly the finding (from table 5.2) shows that among non pregnant and non lactating women in union type of place of residence, region, occupation and women decision making autonomy are found to be statistically significant factors in explaining the variation in women's nutritional status among married /living together women.

Type of Place of Residence

Similar direction of association has been observed between women's nutritional status and type of place of residence in the bivariate and multivariate analysis. Among non pregnant and non lactating women in union those who live in rural areas are more likely (OR=1.65 times) at a higher risk of under nutrition than their corresponding urban counterparts.

Region of Residence

Living in Gambella is found to be statistically significantly associated with women's nutritional status. Similar to the above results women living in Gambella are 1.8 times more likely at risk of under nutrition than women who live in Oromia region.

Occupation

Women occupational status has found to be one of determinant factor which influences women's nutritional status among married or living together women. Like urban model among women in union those who have professional job are less likely (OR= 0.7) at risk than women who have skilled/unskilled manual job.

Women Decision Making Autonomy

The single factor effect of decision making autonomy on women's nutritional status shows that among non pregnant and non lactating women in union those who have low decision making autonomy are highly affected and those who have high decision making autonomy are less affected by chronic energy deficiency than women who have medium decision making autonomy. For instance, women who have low decision making autonomy are 1.34 times more likely at risk than the women who have medium decision making autonomy.

Partner's Characteristics

Even though the multifactor effect of women's under nutrition shows partners' characteristics seems to be not significantly associated with the risk of under nutrition. It provides evidence that women with non educated partner are more likely (OR=1.2 times) at risk than women who have primary educated partners. Women who have secondary and higher educated partners are at similar level of under nutrition with women who have primary educated partners. Regarding to partner's occupation similar to respondents occupation those with agricultural partners are more likely (OR=1.2 times) at risk of under nutrition than women with unemployed partners.

5.5 Determinants of Malnutrition for all Selected Women in Ethiopia.

In this analysis the overall determinants of under nutrition has been assessed to identify the basic determinant factors which were important for identifying women's nutritional status among non pregnant and non lactating women in the national level. Accordingly the results of the multivariate analysis shows age, marital status, type of place of residence, region of residence, household economic status and occupation were found to important determinants in explaining the variation among women's malnutrition.

In the bivariate analysis marital status of the women was found to be not significantly associated to the risk of chronic energy deficiency whereas it is highly significant in the multivariate analysis. This is because of the effect other confounding factors which are important for marital status to express its effect on the dependent variable. From the confounding factors age and occupational status are the most important for explaining its

effect on the dependent variable. For instance 64.3 percent of the never married women are found in the early age group 15-19. The previous results show that women in the age group 15-19 are highly affected by under nutrition. From these two statements we can justify that never married women are more vulnerable to chronic energy deficiency. On the other hand most of the widowed/divorced/separated women are found in the late age group 35-49 and women in the late age group are highly vulnerable to chronic energy deficiency. Therefore widowed/divorced/separated women are at a higher risk than married/living together. The effect of other confounding factors on marital status like education and occupation could be explained the same way (Annex).

Age

Similar direction of association between age and under nutrition has been observed in the multivariate analysis with the bivariate association. The results of the bivariate analysis show that women in the age group 15-19 and 35-49 are highly affected by chronic energy deficiency than women in the age group 25-29. In the multivariate also we can see that among non pregnant and non lactating women in (Ethiopia) in the age group 15-19 are 1.4 times more likely at risk of under nutrition than women in the age group 25-29.

Parity

The effect of parity on women's nutritional status was observed as one of the determinant factor when we combine rural and urban women together. The result from the multivariate analysis shows that women who have more than six children are 1.44 times more likely to be affected by chronic energy deficiency than women who have only one child.

Type of Place of Residence

The urban/rural difference in the type of place of residence has been observed in bivaraite analysis as well as the multivariate analysis. Women living in rural areas are 1.65 times more likely at a higher risk than women living in urban areas.

Region of Residence

As it was seen in the bivariate analysis the direction of association between region of residence and the risk of chronic energy deficiency is similar to the multivariate analysis.

Women living in Gambella and Tigray are 1.9 and 2.0 times more likely at risk of under nutrition than women living in Oromia region respectively. Moreover women living in Afar, Somali,

Ben –Gumuz and Dire-Dawa are more than 1.4 times more likely at a higher risk of under nutrition than women living in Oromia region.

Household Economic Status

In the overall model household economic status has found to be statistically significantly associated at $P<0.01$ with the risk of chronic energy deficiency. Women who have very poor and poor household economic status are found to be more likely (OR=1.62 and OR =1.33 times respectively) at a higher risk of under nutrition than women in the medium or higher household economic status.

Occupation

The last variable that shows a significant effect in women's nutritional status in explaining the variation in under nutrition is occupational status of the women. Women who have non manual or professional job are less likely (OR=0.7) to the risk of under nutrition than women who are unemployed.

Overall, when you see all models on identifying the determinant factors of women's nutritional level in Ethiopia, rural women in the early age (15-19) or late age (35-49), who have 6+ children, who engaged in agricultural work, living in Tigray, Gambella,Somali, Ben-Gumuz and Dire-Dawa are more likely to be affected by under nutrition.

Table 5.2 Estimate(β),Standard error (SE) and Adjusted odds ratio(Exp β) of Chronic Energy Deficiency for Total and Married/Living Together Women Aged 15-49 by Background Characteristics in Ethiopia.

	Total			Married/Living Together		
Background characteristics	Estimate	SE	Odds Ratio	Estimate	SE	Odds Ratio
Age						
15-19	0.36	0.16	1.43**	-0.03	0.29	0.97
20-24	-0.11	0.16	0.89	-0.11	0.25	0.89
25-29(ref)			1.00			1.00
30-34	-0.05	0.18	0.96	-0.19	0.24	0.83
35-49	0.07	0.16	1.08	-0.13	0.21	0.88
Parity						
0	-0.03	0.19	0.98	0.01	0.26	1.01
1(ref)			1.00			1.00
2-3	0.23	0.19	1.26	0.17	0.25	1.19
4-5	0.13	0.20	1.14	0.15	0.27	1.16
6+	0.36	0.20	1.44*	0.15	0.27	1.17
Marital Status				Na		
Never Married	0.43	0.14	1.54***			
Married/Living together(ref)			1.00			
Widowed/Divorced/Separated	0.17	0.11	1.18			
Residence						
Rural	0.44	0.13	1.55***	0.50	0.27	1.65*
Urban(ref)			1.00			1.00
Region						
Tigray	0.64	0.15	1.90****	0.22	0.25	1.24
Afar	0.36	0.19	1.44*	0.06	0.25	1.07
Amhara	0.22	0.14	1.24	-0.17	0.22	0.84
Oromiya(ref)			1.00			1.00
Somali	0.41	0.20	1.51**	-0.12	0.29	0.89
Ben-Gumz	0.44	0.18	1.55**	0.18	0.26	1.20
SNNP	-0.05	0.14	0.95	-0.03	0.23	0.97
Gambela	0.71	0.18	2.04***	0.58	0.26	1.79**
Harari	0.22	0.19	1.25	0.20	0.32	1.22
Addis Abeba	0.12	0.17	1.12	0.00	0.38	1.00
Dire Dawa	0.52	0.18	1.69***	0.49	0.31	1.63
Education						
No Education	0.05	0.10	1.05	0.29	0.20	1.34
Primary(ref)			1.00			1.00
Secondary and Higher	-0.03	0.13	0.97	-0.22	0.35	0.81
House hold Ecoonomic Status						
Very Poor	0.48	0.15	1.62***	0.51	0.32	1.66
Poor	0.28	0.14	1.33**	0.32	0.30	1.37
Medium or Higher(ref)			1.00			
Occupation						
Not Working			1.00			1.00
In Agriculture	0.05	0.12	1.05	0.13	0.16	1.13
Unskilled/Skilled manual(ref)	-0.23	0.18	0.80	-0.02	0.36	0.98
Non Manual/Professional	-0.36	0.11	.70***	-0.37	0.21	.70*
Partners Education	Na					
No Education				0.17	0.17	1.2
Primary(ref)						1.0
Secondary and Higher				0.06	0.25	1.1
Partner's Occupation	Na					
Not Working(ref)						1.00
In Agriculture				0.17	0.49	1.19
Unskilled/Skilled manual				0.06	0.55	1.06
Non Manual/professional				-0.11	0.52	0.90
Decision Making Autonomy	Na					
High				-0.14	0.16	0.87
Medium (ref)						1.00
Low				0.29	0.14	1.34**
Constant			.112****			.098***
Hosmer and Lemeshow test			0.36			0.59

Note: Na = Not Applicable ;

**** Significant at P< 0.001evel ,*** Significant at P<0.01,** significant at P<0.05, * significant at P<0.1; Unmarked = Not Significant

Source: EDHS 2005

CHAPTER SIX

DISCUSSION, CONCLUSION AND POLICY IMPLICATIONS

6.1 Discussion

Malnutrition is assumed to be affected by both health and food security status of the individual. Thus the evaluation of malnutrition needs to be seen in light of these two pillars. For instance, to have enough food (enough daily calories) does not mean that the individual has enough potential to extract from what he consumed. Rather it is better to see the health status of the individual. Different variables affect the women's vulnerability to chronic energy deficiency. The relationship between the explanatory variables and the outcome variable (CED) is discussed as follows.

The type of place of residence (urban/rural) has a great influence in women to reduce or increase their risk of malnutrition. Results from both bivariate and multivariate analysis confirmed that under nutrition (CED) was most prevalent in rural women than their corresponding urban counterparts irrespective of all socio-economic variables and demographic variables. For instance, among women living in rural areas 34.4 percent are malnourished and from those living in urban areas only 18.2 percent are at risk of under nutrition. The same result of hypothesis was observed in India (Premananda B., et al, 2008; Teller and Yimer, 2000). It may be due to better infra-structural facilities available and expenditure on health in urban areas. In rural areas the rate of the utilization of facilities available and expenditure on health is still less due to the low health infrastructures and professionals. The greater access to health care services, safe water and sanitation facilities may be the causal factors for better nutritional status among urban women. Moreover the infrastructure which has a direct influence for food security is relatively rare in rural parts of Ethiopia. Another important reason associated with low nutritional status of rural women may also be due to high labor or work load among rural women than their urban counter parts. The above basic problems in collaboration with low expansion of social services such as education and road in rural parts of Ethiopia may expose rural women to have lower nutritional status.

Concerning the regional variation in women's nutritional status, both bivariate and multivariate analysis in both rural and urban parts of Ethiopia confirmed that women who live in Tigray and Gambella are at a higher risk of under nutrition than women who live in all other regions. More over the rural Model in Table 5.1 and total model in table in table 5.2 reveal (beside women in Tigray and Gambella) women who live in Afar, Somali, Ben-Gomez and Dire Dawa are at a higher risk of under nutrition than women who live in Oromia region.

All of the above malnourished regions except the highlands of Tigray are found in the lowlands of the country. Women living in the lowlands are more malnourished compared to women living in the highlands (Tsegaye D., et al, 2003; Woldemariam and Timotiwos, 2002). The probable reason for this could be associated with livestock holding (more in the lowland), land ownership (greater in the lowlands), education (less literate in the lowlands) and types of illness (more malaria in the lowlands). Moreover cultural problems associated pastoral community which may limit their required dietary intake from crop products is relatively higher in the low lands of Ethiopia than their corresponding highlands.

Educational level of the women in the lowlands was significantly lower compared to the educational level of the women in the highlands (Tsegaye D., et al, 2003). It can be assumed that the low level of educational background could be associated with the low women decision making power which in turn has played some role in increasing malnutrition rate in lowland parts of Ethiopia.

In addition, tropical diseases like malaria and sleeping sickness are relatively highe
r in the lowlands of Ethiopia which are immediate factors to reduce the nutritional status of women. The low BMI value in women living in the highlands of Tigray may be related with the low agricultural productivity because of shortage of arable lands and live stock products.

The low nutritional status of women found in Tigray and Amhara regions might be associated with land degradation, land fragmentation and protracted war(in Tigray) which was frequently occurring in the region. Since civilization has started in Ethiopia, Tigray, Amhara and most of the northern parts of the country were the center of agriculture. Thus the fertility of the soil has

been over used (degraded) that it cannot support the current high population in the area. As a result people specially farmers (in rural) were living their subsistence which may be more of coping strategy. Moreover, the protracted war which was frequently occurring in Tigray has also an impact on the level of their food security by hampering their access for food.

In addition, as a result of the recent land redistribution in Amhara and Tigray, it has created fragmentation of land which in turn affects the production per head and at the time they may not be encouraged to use key technological inputs in agriculture (fertilizers, pesticides).

Regarding to age of the women, women in young and old age groups are subjected to under nutrition. In other words, the chronic energy deficiency i.e 38.8 percent of young women aged 15-19 and 38.3 percent of old rural women aged 35-49 are malnourished women than women in the age group 25-29. The result of the multivariate analysis also confirms that never married women in the age group 15-19 are found to be more vulnerable to chronic energy deficiency than women in the age group 25-29, though it is not shown in the urban model. Women in the age group 35-49 are affected significantly by chronic energy deficiency than women in the age group 25-29. Similar result of hypothesis was found (Teller et al, 2000; Woldemaraim, et.al, 2002). This could be due to the fact that never married women in the age group 15-19 need adequate nutrients that support the fast physical, mental and emotional growth.

Unawareness of adolescent women about their own health and nutritional status could also be another reason associated with their poor nutritional status. In addition to the above reasons lower nutritional status in rural women could be that rural women in the age group 15-19 are more vulnerable to early marriage and child birth than women found in urban parts of the country (CSA/ORC Macro, 2006). Hence in addition to her own health rural woman needs adequate dietary intake for child growth and pregnancy. On the other hand rural women in the age group 35-49 are relatively less educated and therefore have low decision making power which inhibits their control over income and household assets.

Total number of children ever born (parity) is one of the most important demographic factors which explain the variation in women's nutritional status. The results in the bivaraite analysis

reveal that among rural women those who have higher parity (6+) have lower nutritional status (Table 4.2). The same result was observed in the multivariate analysis in the all women model (Table 5.2). Similar result of hypothesis was observed with a research done in Hadiya woreda (Tsegaye, et al., 2003). The probable reason for this could be high parity in Ethiopia is a situation which is associated with illiterate rural women (CSA/ORC Macro, 2006). Poor educational status in turn increases the rate of malnutrition among women by decreasing women's decision making and control over income. But the effect of higher parity on the rate malnutrition is not well observed among urban women but in the overall model the effect of women who have more than 6+ children is significant. This could be because of lower fertility level in urban parts of Ethiopia and hence effects associated with higher fertility may not be characteristics of urban women.

Women's education is also an important factor which reduces the risk of under nutrition among women. Although the result of the multivariate analysis does not show a significant association between women education and the risk of chronic energy deficiency in urban and all model, the results of the bivaraiate analysis among rural model revealed that non educated women are at a higher risk of under nutrition than women who have primary or higher education. But the effect is not highly observed among urban women. For instance, among all malnourished women 31 percent were non educated women and 28 percent had primary education whereas only 18 percent of the women have secondary and higher educational status are at risk (Table 4.3). The same result of association was observed with other literatures (Hindin, 2005; Teller, 2000; Woldemariam et al, 2002). The effect of education on the rate of malnutrition among urban women may be associated with the low illiteracy rate of them. This could be associated with the use of healthcare and community services. Different researches confirm that educated women are more likely to use healthcare and social services than women with no education. Hence using available health care services by it self will reduce the risk of women to infections and diseases which in turn reduce the risk of malnutrition.

Occupation was found to be one of the determinant predictor for women for the risk of under nutrition. The result of the bivariate analysis shows that unemployed women and those who participate in agricultural work are at higher risk of under nutrition than women have non

manual and manual skilled jobs. For instance, 36 percent rural women and 50 percent of urban women are at women who participate in agricultural work are at risk of under nutrition. The urban model in the multivariate analysis also shows that urban women who engage in agricultural jobs are at a higher risk of under nutrition and those who engage in non manual and professional jobs are at a lower risk of under nutrition. The total model of the multivariate analysis also shows that women who have non manual and professional jobs are at a lower risk of under nutrition than women who engage in unskilled and skilled manual jobs. The same result of hypothesis was observed among sub -Saharan African countries (Hindin, 2005).

The probable reason for this could be women engage in agricultural jobs have lower educational status than women who engage in non agricultural jobs (CSA/ORC Macro, 2006) and have relatively lower decision making autonomy and lower control over income than women who have non agricultural jobs. On the other hand women with higher status jobs have more decision making autonomy and control over income.

Another most important determinant factor which affects women in Ethiopia was household economic status. The results in the bivariate show that in all types of women (rural/urban) those who have very poor and poor household economic status are at a higher risk of under nutrition (Table 4.2 and 4.3). The urban model and all women model in the multivariate analysis also show that women who have very poor and poor household economic status highly affected by chronic energy deficiency. This finding is also consistent with other studies (e.g., Edilberto, 1997, Teller, et al., 2000, Woldemaraim, et al., 2002).Which may indicate that household economic status have a direct association with the household food security. Household food security by in turn is a precondition for daily dietary intake for all household members of the family.

Another important variable that affects women's nutritional status in Ethiopia is Partner's characteristics (partner's education and occupation) which affect their partner's characteristics. Even though they are not significantly associated with chronic energy deficiency, the results in the bivariate analysis shows that most of under nourished women are those who have with no educated partners (33 percent) and those who have partners' with agricultural occupation (34.8

percent). The same hypothesis was observed with other sub-Saharan African countries (Hindin, 2005). The probable explanation for this could be women who have agricultural worker and unemployed partners are expected to have low educational level and lower status than women who have relatively higher status partners. Hence in Ethiopia where there is higher dependency ratio on their partners, women who have low status partners have lower access to household food security which strengthens the rate of malnutrition.

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Regarding to women decision making autonomy both the bivarite and the multivariate result confirms that, higher women's decision making power is associated with better nutritional status among women. This result is consistent with the researches done in sub-Saharan Africa and Bangladesh (Hindin, 2005 and Gudrun, 2006). The decisions towards women's final say about their own health and small or large household purchases are important variables which will enable women to control over income and to have better access to their own health. Hence even in the poor households women would have a better chance of food security and better health status if they have higher decision making power.

6.2 Conclusion

Health and nutrition are important dimensions of human well-being. Women and children in Ethiopia are vulnerable to the risk of under nutrition due to different socio-economic and demographic factors associated with it. Therefore assessing the nutritional status of women's and children in any attempt is crucial for the improvement of health and food security of the individuals as well as the society as a whole. In this regard this paper tries to asses the levels, demographic and socio-economic differentials and determinants of malnutrition among women in Ethiopia.

The study reveals that malnutrition among women in Ethiopia is a serious problem, 27.6 percent of the women are malnourished of which 23.1 percent are moderately and 4.5 percent are severely deprived by the condition. Women living in rural areas are highly affected by chronic energy deficiency than women living in urban areas. The level shows chronic energy deficiency among women is almost two times higher in rural areas than their urban counterparts. The distribution of chronic energy deficiency by age of the women shows a V-shaped curve which indicates that women in the age group 15-19 and 45-49 were most affected by chronic energy deficiency where as women in the age group 20-24 were less affected in both rural and urban areas.

The study also identifies women's age, parity, current marital status, place of residence, region, house hold economic status, and occupation as important factors in explaining the variation in women's nutritional status. But factors that determine malnutrition in women are not similar in rural and urban areas. In rural areas only women's age, region of residence, education are found to be significantly associated with chronic energy deficiency. In urban areas where as marital status, region of residence, household economic status and occupation are found to be basic determinant factors for women's nutritional status.

The region wise variation in women's malnutrition shows that in both urban and rural areas of the country women living in Tigray and Gambella are highly affected by chronic energy

deficiency. Moreover, in rural areas women living in Amhara, Somali, Ben-Gumuz and Dire-Dawa are at a higher risk of under nutrition than women living in Oromia region.

In all types of women (living in rural and urban areas) of the country, never married women aged 15-19 are found to be highly affected by chronic energy deficiency though the extent seems to high among women living in rural areas.

Education (in rural areas) and occupation (in urban areas) are also found to be important determinant factors which affects women's nutritional status. The result depicts that women with secondary and higher education which have higher status jobs (non manual and professional jobs) are less affected by malnutrition.

The level of under nutrition among women shows a decreasing trend as women household economic status increases in both urban and rural parts of the country. But the level is highly significant among urban women. Women with very poor and poor household economic status are highly affected by under nutrition.

Regarding women's decision making autonomy, the result confirms that as women's decision making power increases there is higher probability of increasing their nutritional status.

Among married and living together women partner's educational level and occupational status are also found to be important variables which affects women's nutritional status though the result in the multivariate analysis does not show statistical significance. Women with higher status partners (in terms of education and occupation) are less affected by under nutrition.

Of the initial working hypotheses adopted at the beginning of the study all of them have proved to be right in showing the direction of association between the dependent variable (CED) and explanatory variables. When control was made for other socio-economic and demographic variables partner's characteristics (partner's education and occupation) lost its significance, even though the magnitude of the relationship is in the expected direction. This is due to the fact that its effect has been already been explained by other variables.

6.3 Recommendations

Based on the above findings the following recommendations are forwarded.

- Health and nutrition education is therefore has to be given for adolescents in a simple, clear and concise way at secondary and higher educations levels of educational system in order to create awareness among young adolescent women on their own health and nutritional activities.

- Expanding family planning services for all women in all sub-sectors of the country by giving more emphasis on women who reside in rural areas of the country.

- Primary healthcare services and nutrition committees at each regional level each with their own well defined roles and responsibilities must be established to safe guard women who are vulnerable at each regional level. More emphasis has to be given for women living in regions Tigray (both urban and rural areas), Gambella (both urban and rural areas), Amhara (rural parts), Ben–Gumuz (rural areas), Somali (rural areas) and Dire-Dawa (rural areas).

- Empowering women through education by increasing their access to education plays a significant role in advancing women's decision making power. Moreover, the government has to develop a policy for all adolescent women to enroll in compulsory primary or secondary education and non educated adult women to take part in non formal education.

- Creating employment opportunities for women by giving more attention for unemployed women living in urban areas of the country so as to increase women's involvement in control over income and overcome their household economic status.

- In order to strengthen the link between nutrition and agriculture the government has develop a policy to increase agricultural productivity so as sufficient food is available to all people. Moreover, sufficient food at all times has to be distributed at a price they can afford.

- Further study is recommended on issues related with the impact of environmental and cultural factors on women's nutritional status.

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ANNEX

Table A

Marital Status	Age of the Women				
	15-19	20-24	25-29	30-34	35-49
Never married	64.3%	22.5%	8.8%	2.6%	1.8%
Married/living together	9.4%	11.7%	15.3%	12.7%	50.9%
Widowed/divorced/separated	9.2%	11.3%	11.8%	11.3%	56.4%
	33.1%	16.3%	12.0%	8.1%	30.5%

Table B

Age of the Women	Percent CED
15-19	33.1%
20-24	20.9%
30-34	24.6%
35-49	30.5%

Table C

Marital Status	Occupation			
	Not Working	In Agriculture	Unskilled/Skilled manual	Non Manual/professional
Never married	65.5%	6.9%	4.9%	22.6%
Married/living together	61.6%	16.3%	4.0%	18.0%
Widowed/divorced/separated	45.6%	14.4%	11.0%	28.9%

Table D

Occupation	Percent CED
Not Working	29.9
In Agriculture	36.6
Unskilled/Skilled manual	22.9
Non Manual	17.7
Professional	15.7

DECALARATION

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

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Date: 15/08/2008

This thesis has been submitted for examination with my approval as university advisor.

Habtamu Belete		
Advisor	Signature	Date