10

ADDIS ABABA UNIVERSITY

OFFICE OF GRADUATE PROGRAMS

FACULTY OF SCIENCE

DEPARTMENT OF STATISTICS

AN ASSESSEMENT OF FACTORS AFFECTING THE LABOR FORCE PARTICIPATION OF MARRIED WOMEN IN ETHIOPIA

BY

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A Thesis Submitted to the Office of Graduate Programs of Addis Ababa University in Partial fulfillment of the Requirement for the Degree of Master of Science in Statistics

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ABSTRACT

Different reports and data in many disciplines show women are disadvantaged in terms of labor force participation in both the formal and the informal economy of Ethiopia. The primary focus of this paper is to examine the factors which determine the participation of Ethiopian women in the labor force. The study is based on the Ethiopian Demographic and Health Survey (EDHS) data conducted in 2005 by the Central Statistical Agency (CSA) and the American organization ORC Macro. Multiple logistic regression model is used to assess the combined effect of the selected factors on labor force participation of Ethiopian women. The findings of the study indicate that women who live in urban areas of Ethiopia have a better chance of participation in the labor force than those who live in the rural areas. Migration has negative effect on the participation of women in the labor force. Women living in Afar, Somali, Harar, Benshangul-Gumuz and Oromia regions show less participation in the labor force. Education of a woman above high school level and that of her husband with primary level have positive impacts on her participation in labor force whereas pregnancy and breastfeeding have negative effects. The impact of using contraceptive methods on the participation of Ethiopian women in the labor force is positive and as there are more children under the age of five and more members in a household, the participation of women in the labor force decreases. The length of duration in a place and the labor force status of a husband are also important variables in predicting the participation of Ethiopian women in the labor force.

TABLE OF CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS

AfDP= African Development Bank.

AIDS= Acquired Immune Deficiency Syndrome

AU= African Union.

CSA= Central Statistical Agency.

DHS= Demographic and Health Survey.

ECA= Economic Commission for Africa

EDHS= Ethiopian Demographic and Health Survey.

FDRE= Federal Democratic Republic of Ethiopia.

GDP= Gross Domestic Product.

GNI= Gross National Income

HIV= Human Immune Deficiency Virus

ILO= International Labor Organization.

IRIN=Integrated Regional Information Networks

LF= Labor force

LFP= Labor force participation

LFPR= Labor force participation rate

NGOs= Non-Governmental organizations

SNNP= Southern Nations, Nationalities and Peoples region.

UN= United Nations.

USAID= United States Agency for International Development

LIST OF TABLES

Page

CHAPTER ONE
INTRODUCTION

1.1 Background of the study

Ethiopia with population of more than 71.3 million and GNI of $11.1 billion (in the year 2005) is registered as one of the least developed countries in the world. Ethiopia's economy is based on agriculture, accounting for half the country's gross domestic product (GDP). Over 50 Percent of the population lives below poverty line and over 80 percent employment is in the agricultural sector (IRIN, UN Office for the Coordination of Humanitarian Affairs report, 2008). There are insufficient opportunities in the labor markets to absorb rural people and new entrants in the labor force. As described by Stevenson and St-Onge (2005) many Ethiopian are forced into marginal activities in the informal sector as subsistence farmers, petty traders, and tiny handy craft producers with limited market scope.

Though recent job opportunities in Ethiopia tend to favor women more than men, different reports and data in many disciplines show that Ethiopian women are disadvantaged in terms of job participation. Women's limited access to employment opportunities, particularly, in the formal labor market is reflected in the gap between women and men's labor force participation rates. Since Ethiopia is among the countries with a rapidly growing population coupled with a still backward economy, the proper management and efficient utilization of its labor force is essential.

Employment, unemployment and labor force participation are the components of the economically active population of a country. The labor force participation rate (LFPR) expresses the share of the employed people in comparison with the working-age population. It gives an indication of how many people of the working age are actively participating in the labor market. As many of the Ethiopian married women are parts of the labor force, a study which can find out the possible factors that inhibit their participation in the formal and the informal labor market is essential because in addition to earning income

and securing a livelihood and access to social services, participation in the labor force has many advantages for women. It is necessary for their dignity, self-esteem and is an essential element for social inclusion. For women, access to paid employment has a higher value since it strengthens their bargaining position within the household and in the society.

One of the objectives of the National Policy of Ethiopian Women (1993) is to facilitate conducive conditions to the speeding up of equality between men and women so that women can participate in the political, social, and economic life of their country on equal terms with men. The policy stresses the importance of employment diversification as one of the ways in achieving the policy goals. In practice, however, women have reportedly not achieved equality with men. Traditional and cultural factors place the man as the head of the household and men typically hold land tenure, have property rights of the whole family and have better access to job opportunities.

The problem of unemployment is a global issue that every nation is striving to control at its minimum level. However, in developing countries it is getting worse mainly due to the unbalanced relationship between the rates of economic development and the rapid population growth. Some sections of the population in these countries, particularly women were underprivileged in terms of job access and incomes. In recent years, in some countries, women are still concentrated in the category of unpaid family work. According to Lin (2008), among the economically active women who contribute their labor in the family work, they are over 77 per cent in Bangladesh, 44 per cent in Indonesia, 56 per cent in Kenya and 23 per cent in Egypt. For these women, unpaid family work would involve performing all activities in the house including looking after children.

In many developing countries, wage discrimination is severe. On the average women earn 60 to 70 per cent of what men are paid for similar work, and only 50 per cent in parts of Africa and Asia. Women work also longer hours than men. Women's work hours are estimated to exceed men's by about to 30 per cent in developing countries. For the increasing numbers of women who take industrial jobs in developing economies, occupational health risks are many. Many are forced to work long hours at low pay under hazardous conditions and in unhealthy environments.

The gender-based discrimination against women in employment opportunities are often attributed to pre-entry discrimination against women related with access to education at early ages. Marriage further reduces female attendance at educational institutions and therefore the share of women holding higher qualifications and positions as compared to men. The unwillingness of parents to educate their daughters thus confirms them to housework and low-paying occupation.

Education has a positive implication on the labor force participation of women and hence on their wellbeing and that of their families. Education beyond ten or more years of school is also a reliable predictor of lower fertility, improved infant survival, reduced maternal mortality and enhanced levels of infant and child development and educational attainment. Moreover, it increases their creativity and productivity in the house and in the different areas of disciplines they participate. It also plays a significant role in delaying the age at first marriage and creates opportunities for employment. A high level of education significantly influences labor force participation.

Ethiopian women face greater problems to participate in the formal labor markets because of lack of education and training, the tendency to direct women into certain occupations and the continuous heavy burdens of unpaid domestic work including childbearing and child-care. All these problems restrict the time and energy available for them in income-earning activities. Economic crises and the gap between job creation and the growth in the numbers of job seekers have worsened the employment situation of Ethiopian women. Even for urban areas of Ethiopia, the unemployment situation of women is still not improved as compared with that of males. For instance, the 2004 report on urban employment-unemployment survey conducted by CSA indicated that the rate of unemployment of women in the urban areas of Ethiopia was 30.6 percent where as that of males was only 15.8 percent.

Among the majority of rural and low-income urban dwellers in Ethiopia, women perform all domestic tasks, while many are doing farm activities. Most of them are responsible for the care of children, the sick and the elderly, in addition to performing essential social functions within their communities.

Many women with comparable skills and experience are confronted with a gender wage gap and lag behind men in income and career mobility in the formal sector. Women, relative to men, occupy low status, low paying jobs and generally they work under poor conditions and are also more likely to be found in the informal economy than men. This work is largely outside legal and regulatory frameworks, with little social security and a high level of volatility (ILO, 2005). Equal pay for women and men for equal work or work of equal value, has not yet been fully practiced in many developing countries of the world, particularly in Africa. The 10^{th} African regional meeting report (2003) indicated that, labor markets remain strongly segregated and an extremely high number of women are locked in limited jobs because of their low status. Even for similar work, women typically earn 20 to 30 per cent less than men. In general, gender discrimination in hiring and promotion and discrimination related to pregnancy and sexual harassment in the workplace are occurring from time to time.

In some sections of the population of Ethiopia, women's full and equal rights to own land and other property in the house are not recognized. For Ethiopian women, progression in the professions is still difficult.

In almost all regions of Ethiopia, women continue to bear primary responsibility for childcare and house-work. This unpaid work remains economically invisible, but creates a foundation for all other economic, political and social activities. When women are released from backbreaking domestic work, they will be able to participate in the national development effort on equal terms with men and go on to experience the benefits of their participation.

This study aims primarily to present a qualitative and quantitative estimate of the socio-demographic factors that are supposed to affect the labor force participation of women in Ethiopia.

The structure of this paper has the following design: First, brief discussions on literature related to the study on Ethiopia and other countries is given in chapter two. The data source and the complete description of the methodology applied in this research are discussed in chapter three. Model definition, technique of estimation of the parameters and method of assessment for the fit of model are described in this chapter. Chapter four is the analysis part. The socio-economic and demographic factors that are supposed to affect the participation of Ethiopian women in the labor force are analyzed and the outcome of the analysis is described in this chapter. The concluding part, chapter five contains discussion and summary of the results of the study. The major findings of this research, recommendations and policy implications are also provided in this chapter.

1.2Objectives of the study

General objectives:

- To examine the determining factors for the participation of Ethiopian women in the labor force.
- To draw conclusions and to make recommendations that might help policy makers, planners and other concerned organizations in formulating planes and policies regarding the participation of Ethiopian women in the labor force.

Specific objectives:

- ✓ To determine the relative importance of the explanatory variables in predicting the response.
- ✓ To analyze the separate and combined effects of the factors determining the labor force participation of Ethiopian women.

- ✓ To develop a statistical model that predicts the participation of Ethiopian women in the labor force.

1.3 Applications of the research

- The results of this study can be used at regional or federal level by policy makers, planners and other concerned organizations regarding the employment status of Ethiopian women and the determining factors for their participation in the labor force.
- The outcome of the study can generate information for the private sector institutions, employer organizations and non-governmental organizations to give special concern and consideration for the Ethiopian women in terms of job access and participation.
- The results of the study can be used in applied research and academic institutions for further investigation.

1.4 Limitations of the study

- Lack of sufficient literature on our country related to the subject under study.
- The study is exclusively socio-demographic and has no macro-economic or labor-economic aim.
- Due to data limitations, it is not possible to address the contribution of other factors that might affect the participation of Ethiopian women in the labor force.

CHAPTER TWO

LITERATURE REVIEW

2.1 Background

The number of people in the world who are without job is increasing from time to time. The total number of jobless people in the world was 191.8 million at the end of 2005 and it had shown increases of 2.2 million since 2004 and 5.9 million since 2003. While more people are actually "in work", at the same time, more people are unemployed than ever before (ILO, 2006). From these figures, the higher share goes to women. Over the past ten years, the global unemployment trend for women had not improved, with the exception of the industrialized countries, the Middle East, North Africa and south Asia. More women are seeking work but unable to find jobs than men in almost all regions of the world. The 2005 International Labor Organization report on the employment status of women indicated that in 2003 the global female labor force (the sum of employed and unemployed women) was 1.2 billion and among these 77.8 million women were jobless.

In the case of Ethiopia, in the year 1994, the unemployment rate was over 30 per cent for men and 40 per cent for women in Addis Ababa, and it was about 15 per cent for both male and females in other urban areas of the country. People engaged in government services were only 71,000 or 11 per cent of the economically active population (Genene and Giuseppe, 2001). The 2003 and 2004 CSA urban labor force survey also show male dominance over their female counterparts in terms of participation rate across all regions of Ethiopia (See Table 2.1). For instance, in the 2004 survey the rate of unemployment of women in the urban areas of Ethiopia was 30.6 percent where as that of males was only 15.8 percent. When we see the over all participation rate regionwise, the highest was reported for Addis Ababa City Administration (about 63 percent), while Tigray region has shown the least participation rate as compared to the other regions (about 48.8 percent) in the 2003 survey.

Table 2.1: Region wise labor force participation rate

Region		Labor force participation rate		
		Male	Female	Total
Country total:	2003	62.9	53.6	57.9
	2004	61.2	49.9	55.2
Tigray	2003	51.0	47.1	48.8
	2004	50.1	43.7	46.6
Afar	2003	69.8	60.8	65.2
	2004	66.4	47.8	59.9
Amhara	2003	57.4	52.6	54.8
	2004	54.6	50.6	52.4
Oromia	2003	60.1	51.8	55.9
	2004	59.3	48.0	53.5
Somali	2003	62.3	51.2	56.8
	2004	57.4	49.2	53.2
Benshangul	2003	59.3	45.4	52.3
gumuz	2004	57.9	41.7	49.7
SNNP	2003	63.4	55.7	59.5
	2004	62.2	49.2	55.5
Harari	2003	66.7	57.3	61.5
	2004	60.6	54.6	57.4
Addis Ababa	2003	71.4	56.0	63.0
	2004	69.5	52.7	60.5
Diredawa	2003	64.7	61.4	62.9
	2004	59.7	54.4	56.9

Source: 2004 CSA Labor force Survey

The 2004 FDRE Ministry of Labor and Social Affairs national survey report on the employment situation of women shows that there is a significant difference between the status of male and female workers. The share of women in the managerial and professional positions was highly disproportionate as compared to their male counter parts. The report also indicated that the proportion of female workers in low or no-skill jobs such as seasonal and short-term contractual areas was found to be higher than that of men. As a result, the average salary of women was far less than that of men. Men occupied the high-paying managerial and professional positions.

The 2005 Ethiopian Demographic and Health Survey (EDHS) shows that women were predominantly engaged in agricultural occupations. Educational attainment, literacy, exposure to mass media, and employment were considered as critical contributors to women empowerment and exert considerable influence on the development of their personality and their role in the society. In the 2005 EDHS, it is also shown that there are variations in the proportion of employment status of women as compared with that of men. The employment of women increases with an increase in their level of education; the proportion of employed women increases from 27.2 percent among uneducated women to 38 percent among those with secondary education. A marked difference was observed in the level of employment by gender. The proportion of employed males was much higher than that of females, the majority of men (86 percent) were employed at the time of the survey.

Most women in Ethiopia lack support from other family members in carrying their children and it is often a heavy burden for those who work outside the home to support the family. Poverty greatly increases the intensity of the problem.

2.2 General Literature

The 2005 ECA Economic report shows employment in Africa is distinguished by the high proportion of working poor and discouraged workers. The working poor accounts for almost 45 per cent of the total number of the employed people in sub Saharan Africa (Working poor are those people who work but do not earn enough to lift themselves and their families above the US $1 a day poverty line). An estimated 110 million people considered employed earn below the poverty wage and are unable to provide their families with decent living conditions. In 1997, the working poverty rate was about 75 percent in Mali, while only 3 percent of the employed were living below the poverty line of US$ 1 a day in Algeria. The working poor are mostly engaged in the informal sector and in agriculture. Women have a higher share in the number of the working poor in the world. Out of the 550 million working poor in the world, an estimated 330 million are women, which is a share of 60 per cent. Poverty remains particularly acute for African women and girls and many of them work in agriculture or in rural areas. Women and girls in Africa are frequently trapped in the lowest paid, least skilled and most precarious occupations. Gender discrimination remains a deep-seated impediment to growth and development. While the share of women's wage employment in the non-agricultural sector in sub-Saharan Africa increased from 18.9 per cent in 1990 to 28.6 percent in 2001, male participation rates across the region were until recently above 80 per cent (the 10th African regional meeting, 2003 report).

The ILO (2005) report shows even among wage and salaried workers, more and more women are likely to be in non-regular or atypical employment but men are more likely to be hired in core or regular and better-paid positions. For instance, the report in some selected countries shows that women have a higher share in contributing unpaid family works as compared with that of men. Even in terms of self-employment, women have lower opportunities though there are some exceptions (See Table 2.2). Women are increasingly being hired in peripheral, insecure, less-valued jobs including home-based,

casual or temporary work. These jobs are normally characterized by very low pay, irregular income, little security and lack of social protection.

Table2.2: Employment by status and selected economies

Economy and latest year of data availability	Wage and salary workers (employees)		Contributing family works		Self employed workers	
	Female	male	Female	Male	Female	Male
Bangladesh 2000	8.3	15.2	73.2	10.10	11.0	49.8
Pakistan 2000	33.1	36.0	50.1	16.7	16.8	47.3
Cambodia 2001	13.6	19.1	53.3	31.6	33.0	40.9
Thailand 2000	38.8	40.2	39.8	16.4	21.4	43.3
Zimbabwe 1999	22.0	50.8	-	-	58.0	29.2
Yemen 1999	13.8	50.7	0.3	0.3	63.4	49.0
Egypt 2000	57.2	60.6	26.0	8.2	16.8	31.1

Source: ILO (2005) Report on Women's Employment

With the exception of some industrialized countries in the world, women generally have higher rates of unemployment and specifically of underemployment, disguised unemployment than men, and find it harder to re-enter employment once they lose their jobs. For example, at the end of the 1990s, the open unemployment rates for women and men respectively were 5.1 per cent and 3.3 per cent in Indonesia, 9.7 per cent and 6.0 per cent in the Bahamas, 14.3 per cent and 11.9 per cent in Argentina, 11.6 per cent and 7.2 per cent in Brazil, 23.3 per cent and 17.2 per cent in Colombia, and 14.5 per cent and 8.8 per cent in Nicaragua. Between 1990 and 1997, the unemployment rate for women increased by 2 and 5 percentage points in Northern Africa, Central and South America and Eastern and Western Europe (Lin, 2008).

Lack of access to formal education and training has been identified as a key barrier to women's employment and advancement in a society. In Africa, female illiteracy rates were over 60 per cent in 1996, compared to 41 per cent for men. In certain countries, the

illiteracy rate was extremely high: Burkina Faso 91.1 per cent, Sierra Leone 88.7 per cent, Chad 82.1 per cent and Guinea 86.6 per cent (Takyiwaa, 1998).

Miracle (2007) has identified that women participation in the labor force is responded positively to education and the study showed that education is the prime factor in female's labor force participation in South Africa. The study also identified that non-labor income, marriage, fertility and geographical variations persistently stifled the labor force participation of women.

Sunghee (2005) suggests that both educational level and the family economic status determine women's labor force participation. Women with middle school education or above are more economically active than those with no education. Women from lower economic background families are almost two to three times more likely to be unemployed than those in high-status families. Widarti (1998) identified that education is a strong determinant of women's participation in the labor force.

Many of the currently popular explanations of the labor force participation of married women are stated in terms of economic considerations. The working wife explains her employment as a need for additional income to maintain a desired standard of living, the pressure of family debts, or expected usual family expenditures. The study made by Sharon and Emiy (2007) indicated that women whose husbands are relatively highly paid is expected to have greater choice about whether to work when they have children. Married mothers who have small children in which whose husbands' earnings were in the highest and lowest quintile had shown the lowest participation rate and wives whose husbands were in the middle earnings quintile had shown the highest participation rate.

Use of family planning methods increases a woman's prospects for employment, which can result in both economic benefits and better self-esteem. It also allows women to seek additional training and education that enables them to get better employment. Lin (2008) indicated that in industrialized countries women have increased their share in the labor force. The increased participation of women in the labor force is linked to the completion of fertility transition. The increasing participation of women's in paid work has been

driving employment trends, and the gender gaps in labor force participation rates have been shrinking. However, in many developing countries fertility decline is slow or stalled.

Studies of labor force participation have also stressed the influences of earnings as a determinant of the population that seeks employment. Low earning is associated with high desire to engage in the labor force. Earning an income improves marriage prospects for many unmarried women, and gives them a greater voice in the family when they marry. Increased family income may reduce tensions related to poverty and reduce domestic violence. Many women report that gaining through wage-employment, are more able to communicate effectively with their partners, and feel less vulnerable to abuse. Nan (1990) studied that increased labor force participation changes the dispersion of female earnings. That is, women who work full-time have more equally distributed earnings than men who work full-time. As female labor force participation increases, and as women increase hours worked, female earning dispersion decreases. Another study made by Goldin (1989) identified that the likelihood of married women's labor force participation highly determined by the relative amount of time employed in the previous years and the study emphasized that previous work experience significantly affects married women's labor force participation.

Female participation in the labor force is inversely related to the number of children living in the household. The more children a woman has, the less likely she is to be in the labor force. The study made by Sharon and Emiy (2007) reveals that, among married mothers who have small children, those whose infant was their only child had shown a participation rate of 60 percent, 55 percent for those with two children and 46 percent for those with three children (See Table 2.3). Won (1997) shows that child-care is the main factor deterring labor participation of married women of low-income families. For married women of high-income families, size of household has a strong negative effect on the probability of labor force participation. Another study made by Troske and Voicu (2004) indicated that pregnancy and child bearing have a strong negative effect on women labor force participation in both the pre- and post-birth period. This study also indicated that the effects of children on the labor force participation of women vary by education and

race. Takyiwaa (1998) stated that, about 50 per cent of women in Africa are married by the age of 18 and pregnancy and care for young children impede women's opportunities for employment.

Table 2.3: Labor force participation of married women by number of children

Number of children	2000	2001	2002	2003	2004	2005
Infant	53.3	53.8	54.7	52.9	51.7	53.5
One child	57.2	60.1	63.1	61.1	57.4	59.5
Two children	55.8	55.0	53.0	54.0	53.7	54.8
Three children	47.4	48.1	48.3	41.5	43.6	46.1
Four Children	38.2	37.6	43.5	39.8	40.2	40.6
Five or more	37.1	28.7	31.6	30.9	32.9	36.6

Source: Monthly Labor Review (2007)

In general, the increasing participation of women in the labor force is highly affected by the degree to which women are freed from the burdens associated with marriage, house work, child bearing and access to education. In particular, the presence or absence of women in the labor market depends on cultural, economic and social factors that vary according to the choices and outcomes in terms of reproduction and child rearing.

Lin (2008) pointed out that the nature of women's employment or the kinds of jobs and working conditions for women that are likely to empower them, enhance their status and decision-making within their families, increase their economic or financial independence, constrain domesticity or motherhood or provide alternative returns and satisfactions to having children can be identified as

- Wage employment away from the home – particularly in non-familial enterprises;
- Productive and remunerative jobs in the formal rather than in the informal economy;
- Regular, full-time jobs that are permanent and secure;
- Non-discrimination in the labor market and labor markets that are not strongly sex segregated;
- Jobs that allow women to organize and increase their representation and voice at the workplace, community and society;

CHAPTER THREE

DATA AND METHODOLOGY

3.1 Description of Data Source and Methodology

3.1.1 The data

The data used in this research are taken from the Ethiopian Demographic and Health Survey (EDHS) conducted in 2005. The Ethiopian Demographic and Health Survey (EDHS) data were collected by CSA in collaboration with ORC Macro in 2005. The 2005 Ethiopian Demographic and Health Survey (2005 EDHS) is part of the worldwide MEASURE DHS project funded by the United States Agency for International Development (USAID). The first worldwide Demographic and health survey (DHS) was conducted in 2000. The 2005 EDHS is the second comprehensive survey conducted in Ethiopia as part of the DHS project performed. The 2005 EDHS is stratified, clustered and selected in two stages.

3.1.2 Variables Considered in the research

The response variable

The response variable considered in this research is the labor force participation of Ethiopian women of age 15-49 years. It is dichotomous and it is coded "one" if a woman during the interview is gainfully working and is "zero" when she says she is not. This means the participation variable indicates only whether a woman has a job and does not indicate her labor force participation directly. Since the labor force is the total of the employed people and those looking for work, in this study it is taken that labor force participation equals "one" regardless of whether the woman works part-time or full-time.

The predictor variables

The predictor variables selected are those raised in other literature reviews that are assumed to have important effect on the labor force participation of Ethiopian woman. The variables that are assumed to influence the prediction of the labor force participation of women are listed in Table 2.4.

Table 2.4: List of the predictor variables

No	Description of Variables	Coding
1	Age (AGE)	15-24=0 25-34=1 35-49=2
2	Type of place of residence (RESIDENCE)	Rural=0 Urban=1
3	Educational level of wife (EDUCATIONW)	No education=0 Primary =1 Secondary or higher=2
4	Number of children under the age of five(CHILDNUM5)	Discrete
5	Educational level of husband (EDUCATIONH)	No education =0 Primary=1 Secondary or higher=2

6	Pregnancy (PREGNANCY)	No=0 Yes=1
7	Region (REGION)	Tigray=1 Afar=2 Amhara=3 Oromia=4 Somali=5 Ben-Gumuz=6 SNNP=7 Gambela=8 Harari=9 Addis Ababa= 10 Dire Dawa=11
8	Religion (RELIGION)	Christian=0 Muslim=1 Other=2
9	Use of contraception methods (CONTRACEPTION)	Yes=0 No=1
10	Breastfeeding(BREASTF)	No=0 Yes=1

11	Labor force status of husband (LABORH)	Did not work=0 Government employee=1 Agricultural employee=2 Other=3
12	Total number of living children (CHILDNUM)	Discrete
13	Household size (HHSIZE)	Discrete
14	Number of years lived in place of residence (YEARSLIVED)	0-5=0 6-10=1 11-20=2 21-95=3

3.2 Methodology and Model Specification

3.2.1 The logistic regression model

Logistic regression belongs to the class of statistical models called generalized linear models. In most literatures and in many situations, logistic regression modeling is a commonly used strategy in analyzing data, which have categorical dependent variable and a mixture of continuous and categorical independent variables. Logistic regression can be classified as binary, ordinal and multinomial logistic regression depending on the category of the response variable. In this thesis, binary logistic regression modeling technique is used.

The response variable in binary logistic regression is taken to be dichotomous, such as yes/no, life/death, presence/absence, etc. We will define such a response variable as y, and denote the event $y = 1$ when the subject has the characteristic of interest and $y = 0$ when the subject does not have that characteristic. Logistic regression models the relationship between a set of explanatory variables and the probability that a case is a member of one

of the categories of the response variable. In this paper, if the probability is greater than 0.5, the case is classified in the category of interest and if the probability is less than 0.50, the case is classified in the other category.

3.2.1.1 The univariate logistic regression model

Definition

For a binary response Y, let $p(x)$ denote the "success" probability. The logistic regression model has a linear form for the logit of this probability, and it is defined as

$$\log it[P(x)] = \log\left[\frac{p(x)}{1-p(x)}\right] = \log[\exp(\alpha+\beta x)] = \alpha+\beta\, x \ldots\ldots\ldots\ldots\ldots\ldots *$$

or

$$p(x) = \frac{\exp(\alpha+\beta x)}{1+\exp(\alpha+\beta X)}$$

In particular, this is equivalent to

$$pr(y=1/x) = \frac{\exp(\alpha+\beta x)}{1+\exp(\alpha+\beta X)}$$

And hence that

$$pr(y=0/x) = 1-\left[\frac{\exp(\alpha+\beta x)}{1+\exp(\alpha+\beta x)}\right] = \frac{1}{1+\exp(\alpha+\beta x)}$$

The relationship between the predictor variable and the probability of success p(x) is not a linear function; instead, a link function is used, which is the logit transformation

$\log\left[\frac{p(x)}{1-p(x)}\right]$ of the odds ratio. Hence, logistic regression model is often called the logit model.

The results of the logistic analysis are in the form of an odds ratio. The definition of the odds of an event is given by, $\text{Odds} = \frac{p(Event)}{1-p(Event)}$. If an event occurs with success probability p, then the odds in favor of the probability of success are

$$\text{Odds} = \frac{p(x)}{1-p(x)} = \frac{\frac{\exp(\alpha+\beta x)}{1+\exp(\alpha+\beta X)}}{\frac{1}{1+\exp(\alpha+\beta x)}} = \exp(\alpha+\beta x)$$

The odds are non-negative with value greater than 1 when a success is more likely than failure. The success probability is the function of the odds. $p(x) = \frac{odds}{odds+1} = \frac{\frac{p(x)}{1-p(x)}}{\frac{p(x)}{1-p(x)}+1}$

3.2.1.2 The Multiple logistic regression model

Definition

The predictor variables in multiple regression model can be quantitative, qualitative or both types. Consider a collection of k predictor variables, which will be denoted by the vector $x' = (x_1, x_2, x_3, \cdots, x_k)$. Then the probability of success $p(x)$ that $Y = 1$ in the univariate case can be generalized to the multivariate case as

$$P(x) = \frac{\exp(\alpha + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k)}{1 + \exp(\alpha + \beta_1 x_1 + \beta_2 x_2 + \cdots \beta_k x_k)}$$

In particular, this is equivalent to

$$pr(y=1/x_1,x_2,\cdots,x_k)=\frac{\exp(\alpha+\beta_1x_1+\beta_2x_2+\cdots+\beta_kx_k)}{1+\exp(\alpha+\beta_1x_1+\beta_2x_2+\cdots\beta_kx_k)}$$

and hence,

$$pr(y=0/x_1,x_2,\cdots,x_k)=1-\frac{\exp(\alpha+\beta_1x_1+\beta_2x_2+\cdots+\beta_kx_k)}{1+\exp(\alpha+\beta_1x_1+\beta_2x_2+\cdots\beta_kx_k)}$$

$$=\frac{1}{1+\exp(\alpha+\beta_1x_1+\beta_2x_2,\cdots,\beta_kx_k)}$$

where α is the constant of the model and $\beta_1,\beta_2,\cdots,\beta_k$ are the coefficient of the predictor variables.

Performing the logit transformation on the above equation gives the multiple logistic regression model whose equation is given by

$$\log it[P(x)]=\log\left[\frac{p(x)}{1-p(x)}\right]=\alpha+\beta_1x_1+\beta_2x_2+\ldots+\beta_kx_k.$$

P(x) lies between 0 and 1 and the logit can take any real number. Applications of logistic regression have also been extended to cases where the dependent variable has more than two categories. Such type of regression is known as multinomial logistic regression.

We use the concept of odds ratio to interpret the parameters in logistic regression model. The odds ratio of Y=1 vs. Y=0 for a given set of predictor variables $(x_1,\cdots,x_k)$ is denoted by

$\text{Odds}(x_1,\cdots,x_k)=\frac{pr(y=1/x_1,\cdots,x_k)}{pr(y=0/x_1,\cdots,x_k)}$ (for example, $pr(y=1/x_1,\cdots,x_k)$=0.75 implies $\text{odds}(x_1,\cdots,x_k)=\frac{0.75}{0.25}=3$, and hence the odds of the event Y=1 occurring are 3 to 1.) and substituting the appropriate values gives

$\text{Odds}(x_1,\cdots,x_k) = \exp\left(\alpha + \sum_{J=1}^{k} \beta_j x_j\right)$ and if any explanatory variable x_j is incremented by one unit, then we see that

$$\frac{Odds(x_1,\cdots,x_i+1,\cdots,x_k)}{Odds(x_1,\cdots,x_i,\cdots,x_k)} = \frac{\exp\left(\alpha + \beta_j(x_j+1) + \sum_{l\neq j}\beta_l x_l\right)}{\exp\left(\alpha + \beta_j x_j + \sum_{l\neq j}\beta_l x_l\right)}$$

$$= \exp\left[\left(\alpha + \beta_j(x_j+1) + \sum_{l\neq j}\beta_l x_l\right) - \left(\alpha + \beta_j x_j + \sum \beta_l x_l\right)\right]$$

$$= \exp(\beta_j).$$

Hence, $\exp(\beta_j)$ is the multiplicative effect on the odds of a 1-unit increase in x_i, at fixed level of the other x's.

3.2.1.3 Fitting the model and parameter estimation

Fitting a model is a statistical procedure used for estimating the unknown parameters of the model. In linear regression model the unknown parameters are estimated using ordinary least square method whereas in generalized linear models another approach called maximum likelihood method is used for estimating the parameters. The maximum likelihood estimate of a parameter is the value that maximizes the probability of the observed data. In logistic regression, as it is part of generalized linear models, the parameters are estimated by the maximum likelihood procedure. The procedure is outlined as follows.

Let Y be the random binary variable whose value is either zero or one. The probability $P(Y = 1 / x_1,\cdots, x_k)$ is given by

$$P(Y=1/x_1,\cdots,x_k)=\frac{\exp\left(\alpha+\sum_{j=1}^{k}\beta_j x_j\right)}{1+\exp\left(\alpha+\sum_{j=1}^{k}\beta_j x_j\right)}$$

The parameters of the above equation cannot be estimated directly; rather we can apply the maximum likelihood estimation technique. To apply the technique, each observation can be considered as Bernoulli trial and by assumption that each y_i is independent, the joint distribution of the observed values can be written as

$P(Y_1=y_1,Y_2=y_2,\cdots,Y_n=y_n)=P(Y_1=y_1)P(Y_2=y_2)\cdots P(Y_n=y_n)$.

The probability of the i^{th} observation given $(x_{1i},\cdots,x_{ki})$ is given by

$P(Y=y_i/x_{1i}\cdots,x_{ki})=p_i(1-p_i)^{1-y_i}$, where $i=1,\cdots,n$ and n is the number of cases in the data.

The likelihood function for (α, β_1, β_2, $\cdots$, β_k) given $(y_1,\cdots,y_n)$ can be expressed as

$$L(\alpha,\beta_1\cdots,\beta_k/y_1,\cdots,y_n)=\prod_{i=1}^{n}p_i^{y_i}(1-p_i)^{1-y_i}$$

By substituting appropriate expressions in the above function gives

$$L(\alpha,\beta_1\cdots,\beta_k/y_1,\cdots,y_n)=\prod_{i=1}^{n}\left\{\left[\frac{\exp\left(\alpha+\sum_{j=1}^{k}\beta_j x_j\right)}{1+\exp\left(\alpha+\sum_{j=1}^{k}\beta_j x_j\right)}\right]^{y_i}\left[\frac{1}{1+\exp\left(\alpha+\sum_{j=1}^{k}\beta_j x_j\right)}\right]^{1-y_j}\right\}$$

The log of the likelihood function is given by

$$l = \log \prod_{i=1}^{n} \left\{ \left[\frac{\exp\left(\alpha + \sum_{j=1}^{k} \beta_j x_j \right)}{1 + \exp\left(\alpha + \sum_{j=1}^{k} \beta_j x_j \right)} \right]^{y_i} \left[\frac{1}{1 + \exp\left(\alpha + \sum_{j=1}^{k} \beta_j x_j \right)} \right]^{1-y_j} \right\}$$

This is equivalent to

$$l = \sum_{i=1}^{n} y_i \log \left[\frac{\exp\left(\alpha + \sum_{j=1}^{k} \beta_j x_j \right)}{1 + \exp\left(\alpha + \sum_{j=1}^{k} \beta_j x_j \right)} \right] + \sum_{j=1}^{n} (1 - y_i) \log \left(\frac{1}{1 + \exp(\alpha + \beta_j x_j)} \right)$$

The estimates of the unknown parameters of the above equation are obtained by maximizing the equation with respect to each of the parameters. However, the equation does not have an analytical solution. The estimates can be found by maximizing the equation using iterative techniques such as Newton-Raphison method (Sharma, 1996). Iterative techniques are programmed in logistic regression packages like SPSS, STATA and SAS.

3.2.1.4 Model selection criteria

The goal of logistic regression is to correctly predict the category of the outcome for individual cases using the most parsimonious model. To accomplish this goal, a model is created that includes all variables that are useful in predicting the response variable. The criteria for inclusion of a variable in a model may vary from one problem to the next and from one scientific discipline to another. For instance, a model with several predictors

has the potential for multicollinearity. Strong correlations among predictors make it seem that no one variable is important when all the others are in the model. A variable may seem to have little effect simply because it "overlaps" considerably with other predictor variables in the model (See Agresti, 1996).

As described by Hosmer and Lemeshow (1989), there are certain steps that can be followed in the selection of variables for a logistic regression model. First, the selection process should begin with a careful univariate analysis of each of the variables. For this purpose, the Pearson's chi-square and/or the likelihood ratio chi-square tests may be used. Up on completion of the univariate analysis we select variables for the multiple logistic regression analysis. Any variable whose univariate test has a p-value < 0.05 should be considered as a candidate for multiple logistic regression analysis. Finally, following the fit of the multiple logistic regression model, the importance of each variable included in the model should be verified. This should include an examination of the Wald statistic for each of the variables and the comparison of each estimated coefficient with the coefficient from the univariate model containing only that variable. Variables that do not contribute to the model based on these criteria should be eliminated and a new model will be fitted. The new model should be compared to the old model through the likelihood ratio test. Also, the estimated coefficient for the remaining variables should be compared to those from the full model.

Another approach to variable selection is to use stepwise selection procedure. Stepwise selection of variables has been widely used in linear regression. In this method, variables are selected for either inclusion or exclusion from the logistic regression model in a sequential fashion based on statistical criterion that checks for the "importance" of variables. The "importance" of variables is defined in terms of a measure of the statistical significance of the coefficient for the variable. In stepwise selection procedure, backward selection and/or forward selection procedures are used

In backward elimination procedure, we start with a model that contains all the predictors and we systematically remove the largest non-significant p-value terms until we are left with a subset that consists of entirely statistically significant terms. Backward regression

appears to be the preferred method of exploratory analyses, where the analysis begins with a full or saturated model and variables are eliminated from the model in an iterative process. The fit of the model is tested after the elimination of each variable to ensure that the model still adequately fits the data. When no more variables can be eliminated from the model, the analysis has been completed.

The foreword selection procedure starts with no predictors in the model and examines each term that could be possibly added and then add the most significant predictor, or the predictor with the smallest p-value. In the next stage, the procedure adds the next most significant term and checks to see if any previous terms are now non-significant and removes them if they are not significant. This procedure continues until there are no further significant terms to be added. Therefore, unlike backward elimination, this procedure builds the model by adding terms.

The Pearson chi-square statistic

Pearson's chi-square is by far the most common type of chi-square significance test. This statistic is used to test the hypothesis of no association of columns and rows in tabular data. A chi-square probability of .05 or less is commonly used for rejecting the null hypothesis that the row variable is unrelated (that is, only randomly related) to the column variable (Stat notes, 2006). It is the sum of observed minus expected count squared and divided by the expected or the Pearson's X^2 statistic has the form

$$X^2 = \sum \left[\frac{(Observed - fitted)^2}{fitted} \right] = \sum \left[\frac{(y_i - m_i)^2}{m_i} \right]$$

where y_i is the observed count and m_i is the expected count in the i^{th} category.

3.2.1.5 Assessing the fit of the model

After fitting the multiple logistic regression model using the selected predictor variables, the next step is to assess the overall fit of the model to the data. Suppose we denote the observed data sample values of the response variable are in vector form as.

$$y' = (y_1, y_2, y_3, \cdots, y_n)$$

And the fitted values as $\hat{y}$,

$$\hat{y}' = (\hat{y}_1, \hat{y}_2, \hat{y}_3, \cdots, \hat{y}_n).$$

A number of statistics can be used for the process of assessment of the model. In testing the hypothesis that the model fits the data, the two commonly used approaches are Pearson's X^2 statistic and the likelihood-ratio statistic (G^2).

The likelihood ratio chi-square statistic

The likelihood ratio chi-square (G^2) statistic is the test statistic commonly in use for assessing the overall fit of the logistic regression model. The likelihood ratio test, also called the log-likelihood test, is based on -2 LL (deviance). The likelihood ratio statistic is obtained by subtracting the deviance (-2 LL) for the final (full) model from the deviance for the intercept only model. This likelihood-ratio test uses the ratio of the maximized value of the likelihood function for the full model (L_1) over the maximized value of the likelihood function for the simpler model (L_0). The likelihood-ratio test statistic is given by

$$G^2 = -2\log\left(\frac{L_0}{L_1}\right) = -2[\log(L_0) - \log(L_1)] = -2LL_0 - (-2LL_1),$$

where LL_0 is the log likelihood value of the model which have the intercept term only and LL_1 is the log likelihood value of the full model. The likelihood ratio statistic has a chi-square distribution and it tests the null hypothesis that all population logistic regression coefficients except the constant are zero. The degrees of freedom in this test equal the number of terms in the full model minus 1 (for the constant). This is the same as the difference in the number of terms between the two models, since the null model has only one term. A finding of significance (p<=0.05) leads to rejection of the null hypothesis that all of the predictor effects are zero. When this likelihood test is significant, at least one of the predictors is significantly related to the response variable.

The Hosmer and Lemeshow statistic

Hosmer and Lemeshow (1989) proposed a statistic, which is constructed by first breaking the data set into roughly 10 groups. The groups are formed by ordering the existing data by the level of their predicted probabilities. That is, in the first group $n_1' = \frac{n}{10}$ subjects having the smallest estimated probabilities is incorporated and in the last group contains $n_{10}' = \frac{n}{10}$ subjects having the largest estimated probabilities. From each group the observed and expected number of events is computed. The Hosmer and Lemeshow test statistic is given by

$$\hat{C} = \sum_{k=1}^{g} \frac{(O_k - E_k)^2}{V_k},$$

where O_k and E_k are the observed and expected number of events in the k^{th} group and V_k is variance correction factor for the k^{th} group. The equivalent form of the test statistic is

$$\hat{C} = \sum_{k=1}^{g} \frac{(o_k - n_k' \bar{p}_k)^2}{n_k' \bar{p}_k (1 - \bar{p}_k)},$$

with n'_k as is the number of covariate patterns in the k^{th} group.

$$o_k = \sum_{j=1}^{n'_k} y_j ,$$

the number of responses among the n'_k covariate patterns, and

$$\overline{p}_k = \sum_{j=1}^{n'_k} \frac{m_j \hat{p}_j}{n'_k} ,$$

the average estimated probability (See Hosmer and Lemeshow, 1989). If the observed number of events is not different from what is expected by the model, the statistic $\hat{C}$ will be small and there will be an evidence not to reject the null hypothesis. That is, if the p-value of the Hosmer and Lemeshow goodness-of-fit test statistic is greater than 0.05, we fail to reject the null hypothesis that there is no difference between observed and model-predicted values, implying that the model's estimates fit the data at an acceptable level. This statistic has approximate chi-squared distribution with g-2 degrees of freedom, where g is the number of groups formed.

The Wald statistic

The Wald statistic is an alternative test, which is commonly used to test the significance of individual logistic regression coefficients for each independent variable (that is, to test the null hypothesis in a logistic regression model that a particular logit coefficient is zero). This test is based on the behavior of the log-likelihood function at the maximum likelihood estimate $\left(\hat{\beta}_i\right)$ of the parameters of the model. The Wald statistic, Z^2 is the squared ratio of the logistic coefficient to its standard error

$$Z^2 = \left[\frac{\hat{\beta}_i}{SE\left(\hat{\beta}_i\right)}\right]^2$$

This statistic has a chi-squared distribution.

3.2.1.6 Outliers and Influential Cases

The actual probability of the response variable for any case in binary logistic regression is either 1.0 or 0.0. The residual is the difference between the actual probability and the predicted probability for a case. The residual can be standardized by dividing it by an estimate of its standard deviation. If a case has a standardized residual larger than 3.0 or smaller than -3.0, it is considered as an outlier.

Leverage values are used for detecting observations that have a large impact on the predicted probabilities of the logistic regression. It is bounded between 0 (No influence on the model and 1 (Completely determines the model). The leverage of any given case may be compared to the average leverage, which equals $\frac{p}{n}$, where $p = \frac{(k+1)}{n}$, k is the number of independents and n is the sample size (Stat notes, 2006).

Another diagnostic measure is Cook's distance. Cook's distance is a measure of the influence of a case and it tests how much deleting a given case affects residuals for all other cases. Cook's distance depends on the standardized residual for a case as well as its leverage. The statistic is given by.

Cook's $D_i = \frac{Z_i h_i}{(1-h_i)^2}$, where Z_i is the standardized residual and h_i is the leverage. In logistic regression, a case is identified as influential if its Cook's distance is greater than 1.0 (Hosmer and Lemeshow, 1989). If the model excluding outliers and influential cases has a classification accuracy rate that is better than the baseline model, we will interpret the revised model.

3.2.1.7 Assumptions in the logistic regression model

- Logistic regression assumes meaningful coding of the variables. It will be difficult to interpret logistic regression coefficients if variables are not coded meaningfully.
- Logistic regression assumes the exclusion of all irrelevant variables and the inclusion of all relevant variables in the model. If causally irrelevant variables are included in the model, the common variance they share with included variables may be wrongly attributed to the irrelevant variables.
- In logistic regression, error terms are assumed to be independent. Violations of this assumption can have serious effects. Violations will occur, for instance, in correlated samples and repeated measures designs, such as before-after or matched-pairs studies, cluster sampling, or time-series data.

CHAPTER FOUR

STATISTICAL DATA ANALYSIS

4.1 Introduction

The response variable considered in this research is the work status or the labor force participation of married Ethiopian women of age 15-49 years. This variable is coded as "LABOR" and the value "one" is assigned if a woman during the interview was participating in the labor force. Otherwise, it is assigned "zero" if she was not participating. The data used in this paper are taken from the Ethiopian Demographic and Health Survey (EDHS) conducted in 2005 by the Central Statistical Agency (CSA) and the American organization ORC Macro. The 2005 EDHS is stratified, clustered and selected in two stages and it comprises 8,438 married women data. After removing cases which have incomplete information on the variables, the analysis is based on 8,289 women data taken from all regions of Ethiopia: Tigray, Afar, Amhara, Oromia, Somali, Benshangul-Gumuz, Southern Nations Nationalities and People (SNNP) region, Gambela, Harari, Addis Ababa, and Dire Dawa.

The percentage of labor force participation and non-participation across regions is summarized in the following table.

Table 4.1: Labor force participation of women by region

Region		Labor force participation		Total
		No (%)	Yes (%)	
Tigray	Number	580	175	755
	Percentage	76.8	23.2	100%

Afar	Number	564	35	599
	Percentage	94.2	5.8	100%
Amhara	Number	965	296	1261
	Percentage	76.5	23.5	100%
Oromia	Number	997	433	1430
	Percentage	69.7	30.3	100%
Somali	Number	446	39	485
	Percentage	92	8	100%
Ben-gumuz	Number	408	199	607
	Percentage	67.2	32.8	100%
SNNP	Number	1042	277	1319
	Percentage	79	21	100%
Gambela	Number	366	119	485
	Percentage	75.5	24.5	100%
Harari	Number	293	168	461
	Percentage	63.6	36.4	100%
AddisAbaba	Number	277	126	403
	Percentage	68.7	31.3	100%
Dire Dawa	Number	277	126	403
	Percentage	68.7	31.3	100%

From the 8,289 married women considered in the analysis, 6,223 women were not participating in the labor force whereas 2,066 Ethiopian women were participating. In the year 2005, the overall participation of Ethiopian women in the labor force was only 24.9%. As described in Table 4.1, the participation rate varies from one region to another. This might be due the variations in job opportunities, ethnic characteristics and ways of living across the regions of Ethiopia. Women in the Afar and Somali regions have shown the lowest percentage of participation which is 5.8% and 8.0%, respectively (See Table 4.1) while the Harari region has shown the highest participation rate (36.4%).

Table 4.2: Labor force participation of women by socio-demographic characteristics

Socio-demographic factors		Number of participants	Percentage of participants
Age of woman	(0) 15-24	404	19.6%
	(1) 25-34	846	40.9%
	(2) 35-49	816	39.5%
Place of residence	(1) Urban	625	30.3%
	(2) Rural	1441	69.7%
Pregnancy	(0) No	1884	91.2%
	(1) Yes	182	8.8%
Breastfeeding	(0) No	1211	58.6%
	(1) Yes	855	41.4%
Labor force status of husband	(0) Doesn't work	17	0.8%
	(1) Agric-employee	1333	64.5%
	(2) Others	548	26.5%
	(3) Prof., Tech., Manag.	168	8.1%

Years lived in place of residence	(0) 0-5	228	11.0%
	(1) 6-10	226	10.9%
	(2) 11-20	330	16.0%
	(3) >20	1282	62.1%
Educational level	(0) No education	1345	65.1%
	(1) primary	338	16.4%
	(2) Secondary or higher	383	18.5%
Educational level of husband	(0) No education	1004	48.6%
	(1) primary	553	26.8%
	(2) Secondary or higher	509	24.6%
Religion	(0) Orthodox	1027	50.0%
	(1) Muslim	626	30.3%
	(2) Protestant and Catholic	335	16.2
	(3) Traditional and others	78	3.8%
Use of contraception methods	(0) No	1541	74.6%
	(1) Yes	525	25.4%
Total number of living children	Discrete	2066	100%
Number of children under the age of five	Discrete	2066	100%
Number of members in the household	Discrete	2066	100%

4.2 Univariate analysis

A preliminary assessment is made to see the existence of the expected relationship between each predictor variables and the response variable 'labor force participation'. For this purpose, the Pearson chi-squared test statistic is used.

The predictor variables considered in the univariate analysis are:

- Age of woman (AGE)
- Type of place of residence (RESIDENCE)
- Pregnancy (PREGNANCY)
- Breastfeeding (BREASTF)
- Labor force status of husband (LABORH)
- Years lived in place of residence (YEARSLIVED)
- Educational level (EDUCATIONW)
- Educational level of husband (EDUCATIONH)
- Religion (RELIGION)
- Region (REGION)
- Household size (HHSIZE)
- Number of children under the age of five (CHILD5)
- Total number of living Children (CHILDNUM)
- Use of contraceptive methods (CONTRACEPTION)

These variables are selected for inclusion in the univariate analysis based on the findings of previous researches and the logic of their expected relationships with the labor-force participation of Ethiopian women.

To see the relationship of the predictor variables with the labor force participation, Pearson chi-square test is conducted and the result is summarized in Table 4.3.

Table 4.3: Summary of Pearson chi-square test

Variable	Pearson chi-square	DF	Asymptotic significance
Age(AGE)	55.750	2	.000
Place of residence(RESIDENCE)	227.515	1	.000
Pregnancy(PREGNANCY)	26.944	1	.000
Breast feeding(BREASTF)	43.027	1	.000
Labor force status of husband(LABORH)	179.152	3	.000
Years lived in place of residence(YEARSLIVED)	16.368	3	0.001
Educational level(EDUCATIONW)	218.930	2	.000
Educational level of husband(EDUCATIONH)	150.438	2	.000
Region (REGION)	355.079	10	.000
Religion of woman(RELIGION)	92.730	2	.000
Total number of living children (CHILDNUM)	21.530	13	.063
Household size(HHSIZE)	29.316	17	.032
Number of children under the age of five(CHILD5)	70.885	5	.000
Use of contraception (CONTRACEPTION)	133.832	1	.000

The test results in Table 4.3 show that there is no significant association between CHILDNUM and the dependent variable labor force participation. Moreover, the variable CHILDNUM is found to be correlated with HHSIZE and CHILDNUM at .01 level of significance. Hence, CHILDNUM will not be included in the multiple logistic regression analysis.

4.3 Multiple logistic regression analysis

Among the determining factors proved in the univariate analysis, all the variables : Age of woman (AGE), Place of residence (RESIDENCE), pregnancy (PREGNANCY), breastfeeding (BREASTF), educational level of wife (EDUCATIONW), educational level of husband (EDUCATIONH), religion (RELIGION), region (REGION), use of contraception methods (CONTRACEPTION), Years lived in place of residence (YEARSLIVED), the labor force status of the husband (LABORH), the size of the Household (HHSIZE) and number of children under the age of five (CHILDNUM5), are found to be significant using the stepwise likelihood ratio test of the multiple logistic regression procedure.

Assessing Model Fit

After the logistic regression model is formed using the selected predictor variables in the forward likelihood ratio selection procedure, the first step is to assess the overall fit of the model to the data.

The likelihood ratio chi-square test

As discussed in the methodology part, the log likelihood statistic (-2LL) can be used for assessing the significance of logistic regression model. The SPSS output for the multiple logistic regression model provides two likelihood ratio statistics: one for a model that includes the intercept term and the other for a model that includes the intercept and all the

predictors selected in the final model. The log likelihood statistic is computed by the formula.

$$G^2 = -2\log\left(\frac{L_0}{L_1}\right) = -2(L_0 - L_1) = -2LL_0 - (-2LL_1)$$

The log likelihood values for the simpler model ($-2LL_0$) and the full model ($-2LL_1$) are given as

$-2LL_0 = 9308.634$ and

$-2LL_1 = 8595.318$

Hence, $G^2 = 9308.634 - 8595.318 = 713.316$ with p-value of 0.000.

The statistic is highly significant at 31 degrees of freedom and we can say that our model is significantly different from the one with a constant only.

Hosmer and Lemeshow Test

As described in the methodology part, the other recommended test for overall fit of a logistic regression model is the Hosmer and Lemeshow test, also called the chi-square test. The Hosmer and Lemeshow goodness of fit test divides cases into deciles based on predicted probabilities (See Table 4.5), and then computes the chi-square value from observed and expected frequencies (See Table 4.4). The SPSS output in Table 4.4 shows the non-significance of the chi-square value. Hence, we do not reject the null hypothesis that there is no difference between the observed and the model predicted values at 5 percent level of significance. We then conclude that the model adequately fits the data.

Table 4.4: Hosmer and Lemeshow test

Step	Chi-square	DF	Sig.
1	10.385	8	.239

Table4.5: Contingency Table for Hosmer and Lemeshow Test

	Labor force participation = No		Labor force participation = Yes		Total
Step1	Observed	Expected	Observed	Expected	
1	791	783.415	38	45.585	829
2	707	726.839	123	103.161	830
3	696	687.452	133	141.548	829
4	676	667.011	155	163.989	831
5	627	645.915	203	184.085	830
6	637	623.770	193	206.230	830
7	587	599.092	242	229.908	829
8	577	568.741	252	260.259	829
9	524	516.943	306	313.057	830
10	401	403.822	421	418.178	822

Classification tables are 2 x 2 tables in the logistic regression output for a dichotomous response and report correct and incorrect estimates obtained by the logistic regression model. The columns are the two predicted values of the response variable, while the rows are the two observed (actual) values. In a perfect model, it is supposed that all cases will be on the diagonal and the overall percent will be 100%. Our model shows a good percentage of correct predictions (75.8 percent) for the participation of Ethiopian women in the labor force (See Table 4.6).

Classification tables should not be used as goodness-of-fit measures because they ignore actual predicted probabilities and instead use dichotomized predictions based on a cutoff .50 value. In predicting a 1 or 0 dependent, the classification table does not reveal how

close to 1.0 or 0.0 the correct predictions were. A model in which the predictions were mostly close to the .50 cutoff value does not have as good a fit as a model where the predicted scores clustered either near 1.0 or 0.0.

Table 4.6: Classification table

Observed		Predicted		
		Labor force participation		Percentage Correct
		No	Yes	
Labor force participation	No	6055	168	97.3
	Yes	1841	225	10.9
Overall Percentage				75.8

The cut value is .500

Omnibus test of model coefficients

Omnibus test of model coefficients in SPSS out put tests if the model with the predictors is significantly different from the model with only the intercept. The chi-squared value for this test given in Table 4.7 is significant at 0.05 level and hence, we can say that all predictors in the model jointly predict the participation of Ethiopian women in the labor force.

Table 4.7: Omnibus test of model coefficients

		Chi-square	DF	Sig.
Step 1	Step	713.316	31	.000
	Block	713.316	31	.000
	Model	713.316	31	.000

When predictors are entered in steps, the Hosmer-Lemeshow and omnibus tests may also be interpreted as tests of the change in model significance when adding a variable stepwise to the model (See the Appendix).

Table 4.8: Categorical Variables Coding

		Frequency	Parameter coding									
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Region	Tigray	755	1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Afar	599	.000	1.000	.000	.000	.000	.000	.000	.000	.000	.000
	Amhara	1261	.000	.000	1.000	.000	.000	.000	.000	.000	.000	.000
	Oromia	1430	.000	.000	.000	1.000	.000	.000	.000	.000	.000	.000
	Somali	485	.000	.000	.000	.000	1.000	.000	.000	.000	.000	.000
	Ben-Gumuz	607	.000	.000	.000	.000	.000	1.000	.000	.000	.000	.000
	SNNP	1319	.000	.000	.000	.000	.000	.000	1.000	.000	.000	.000
	Gambela	485	.000	.000	.000	.000	.000	.000	.000	1.000	.000	.000
	Harari	461	.000	.000	.000	.000	.000	.000	.000	.000	1.000	.000
	Addis Ababa	484	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.000
	Dire Dawa	403	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Religion	Orthodox	3532	1.000	.000	.000							
	Moslem	3117	.000	1.000	.000							
	Protestant And Catholic	1435	.000	.000	1.000							
	Traditional and others	205	.000	.000	.000							
Labor force status of husband	Didn't work	73	1.000	.000	.000							
	Agric-employee	6206	.000	1.000	.000							
	others	1626	.000	.000	1.000							
	Prof., Tech., Manag.	384	.000	.000	.000							

Years lived in place of residence	0-5	1097	1.000	.000	.000								
	6-10	966	.000	1.000	.000								
	11-20	1201	.000	.000	1.000								
	>20	5025	.000	.000	.000								
Educational level	No education	6180	1.000	.000									
	Primary	1258	.000	1.000									
	Secondary or higher	851	.000	.000									
Age of woman	15-24	2104	1.000	.000									
	25-34	3308	.000	1.000									
	35-49	2877	.000	.000									
Educational level of husband	No education	4871	1.000	.000									
	Primary	2010	.000	1.000									
	Secondary or higher	1408	.000	.000									
Type of place of residence	Urban	1573	1.000										
	Rural	6716	.000										
Breast feeding	No	4341	1.000										
	Yes	3948	.000										
Pregnancy	No	7292	1.000										
	Yes	997	.000										
Use of contraception methods	No	6871	1.000										
	Yes	1418	.000										

The chi-square values of the Wald statistic, standared errors and p-values for the parameter estimates (β) and the odds ratio ($Exp(\beta)$) are given in Table 4.9 for each of the variables selected in the final logistic regression model.

Table 4.9: Variables in the final model

	β	S.E.	Wald	df	Sig.	$Exp(\beta)$
AGE			45.985	2	.000	
AGE(1)	-.547	.088	39.026	1	.000	.578
AGE(2)	-.093	.070	1.795	1	.180	.911
RESIDENCE(1)	.334	.119	7.831	1	.005	1.397
YEARSLIVED			9.296	3	.026	
YEARSLIVED(1)	-.258	.089	8.360	1	.004	.772
YEARSLIVED(2)	-.121	.089	1.818	1	.178	.886
YEARSLIVED(3)	-.086	.078	1.230	1	.267	.917
EDUCATIONW			13.944	2	.001	
EDUCATIONW(1)	-.439	.121	13.134	1	.000	.645
EDUCATIONW(2)	-.392	.117	11.239	1	.001	.676
PREGNANCY(1)	.366	.097	14.400	1	.000	1.443
CONTRACEPTION(1)	-.214	.074	8.384	1	.004	.808
BREASTF(1)	.167	.073	5.189	1	.023	1.182
EDUCATIONH			10.731	2	.005	
EDUCATIONH(1)	.047	.106	.195	1	.659	1.048
EDUCATIONH(2)	.241	.100	5.796	1	.016	1.272

LABORH			8.087	3	.044	
LABORH(1)	-.435	.316	1.901	1	.168	.647
LABORH(2)	-.411	.156	6.949	1	.008	.663
LABORH(3)	-.179	.131	1.872	1	.171	.836
RELIGION			24.618	3	.000	
RELIGION(1)	-.678	.161	17.682	1	.000	.508
RELIGION(2)	-.764	.160	22.701	1	.000	.466
RELIGION(3)	-.753	.163	21.376	1	.000	.471
CHILDNUM5	-.065	.042	2.402	1	.121	.937
HHSIZE	-.039	.015	6.848	1	.009	.961
REGION			200.830	10	.000	
REGION(1)	.070	.159	.195	1	.659	1.073
REGION(2)	-1.417	.215	43.607	1	.000	.242
REGION(3)	.151	.148	1.038	1	.308	1.163
REGION(4)	.500	.137	13.207	1	.000	1.648
REGION(5)	-1.059	.208	25.791	1	.000	.347
REGION(6)	.607	.154	15.580	1	.000	1.834
REGION(7)	-.059	.149	.155	1	.694	.943
REGION(8)	.098	.169	.333	1	.564	1.102
REGION(9)	.371	.153	5.885	1	.015	1.449
REGION(10)	.028	.151	.035	1	.852	1.028

Outliers and influential cases

The impact of outliers and influential cases on our final logistic regression model is assessed by excluding outliers (whose standardized residual is greater than 3.0 or less than 3.0) and influential cases (whose Cook's distance is greater than 1.0). The SPSS output result in the Appendix shows that there are 51 cases that are being considered as both outliers and influential. After removing these cases from the data, we fit another model to see their impact on the classification table. The result in Table 4.10 shows, the absence of these outliers and influential cases from the data improves the percentage of correct classification from 75.8% to 76.1%. This result does not lead us to reject the outliers and influential cases from the data and fit another model using the remaining 8,238 cases. Hence, the presence of outliers and influential cases in the data do not affect the adequacy of our model

Table 4.10: Classification table in the absence of outliers and influential cases

Observed		Predicted		
		Labor force participation		Percentage Correct
		No	Yes	
Labor force participation	No	6036	187	97.0
	Yes	1783	232	11.5
Overall Percentage				76.1

The cut value is .500

4.4 Interpretation and discussion of the results

The significant variables that influence the participation of Ethiopian women in the labor force are selected using forward likelihood ratio method in multiple logistic regression. These variables are:

- AGE

- RESIDENCE
- EDUCATIONW
- PREGNANCY
- CONTRACEPTION
- BREASTF
- EDUCATIONH
- RELIGION
- REGION
- CHILDNUM5
- HHSIZE
- LABORH
- YEARSLIVED

In the analysis, the women's age is represented by three categories: 15-24 (1), 25-32(2), and 33-49. Here our reference category is taken to be married women with age group 33-49. As summarized in Table 4.9, the labor force participation of women with age group 15-24 is less than that of the older age group (Odds ratio=.578).

Though most Ethiopian married women (about 81 percent) are living in rural areas, their participation in the labor force is less than that of the women who live in urban areas. As indicated in Table 4.9, the odds of participation of women living in urban areas is much higher (odds ratio=1.397) than those who live in rural areas. The result shows that Ethiopian women who live in urban areas have a better chance to participate in the labor force than those who live in rural areas.

The number of years a woman lived in a given area has also influence on the participation in the labor force. Table 4.9 shows those women who lived 0 to 5 years in an area show less participation (Odds ratio=.772) in the labor force than those who permanently lived

in the area. Hence, migration has negative effect on the participation of Ethiopian women in the labor force

One of the most expected results of the analysis is the impact of education on the participation of Ethiopian women in the labor force. As it is well-known and other researches show, the impact of education on the participation of Ethiopian women in the labor force is positive. This study also strengthens this well-known fact. The SPSS output in Table 4.9 shows, the participation of Ethiopian women with no education is less than that of above high school educated women (Odds ratio=.645) and the participation of those with primary education is low (Odds ratio=.676) as compared to above high school educated women. For Ethiopian women, education above high school level is found to be critical and most important for their participation in the labor force.

The educational level of the husband with primary level has also influence on the participation of Ethiopian women in the labor force. Table 4.9 shows Ethiopian women whose husbands have primary education has better participation (odds ratio=1.272) than those women whose husbands have a high school and above education and those women whose husbands are agricultural employee show less participation rate (Odds ratio=.663).

It is obvious and expected that pregnancy and breastfeeding have negative impacts on the labor force participation of a woman. Women who are not breastfeeding have more chance (Odds ratio=1.182) of participation than those mothers who are breastfeeding. As it is shown in Table 4.9, this study also reaffirms this fact. It is found that the non-pregnant women have a better participation rate (odds=1.443) than pregnant women.

Different studies have shown that the use of contraception methods can increase women's participation in the labor force. This study also found the same result. In the analysis, it is found that those Ethiopian women who do not use contraception methods are less in their participation (Odds ratio=.808) than those who use the methods.

The unexpected result obtained in this study is the impact of religion on labor force participation of Ethiopian women. As compared to those who follow traditional faith and other religions, the Ethiopian woman who follow Coptic Christianity, Islam, Protestantism and Catholicism show less participation in the labor force.

Less participation of those women who believe in the dominant religions of Ethiopia may be due to the high participation of the 205 (9.8 percent) women who follow traditional and other faiths.

In the introduction part of this chapter, it was pointed out that in the Afar and Somali regions the participation of women in the labor force is by far lower than those living in the other regions of Ethiopia. This fact is also reaffirmed in the multiple logistic analysis. As Table 4.9 shows, the labor force participation of women living in the Afar region is lower (Odds ratio=.245) than those women who live in Dire Dawa administrative zone. The same is true for women living in the Somali, Harar, Benshangul-gumuz and Oromia regions. Table 4.9 shows the labor force participation of women living in Somali, Harar, Benshangul-Gumuz and Oromia regions is lower than those women living in Dire Dawa administrative council.

The number of members in the household has also influence on the participation of Ethiopian women in the labor force. Table 4.9 shows for each additional person in the household, the participation of the women in the labor force can decrease by 96.1 percent.

The last variable, which is expected to have a big impact on the participation of Ethiopian women in the labor force is the number of children in the household under the age of five. Table 4.9 shows for each additional child under the age of five in the household, the participation of a woman in the labor force can decrease by 82.1 percent.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary and conclusion

In this study, attempts were made to examine the effect of selected socio-demographic factors on the participation of Ethiopian women in the labor force. The study is made on Ethiopian married women of age 15-49 years. The data are taken from the Ethiopian Demographic and Health Survey (EDHS) conducted in 2005 by the Central Statistical Agency (CSA) and the American organization ORC Macro. The analysis was done based on 8,289 cases. It was observed that only 2,066 women participated in the labor force. This gives the overall participation rate of 24.9 percent.

Multiple logistic regression model was used to analyze the combined effect of the selected factors on the participation of Ethiopian women in the labor force. The labor force status (work status) of women was taken to be the response variable in the analysis.

The variables that are believed to affect the participation of Ethiopian women in the labor force are: Age of the woman (AGE), Type of place of residence (RESIDENCE), Pregnancy (PREGNANCY), Breastfeeding (BREASTF), Labor force status of the husband (LABORH), Years lived in place of residence (YEARSLIVED), Educational level of a woman (EDUCATIONW), educational level of the husband (EDUCATIONH), Religion (RELIGION), Region (REGION), Use of contraception methods (CONTRACEPTION), Number of children under the age of five (CHILDNUM5), Total number of children in a household (CHILDNUM) and the number of members in the household (HHSIZE).

Among these variables, CHILDNUM has no effect on the labor force participation of Ethiopian women at the .05 level of significance. The forward likelihood ratio test in multiple logistic regression procedure selects the following significant variables in the final step: AGE, RESIDENCE, PREGNANCY, BREASTF, CHILDNUM5, EDUCATIONW, EDUCATIONH, YERSLIVED, LABORH, RELIGION, REGION, HHSIZE and CONTRACEPTION.

The findings show that the Ethiopian women who live in the urban areas have a better chance of participation in the labor force than those who live in the rural areas whereas migration has negative effect on participation of women in the labor force. It is also seen that the increase in participation is higher for those women in the older age groups (34-49) than those in the younger age groups.

The study also shows that educational level of a woman and her husband has a positive impact on her participation in the labor force. Specifically, high school level or above high school level education contributes much to women's participation in the labor force. Uneducated women have less participation in the labor force than those who have some education. Those Ethiopian women whose husbands are agricultural employee show less participation in the labor force.

In the study it is also proved that women's who live in the Afar, Somali, Oromia, Benshangul-Gumuz and Harar regions show less participation rate as compared with those who live in the Dire Dawa administrative zone.

Use of contraceptive methods increases the participation of Ethiopian women in the labor force whereas the impacts of pregnancy and breastfeeding are found to be negative.

It is also found that Ethiopian women participation in the labor force is found to have inverse relationship with the increased number of children under the age of five and the increased number of members in the household.

The participation of women who are followers of the dominant religions in Ethiopia (Christianity or Islam) is less than those who follow traditional and other faiths.

The results of this study, on the whole, do not differ substantially from those obtained by researchers in other countries.

In general, the participation of Ethiopian women in the labor force could be attributed to access to better education above high school level, avoiding marriage at early ages, creating awareness in using contraceptive methods and other factors that might be related to modernization.

5.2 Recommendations

To increase the participation of Ethiopian women in the labor force and thereby improve their status and position in the society, policy makers, planners, governmental and non-governmental organizations and other concerned bodies would be advised to adopt the following list of measures and make them practical in all regions of Ethiopian, particularly in the Afar, Somali and SNNP regions.

1. Taking actions that would decrease female dropouts and increase their proportion in the educational institutions, specifically at high school or above high school levels.
2. Creating awareness about the use of contraceptive methods and family planning techniques.
3. Taking actions that would increase age at first marriage.
4. To give longer maternal leave for women who work in different companies, including private institutions.
5. Facilitating jobs that allow equal participation of women with that of men in all areas with the same qualifications.

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APPENDIX

A. UNIVARIATE SUMMARY TABLES

Crosstab

			Labor force participation		
			No	Yes	Total
Age of woman	15-24	Count	1700	404	2104
		% within Labor force participation	27.3%	19.6%	25.4%
	25-34	Count	2462	846	3308
		% within Labor force participation	39.6%	40.9%	39.9%
	35-49	Count	2061	816	2877
		% within Labor force participation	33.1%	39.5%	34.7%
Total		Count	6223	2066	8289
		% within Labor force participation	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	55.750[a]	2	.000
Likelihood Ratio	57.403	2	.000
Linear-by-Linear Association	52.365	1	.000
N of Valid Cases	8289		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 524.41.

Crosstab

			Labor force participation		
			No	Yes	Total
Type of place of residence	Urban	Count	948	625	1573
		% within Labor force participation	15.2%	30.3%	19.0%
	Rural	Count	5275	1441	6716
		% within Labor force participation	84.8%	69.7%	81.0%
Total		Count	6223	2066	8289
		% within Labor force participation	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	227.515[b]	1	.000		
Continuity Correction[a]	226.539	1	.000		
Likelihood Ratio	210.973	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	227.488	1	.000		
N of Valid Cases	8289				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 392.06.

Crosstab

			Labor force participation		
			No	Yes	Total
Years lived in place of residence	0-5	Count	869	228	1097
		% within Labor force participation	14.0%	11.0%	13.2%
	6-10	Count	740	226	966
		% within Labor force participation	11.9%	10.9%	11.7%
	11-20	Count	871	330	1201
		% within Labor force participation	14.0%	16.0%	14.5%
	>20	Count	3743	1282	5025
		% within Labor force participation	60.1%	62.1%	60.6%
Total		Count	6223	2066	8289
		% within Labor force participation	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.368[a]	3	.001
Likelihood Ratio	16.702	3	.001
Linear-by-Linear Association	9.801	1	.002
N of Valid Cases	8289		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 240.77.

Crosstab

			Labor force participation		
			No	Yes	Total
Educational level	No education	Count	4835	1345	6180
		% within Labor force participation	77.7%	65.1%	74.6%
	Primary	Count	920	338	1258
		% within Labor force participation	14.8%	16.4%	15.2%
	Secondary or higher	Count	468	383	851
		% within Labor force participation	7.5%	18.5%	10.3%
Total		Count	6223	2066	8289
		% within Labor force participation	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	218.930[a]	2	.000
Likelihood Ratio	197.813	2	.000
Linear-by-Linear Association	198.807	1	.000
N of Valid Cases	8289		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 212.11.

Crosstab

			Labor force participation		
			No	Yes	Total
Pregnancy	No	Count	5408	1884	7292
		% within Labor force participation	86.9%	91.2%	88.0%
	Yes	Count	815	182	997
		% within Labor force participation	13.1%	8.8%	12.0%
Total		Count	6223	2066	8289
		% within Labor force participation	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	26.944[b]	1	.000		
Continuity Correction[a]	26.540	1	.000		
Likelihood Ratio	28.591	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	26.940	1	.000		
N of Valid Cases	8289				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 248.50.

Crosstab

			Labor force participation		
			No	Yes	Total
Use of contraception methods	No	Count	5330	1541	6871
		% within Labor force participation	85.7%	74.6%	82.9%
	Yes	Count	893	525	1418
		% within Labor force participation	14.3%	25.4%	17.1%
Total		Count	6223	2066	8289
		% within Labor force participation	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	133.832[b]	1	.000		
Continuity Correction[a]	133.053	1	.000		
Likelihood Ratio	125.063	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	133.815	1	.000		
N of Valid Cases	8289				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 353.43.

Crosstab

			Labor force participation		
			No	Yes	Total
Breast feeding	No	Count	3130	1211	4341
		% within Labor force participation	50.3%	58.6%	52.4%
	Yes	Count	3093	855	3948
		% within Labor force participation	49.7%	41.4%	47.6%
Total		Count	6223	2066	8289
		% within Labor force participation	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	43.027[b]	1	.000		
Continuity Correction[a]	42.695	1	.000		
Likelihood Ratio	43.231	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	43.022	1	.000		
N of Valid Cases	8289				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 984. 02.

Crosstab

			Labor force participation		
			No	Yes	Total
Educational level of husband	No education	Count	3867	1004	4871
		% within Labor force participation	62.1%	48.6%	58.8%
	Primary	Count	1457	553	2010
		% within Labor force participation	23.4%	26.8%	24.2%
	Secondary or higher	Count	899	509	1408
		% within Labor force participation	14.4%	24.6%	17.0%
Total		Count	6223	2066	8289
		% within Labor force participation	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	150.438[a]	2	.000
Likelihood Ratio	144.847	2	.000
Linear-by-Linear Association	149.864	1	.000
N of Valid Cases	8289		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 350.94.

Crosstab

			Labor force participation		
			No	Yes	Total
Labor force status of husband	Didn't work	Count	56	17	73
		% within Labor force participation	.9%	.8%	.9%
	Agric-employee	Count	4873	1333	6206
		% within Labor force participation	78.3%	64.5%	74.9%
	others	Count	1078	548	1626
		% within Labor force participation	17.3%	26.5%	19.6%
	Prof., Tech., Manag.	Count	216	168	384
		% within Labor force participation	3.5%	8.1%	4.6%
Total		Count	6223	2066	8289
		% within Labor force participation	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	179.152[a]	3	.000
Likelihood Ratio	167.730	3	.000
Linear-by-Linear Association	172.043	1	.000
N of Valid Cases	8289		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 18.19.

Crosstab

			Labor force participation		
			No	Yes	Total
Religion	Orthodox	Count	2505	1027	3532
		% within Labor force participation	40.3%	49.7%	42.6%
	Moslem	Count	2491	626	3117
		% within Labor force participation	40.0%	30.3%	37.6%
	Prothestant and Catholic	Count	1100	335	1435
		% within Labor force participation	17.7%	16.2%	17.3%
	Traditional and others	Count	127	78	205
		% within Labor force participation	2.0%	3.8%	2.5%
Total		Count	6223	2066	8289
		% within Labor force participation	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	92.370[a]	3	.000
Likelihood Ratio	91.517	3	.000
Linear-by-Linear Association	13.100	1	.000
N of Valid Cases	8289		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 51.10.

Crosstab

			Labor force participation		
			No	Yes	Total
Number of children 5 years and under	0	Count	1479	667	2146
		% within Labor force participation	23.8%	32.3%	25.9%
	1	Count	2274	742	3016
		% within Labor force participation	36.5%	35.9%	36.4%
	2	Count	1986	519	2505
		% within Labor force participation	31.9%	25.1%	30.2%
	3	Count	444	126	570
		% within Labor force participation	7.1%	6.1%	6.9%
	4	Count	35	9	44
		% within Labor force participation	.6%	.4%	.5%
	5	Count	5	3	8
		% within Labor force participation	.1%	.1%	.1%
Total		Count	6223	2066	8289
		% within Labor force participation	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	70.885[a]	5	.000
Likelihood Ratio	69.812	5	.000
Linear-by-Linear Association	55.308	1	.000
N of Valid Cases	8289		

a. 1 cells (8.3%) have expected count less than 5. The minimum expected count is 1.99.

Crosstab

			Labor force participation		Total
			No	Yes	
Total number of living children	0	Count	598	210	808

		% within Labor force participation	9.6%	10.2%	9.7%
	1	Count	982	304	1286
		% within Labor force participation	15.8%	14.7%	15.5%
	2	Count	972	364	1336
		% within Labor force participation	15.6%	17.6%	16.1%
	3	Count	907	336	1243
		% within Labor force participation	14.6%	16.3%	15.0%
	4	Count	837	287	1124
		% within Labor force participation	13.5%	13.9%	13.6%
	5	Count	680	209	889
		% within Labor force participation	10.9%	10.1%	10.7%
	6	Count	543	163	706
		% within Labor force participation	8.7%	7.9%	8.5%
	7	Count	341	98	439
		% within Labor force participation	5.5%	4.7%	5.3%
	8	Count	192	50	242
		% within Labor force participation	3.1%	2.4%	2.9%
	9	Count	99	25	124
		% within Labor force participation	1.6%	1.2%	1.5%
	10	Count	51	16	67
		% within Labor force participation	.8%	.8%	.8%
	11	Count	17	2	19
		% within Labor force participation	.3%	.1%	.2%
	12	Count	4	1	5
		% within Labor force participation	.1%	.0%	.1%
	13	Count	0	1	1
		% within Labor force participation	.0%	.0%	.0%
Total		Count	6223	2066	8289
		% within Labor force participation	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.530[a]	13	.063
Likelihood Ratio	21.836	13	.058
Linear-by-Linear Association	6.399	1	.011
N of Valid Cases	8289		

a. 5 cells (17.9%) have expected count less than 5. The minimum expected count is .25.

			Labor force participation		Total
			No	Yes	
Number of household members	1	Count	8	6	14
		% within Labor force participation	.1%	.3%	.2%
	2	Count	314	126	440
		% within Labor force participation	5.0%	6.1%	5.3%
	3	Count	710	218	928
		% within Labor force participation	11.4%	10.6%	11.2%
	4	Count	935	331	1266
		% within Labor force participation	15.0%	16.0%	15.3%
	5	Count	1077	410	1487
		% within Labor force participation	17.3%	19.8%	17.9%
	6	Count	1029	340	1369
		% within Labor force participation	16.5%	16.5%	16.5%
	7	Count	858	260	1118
		% within Labor force participation	13.8%	12.6%	13.5%
	8	Count	615	176	791
		% within Labor force participation	9.9%	8.5%	9.5%
	9	Count	339	101	440
		% within Labor force participation	5.4%	4.9%	5.3%
	10	Count	182	56	238
		% within Labor force participation	2.9%	2.7%	2.9%
	11	Count	76	19	95

		% within Labor force participation	1.2%	.9%	1.1%
	12	Count	37	11	48
		% within Labor force participation	.6%	.5%	.6%
	13	Count	18	3	21
		% within Labor force participation	.3%	.1%	.3%
	14	Count	12	1	13
		% within Labor force participation	.2%	.0%	.2%
	15	Count	5	4	9
		% within Labor force participation	.1%	.2%	.1%
	16	Count	7	2	9
		% within Labor force participation	.1%	.1%	.1%
	17	Count	1	1	2
		% within Labor force participation	.0%	.0%	.0%
	19	Count	0	1	1
		% within Labor force participation	.0%	.0%	.0%
Total		Count	6223	2066	8289
		% within Labor force participation	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	29.316[a]	17	.032
Likelihood Ratio	29.178	17	.033
Linear-by-Linear Association	7.554	1	.006
N of Valid Cases	8289		

a. 8 cells (22.2%) have expected count less than 5. The minimum expected count is .25.

Crosstab

			Labor force participation		Total
			No	Yes	
Region	Tigray	Count	580	175	755

		% within Labor force participation	9.3%	8.5%	9.1%
	Afar	Count	564	35	599
		% within Labor force participation	9.1%	1.7%	7.2%
	Amhara	Count	965	296	1261
		% within Labor force participation	15.5%	14.3%	15.2%
	Oromia	Count	997	433	1430
		% within Labor force participation	16.0%	21.0%	17.3%
	Somali	Count	446	39	485
		% within Labor force participation	7.2%	1.9%	5.9%
	Ben-Gumuz	Count	408	199	607
		% within Labor force participation	6.6%	9.6%	7.3%
	SNNP	Count	1042	277	1319
		% within Labor force participation	16.7%	13.4%	15.9%
	Gambela	Count	366	119	485
		% within Labor force participation	5.9%	5.8%	5.9%
	Harari	Count	293	168	461
		% within Labor force participation	4.7%	8.1%	5.6%
	Addis Ababa	Count	285	199	484
		% within Labor force participation	4.6%	9.6%	5.8%
	Dire dawa	Count	277	126	403
		% within Labor force participation	4.5%	6.1%	4.9%
Total		Count	6223	2066	8289
		% within Labor force participation	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	355.079[a]	10	.000
Likelihood Ratio	399.475	10	.000
Linear-by-Linear Association	87.753	1	.000
N of Valid Cases	8289		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 100.45.

Correlations

Correlations

		Number of children 5 years and under	Total number of living children	Number of household members
Number of children 5 years and under	Pearson Correlation	1	.279**	.384**
	Sig. (2-tailed)		.000	.000
	N	8289	8289	8289
Total number of living children	Pearson Correlation	.279**	1	.689**
	Sig. (2-tailed)	.000		.000
	N	8289	8289	8289
Number of household members	Pearson Correlation	.384**	.689**	1
	Sig. (2-tailed)	.000	.000	
	N	8289	8289	8289

**. Correlation is significant at the 0.01 level (2-tailed).

B. MULTIPLE LOGISTIC REGRESSION OUT PUT

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	8289	100.0
	Missing Cases	0	.0
	Total	8289	100.0
Unselected Cases		0	.0
Total		8289	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
No	0
Yes	1

Categorical variable codings

		Frequency	Parameter coding									
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Region	Tigray	755	1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Afar	599	.000	1.000	.000	.000	.000	.000	.000	.000	.000	.000
	Amhara	1261	.000	.000	1.000	.000	.000	.000	.000	.000	.000	.000
	Oromia	1430	.000	.000	.000	1.000	.000	.000	.000	.000	.000	.000
	Somali	485	.000	.000	.000	.000	1.000	.000	.000	.000	.000	.000
	Ben-Gumuz	607	.000	.000	.000	.000	.000	1.000	.000	.000	.000	.000
	SNNP	1319	.000	.000	.000	.000	.000	.000	1.000	.000	.000	.000
	Gambela	485	.000	.000	.000	.000	.000	.000	.000	1.000	.000	.000
	Harari	461	.000	.000	.000	.000	.000	.000	.000	.000	1.000	.000
	Addis Ababa	484	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.000
	Dire Dawa	403	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Religion	Orthodox	3532	1.000	.000	.000							
	Moslem	3117	.000	1.000	.000							
	Protestant And Catholic	1435	.000	.000	1.000							
	Traditional and others	205	.000	.000	.000							
Labor force status of husband	Didn't work	73	1.000	.000	.000							
	Agric-employee	6206	.000	1.000	.000							
	others	1626	.000	.000	1.000							
	Prof., Tech., Manag.	384	.000	.000	.000							
Years lived in place of residence	0-5	1097	1.000	.000	.000							
	6-10	966	.000	1.000	.000							

	11-20	1201	.000	.000	1.000							
	>20	5025	.000	.000	.000							
Educational level	No education	6180	1.000	.000								
	Primary	1258	.000	1.000								
	Secondary or higher	851	.000	.000								
Age of woman	15-24	2104	1.000	.000								
	25-34	3308	.000	1.000								
	35-49	2877	.000	.000								
Educational level of husband	No education	4871	1.000	.000								
	Primary	2010	.000	1.000								
	Secondary or higher	1408	.000	.000								
Type of place of residence	Urban	1573	1.000									
	Rural	6716	.000									
Breast feeding	No	4341	1.000									
	Yes	3948	.000									
Pregnancy	No	7292	1.000									
	Yes	997	.000									
Use of contraception methods	No	6871	1.000									
	Yes	1418	.000									

Block 0: Beginning Block

Iteration History[a,b,c]

Iteration		-2 Log likelihood	Coefficients Constant
Step 0	1	9324.282	-1.003
	2	9308.643	-1.100
	3	9308.634	-1.103
	4	9308.634	-1.103

a. Constant is included in the model.

b. Initial -2 Log Likelihood: 9308.634

c. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Classification Table[a,b]

Observed			Predicted		
			Labor force participation		Percentage Correct
			No	Yes	
Step 0	Labor force participation	No	6223	0	100.0
		Yes	2066	0	.0
	Overall Percentage				75.1

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-1.103	.025	1885.792	1	.000	.332

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	AGE	55.750	2	.000
		AGE(1)	49.356	1	.000
		AGE(2)	1.242	1	.265
		RESIDENCE(1)	227.515	1	.000
		YEARSLIVED	16.368	3	.001
		YEARSLIVED(1)	11.584	1	.001
		YEARSLIVED(2)	1.366	1	.242
		YEARSLIVED(3)	4.890	1	.027
		EDUCATIONW	218.930	2	.000
		EDUCATIONW(1)	129.686	1	.000
		EDUCATIONW(2)	2.994	1	.084
		PREGNANCY(1)	26.944	1	.000
		CONTRACEPTION(1)	133.832	1	.000
		BREASTF(1)	43.027	1	.000
		EDUCATIONH	150.438	2	.000
		EDUCATIONH(1)	117.421	1	.000
		EDUCATIONH(2)	9.496	1	.002
		LABORH	179.152	3	.000
		LABORH(1)	.105	1	.745
		LABORH(2)	156.666	1	.000
		LABORH(3)	83.290	1	.000
		RELIGION	92.370	3	.000
		RELIGION(1)	56.711	1	.000
		RELIGION(2)	62.569	1	.000
		RELIGION(3)	2.314	1	.128
		CHILDNUM5	55.314	1	.000
		HHSIZE	7.555	1	.006
		REGION	355.079	10	.000
		REGION(1)	1.353	1	.245
		REGION(2)	125.633	1	.000
		REGION(3)	1.674	1	.196
		REGION(4)	26.484	1	.000
		REGION(5)	78.473	1	.000
		REGION(6)	21.622	1	.000
		REGION(7)	12.907	1	.000
		REGION(8)	.042	1	.838
		REGION(9)	34.608	1	.000
		REGION(10)	72.011	1	.000
	Overall Statistics		675.031	31	.000

Block 1: Method = Forward Stepwise (Likelihood Ratio)

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	399.475	10	.000
	Block	399.475	10	.000
	Model	399.475	10	.000
Step 2	Step	120.315	1	.000
	Block	519.790	11	.000
	Model	519.790	11	.000
Step 3	Step	57.963	2	.000
	Block	577.753	13	.000
	Model	577.753	13	.000
Step 4	Step	30.059	2	.000
	Block	607.813	15	.000
	Model	607.813	15	.000
Step 5	Step	22.547	1	.000
	Block	630.360	16	.000
	Model	630.360	16	.000
Step 6	Step	21.169	3	.000
	Block	651.529	19	.000
	Model	651.529	19	.000
Step 7	Step	14.486	1	.000
	Block	666.015	20	.000
	Model	666.015	20	.000
Step 8	Step	10.386	1	.001
	Block	676.402	21	.000
	Model	676.402	21	.000
Step 9	Step	9.546	2	.008
	Block	685.947	23	.000
	Model	685.947	23	.000
Step 10	Step	5.139	1	.023
	Block	691.087	24	.000
	Model	691.087	24	.000
Step 11	Step	5.720	1	.017
	Block	696.807	25	.000
	Model	696.807	25	.000
Step 12[a]	Step	-2.625	1	.105
	Block	694.182	24	.000
	Model	694.182	15	.000
Step 13	Step	8.620	3	.035
	Block	702.802	27	.000
	Model	702.802	27	.000
Step 14	Step	8.105	3	.044
	Block	710.907	30	.000
	Model	710.907	30	.000

a. A negative Chi-squares value indicates that the Chi-squares value has decreased from the previous step.

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	8909.159[a]	.047	.070
2	8788.844[a]	.061	.090
3	8730.881[a]	.067	.100
4	8700.821[a]	.071	.105
5	8678.274[a]	.073	.109
6	8657.105[a]	.076	.112
7	8642.619[a]	.077	.114
8	8632.233[a]	.078	.116
9	8622.687[a]	.079	.118
10	8617.548[a]	.080	.119
11	8611.827[a]	.081	.120
12	8614.452[a]	.080	.119
13	8605.832[a]	.081	.120
14	8597.727[a]	.082	.122

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	.000	7	1.000
2	4.403	7	.732
3	5.306	8	.724
4	12.562	8	.128
5	17.040	8	.030
6	11.486	8	.176
7	14.162	8	.078
8	10.999	8	.202
9	7.903	8	.443
10	5.217	8	.734
11	6.118	8	.634
12	7.316	8	.503
13	5.037	8	.754
14	10.385	8	.239

Contingency Table for Hosmer and Lemeshow Test

	Labor force participation = No	Labor force participation = Yes	Total

		Observed	Expected	Observed	Expected	
Step 1	1	564	564.000	35	35.000	599
	2	446	446.000	39	39.000	485
	3	1042	1042.000	277	277.000	1319
	4	580	580.000	175	175.000	755
	5	965	965.000	296	296.000	1261
	6	366	366.000	119	119.000	485
	7	997	997.000	433	433.000	1430
	8	685	685.000	325	325.000	1010
	9	578	578.000	367	367.000	945
Step 2	1	899	894.726	52	56.274	951
	2	1091	1090.691	256	256.309	1347
	3	661	654.131	170	176.869	831
	4	319	320.086	90	88.914	409
	5	920	917.937	262	264.063	1182
	6	199	196.292	68	70.708	267
	7	920	932.628	385	372.372	1305
	8	590	609.481	327	307.519	917
	9	624	607.028	456	472.972	1080
Step 3	1	775	770.319	41	45.681	816
	2	733	742.046	130	120.954	863
	3	716	726.162	179	168.838	895
	4	584	580.974	160	163.026	744
	5	494	484.743	132	141.257	626
	6	656	652.342	202	205.658	858
	7	539	523.382	172	187.618	711
	8	449	450.706	194	192.294	643
	9	594	602.828	308	299.172	902
	10	683	689.496	548	541.504	1231
Step 4	1	786	779.966	41	47.034	827
	2	621	620.897	95	95.103	716
	3	683	705.436	178	155.564	861
	4	618	618.482	166	165.518	784
	5	657	650.725	182	188.275	839
	6	648	637.223	195	205.777	843
	7	747	738.603	267	275.397	1014
	8	532	560.676	290	261.324	822
	9	550	531.381	284	302.619	834
	10	381	379.612	368	369.388	749
Step 5	1	804	796.896	41	48.104	845
	2	690	703.785	124	110.215	814
	3	696	698.288	158	155.712	854
	4	625	650.415	196	170.585	821
	5	601	583.082	153	170.918	754
	6	661	651.481	205	214.519	866
	7	641	618.773	211	233.227	852

	8	550	571.471	278	256.529	828
	9	537	526.917	293	303.083	830
	10	418	421.894	407	403.106	825
Step 6	1	802	794.213	40	47.787	842
	2	705	720.001	126	110.999	831
	3	669	677.721	157	148.279	826
	4	662	661.615	170	170.385	832
	5	627	636.168	195	185.832	822
	6	648	622.749	180	205.251	828
	7	596	601.873	233	227.127	829
	8	577	561.641	237	252.359	814
	9	529	525.773	302	305.227	831
	10	408	421.247	426	412.753	834
Step 7	1	802	795.047	41	47.953	843
	2	721	724.719	114	110.281	835
	3	682	687.622	154	148.378	836
	4	644	660.437	184	167.563	828
	5	619	626.377	189	181.623	808
	6	684	652.372	184	215.628	868
	7	593	601.696	238	229.304	831
	8	570	570.285	263	262.715	833
	9	535	514.476	288	308.524	823
	10	373	389.969	411	394.031	784
Step 8	1	779	772.227	39	45.773	818
	2	718	724.496	112	105.504	830
	3	688	688.200	146	145.800	834
	4	643	662.501	186	166.499	829
	5	639	645.002	191	184.998	830
	6	648	622.575	180	205.425	828
	7	603	609.063	238	231.937	841
	8	576	569.686	254	260.314	830
	9	532	518.943	296	309.057	828
	10	397	410.308	424	410.692	821
Step 9	1	776	769.882	39	45.118	815
	2	721	728.414	112	104.586	833
	3	693	686.619	137	143.381	830
	4	649	665.806	183	166.194	832
	5	660	665.172	197	191.828	857
	6	630	623.154	200	206.846	830
	7	608	597.628	219	229.372	827
	8	574	578.110	271	266.890	845
	9	534	515.858	294	312.142	828
	10	378	392.357	414	399.643	792
Step 10	1	791	784.781	40	46.219	831
	2	714	721.158	112	104.842	826
	3	676	685.061	152	142.939	828
	4	664	664.498	165	164.502	829

	5	639	645.156	190	183.844	829
	6	626	622.532	203	206.468	829
	7	600	597.260	226	228.740	826
	8	580	568.843	249	260.157	829
	9	532	518.205	297	310.795	829
	10	401	415.506	432	417.494	833
Step 11	1	788	783.024	41	45.976	829
	2	711	724.321	118	104.679	829
	3	694	686.338	135	142.662	829
	4	662	664.632	167	164.368	829
	5	638	645.000	191	184.000	829
	6	629	623.062	200	205.938	829
	7	591	599.300	238	229.700	829
	8	576	568.601	253	260.399	829
	9	533	517.397	296	311.603	829
	10	401	411.324	427	416.676	828
Step 12	1	708	717.206	114	104.794	822
	2	701	698.358	128	130.642	829
	3	703	690.856	137	149.144	840
	4	669	667.301	161	162.699	830
	5	637	649.585	188	175.415	825
	6	652	636.925	177	192.075	829
	7	606	616.116	223	212.884	829
	8	586	589.877	244	240.123	830
	9	549	534.260	280	294.740	829
	10	412	422.515	414	403.485	826
Step 13	1	789	784.037	41	45.963	830
	2	714	725.492	115	103.508	829
	3	691	686.215	138	142.785	829
	4	671	662.146	155	163.854	826
	5	640	645.115	189	183.885	829
	6	621	623.022	208	205.978	829
	7	584	599.179	245	229.821	829
	8	579	569.034	250	259.966	829
	9	521	518.230	308	310.770	829
	10	413	410.530	417	419.470	830
Step 14	1	792	783.355	37	45.645	829
	2	709	726.828	121	103.172	830
	3	693	687.017	136	141.983	829
	4	676	665.037	153	163.963	829
	5	642	645.039	187	183.961	829
	6	614	619.029	210	204.971	824
	7	580	600.371	250	229.629	830
	8	583	569.244	246	259.756	829
	9	522	517.694	307	311.306	829
	10	412	409.386	419	421.614	831

Classification Table[a]

Observed			Predicted		
			Labor force participation		Percentage Correct
			No	Yes	
Step 1	Labor force participation	No	6223	0	100.0
		Yes	2066	0	.0
	Overall Percentage				75.1
Step 2	Labor force participation	No	6192	31	99.5
		Yes	2047	19	.9
	Overall Percentage				74.9
Step 3	Labor force participation	No	6136	87	98.6
		Yes	1990	76	3.7
	Overall Percentage				74.9
Step 4	Labor force participation	No	6088	135	97.8
		Yes	1903	163	7.9
	Overall Percentage				75.4
Step 5	Labor force participation	No	6082	141	97.7
		Yes	1887	179	8.7
	Overall Percentage				75.5
Step 6	Labor force participation	No	6074	149	97.6
		Yes	1859	207	10.0
	Overall Percentage				75.8
Step 7	Labor force participation	No	6084	139	97.8
		Yes	1879	187	9.1
	Overall Percentage				75.7
Step 8	Labor force participation	No	6074	149	97.6
		Yes	1874	192	9.3
	Overall Percentage				75.6
Step 9	Labor force participation	No	6068	155	97.5
		Yes	1867	199	9.6
	Overall Percentage				75.6
Step 10	Labor force participation	No	6067	156	97.5
		Yes	1860	206	10.0
	Overall Percentage				75.7
Step 11	Labor force participation	No	6061	162	97.4
		Yes	1853	213	10.3
	Overall Percentage				75.7
Step 12	Labor force participation	No	6053	170	97.3
		Yes	1847	219	10.6
	Overall Percentage				75.7
Step 13	Labor force participation	No	6043	180	97.1
		Yes	1841	225	10.9
	Overall Percentage				75.6
Step 14	Labor force participation	No	6052	171	97.3
		Yes	1840	226	10.9
	Overall Percentage				75.7

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1(a)	REGION			306.987	10	.000	
	REGION(1)	-.411	.138	8.876	1	.003	.663
	REGION(2)	-1.992	.205	94.721	1	.000	.136
	REGION(3)	-.394	.126	9.727	1	.002	.674
	REGION(4)	-.046	.122	.144	1	.704	.955
	REGION(5)	-1.649	.199	68.965	1	.000	.192
	REGION(6)	.070	.138	.256	1	.613	1.072
	REGION(7)	-.537	.127	17.902	1	.000	.584
	REGION(8)	-.336	.151	4.971	1	.026	.715
	REGION(9)	.232	.145	2.563	1	.109	1.261
	REGION(10)	.429	.142	9.146	1	.002	1.535
	Constant	-.788	.107	53.741	1	.000	.455
Step 2(b)	RESIDENCE(1)	.858	.077	123.261	1	.000	2.359
	REGION			227.591	10	.000	
	REGION(1)	.069	.147	.220	1	.639	1.071
	REGION(2)	-1.532	.210	53.113	1	.000	.216
	REGION(3)	.119	.137	.752	1	.386	1.126
	REGION(4)	.447	.132	11.390	1	.001	1.563
	REGION(5)	-1.250	.203	37.816	1	.000	.286
	REGION(6)	.569	.148	14.855	1	.000	1.767
	REGION(7)	-.043	.137	.101	1	.751	.957
	REGION(8)	.084	.158	.282	1	.595	1.087
	REGION(9)	.363	.148	6.017	1	.014	1.437
	REGION(10)	.198	.144	1.876	1	.171	1.219
	Constant	-1.365	.122	124.362	1	.000	.255
Step 3(c)	AGE			55.789	2	.000	
	AGE(1)	-.528	.071	54.616	1	.000	.590
	AGE(2)	-.133	.060	5.022	1	.025	.875
	RESIDENCE(1)	.845	.078	117.909	1	.000	2.327
	REGION			236.015	10	.000	
	REGION(1)	.076	.147	.269	1	.604	1.079
	REGION(2)	-1.525	.211	52.355	1	.000	.218
	REGION(3)	.135	.138	.956	1	.328	1.144
	REGION(4)	.458	.133	11.838	1	.001	1.581
	REGION(5)	-1.270	.204	38.820	1	.000	.281
	REGION(6)	.609	.149	16.782	1	.000	1.838
	REGION(7)	-.056	.138	.164	1	.685	.946
	REGION(8)	.130	.159	.676	1	.411	1.139
	REGION(9)	.407	.149	7.473	1	.006	1.502
	REGION(10)	.180	.145	1.541	1	.215	1.198
	Constant	-1.195	.127	88.029	1	.000	.303
Step 4(d)	AGE			62.075	2	.000	
	AGE(1)	-.571	.073	61.445	1	.000	.565

	AGE(2)	-.172	.061	8.055	1	.005	.842
	RESIDENCE(1)	.596	.091	42.522	1	.000	1.814
	EDUCATIONW			30.215	2	.000	
	EDUCATIONW(1)	-.564	.103	30.046	1	.000	.569
	EDUCATIONW(2)	-.461	.107	18.567	1	.000	.630
	REGION			224.600	10	.000	
	REGION(1)	.065	.148	.194	1	.660	1.067
	REGION(2)	-1.503	.211	50.548	1	.000	.222
	REGION(3)	.133	.138	.921	1	.337	1.142
	REGION(4)	.449	.134	11.286	1	.001	1.567
	REGION(5)	-1.217	.205	35.293	1	.000	.296
	REGION(6)	.612	.149	16.812	1	.000	1.843
	REGION(7)	-.067	.138	.233	1	.629	.935
	REGION(8)	.127	.159	.638	1	.425	1.136
	REGION(9)	.362	.150	5.829	1	.016	1.437
	REGION(10)	.080	.147	.297	1	.586	1.084
	Constant	-.625	.165	14.383	1	.000	.535
Step 5(e)	AGE			58.803	2	.000	
	AGE(1)	-.539	.073	54.223	1	.000	.583
	AGE(2)	-.093	.063	2.182	1	.140	.911
	RESIDENCE(1)	.540	.092	34.185	1	.000	1.717
	EDUCATIONW			27.611	2	.000	
	EDUCATIONW(1)	-.541	.103	27.428	1	.000	.582
	EDUCATIONW(2)	-.445	.107	17.149	1	.000	.641
	CHILDNUM5	-.147	.031	22.296	1	.000	.863
	REGION			228.434	10	.000	
	REGION(1)	.070	.149	.221	1	.638	1.072
	REGION(2)	-1.539	.212	52.751	1	.000	.215
	REGION(3)	.110	.139	.624	1	.430	1.116
	REGION(4)	.463	.134	11.901	1	.001	1.589
	REGION(5)	-1.221	.205	35.390	1	.000	.295
	REGION(6)	.596	.150	15.868	1	.000	1.815
	REGION(7)	-.059	.139	.180	1	.671	.943
	REGION(8)	.098	.160	.376	1	.540	1.103
	REGION(9)	.360	.151	5.721	1	.017	1.434
	REGION(10)	.058	.148	.156	1	.693	1.060
	Constant	-.494	.167	8.708	1	.003	.610
Step 6(f)	AGE			57.508	2	.000	
	AGE(1)	-.534	.073	52.844	1	.000	.587
	AGE(2)	-.089	.063	2.001	1	.157	.915
	RESIDENCE(1)	.531	.094	31.882	1	.000	1.701
	EDUCATIONW			26.503	2	.000	
	EDUCATIONW(1)	-.537	.105	26.403	1	.000	.584
	EDUCATIONW(2)	-.430	.108	15.938	1	.000	.650
	RELIGION			22.208	3	.000	
	RELIGION(1)	-.600	.160	14.100	1	.000	.549
	RELIGION(2)	-.709	.159	19.849	1	.000	.492

	RELIGION(3)	-.698	.161	18.700	1	.000	.497
	CHILDNUM5	-.144	.031	21.261	1	.000	.866
	REGION			215.899	10	.000	
	REGION(1)	.004	.158	.001	1	.981	1.004
	REGION(2)	-1.507	.213	50.181	1	.000	.222
	REGION(3)	.057	.146	.150	1	.698	1.058
	REGION(4)	.442	.136	10.641	1	.001	1.556
	REGION(5)	-1.181	.206	32.700	1	.000	.307
	REGION(6)	.537	.151	12.579	1	.000	1.710
	REGION(7)	-.101	.148	.465	1	.495	.904
	REGION(8)	.054	.168	.105	1	.746	1.056
	REGION(9)	.369	.151	5.950	1	.015	1.446
	REGION(10)	.021	.150	.019	1	.890	1.021
	Constant	.165	.226	.536	1	.464	1.180
Step 7(g)	AGE			57.602	2	.000	
	AGE(1)	-.537	.073	53.413	1	.000	.585
	AGE(2)	-.097	.063	2.346	1	.126	.908
	RESIDENCE(1)	.477	.095	25.057	1	.000	1.611
	EDUCATIONW			20.616	2	.000	
	EDUCATIONW(1)	-.477	.106	20.323	1	.000	.621
	EDUCATIONW(2)	-.399	.108	13.574	1	.000	.671
	CONTRACEPTION(1)	-.275	.072	14.718	1	.000	.759
	RELIGION			22.471	3	.000	
	RELIGION(1)	-.633	.160	15.622	1	.000	.531
	RELIGION(2)	-.724	.159	20.645	1	.000	.485
	RELIGION(3)	-.710	.162	19.307	1	.000	.492
	CHILDNUM5	-.147	.031	22.160	1	.000	.863
	REGION			211.128	10	.000	
	REGION(1)	.029	.158	.034	1	.854	1.029
	REGION(2)	-1.473	.213	47.860	1	.000	.229
	REGION(3)	.073	.146	.252	1	.616	1.076
	REGION(4)	.459	.136	11.415	1	.001	1.582
	REGION(5)	-1.134	.207	30.021	1	.000	.322
	REGION(6)	.554	.152	13.376	1	.000	1.741
	REGION(7)	-.086	.148	.336	1	.562	.918
	REGION(8)	.062	.168	.139	1	.710	1.064
	REGION(9)	.372	.152	6.024	1	.014	1.450
	REGION(10)	.008	.150	.003	1	.960	1.008
	Constant	.366	.232	2.488	1	.115	1.441
Step 8(h)	AGE			52.942	2	.000	
	AGE(1)	-.509	.074	47.348	1	.000	.601
	AGE(2)	-.071	.064	1.251	1	.263	.931
	RESIDENCE(1)	.466	.095	23.916	1	.000	1.594
	EDUCATIONW			20.812	2	.000	
	EDUCATIONW(1)	-.480	.106	20.567	1	.000	.619
	EDUCATIONW(2)	-.397	.108	13.477	1	.000	.672
	PREGNANCY(1)	.288	.091	9.998	1	.002	1.333

	CONTRACEPTION(1)	-.237	.073	10.603	1	.001	.789
	RELIGION			22.598	3	.000	
	RELIGION(1)	-.637	.160	15.767	1	.000	.529
	RELIGION(2)	-.726	.159	20.720	1	.000	.484
	RELIGION(3)	-.715	.162	19.521	1	.000	.489
	CHILDNUM5	-.156	.031	24.596	1	.000	.856
	REGION			211.887	10	.000	
	REGION(1)	.039	.158	.060	1	.806	1.040
	REGION(2)	-1.477	.213	48.069	1	.000	.228
	REGION(3)	.072	.146	.246	1	.620	1.075
	REGION(4)	.466	.136	11.740	1	.001	1.593
	REGION(5)	-1.132	.207	29.882	1	.000	.323
	REGION(6)	.556	.152	13.458	1	.000	1.744
	REGION(7)	-.075	.148	.255	1	.614	.928
	REGION(8)	.062	.168	.137	1	.711	1.064
	REGION(9)	.382	.152	6.339	1	.012	1.465
	REGION(10)	.013	.150	.008	1	.929	1.013
	Constant	.075	.249	.089	1	.765	1.077
Step 9(i)	AGE			56.686	2	.000	
	AGE(1)	-.536	.075	51.449	1	.000	.585
	AGE(2)	-.089	.064	1.942	1	.163	.915
	RESIDENCE(1)	.459	.098	21.825	1	.000	1.582
	EDUCATIONW			19.324	2	.000	
	EDUCATIONW(1)	-.501	.118	18.015	1	.000	.606
	EDUCATIONW(2)	-.451	.114	15.643	1	.000	.637
	PREGNANCY(1)	.297	.091	10.629	1	.001	1.346
	CONTRACEPTION(1)	-.225	.073	9.505	1	.002	.799
	EDUCATIONH			9.633	2	.008	
	EDUCATIONH(1)	-.024	.102	.056	1	.813	.976
	EDUCATIONH(2)	.178	.097	3.403	1	.065	1.195
	RELIGION			23.424	3	.000	
	RELIGION(1)	-.648	.161	16.274	1	.000	.523
	RELIGION(2)	-.734	.160	21.112	1	.000	.480
	RELIGION(3)	-.737	.162	20.624	1	.000	.478
	CHILDNUM5	-.159	.031	25.382	1	.000	.853
	REGION			203.791	10	.000	
	REGION(1)	.040	.158	.064	1	.801	1.041
	REGION(2)	-1.453	.213	46.353	1	.000	.234
	REGION(3)	.089	.146	.366	1	.545	1.093
	REGION(4)	.449	.136	10.866	1	.001	1.567
	REGION(5)	-1.099	.208	28.026	1	.000	.333
	REGION(6)	.561	.152	13.635	1	.000	1.752
	REGION(7)	-.099	.148	.445	1	.505	.906
	REGION(8)	.066	.168	.153	1	.696	1.068
	REGION(9)	.372	.152	5.997	1	.014	1.450
	REGION(10)	.004	.150	.001	1	.979	1.004
	Constant	.080	.252	.101	1	.750	1.084

Step 10(j)	AGE			49.029	2	.000	
	AGE(1)	-.499	.077	42.535	1	.000	.607
	AGE(2)	-.065	.065	.997	1	.318	.937
	RESIDENCE(1)	.450	.098	20.969	1	.000	1.569
	EDUCATIONW			18.970	2	.000	
	EDUCATIONW(1)	-.496	.118	17.631	1	.000	.609
	EDUCATIONW(2)	-.448	.114	15.436	1	.000	.639
	PREGNANCY(1)	.368	.096	14.614	1	.000	1.445
	CONTRACEPTION(1)	-.210	.073	8.257	1	.004	.810
	BREASTF(1)	.165	.073	5.145	1	.023	1.180
	EDUCATIONH			9.732	2	.008	
	EDUCATIONH(1)	-.022	.102	.049	1	.826	.978
	EDUCATIONH(2)	.181	.097	3.490	1	.062	1.198
	RELIGION			23.963	3	.000	
	RELIGION(1)	-.646	.161	16.185	1	.000	.524
	RELIGION(2)	-.742	.160	21.567	1	.000	.476
	RELIGION(3)	-.741	.162	20.804	1	.000	.477
	CHILDNUM5	-.109	.038	8.158	1	.004	.897
	REGION			204.573	10	.000	
	REGION(1)	.038	.158	.057	1	.811	1.039
	REGION(2)	-1.451	.213	46.205	1	.000	.234
	REGION(3)	.105	.147	.510	1	.475	1.110
	REGION(4)	.457	.136	11.236	1	.001	1.579
	REGION(5)	-1.098	.208	27.981	1	.000	.334
	REGION(6)	.571	.152	14.118	1	.000	1.770
	REGION(7)	-.081	.149	.300	1	.584	.922
	REGION(8)	.069	.168	.168	1	.682	1.071
	REGION(9)	.381	.152	6.281	1	.012	1.463
	REGION(10)	.009	.150	.003	1	.953	1.009
	Constant	-.170	.275	.380	1	.538	.844
Step 11(k)	AGE			54.374	2	.000	
	AGE(1)	-.588	.085	47.579	1	.000	.556
	AGE(2)	-.118	.069	2.951	1	.086	.888
	RESIDENCE(1)	.442	.098	20.183	1	.000	1.556
	EDUCATIONW			18.340	2	.000	
	EDUCATIONW(1)	-.490	.118	17.139	1	.000	.613
	EDUCATIONW(2)	-.439	.114	14.784	1	.000	.645
	PREGNANCY(1)	.375	.096	15.113	1	.000	1.455
	CONTRACEPTION(1)	-.221	.073	9.041	1	.003	.802
	BREASTF(1)	.175	.073	5.755	1	.016	1.191
	EDUCATIONH			9.942	2	.007	
	EDUCATIONH(1)	-.026	.102	.065	1	.798	.974
	EDUCATIONH(2)	.180	.097	3.462	1	.063	1.197
	RELIGION			23.797	3	.000	
	RELIGION(1)	-.656	.161	16.638	1	.000	.519
	RELIGION(2)	-.744	.160	21.647	1	.000	.475
	RELIGION(3)	-.741	.162	20.779	1	.000	.477

	CHILDNUM5	-.068	.042	2.617	1	.106	.934
	HHSIZE	-.036	.015	5.659	1	.017	.965
	REGION			201.181	10	.000	
	REGION(1)	.048	.158	.093	1	.760	1.050
	REGION(2)	-1.435	.214	45.136	1	.000	.238
	REGION(3)	.112	.147	.586	1	.444	1.119
	REGION(4)	.463	.136	11.517	1	.001	1.589
	REGION(5)	-1.089	.208	27.509	1	.000	.337
	REGION(6)	.568	.152	13.940	1	.000	1.764
	REGION(7)	-.076	.149	.260	1	.610	.927
	REGION(8)	.067	.168	.157	1	.692	1.069
	REGION(9)	.379	.152	6.203	1	.013	1.460
	REGION(10)	.034	.150	.052	1	.819	1.035
	Constant	.020	.287	.005	1	.944	1.020
Step 12(k)	AGE			56.487	2	.000	
	AGE(1)	-.608	.084	51.929	1	.000	.545
	AGE(2)	-.145	.067	4.709	1	.030	.865
	RESIDENCE(1)	.451	.098	21.098	1	.000	1.570
	EDUCATIONW			18.523	2	.000	
	EDUCATIONW(1)	-.493	.118	17.363	1	.000	.611
	EDUCATIONW(2)	-.440	.114	14.846	1	.000	.644
	PREGNANCY(1)	.395	.096	17.011	1	.000	1.484
	CONTRACEPTION(1)	-.217	.073	8.749	1	.003	.805
	BREASTF(1)	.239	.061	15.225	1	.000	1.270
	EDUCATIONH			9.841	2	.007	
	EDUCATIONH(1)	-.024	.102	.055	1	.814	.976
	EDUCATIONH(2)	.181	.097	3.486	1	.062	1.198
	RELIGION			24.179	3	.000	
	RELIGION(1)	-.653	.161	16.542	1	.000	.520
	RELIGION(2)	-.749	.160	21.962	1	.000	.473
	RELIGION(3)	-.742	.162	20.881	1	.000	.476
	HHSIZE	-.046	.014	11.167	1	.001	.955
	REGION			199.856	10	.000	
	REGION(1)	.045	.158	.079	1	.779	1.046
	REGION(2)	-1.420	.213	44.304	1	.000	.242
	REGION(3)	.123	.147	.702	1	.402	1.131
	REGION(4)	.463	.136	11.544	1	.001	1.589
	REGION(5)	-1.085	.208	27.332	1	.000	.338
	REGION(6)	.574	.152	14.252	1	.000	1.775
	REGION(7)	-.071	.149	.227	1	.634	.932
	REGION(8)	.074	.168	.196	1	.658	1.077
	REGION(9)	.382	.152	6.323	1	.012	1.465
	REGION(10)	.047	.150	.099	1	.754	1.048
	Constant	-.047	.284	.027	1	.869	.954
Step 13(l)	AGE			48.289	2	.000	
	AGE(1)	-.572	.087	43.647	1	.000	.565
	AGE(2)	-.123	.068	3.329	1	.068	.884

	RESIDENCE(1)	.492	.100	24.357	1	.000	1.635
	YEARSLIVED			8.500	3	.037	
	YEARSLIVED(1)	-.242	.089	7.387	1	.007	.785
	YEARSLIVED(2)	-.127	.089	2.035	1	.154	.881
	YEARSLIVED(3)	-.084	.078	1.182	1	.277	.919
	EDUCATIONW			18.444	2	.000	
	EDUCATIONW(1)	-.493	.119	17.309	1	.000	.611
	EDUCATIONW(2)	-.440	.114	14.765	1	.000	.644
	PREGNANCY(1)	.389	.096	16.517	1	.000	1.476
	CONTRACEPTION(1)	-.224	.073	9.263	1	.002	.800
	BREASTF(1)	.231	.061	14.099	1	.000	1.260
	EDUCATIONH			10.083	2	.006	
	EDUCATIONH(1)	-.017	.102	.029	1	.865	.983
	EDUCATIONH(2)	.188	.097	3.769	1	.052	1.207
	RELIGION			24.352	3	.000	
	RELIGION(1)	-.653	.161	16.485	1	.000	.520
	RELIGION(2)	-.752	.160	22.077	1	.000	.472
	RELIGION(3)	-.744	.163	20.949	1	.000	.475
	HHSIZE	-.050	.014	12.974	1	.000	.952
	REGION			195.662	10	.000	
	REGION(1)	.052	.159	.107	1	.743	1.053
	REGION(2)	-1.375	.214	41.337	1	.000	.253
	REGION(3)	.146	.147	.984	1	.321	1.157
	REGION(4)	.482	.136	12.485	1	.000	1.620
	REGION(5)	-1.048	.208	25.348	1	.000	.351
	REGION(6)	.603	.153	15.644	1	.000	1.828
	REGION(7)	-.052	.149	.123	1	.726	.949
	REGION(8)	.113	.169	.451	1	.502	1.120
	REGION(9)	.373	.152	6.015	1	.014	1.452
	REGION(10)	.050	.150	.109	1	.742	1.051
	Constant	-.001	.285	.000	1	.997	.999
Step 14(m)	AGE			47.573	2	.000	
	AGE(1)	-.567	.087	42.607	1	.000	.567
	AGE(2)	-.118	.068	3.029	1	.082	.889
	RESIDENCE(1)	.342	.119	8.245	1	.004	1.408
	YEARSLIVED			9.391	3	.025	
	YEARSLIVED(1)	-.256	.089	8.234	1	.004	.774
	YEARSLIVED(2)	-.133	.089	2.233	1	.135	.875
	YEARSLIVED(3)	-.085	.078	1.196	1	.274	.918
	EDUCATIONW			14.028	2	.001	
	EDUCATIONW(1)	-.441	.121	13.255	1	.000	.644
	EDUCATIONW(2)	-.392	.117	11.236	1	.001	.676
	PREGNANCY(1)	.385	.096	16.122	1	.000	1.470
	CONTRACEPTION(1)	-.210	.074	8.129	1	.004	.810
	BREASTF(1)	.228	.062	13.776	1	.000	1.257
	EDUCATIONH			10.680	2	.005	
	EDUCATIONH(1)	.049	.106	.219	1	.640	1.051

	EDUCATIONH(2)	.242	.100	5.859	1	.015	1.274
	LABORH			8.237	3	.041	
	LABORH(1)	-.437	.316	1.915	1	.166	.646
	LABORH(2)	-.415	.156	7.096	1	.008	.661
	LABORH(3)	-.182	.131	1.922	1	.166	.834
	RELIGION			24.994	3	.000	
	RELIGION(1)	-.676	.161	17.580	1	.000	.509
	RELIGION(2)	-.768	.160	23.023	1	.000	.464
	RELIGION(3)	-.754	.163	21.475	1	.000	.471
	HHSIZE	-.049	.014	12.760	1	.000	.952
	REGION			199.548	10	.000	
	REGION(1)	.066	.159	.174	1	.677	1.069
	REGION(2)	-1.402	.214	42.805	1	.000	.246
	REGION(3)	.161	.148	1.184	1	.277	1.175
	REGION(4)	.500	.137	13.237	1	.000	1.649
	REGION(5)	-1.054	.208	25.603	1	.000	.348
	REGION(6)	.612	.154	15.896	1	.000	1.845
	REGION(7)	-.054	.149	.130	1	.718	.948
	REGION(8)	.105	.169	.389	1	.533	1.111
	REGION(9)	.373	.153	5.976	1	.015	1.453
	REGION(10)	.040	.151	.071	1	.790	1.041
	Constant	.282	.305	.856	1	.355	1.326

a Variable(s) entered on step 1: REGION.
b Variable(s) entered on step 2: RESIDENCE.
c Variable(s) entered on step 3: AGE.
d Variable(s) entered on step 4: EDUCATIONW.
e Variable(s) entered on step 5: CHILDNUM5.
f Variable(s) entered on step 6: RELIGION.
g Variable(s) entered on step 7: CONTRACEPTION.
h Variable(s) entered on step 8: PREGNANCY.
i Variable(s) entered on step 9: EDUCATIONH.
j Variable(s) entered on step 10: BREASTF.
k Variable(s) entered on step 11: HHSIZE.
l Variable(s) entered on step 13: YEARSLIVED.
m Variable(s) entered on step 14: LABORH.

Model if Term Removed

Variable		Model Log Likelihood	Change in -2 Log Likelihood	df	Sig. of the Change
Step 1	REGION	-4654.317	399.475	10	.000
Step 2	RESIDENCE	-4454.579	120.315	1	.000
	REGION	-4548.831	308.817	10	.000
Step 3	AGE	-4394.422	57.963	2	.000
	RESIDENCE	-4423.007	115.134	1	.000
	REGION	-4524.771	318.662	10	.000
Step 4	AGE	-4382.637	64.453	2	.000

	RESIDENCE	-4371.168	41.515	1	.000
	EDUCATIONW	-4365.440	30.059	2	.000
	REGION	-4498.748	296.676	10	.000
Step 5	AGE	-4369.899	61.523	2	.000
	RESIDENCE	-4355.853	33.432	1	.000
	EDUCATIONW	-4352.869	27.464	2	.000
	CHILDNUM5	-4350.411	22.547	1	.000
	REGION	-4490.520	302.766	10	.000
Step 6	AGE	-4358.620	60.136	2	.000
	RESIDENCE	-4344.151	31.197	1	.000
	EDUCATIONW	-4341.731	26.356	2	.000
	RELIGION	-4339.137	21.169	3	.000
	CHILDNUM5	-4339.299	21.492	1	.000
	REGION	-4463.636	270.167	10	.000
Step 7	AGE	-4351.409	60.200	2	.000
	RESIDENCE	-4333.599	24.579	1	.000
	EDUCATIONW	-4331.562	20.505	2	.000
	CONTRACEPTION	-4328.553	14.486	1	.000
	RELIGION	-4331.979	21.339	3	.000
	CHILDNUM5	-4332.516	22.413	1	.000
	REGION	-4452.470	262.321	10	.000
Step 8	AGE	-4343.764	55.295	2	.000
	RESIDENCE	-4327.851	23.470	1	.000
	EDUCATIONW	-4326.467	20.701	2	.000
	PREGNANCY	-4321.309	10.386	1	.001
	CONTRACEPTION	-4321.351	10.470	1	.001
	RELIGION	-4326.845	21.457	3	.000
	CHILDNUM5	-4328.564	24.895	1	.000
	REGION	-4447.904	263.576	10	.000
Step 9	AGE	-4340.960	59.234	2	.000
	RESIDENCE	-4322.076	21.465	1	.000
	EDUCATIONW	-4321.004	19.321	2	.000
	PREGNANCY	-4316.870	11.054	1	.001
	CONTRACEPTION	-4316.040	9.393	1	.002
	EDUCATIONH	-4316.116	9.546	2	.008
	RELIGION	-4322.454	22.220	3	.000
	CHILDNUM5	-4324.192	25.696	1	.000
	REGION	-4436.657	250.627	10	.000
Step 10	AGE	-4334.295	51.043	2	.000
	RESIDENCE	-4319.089	20.630	1	.000
	EDUCATIONW	-4318.257	18.967	2	.000
	PREGNANCY	-4316.364	15.181	1	.000
	CONTRACEPTION	-4312.857	8.167	1	.004
	BREASTF	-4311.343	5.139	1	.023
	EDUCATIONH	-4313.596	9.644	2	.008
	RELIGION	-4320.146	22.743	3	.000
	CHILDNUM5	-4312.894	8.240	1	.004

	REGION	-4434.741	251.933	10	.000
Step 11	AGE	-4334.172	56.516	2	.000
	RESIDENCE	-4315.844	19.861	1	.000
	EDUCATIONW	-4315.080	18.333	2	.000
	PREGNANCY	-4313.768	15.708	1	.000
	CONTRACEPTION	-4310.383	8.938	1	.003
	BREASTF	-4308.788	5.748	1	.017
	EDUCATIONH	-4310.839	9.851	2	.007
	RELIGION	-4317.195	22.563	3	.000
	CHILDNUM5	-4307.226	2.625	1	.105
	HHSIZE	-4308.774	5.720	1	.017
	REGION	-4429.615	247.403	10	.000
Step 12	AGE	-4336.560	58.668	2	.000
	RESIDENCE	-4317.604	20.756	1	.000
	EDUCATIONW	-4316.483	18.515	2	.000
	PREGNANCY	-4316.094	17.735	1	.000
	CONTRACEPTION	-4311.552	8.651	1	.003
	BREASTF	-4314.836	15.220	1	.000
	EDUCATIONH	-4312.102	9.752	2	.008
	RELIGION	-4318.694	22.935	3	.000
	HHSIZE	-4312.894	11.336	1	.001
	REGION	-4430.043	245.634	10	.000
Step 13	AGE	-4327.860	49.888	2	.000
	RESIDENCE	-4314.903	23.974	1	.000
	YEARSLIVED	-4307.226	8.620	3	.035
	EDUCATIONW	-4312.133	18.434	2	.000
	PREGNANCY	-4311.520	17.208	1	.000
	CONTRACEPTION	-4307.495	9.157	1	.002
	BREASTF	-4309.963	14.094	1	.000
	EDUCATIONH	-4307.912	9.991	2	.007
	RELIGION	-4314.471	23.109	3	.000
	HHSIZE	-4309.511	13.190	1	.000
	REGION	-4422.016	238.201	10	.000
Step 14	AGE	-4323.437	49.147	2	.000
	RESIDENCE	-4302.987	8.247	1	.004
	YEARSLIVED	-4303.630	9.533	3	.023
	EDUCATIONW	-4305.863	13.999	2	.001
	PREGNANCY	-4307.257	16.787	1	.000
	CONTRACEPTION	-4302.885	8.042	1	.005
	BREASTF	-4305.749	13.770	1	.000
	EDUCATIONH	-4304.165	10.603	2	.005
	LABORH	-4302.916	8.105	3	.044
	RELIGION	-4310.699	23.670	3	.000
	HHSIZE	-4305.349	12.971	1	.000
	REGION	-4420.449	243.172	10	.000

Variables not in the Equation

			Score	df	Sig.
Step 1	Variables	AGE	61.220	2	.000
		AGE(1)	56.022	1	.000
		AGE(2)	2.432	1	.119
		RESIDENCE(1)	127.181	1	.000
		YEARSLIVED	10.022	3	.018
		YEARSLIVED(1)	7.863	1	.005
		YEARSLIVED(2)	.225	1	.635
		YEARSLIVED(3)	3.089	1	.079
		EDUCATIONW	97.636	2	.000
		EDUCATIONW(1)	38.937	1	.000
		EDUCATIONW(2)	.367	1	.544
		PREGNANCY(1)	22.369	1	.000
		CONTRACEPTION(1)	51.908	1	.000
		BREASTF(1)	37.981	1	.000
		EDUCATIONH	46.545	2	.000
		EDUCATIONH(1)	31.917	1	.000
		EDUCATIONH(2)	1.073	1	.300
		LABORH	112.622	3	.000
		LABORH(1)	.194	1	.660
		LABORH(2)	99.112	1	.000
		LABORH(3)	43.335	1	.000
		RELIGION	42.781	3	.000
		RELIGION(1)	20.844	1	.000
		RELIGION(2)	25.593	1	.000
		RELIGION(3)	2.078	1	.149
		CHILDNUM5	47.098	1	.000
		HHSIZE	3.389	1	.066
	Overall Statistics		316.650	21	.000
Step 2	Variables	AGE	56.345	2	.000
		AGE(1)	51.089	1	.000
		AGE(2)	1.888	1	.169
		YEARSLIVED	18.695	3	.000
		YEARSLIVED(1)	14.608	1	.000
		YEARSLIVED(2)	1.953	1	.162
		YEARSLIVED(3)	.747	1	.387
		EDUCATIONW	23.823	2	.000
		EDUCATIONW(1)	4.125	1	.042
		EDUCATIONW(2)	2.019	1	.155
		PREGNANCY(1)	16.249	1	.000
		CONTRACEPTION(1)	18.139	1	.000
		BREASTF(1)	22.775	1	.000
		EDUCATIONH	4.841	2	.089
		EDUCATIONH(1)	4.771	1	.029
		EDUCATIONH(2)	1.875	1	.171

		LABORH	17.690	3	.001
		LABORH(1)	.750	1	.387
		LABORH(2)	9.007	1	.003
		LABORH(3)	.306	1	.580
		RELIGION	27.319	3	.000
		RELIGION(1)	3.576	1	.059
		RELIGION(2)	8.341	1	.004
		RELIGION(3)	1.086	1	.297
		CHILDNUM5	26.519	1	.000
		HHSIZE	.756	1	.385
	Overall Statistics		191.721	20	.000
Step 3	Variables	YEARSLIVED	7.105	3	.069
		YEARSLIVED(1)	3.770	1	.052
		YEARSLIVED(2)	1.075	1	.300
		YEARSLIVED(3)	.376	1	.540
		EDUCATIONW	30.417	2	.000
		EDUCATIONW(1)	11.590	1	.001
		EDUCATIONW(2)	.162	1	.688
		PREGNANCY(1)	11.285	1	.001
		CONTRACEPTION(1)	20.236	1	.000
		BREASTF(1)	14.021	1	.000
		EDUCATIONH	13.109	2	.001
		EDUCATIONH(1)	12.980	1	.000
		EDUCATIONH(2)	5.252	1	.022
		LABORH	19.867	3	.000
		LABORH(1)	.660	1	.416
		LABORH(2)	12.616	1	.000
		LABORH(3)	1.257	1	.262
		RELIGION	25.228	3	.000
		RELIGION(1)	3.036	1	.081
		RELIGION(2)	7.571	1	.006
		RELIGION(3)	.933	1	.334
		CHILDNUM5	24.925	1	.000
		HHSIZE	17.023	1	.000
	Overall Statistics		136.675	18	.000
Step 4	Variables	YEARSLIVED	6.719	3	.081
		YEARSLIVED(1)	4.205	1	.040
		YEARSLIVED(2)	.747	1	.388
		YEARSLIVED(3)	.207	1	.649
		PREGNANCY(1)	10.809	1	.001
		CONTRACEPTION(1)	13.806	1	.000
		BREASTF(1)	12.160	1	.000
		EDUCATIONH	8.561	2	.014
		EDUCATIONH(1)	5.900	1	.015
		EDUCATIONH(2)	8.408	1	.004
		LABORH	9.214	3	.027
		LABORH(1)	.426	1	.514

		LABORH(2)	7.221	1	.007
		LABORH(3)	2.511	1	.113
		RELIGION	23.866	3	.000
		RELIGION(1)	1.885	1	.170
		RELIGION(2)	4.102	1	.043
		RELIGION(3)	2.165	1	.141
		CHILDNUM5	22.364	1	.000
		HHSIZE	15.431	1	.000
	Overall Statistics		106.721	16	.000
Step 5	Variables	YEARSLIVED	7.024	3	.071
		YEARSLIVED(1)	5.291	1	.021
		YEARSLIVED(2)	.244	1	.621
		YEARSLIVED(3)	.212	1	.645
		PREGNANCY(1)	13.717	1	.000
		CONTRACEPTION(1)	14.583	1	.000
		BREASTF(1)	1.000	1	.317
		EDUCATIONH	9.320	2	.009
		EDUCATIONH(1)	6.628	1	.010
		EDUCATIONH(2)	9.091	1	.003
		LABORH	8.595	3	.035
		LABORH(1)	.508	1	.476
		LABORH(2)	6.506	1	.011
		LABORH(3)	2.265	1	.132
		RELIGION	22.806	3	.000
		RELIGION(1)	1.158	1	.282
		RELIGION(2)	3.249	1	.071
		RELIGION(3)	1.872	1	.171
		HHSIZE	3.895	1	.048
	Overall Statistics		84.123	15	.000
Step 6	Variables	YEARSLIVED	7.257	3	.064
		YEARSLIVED(1)	5.648	1	.017
		YEARSLIVED(2)	.253	1	.615
		YEARSLIVED(3)	.130	1	.718
		PREGNANCY(1)	13.847	1	.000
		CONTRACEPTION(1)	14.758	1	.000
		BREASTF(1)	1.243	1	.265
		EDUCATIONH	10.123	2	.006
		EDUCATIONH(1)	7.173	1	.007
		EDUCATIONH(2)	9.888	1	.002
		LABORH	9.076	3	.028
		LABORH(1)	.500	1	.479
		LABORH(2)	6.876	1	.009
		LABORH(3)	2.317	1	.128
		HHSIZE	3.694	1	.055
	Overall Statistics		61.509	12	.000
Step 7	Variables	YEARSLIVED	7.629	3	.054
		YEARSLIVED(1)	5.516	1	.019

		YEARSLIVED(2)	.326	1	.568
		YEARSLIVED(3)	.290	1	.590
		PREGNANCY(1)	10.045	1	.002
		BREASTF(1)	1.049	1	.306
		EDUCATIONH	8.971	2	.011
		EDUCATIONH(1)	5.846	1	.016
		EDUCATIONH(2)	8.893	1	.003
		LABORH	7.222	3	.065
		LABORH(1)	.310	1	.578
		LABORH(2)	5.393	1	.020
		LABORH(3)	1.533	1	.216
		HHSIZE	4.734	1	.030
	Overall Statistics		46.935	11	.000
Step 8	Variables	YEARSLIVED	7.519	3	.057
		YEARSLIVED(1)	5.660	1	.017
		YEARSLIVED(2)	.199	1	.656
		YEARSLIVED(3)	.298	1	.585
		BREASTF(1)	5.050	1	.025
		EDUCATIONH	9.648	2	.008
		EDUCATIONH(1)	6.148	1	.013
		EDUCATIONH(2)	9.587	1	.002
		LABORH	6.917	3	.075
		LABORH(1)	.334	1	.563
		LABORH(2)	5.097	1	.024
		LABORH(3)	1.453	1	.228
		HHSIZE	4.877	1	.027
	Overall Statistics		36.914	10	.000
Step 9	Variables	YEARSLIVED	7.731	3	.052
		YEARSLIVED(1)	5.618	1	.018
		YEARSLIVED(2)	.208	1	.648
		YEARSLIVED(3)	.421	1	.517
		BREASTF(1)	5.149	1	.023
		LABORH	7.323	3	.062
		LABORH(1)	.339	1	.561
		LABORH(2)	4.786	1	.029
		LABORH(3)	.902	1	.342
		HHSIZE	5.066	1	.024
	Overall Statistics		27.303	8	.001
Step 10	Variables	YEARSLIVED	7.209	3	.066
		YEARSLIVED(1)	5.134	1	.023
		YEARSLIVED(2)	.250	1	.617
		YEARSLIVED(3)	.387	1	.534
		LABORH	7.313	3	.063
		LABORH(1)	.395	1	.530
		LABORH(2)	4.607	1	.032
		LABORH(3)	.824	1	.364
		HHSIZE	5.667	1	.017

	Overall Statistics		22.174	7	.002
Step 11	Variables	YEARSLIVED	8.441	3	.038
		YEARSLIVED(1)	6.025	1	.014
		YEARSLIVED(2)	.419	1	.517
		YEARSLIVED(3)	.294	1	.588
		LABORH	7.187	3	.066
		LABORH(1)	.386	1	.534
		LABORH(2)	4.483	1	.034
		LABORH(3)	.773	1	.379
	Overall Statistics		16.510	6	.011
Step 12(a)	Variables	YEARSLIVED	8.515	3	.036
		YEARSLIVED(1)	5.772	1	.016
		YEARSLIVED(2)	.645	1	.422
		YEARSLIVED(3)	.252	1	.615
		LABORH	7.319	3	.062
		LABORH(1)	.385	1	.535
		LABORH(2)	4.560	1	.033
		LABORH(3)	.772	1	.380
		CHILDNUM5	2.618	1	.106
	Overall Statistics		19.139	7	.008
Step 13(a)	Variables	LABORH	8.262	3	.041
		LABORH(1)	.331	1	.565
		LABORH(2)	5.332	1	.021
		LABORH(3)	.892	1	.345
		CHILDNUM5	2.550	1	.110
	Overall Statistics		10.657	4	.031
Step 14(a)	Variables	CHILDNUM5	2.403	1	.121
	Overall Statistics		2.403	1	.121

a Variable(s) removed on step 12: CHILDNUM5.

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	8238	100.0
	Missing Cases	0	.0
	Total	8238	100.0
Unselected Cases		0	.0
Total		8238	100.0

a. If weight is in effect, see classification table for the total number of cases.

Classification Table[a]

Observed			Predicted		
			Labor force participation		Percentage Correct
			No	Yes	
Step 1	Labor force participation	No	6036	187	97.0
		Yes	1783	232	11.5
	Overall Percentage				76.1

a. The cut value is .500

DECLARATION

I, the undersigned, declare that the thesis is my original work, has not been presented for degrees in any other University and all sources of material used for the thesis have been duly acknowledged.

Name: Addisalem Assaye

Signature: .....

Place: Faculty of Science, Addis Ababa University

Date: July 2008

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

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Professor Eshetu Wencheko