
**ADDIS ABABA UNIVERSITY**

**SCHOOL OF COMMERCE**

**DEPARTMENT OF ECONOMICS**

# DETERMINANTS OF WOMEN'S LABOR FORCE PARTICIPATION: THE CASE OF ETHIOPIA

**BY:**

**DEREJE ABEBE**

**A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN DEVELOPMENT ECONOMICS**

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**Advisor: Dr. AREGAWI GEBREMEDHIN**

**ADDIS ABABA UNIVERSITY**

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# Addis Ababa University

# School of Commerce

This is to certify that the thesis prepared by Dereje Abebe, entitled: Determinants of Women's Labor Force Participation: the case of Ethiopia and Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in Development Economics compiles with the regulations of the university and meets the accepted standards with respect to originality and quality.

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| Advisor | Signature | Date |

# Declaration

I hereby declare that this thesis entitled "Determinates of Women's Labor Force Participation: The case of Ethiopia" was carried out by me for the master's degree of development economics under the guidance and supervision of Dr.Aregawi Gebremedhin –Addis Ababa university, school of commerce business and economics.

The interpretations are based on my reading and understanding of the original texts and they are not published anywhere in the form of books, articles and reports. The other books, articles and websites, which I have made use of are acknowledged at the respective place in the text.

For the present thesis, which I am submitted to the University, no degree or diploma or distinction has been conferred on me before, either in this or in any other university.

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Name_____

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Date_____

Place and date of submission_____

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## ACRONYMS

CSA: Central Statistics Agency

DHS: Demographic Health Survey

GDP: Gross Domestic Product

ILO: International Labor Organization

IMF: International Monetary Fund

LFP: Labor Force Participation

MoE: Ministry of Education

NLFS: National Labor Force Survey

SNNP: Southern Nations and nationality of People

SSA: Sub-Saharan Africa

TVET: Technical Vocational Education and Training

UNDP: United Nations Development Program

UNFP: United Nations Populations Fund

WB: World Bank

WLFP: Women's Labor Force Participation

## ABSTRACT

Women constitute almost half of the Ethiopian population and without hesitation they play an important role in economic growth and development. However, women's labor force participation is low when compared to their counterpart males in Ethiopia. As a result of this women's economic status is lower compared to male and this implies lower output and lower economic performance in Ethiopia. In Ethiopia there is a labor force participation gap and it needs to be investigated seriously. Many studies had been done with this regard but there are limitations in scope and coverage and in addition to this there are contradicting findings concerning the factors/challenges that affect women's labor force participation. Thus, the purpose of this research is to find out factors/challenges that determine women's labor market in Ethiopia. In order to identify factors/ challenges that determine women's labor force participation in Ethiopia the Ethiopian Demographic Health survey (EDHS) was employed. The 2011 and 2016 cross sectional data set were employed and these two data sets were pooled so as to increase sample size and observation. This pooled data set is assumed to help identify factors/challenges that determine women's labor force participation in Ethiopia. For the analysis of this research paper descriptive and econometric analysis were employed. Specifically logit/logistic regression model was employed to analysis the econometrics part. The results of the descriptive statistics indicate that 71.7 percent of women are not participating in labor market and only 28.3 percent of women participate in the labor market. The results of the logit/logistic model revealed that education level of women, economic status, number of household members, husband's education, women's age, and sex of household head affects women's labor force participation positively and significantly while number of children age five year and under, pregnancy and place of residence rural negatively and significantly affects women's labor force participation. The results obtained from this study have their own implications on women's labor force participation in Ethiopia. As a result the findings of this research could invite further investigation on factors/challenges that determine women's labor force participation and might help policymakers to reconsider the issue of women's labor force participation and its role to economic growth and development in Ethiopia.



Key Words: Women's labor force participation, economic development, Ethiopia

# CHAPTER ONE

# 1. INTRODUCTION

## 1.1. Background of the study

It is evident that women constitute almost half of the world population. Many types of research in the area of women's labor force participation have shown that women are capable of bringing economic development if appropriate opportunities are given to them. Greulich,(2009) argued that women's labor force participation has a positive contribution to economic growth. The presence of women's labor force participation should be considered as one of the prerequisites to economic growth in the world in general and in developing countries in particular.

However, as UNDP (2018) stated there are deep imbalances between women and men with regard to work, opportunities, and choices that stem from inequalities in income. In addition according to UNDP (2018) the imbalances between women and men are also manifested in education, health, voice, access to technology, and exposure to shocks. According to ILO, (2018) for the last twenty years, despite the existence of imbalance between women and men with regard to labor force participation considerable progress has been made in the world of work and in maintaining gender equality around the world by many nations.

Although tangible improvements have been made in women's labor force participation in the labor market in many parts of the world there should be much to be done to enhance labor force participation. These days' women's labor force participation has considerably been increasing than ever before, but progress should have been made to increase women's labor force participation. According to ILO (2018) at the global level, women's and men's labor force participation rate are 48.5 and 75 percent respectively. This shows that the gap in labor force participation rate is 26.5 percentages. Currently, there is greater awareness of gender equality, because without maintaining the gender gap, reducing poverty and boosting economic development will not be realized.

When we compare women's labor force participation in developed countries with respect to men's labor force participation the gender gap is the minimum when compared to the rest of the world. Recently the labor force participation rate gap between women and men is narrowing.

Accordingly, women's and men's labor force participation is getting closer recently. As ILO (2018) stated women's labor force participation rate has been getting less since 1990 in developed countries. As ILO (2018) found women's labor force participation rates are gradually approaching those of their men counterparts and the labor force participation rate was at 15.6 percentage points.

Based on the level of economic development there are different trends concerning women's labor force participation. ILO (2018) finds that women's labor force participation between 1993 and 2003 was found to be 64 percent in low-income countries while it was 35 percent in lower-middle-income countries. Here it should be noted that high women's labor force participation in low-income countries is mainly due to the economic necessity for women to contribute to the family income by engaging in market or subsistence activities. When we compare women's labor force participation in many parts of the world women are still left behind their counterpart male. Furthermore, ILO (2018) states that even when women participate in the labor market, they encounter more unemployment or they are in more vulnerable forms of employment. In fact, higher vulnerability is manifested in low-income (developing) countries

For the last three decades, in Ethiopia, many things have come together to enhance women's Labor force participation in the labor market. In this regard UNDP (2018) found efforts have been made by the government to increase women's share of employment in the government sector. This can be associated with many actions that have been taken by the government to expand the opportunities for women to participate in the labor market. For instance, female education has been expanded very rapidly at all levels even though much has been left to be done. As MOE, (2017) stated female enrolment in education at primary, secondary TVET, and tertiary are 48, 47, 44.5, and 33.28 percent respectively. Here we can observe that there is a significant gap in enrolment at the tertiary level. This low-level tertiary enrolment of females might have its own implication for women's labor force participation.

In Ethiopia, women are almost half of the total population. Despite a large number of females in Ethiopia women constitute a majority of the poor. According to CSA (2007) the Ethiopian population and house census, women constitute 49.5 percent of the total population. However, several pieces of evidence have shown that women's labor force participation is lower in contrast to their male counterparts. According to the 2013 Ethiopian national labor force survey the

unemployment rates for males and females were 2.7 and 6.5 percent respectively. This indicates that there is a significant level of the gender gap in the labor market.

Although women's labor force participation increases at a faster rate, the difference between males and females remain large. As UNDP (2018) stated women proportionally have fewer wage jobs than their counterpart males though the difference is not as considerable. In Ethiopia, women's earnings are less in contrast to males. Accordingly, UNDP (2018) stated that women's economic status in Ethiopia is the lowest compared to their male counterparts. Such a gender gap between women and men in the socio-economic condition might have its own negative impact on the overall development of the country.

Evidence has shown that women's labor force participation is increasing than ever before. However, there are sectors in which women are not participating. For instance, we can mention the industry as an example. According to UNDP (2018) in many parts of the world, women are not participating in the industrial sector due to socio-cultural negative influence. Most of the time women participate in areas that need low-level skills and accordingly their participation is less in more professional areas when they are compared to their counterpart male. This brings about a negative impact on women's standard of living in particular and their family in general.

Since the 1990s encouraging efforts have been made to increase women's labor force participation, however, a lot is left to be done to foster the economic activity of women in Ethiopia. Because Ethiopia, is among the developing nations there might be factors that lessen women's labor force participation in the labor market. These could include education, culture, and norms which are prevalent obstacles that inhibit women from participating in the labor market and consequently in economic development. Such constraints that prevent women's full potential in the labor force needs to be investigated so as to realize economic development in Ethiopia.

## 1.2. Statement of the problem

Women's labor force participation is among the most important thing that helps to reduce poverty, narrow the gender gap, and foster economic development. Evidences have shown that there are several studies with this respect around the world that justified the very importance of women's labor force participation in poverty reduction and economic development. According to

ILO (2018), findings at the global level men's labor force participation was 74.9 percent while women's labor force participation rate was 49.9 percent and this shows that the labor force participation rate of men exceeds by 25 percent which means women are lagging much behind their counterpart male. This shows that there is a considerable labor force participation rate gap at the global level which is substantial and this should be an important indicator to consider the issue of women's labor force participation seriously. Therefore, there might be factors/challenges that affect women's labor force participation in the labor market.

Less women's participation in the labor market has become a major problem in African countries. In Ethiopia there is considerable gap in labor force participation between women and men and consequently women's labor force participation is lower when compared to their male counterparts. According to the 2013 Ethiopian national labor force survey the unemployment rates for females and males were 2.7 and 6.5 percent respectively. This indicates that there is a significant level of the gender gap in the labor market. Thus, less women's labor force participation imply that women are the most vulnerable in the society than men. It is natural to expect that the increase in the number of women's population who are looking for work due to population pressure induce chronic problem to the society. Unable to address the issue of women's labor force participation (WLPF) would bring serious consequences for the economy and society as a whole.

There are researches that had been done by many researchers concerning women's labor force participation in Ethiopia. However, the majority of these research papers are limited to a single town or city area and the findings that are assumed to determine women's labor force participation also differ from researcher to researcher. Accordingly, Mulugeta et. al(2017) found that the presence of children under five years of age, educational level of husband/partner, training, drug addiction occupation of husband/partner, were found to insignificant in Halaba Town. On the other hand, Misikir (2020) found that age, marital status, education, migration, and media exposure affects women's labor force participation in Wolaita Sodo Town

However, these empirics which were found by different researchers have shown variations in results of the same determinants that could affect women's labor force participation in the labor market in Ethiopia. Determinants that affect women's labor force participation positively in some areas of Ethiopia might affect negatively in other areas. This difference in the results of the

same determinants in different parts of Ethiopia has its own implication for further research to be done in this area.

Furthermore, despite researches have been done on labor force participation in Ethiopia, they are limited in scope and coverage and hence will not be able to show the overall trends of women's labor force participation (WLFP) in Ethiopia. Therefore, the existence of variations in results of the same determinants that affect women's labor force participation and in addition limitations in scope and coverage of researches are the main rationale for this study to be done. And if we intend to reduce poverty, narrow inequality, and consequently bring about economic development in Ethiopia the determinants that become obstacle in women's labor force participation need to be investigated properly. Accordingly, this research aims to identify and estimate the factors/challenges that determine women's labor force participation in Ethiopia and this might help the policymakers to reconsider their policies concerning women's labor force participation.

## 1.3. OBJECTIVES OF THE RESEARCH

### 1.3.1. General objective of the research

The overall concern of the general objective of this research paper is to investigate factors/challenges that determine women's labor force participation and to explain its impact on economic development in Ethiopia.

### 1.3.2. Specific objectives of the research

The main concern of the specific objective of this research paper is:

I) To find out which factors/challenges are related to women's labor force participation in Ethiopia.

II) To investigate the extent to which the factors/challenges that determines women's labor force participation varies between rural and urban areas of Ethiopia.

III) To estimate the factors/challenges that determines women's labor force participation in Ethiopia.

IV) To forward appropriate recommendations for policymakers and the concerned stakeholders.

## 1.4. RESEARCH QUESTION

The main purpose of this research paper is to examine the determinants that limit women's labor force participation in Ethiopia**.** Accordingly, the study is designed to answer certain specific questions like:

I) Does education level determine women's labor force participation?

II) Does the fertility rate affect women's labor force participation?

III) To what extent do the factors/challenges affect women's labor force participation?

IV) What makes variations in women's labor force participation between rural and urban?

## 1.5. HYPOTHESIS OF THE STUDY

The main hypothesis of this research paper is based on the theory that education level and economic development will positively affect women's labor force participation. It is expected that as women's education level rises, their labor force participation will also rise. However, at the very beginning of economic growth women's labor force participation is lower. In addition, women's labor force participation is determined by household factors-such as family income, husband's education level, husband's employment status, the fertility rate (number of children), pregnancy and place of residence.

## 1.6. SIGNIFICANCE OF THE RESEARCH

The claim of this research paper is to investigate the determinants that limit women's labor force participation in Ethiopia. Understanding the kinds of factors/challenges that determine women's labor force participation will be crucial for the effective policy interventions. It will be important to achieve policy instruments that enable women to actively participate in the labor market. Thus, this study aims to provide awareness to governmental and non-governmental organization to take appropriate policy intervention so that women's labor force participation will be enhanced.

The results that will be obtained in this research could be used in many ways by the government in policy making, and it also helpful for stakeholders who are involved in the labor market.

Finally, it might be helpful for other researchers who will want to do additional investigation in this area that would forward valuable ideas that enhance stakeholders' capacity in reducing the factor/challenges in women's labor force participation in Ethiopia.

## 1.7. SCOPE AND LIMITATION OF THE STUDY

As this study will be undertaken at national level, there is no limitation in scope. However, it will be restricted to labor force participation rate measurements for the identification of factors/challenges that determine women's labor force participation in Ethiopia. Consequently, the study will try to investigate the linkages between women's labor force participation and economic development.

## 1.8. ORGANIZATION OF THE STUDY

The study is divided into five chapters. The first chapter deals with general introduction and it will introduce the problem in the context against related and theoretical backgrounds. The aim, objectives, research questions, research methodology and organization of the study will be presented. In chapter two previous researches that had been done in the area of determinants of women's labor force participation will be rigorously investigated and properly reviewed. The literature review will be expected to shed light on the variables which affect women's labor force participation in Ethiopia and to assist the researcher for the purpose of developing a conceptual framework for this study. Chapter three will be providing methods and methodologies to estimate determinants of women's labor force participation in Ethiopia. Chapter four will present data analysis in determinants of women's labor force participation. In chapter five discussions, conclusions, and recommendations will be presented.

# CHAPTER TWO

# LITERATURE REVIEW

## 2. Introduction

In this chapter theoretical and empirical literature on women's labor force participation was briefly reviewed. The chapter was divided into three sections. The first section (2.1) deals with definitions of basic concepts and terms. The second section (2.2) looks at theoretical literature relevant to the current study while section (2.3) looks into empirical literature or empirical findings that are relevant for the current study.

## 2.1. Definitions of basic terms, concepts, and importance

### 2.1.1. Definition of basic terms

It is important to define two terminologies that are helpful in the subsequent discussion. These terminologies include women's labor force participation (WLFP) and women's labor force participation rate.

When we take the term women labor force participation it refers to all those women over 15 years of age who are employed, unemployed (but actively seeking work), or expecting recall from a layoff. Thus, from this, we can infer that the total female labor force consists of the employed and the unemployed (but actively seeking work) female. To quantify the labor force participation of women in the market we need to have a measure which is known as women labor force participation rate. Women labor force participation is defined as the percentage of a given female population that either has a job or look for one.

### 2.1.2. Concepts on women's labor force participation

Significant progress has been made concerning women's labor force participation in recent decades yet there is much left to be done to minimize the division that exists when it comes to labor force participation among women and men. When we compare women's labor force participation to that of male labor force participation we find that women are left behind their male counterparts in the economic activity. According to IMF (2013), even when women

participate in the labor market, they usually participate in unpaid work and family enterprises. Those women who are employed in paid work, most of the time they are engaged in the informal sector and among the poor.

Women's empowerment is needed if economic growth has to come because women make up almost half of the world population. Missing women in economic growth and development means missing equivalent economic growth that could have been brought by men. With this regard, Duflo (2012) suggested that there should be a policy that empowers women since women's empowerment and economic development are highly interrelated.

### 2.1.3. Importance of women's labor market participation

These days women are almost half of the world population. However, when we compare women's labor force participation to that of their males' counterparts, we find it to be much lower. According to ILO (2013), at the global level, women's labor force participation rate accounts for 50 percent while male's labor force participation rate is 75 percent. The full potential of women's labor force participation could lead to tangible economic progress. With this regard in the developed countries, higher women's labor force participation has the potential to induce economic growth.

Voluminous evidence has shown that women who get better opportunities to earn and manage sources of income could lead to economic growth and development in developing economies. According to the ILO (201), women who engaged in paid and unpaid work could be taken as the most important instrument in poverty reduction in developing countries. Accordingly, higher WLFP and better earnings by women could lead women to expend more money on school enrollment for children's fees. This in turn could potentially induce a virtuous cycle in society. When women become educated and considered role models in society there will be a positive externality. For instance, the contribution of women's labor force participation to the United States GDP was found to increase by an annual rate of 2.12 percent from 1964 to 2007 Eckstein and Lifshitz,(2011).On the other hand, the losses in per capita GDP attributed to gender gaps in the labor market have been estimated at around 12 percent in Sub-Saharan Africa (SSA).

As Sen (1987) argued that if those women who are responsible for leading the household encounter economic hardship, then this economic hardship, in turn, induces poverty and

deprivation to both the women and the family as a whole. For the world to be more prosperous women should be properly empowered to access health, education, influence, earning power, and political representation so that women's participation in the labor market could be improved.

Although, Ethiopia has made considerable improvements toward the advancement of gender equality and women's rights, yet significant challenges around women's economic participation remain untouched. Women in Ethiopia face many barriers such as a lower level of education at secondary and tertiary levels that hinder women's labor force participation in the labor force. Mitigating gender gaps that hold back women's participation in the labor market could increase Ethiopia's output by about 24 percent IMF (2018). By increasing women's labor force participation in the formal economy it is possible to increase output and this could be done simply by bringing the existing activities into the formal measurement output or by increasing women's labor supply into the labor market.

## 2.2. Theoretical literature review

The theoretical literature review of this research paper on women's labor force participation is assumed to show women's decision to involve or not to involve in the labor market. Many economists have tried to explain how women reach a decision to actively engage or not in the labor market based on the impact of the level of education, level of economic development, demographic factors, socio-economic factors, and norm and cultural factors by which women's labor force participation is assumed to be affected. Thus, the literature review presumes these factors in women's labor market decisions.

To proceed with the theoretical literature review we need to consider some basic theories that have been dealt with by some well-known economists in the 1960s. The main basic theories that will be taken into account are Work-leisure choice theory, human capital, and household production. Besides, level of education, level of economic development, demographic factors, socio-economic factors, and norm and cultural factors will also be considered in the review to consolidate the theoretical background concerning women's participation in the labor market.

### 2.2.1. Work-leisure choice theory

Women's decision to involve or not to involve in the labor market depends on the neoclassical model of work-leisure choice theory. Fundamentally the work-leisure choice theory was in use by many economists in the analysis of labor economics like Mincer in the 1960s. The basic idea of this model is that individuals seek to maximize their well-being by consuming both goods and leisure by considering leisure as a normal good. In the work-leisure choice theory, leisure time and hours of work are considered as a dichotomy in the analysis of labor supply. Accordingly, people should either supply labor or choose leisure time by taking into account their opportunity cost.

People would like to supply labor by analyzing their cost-benefit- that is people would make decisions on how to supply labor based on remuneration (wage). For people who are not initially supplying labor if the wage rate increases, they would prefer to work to leisure time. They would substitute work for leisure. On the other hand, if an earned income increases people would prefer leisure to work. This implies that there is a positive substitution effect between work and leisure whereas there is a negative income effect concerning the response of hours of work supplied to various wage rates. Accordingly, an increase in the wage rate makes leisure time more expensive and this induces an increase in women's hours of work Mincer (1962). An increase in the wage rate for a given amount of hours of work would lead to an increase in income and this in turn would lead to an increase in the purchase of various commodities that could include leisure time. Regarding the income effect, the work-leisure choice theory assumes that as income increases hours of work tend to decrease. According to the "backward-bending" notion, on average the income effect is stronger when compared to the substitution effect. Thus, an increase in the wage rate usually results in a decreased amount of work offered by suppliers of labor.

As Mincer (1962) suggested there is a decrease in the labor force participation of women due to the wage rate rises-and this indicates that there is a negative relationship between wage rate and women labor force participation. Leisure time and hours of work are taken as a dichotomy in the analysis of labor supply. It is important to note that leisure time and work logically complement that could include remunerative production in the labor market. Work that is "not paid for" includes various forms of investment in one, and the production of goods and services for the home and the family. Work at home is considered to be the main activity to which women, on

average, devote their larger part of marriage life. It is an exclusive occupation for many women and it becomes the worst when young children are present.

With regard to the analysis of labor market supply, the theory of consumption implied a strong suggestion concerning the appropriate decision-making unit. It is evident that in studying consumption behavior the family is the principal unit of analysis. Income is assumed to be pooled together, and total family consumption is positively related to it. The distribution of consumption among family members depends on a taste that is assumed to exist in the household. It is important to note that the decisions about the production of goods and services at home and leisure are largely family decisions.

### 2.2.2. Household Production Theory

Becker's (1965) classic work, "A theory of the allocation of time" has a tangible contribution in laying the foundation for the study of household production. Thus, Becker is the one who first postulated the theory of household production by which households combine time and market goods to produce more basic commodities that directly enter their utility functions. Accordingly, household production, consumption, and household time allocation are the concerns of the household production theory. According to the theory families maximize their utility subject to the time and budget constraints in which utility is a function of commodities, which are produced using market goods and time. In the process of production of goods and services, households try to efficiently allocate their time, goods, and services by which they could produce their needs.

However, there is another feature of household production which is introduced by Mincer (1962) which is formalized in Becker's (1965) household production theory. As Mincer stated there is multiple use of non-market time and this could include child care and other household activities which produced greater wage elasticity for women when compared to their counterpart men. This is because women faced more margins of substitution while formally this argument is incorrect, the intuition behind it is powerful and continues to shape thinking about female labor supply.

As suggested by Ehrenberg and Smith (2012) there are three different types of models that are employed to analyze the household production theory. The first model assumes that household production and market products are the same. The second model assumes that part of the time the women spent at home is used not only in leisure rather it is also used for household

productions -such as cooking, cleaning, and childcare. With this regard to we take consideration into account. That is we can say that work differs based on whether is in relation to household production or market production. On the other hand, work is defined as a choice among three alternatives in the third model.

### 2.2.3. Human Capital Theory

This theory was first formulated by Theodore Schultz in 1961 that is based on the noun "capital" indicating that it's economic content and can be determined by acquired valuable human qualities which could be improved as a result of appropriate investments. As Schultz (1961) argued the productive capacity of human beings is larger than all other forms of wealth taken together. On the other hand, Becker (1962) related the emergence of the human capital with investments in education, nutrition, and other factors that has an influence on physical, financial, and emotional welling highlighting education as a primary determinant. Human capital can be considered as the study of investments of individuals, organizations, or nations that accumulate stocks of productive skills and cognitive or technical knowledge.

Further, Becker (1975) suggested that the definition of human capital, as the productive investments embodied in individuals and these could include skills, abilities, knowledge, habits, and social attributes and most of the time it is often the result of investment in education, in the job training program and medical care. Accordingly, individuals invest in education and job training to enhance their capacity could induce more prospective income. Accordingly, the human capital theory indicates that investment in education and job training plays a key role in the increment of women's labor force participation in the labor market. Human capital corresponds to the accumulation of knowledge or characteristics that the worker has which contributes to his or her "productivity".

On the other hand, Mincer (1981) explained that human capital theory deals with acquiring capabilities which are developed through informal and formal education at home and school through training, experience, and mobility in the labor market. Mincer further added that human capital involves not only the transmission and embodiment of knowledge but also involves in the transmission of new ones and as a result, it is the source of innovation and technical change that could enhance all factors of production.

As Becker (1985) suggested there is a positive relationship between investment in human capital specific to a particular activity and time spent at that activity. Investments in specialized human capital produce increasing returns and thereby provide a strong incentive for a division of labor even among basically identical persons. Then human capital theory has paramount importance in the analysis of labor force participation, especially for married women. As stated by many economists the relationship between education and women labor force participation may follow the U-shape hypothesis concerning educational attainment level. According to the U-shape hypothesis, the labor force participation rate for illiterate women and university graduate women is found to be higher while for those women at the primary and secondary level of education the labor force participation is found to be lower.

### 2.2.4. Level of economic development

The above-mentioned theories: -work-leisure theory, household production theory, and human capital theory help to explain women's labor market in a specific time. Nevertheless, it is important to consider the general movement of aggregate labor supply and demand with regard to time trends. The relationship between economic development and women's labor force participation has been one of the most researched areas in many countries so as to explain how the labor market changed over time.

It is an indisputable fact that women's labor force participation in the labor market is one of the most important issues for the wellbeing of women and their families. Whenever we take into account studies that have been conducted concerning women's labor force participation concerning economic development, we find certain types of trends. As Psacharopoulos and Tzannatos (1989) suggested women's labor force participation has a U-shaped pattern depending on the level of economic development-accordingly countries experience a decline in the subsistence sector (agriculture) which is the main employer of women. However, as the economy starts to develop women's labor force participation also starts to increase in accordance. Goldin (1994) also argued that economic development becomes a cause for the decline of female labor force participation in the early stages of economic development and later on increase the labor force participation as the economy starts to develop. Accordingly, women's labor force participation is high in low-income and high-income countries whereas women's labor force

participation is low in middle-income countries. This indicated that the relationship between economic development and women's labor market brings about a U-shaped trend activity.

Accordingly, the U-shaped hypothesis states that in the first phase of industrialization agricultural production has become less in importance for the recruitment of women. However, in the process of economic growth, the structure of the economy is taking place at a slower pace in which the industrial sector could not be able to absorb those women who were employed in the agricultural sector. Thus, these opposite but not necessarily offsetting economic movements induce an initial decline in women's labor force participation. During the economic development, there is an expansion in public and private sectors. According to Psacharopoulos and Tzannatos (1989); Goldin (1994); Mammen and Paxson (2000).This process brings about a U-shaped trend in women's employment'

Several studies have been done in order to explain changes in women's labor force participation in the process of economic development and to analyze whether there exists a U-shaped curve or not. Many pieces of evidence have shown that economic development and women's labor force participation revealed a U-shaped curve. Concerning this Mammen and Paxson (2000) find further evidence of a U-shaped women's labor supply function with economic development which is measured as GDP per capita. As Olivetti (2013) suggested that there is a consistent U-shaped relationship between women's role in the labor market and the process of economic development, both within and across countries although the U-shaped is more muted for countries that are developing in the post-1950s.

### 2.2.5. Level of Education

Educational achievement is taken as one of the toughest factors that determine the labor market outcomes in developing and developed countries. There has been considerable improvement in women's level of education in many developing countries. However, there are remaining discrepancies within countries that could play a critical role in determining women's labor force participation in the labor market. Several studies have shown that women's level of education plays an important role in labor force participation in the labor market. As Psacharopoulos and Tzannatos (1989) suggested education has a positive effect on women's labor market that means the higher the participation of women in education induce total productivity. Concerning this,

there is a hypothesis that is suggesting women's labor force participation has a U-shaped curve in which it depends on women's level of education.

Furthermore, many studies have indicated that there is a nonlinear relationship between educational achievement and women's labor force participation in the labor market in many developing countries around the world. Illiterate women in developing countries are more likely to participate in subsistence activities and informal employment for reasons of survival. On the other hand, women with a high school education will be able to stay in school to increase their prospects in the labor market. Once women have higher education, they are encouraged to join the labor force. As a educational attainment and women's labor force participation creates a U-shaped pattern. The positively sloped portion of the U-shaped curve in women's labor force participation is usually correlated with an increasing level of education. Goldin (1994) argued that as female education starts to improve and as the value of women's time in the market increases, then they move back into the paid labor force, whereby their participation rate will be increased and consequently a formation of a U-shaped curve. Here we can say that education is a key factor behind the U-shaped hypothesis.

It is important to note that education serves as a significant tool for the acquisition of better jobs in which it induces its own influence in decision making in the supply side whether to engage or not the labor market. Psacharopoulos and Tzannatos (1989) suggested that literate women participate more when compared to illiterate women in the labor market. Klasen and Pieters (2012) suggested that women's labor force participation is motivated by necessity rather than economic opportunities at lower levels of education. Consequently, it is found that education is one of the determinants for women's labor force participation in the labor market. This shows that if greater participation of women in the labor force market is a desirable goal, education for women may be the principal device. From this, we can see that education is considered as one of the potential boosters of women's labor supply both in developed and developing countries.

The economic theory emphasizes that there is positive relationship between education attainment and women's labor force participation. Because the returns to education increase as women's level of education rise and this were confirmed by many studies that have been undertaken. Schultz (1961) argued that women with more level of education supply more of their time to market work, which means to employments that take into account remuneration. Frequently,

those women who have received a small fraction of the secondary or higher education in society receive relatively a larger wage premium than those who do not have secondary or higher education.

### 2.2.6. Demographic, Socio-economic and Geographic Factors

In addition to a level of economic development and level of education, other factors determine women's labor force participation. Concerning this issue, there are three broad categories of factors that could explain female labor force participation in economic activity. These are individual and demographic factors (such as education, age, and marriage),socio-economic factors, and geographic factors (urban and rural).

Many studies have shown that demographic factors such as age, marital status, and fertility are key drivers of women's labor force participation. Psacharopoulos and Tzannatos (1989) suggested that factors such as education, age, fertility, and religion determine women's labor force participation rate irrespective of the country under study. Women's labor force participation rate is lower during the age of bearing and rearing children than that of women outside the fertility age. Bloom et.al (2009) found that the number of births is significantly and negatively related to women's labor supply, with each birth on average reducing a women's labor supply by almost two years during the reproductive life of the woman. Moffitt (1984) had made a study on the fertility of married woman during post-world war II in which he found that the labor force participation rate increased by four percentages in the 1950s, by five percentages in the 1960s, and by eight percentages in the 1970s due to the decline in the fertility rate.

On the other hand, the age of a woman determines labor force participation in many countries. That means according to studies that had been undertaken by some prominent authors like Psacharopoulos (1989) it is found that there is a u-pattern relationship between the age group of women and their labor force participation. As it is observed in the table with each age group women's labor force participation follows a U-pattern concerning the level of economic development. In low-income and higher-income countries, women in the age group: 25-29, 30-34, 35-39, and 40-44 have higher labor force participation rate whereas in middle-income countries women in the age group 20-24, 25-29, 30-34, and 35-39 have higher labor force participation rate. In general, we can observe that as the age of women increase towards fifty her participation rate increases.

**Table 2. 1. Female Labor Force Participation Rate by Age and per Capita Income**

Age group

| Country group | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | 55-59 | 60-64 |
|---|---|---|---|---|---|---|---|---|---|---|
| Low income | 40 | 48 | 50 | 50 | 51 | 50 | 49 | 47 | 44 | 38 |
| Middle income | 24 | 42 | 42 | 41 | 40 | 38 | 36 | 33 | 27 | 21 |
| High income | 39 | 70 | 65 | 61 | 63 | 64 | 60 | 55 | 41 | 24 |

Source: Psacharopoulos and Tzannatos 1989

Marital status is taken as another demographic issue that determinants women's labor force participation in the labor market. Accordingly, Mincer (1962) argued that the husband's income is negatively and significantly related to women's labor force participation. Mincer further argued that a higher income of a husband means a higher family income and on assumption that leisure is a normal good woman supplies a lesser total amount of work at home and in the market. In addition to the income of the husband, there are factors that affect women's labor force participation that should be taken into account. Some cultures and norms hinder women's labor force participation. For instance, Goldin (1994) suggested that there is a norm that stigmatizes husbands whose wife is working at wage labor in manufacturing. Accordingly, a perception is held on the side of the society that only a husband who is lazy irresponsible of his family allows his wife to work in wage labor.

On the other hand, there is a different pattern of women's labor force participation for single, married, and widowed women. Many types of research have shown that a single woman has more responsibility than a married and widowed woman because a married woman's supply of labor market might depend on her husband's income and a widow's labor market supply might also depend on her husband's inheritance. With this regard, E.Canon et.al.(2015) suggested that the labor force participation rate for single women(unmarried women) is higher than married and widowed women.

Furthermore, women's labor force participation rate could be affected by the number of dependents of the household. The presence of a high number of children especially those whose age under fifteen might affect women's labor force participation rate significantly negatively because women spend more time looking after their children. Khan (2009) found that as the number of offspring increases women's labor force participation decreases since there is no one that looks after the children.

There are urban-rural factors that affect women's labor force participation. In the urban areas, the urban dwellers are more educated than the rural dwellers in which the society is more literate and cosmopolitan. Women who are living in urban areas have more access to paid work than women who are living the rural areas. Morikawa (2015) suggested that education and job searching are more related among urban female students while the unemployment rate is high among secondary and tertiary education graduates.

## 2.3. Review of the Empirical Literature

Several studies have shown that women's labor force participation in the labor market is increasing at a global level; nevertheless, the gap between women and men remains stubborn. Aguirre (et.al. 2012) findings that at the global level, only 50 percent of women participate in the labor market, whereas 75 percent of men participate in the labor market. ILO (2017) also found that the largest gender gap in participation rates is observed in emerging countries estimated to be 30.6 percentage points followed by developed countries, at 16.1 percentage points and developing countries have the smallest participation gap. However, the high participation rate for women in developing countries is often a result of economic necessity. Even though there is narrowing gender gaps in women's labor force participation in the last two decades still a lot remains when we take into account the gender gap among regions around the world. It is important to notice that the narrowing of the gender gap in the labor market helps to improve women's labor force participation. In turn this could importantly raise GDP in many developing countries. World Bank (WB) (2018) found that women's labor force participation in the labor market follows a rising path when compared to cohorts born in the past; cohorts today have higher levels of labor force participation in the labor market. Accordingly, about 15 percent of 30-year old women who were born in 1970 were in the labor force, and in contrast, 25 percent of 30-year old women who were born in 1980were in the labor force.

Many studies have indicated that limitations on the ability and opportunities of women to access the labor market could have negatively and significantly affected the level of economic growth. Tansel (2001) suggested that women's labor force participation rate increased in developed countries but in contrast, it is decreased in developing countries.Aguirre.et.al. (2012) found that 865 million women around the lead live outside the economic system and the majority of these women are found in developing countries that account for 94 percent and in contrast, in developed countries women lead lives outside the economic system account for 6 percent. When we consider those women who are not in the labor market there is a negative relationship to economic growth. Accordingly, Cuberes and Teignier (2012) suggested that there is a significant loss in GDP per capita that is related to gender gaps in the labor market and which is estimated to be 27 percent in certain regions like the Middle East and North Africa that is followed by South Asia and Latin America and the Caribbean with average income losses of about 19 and 14 percent respectively.

Women's labor force participation varies from region to region and in addition, it depends on the level of economic development. In this regard, the least labor force participation gap has been observed in Sub-Saharan Africa. According to ILO (2017), Sub-Saharan Africa exhibited the largest women's labor force participation rate that accounts for 64.6 percent. It had been observed that the labor force participation gap persistently constant for a decade at about 11.7 percentages. However, most of the women's labor force participation in Sub-Saharan Africa indicates both poverty and lack of access to social protection. As a result, the limited access to education and vocational opportunities exposes more women to work in vulnerable forms of employment which could have its own side effect on women and their families.

On the labor force participation gap between women and men, many researchers have tried to figure out the reasons behind the gap and estimated the gender gap. Accordingly, Comblon et.al. (2017) has indicated that there is difference in labor force participation between female and male and this is shown in the following table below.

**Table 2. 2 Labor force participation (LFP) rate, unemployment rate and employment rate (%)**

| | Cameroon | | | | Mali | | | |
|---|---|---|---|---|---|---|---|---|
| | All | Male | Female | Gap | All | Male | Female | Gap |
| LFP | | | | | | | | |
| Single | 64.9 | 73.6 | 64.0 | 9.7 | 67.4 | 74.8 | 52.1 | 22.7 |
| Married monogamous | 87.0 | 94.5 | 79.8 | 14.8 | 71.4 | 91.2 | 51.6 | 39.6 |
| Married polygamous | 80.5 | 88.0 | 76.5 | 11.5 | 64.9 | 82.5 | 55.0 | 27.5 |
| Widowed | 72.4 | 73.9 | 72.1 | 1.8 | 50.4 | 70.0 | 43.5 | 26.5 |
| Divorced/Separated | 88.3 | 89.9 | 87.7 | 2.2 | 42.5 | 48.8 | 42.1 | 6.7 |
| All | 77.1 | 82.0 | 72.5 | 9.4 | 67.0 | 83.2 | 51.8 | 31.4 |

Source: Comblon et.al. (2017)

In the above table, we can easily observe that there exists a considerable gender gap in the labor force participation rate. In particular, this is observed in married monogamous, married polygamous, and single. Since there is underutilization of women in the labor force participation there is a prevalent gender gap that brings about less economic output. In Sub-Saharan Africa, researches indicate that there is a considerable income loss due to less participation of women in the labor market. Accordingly, Cuberes and Teigrier (2014) found that there is income loss in sub-Saharan Africa due to less women's labor force participation and in this regard the gender gap accounts to 8.5 percent.

Another study by Che and Sunjo (2018) in Cameroon suggested that there are factors/challenges that determine women's labor force participation. This was manifested especially for women whose husband is not working, an increase in age, and the presence of more women in the household increases the likelihood of women's labor force participation in the labor market. On the other hand, they found that the presence of young children aged five years and under in the household reduces the likelihood of women's labor force participation in the labor market.

Ethiopia compared to its peers, has higher women labor force participation which is estimated to be 77 percent according to the international labor organization (ILO) (2017). However, women's

labor force participation rate is still lower when compared to their male counterparts that account for 88 percent. Several reasons are stated for the low involvement of women in the labor force than men such as women most of the time spent their time in unpaid care activities at home. Women in urban areas engaged largely in the wholesale and retail sector, followed by manufacturing and then employment in the household. According to ILO (2017) women are less likely to be engaged in the agricultural sector which accounts for 55 percent compared to men accounts for 58 percent and most of the time resulted in less productivity than men in Ethiopia.

In Ethiopia, the majority of women face a higher burden of family care responsibilities and other unpaid household activities. The higher burden of unpaid household activities faced by women results in fewer hours per week spent working or farming than men. In Ethiopia household survey data shows that women are over three times more likely to spend time collecting firewood or fetching water that is 38 percent of their time spent on these activities when compared to men which compared to 18 percent and when they do, they spend, on average, around 50 minutes per day on these chores compared to 12 minutes for men. In rural areas, women are often engaged in a high number of unpaid activities resulting in less time available for farming activities—female farmers spent around 14.4 hours per week on their farm, compared to 23 hours for men CSA (2007).

Several empirics have shown that there are many factors that affect women's labor force participation either positively or negatively in a different part of that the world. The findings have shown variation in the results of the determinants of women's labor market. A determinant that affects women's labor market positively in some areas might affect women's labor market negatively in other areas

In this regard, there are research findings that determine women's labor force participation either positively or negatively. Zaheer and Qaiser (2016) suggested that the unemployment rate of women and mortality rate affect women's labor force participation negatively but there is positive relationship between the population of women and women's labor market. On the other hand, Sorsa et.al (2015) suggested that education, income, social and cultural factors affect women's labor force participation negatively in India. But, contrary to the finding in India by Sorsa et.al (2015), Varol F (2017) found that a high level of education, high level of income, and

those who are better wage earner in the household induce a positive externality on women's labor force participation in Turkey.

According to Zaheer R and Qaiser S (2016), the GDP growth rate affects women's labor force participation negatively but this finding contradicts with the assumption of U-shaped female labor force participation. That means, the hypothesis says women's labor force participation increases with the increase in economic growth. On the other hand, Mohammed G (2011) suggested that educational status and marital stability positively and significantly affect women's labor force participation in Ethiopia. Here we can observe differences in findings of the determinants of women's labor force participation

Mulugata et.al (2017) found that age, educational level of women, and marital status had a significant effect on women's unemployment, while the presence of children under five years of age was found to be insignificant in Ethiopia. On the other hand, Misikir M (2020) found that age, marital status, and education affect women's unemployment negatively in Ethiopia.

Despite many types of research that have been done in Ethiopia there is a limitation concerning the scope and coverage in the area under consideration. The majority of these research papers are confined to a single area which does not help us to see to what extent do the determinants affect women's labor force participation in the country. From the empirics that we have discussed above, we can observe differences in results of the same determinants in different areas in women's labor force participation. In addition, we further noted that research papers that have been done in Ethiopia are limited in scope and coverage. Therefore, this implies that further research in the area needs to be done. As a result, the intention of this research paper is to investigate and estimate the factors/challenges that determine women's labor force participation in Ethiopia. And consequently, it might be helpful for policymakers to reconsider their policies concerning women's labor force participation.

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# CHAPTER THREE

# 3. DATA AND RESEARCH METHODOLOGY

## 3.1. Data Source

The data set used in this study was taken from the Ethiopian Demographic and Health Survey (EDHS) which was conducted by the central Statistics Agency (CSA) in 2011 and 2016.Both the 2011 and 2016 EDHS are a nationally representative survey of women aged 15-49. For the year 2011 from 17817 households from 624 clusters throughout Ethiopia, 187 in urban areas and 437 in the rural areas was taken into account. On the other hand, for the year 2016 from 18008 households and from 645 clusters throughout Ethiopia, 202 in urban areas and 443 in rural areas was taken into account. The survey utilized a multistage cluster sample based on the 1994 and 2007 Population and Housing Census sample frame for the year 2011 and 2016 respectively and was designed to obtain and provide information on the basic indicators of the health and demographic variables of interest for the following domains: Ethiopia as a whole, urban and rural areas of Ethiopia(each as a separate domain), and all geographic areas (nine regions namely: Tigray, Affar,Amhara,Oromiya,Somali,BEnishangul-Gumuz,Southern,Nations Nationalities and poeoples (SNNP), Gambela and Harari regional states and two city administrations: Addis Ababa and Dire DAwa.

These multistage 2011 and 2016 EDHS dataset are of hierarchical structure. The hierarchy for this study follows individuals/women as level-1, and regions as level-2. This means that individuals are nested in regions. From among the 17817 households, 17385 women were eligible for the individual interview in 2011 and 18008 households, 17067 women were eligible for the individual interview in 2016. Interviews were completed with 16515 women in 2011, yielding a response rate of 95 percent and interviews were completed with 16650, yielding a response rate of 98 percent in 2016. Thus, the analysis presented in this study on women's labor force participation is based on 11338 women from the 2011 and 9898 women from 2016 in Ethiopia.

## 3.2. Variables of the study

The response and explanatory variables that were considered to affect women's labor force participation (WLFP) were selected based on experiences from the available similar studies and the available data on the subject.

### 3.2. 1. The response variable

The response variable of this study is women's labor force participation (WLFP) in Ethiopia. According to ILO's definition the term women labor force participation refers to all those women over 15 years of age who are employed, unemployed (but actively seeking work), or expecting recall from a layoff. For the purpose of this study the response variable, women's labor force participation (WLFP) is classified as employed women (those women who were working for wage during the period of the survey) and otherwise unemployed women. Therefore, the outcome for the $i^{th}$ woman is represented by a random variable $Y_i$ with two possible values coded as 1 and 0.In view of this the outcome of the $i^{th}$ woman, $Y_i$ was measured as a binary or dichotomous variable.

$$\mathbf{Y_i}=\begin{cases}\mathbf{1}, \boldsymbol{the\ i^{th} woman\ is\ employed, and}\\ \mathbf{0}, \boldsymbol{otherwise}\end{cases}$$

### 3.2.2. Explanatory variables/Factors

Based on the reviewed literatures some of the common predictors that are expected to influence women's labor force participation (WLFP) in Ethiopia were recorded as given below for the purpose of the analysis.

| Dependent Variable | Description |
|---|---|
| Women's labor force participation(WLFP) | 1= if women is employed and 0= otherwise |

| Independent Variable | Description | Values/categories |
|---|---|---|
| Age | Age group of women | 15-19,20-24,25-29,30-34,35-39,40-44,45-49 |
| PlResid | Place of residence | 0=rural, 1=urban |
| NC | Number of children | 0-1,2-3,4-5,6-7 |
| Sexhh | Sex of household head | 0=male, 1=Female |
| EcoSt | Economic Status | 0=poor, 1=middle, 2=rich |
| CoUse | Contraceptive use | 0=Not contraceptive, 1=use contraceptive |
| WHEduc | Women's highest education level | 0=no education, 2=primary, 3=secondary , 4=higher education |
| CuPreg | Currently pregnant | 0=No or unsure, 1=Yes |
| HuEdL | Husband's education level | 0=no education, 2=primary, 3=secondary , 4=higher education |
| HuEmpst | Husband's employment status | 0=employed ,1=unemployed |
| NuHHM | Number of household member | 1-3,4-6,7 and above |
| YD | Year dummy | 0=if year is 2011,1=if year is 2016 |

## 3.3. The Methodology

Probit and logit models are usually common when the response variable is binary or dichotomous. The Probit model is based on the assumption that standard normal cumulative distribution function (cdf) whereas the logit model depends on the assumption that cumulative distribution function for a standard logistic random variable. The probit and the logit models are almost identical and the choice of the model is arbitrary, although logit model has certain advantages. These advantages are mathematical simplicity and ease of interpretation, Wooldridge, J. M. (2004).

## 3.3.1. Specification of the probit and logit models

Let us consider a class of binary response models of the form:

$$P(Y=1/X)=G(\beta_0+\beta_1 X_1 \ldots\ldots \beta_k X_k)=G(\beta_0 + X\beta) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (A)$$

Where G is a function taking on values strictly between zero and one: <G(z)<1, for all real values of z. In this case the two prominent models, probit and logit will be employed.

In the probit model G is the standard normal cumulative distribution function (cdf) which is expressed as an integral:

**G(z)=$\boldsymbol{\varphi(z) = \varphi(z) = \int_{-\infty}^{z} \emptyset(v)dv}$……(B)**

Where: $\varphi(z)$ is the standard normal density function.

In the logit model, G is the cumulative distribution function for a standard logistic random variable. And this can be expressed as:

**G(z)=exp/[1+exp(z)]……(C)**

### 3.3.2. Model Specification

For the purpose of this study logit model was chosen to identify the factors/challenges that determine women's labor force participation (WLFP) in Ethiopia. The choice of the logi model was made for its mathematical simplicity and ease of interpretation when compared to its competitor probit model. We use the logistic regression model when the nature of the response variable is either binary or dichotomous. The explanatory variables have the possibility to be any type. That is it can be continuous or categorical. To predict a response outcome from a given set of explanatory variables, logistic regression is one of the principal models mostly used. The other rationale for the application of the logistic regression model is that it takes fewer assumptions into account. In logistic regression the explanatory variables need not to be normally distributed or have equal variance like the discriminate analysis.

Assume that the decision of an individual woman either to participate or not in the labor force denoted by Y_i, depends on explanatory variables such as level of economic development, level of education, demographic factors, socio-economic factors, and geographic factors (Urban and Rural).

Then we can express the model as:

$Y_i = \boldsymbol{\beta X} + \mu_i$…… (1)

Where: $\boldsymbol{\beta}$-is the vector of unknown coefficients of the covariates and intercept.

**X=** a vector of explanatory variables

$Y_i$=woman labor force participation (WLFP)

Since WLFP is a binary or dichotomous variable we can express it as follows:

$Y_i$=1 if woman is employed and 0 otherwise

We can deal with WLFP in terms of the probability of making a choice, say the choice of participating in the labor market (i.e. Y=1):

Then, the conditional probability that a woman is participating in the labor market given the $X_i$ set of explanatory variables is denoted by:

$$\Pr(Y_i=1/X_i) = P_i$$

$$= \Pr[(\beta X + \mu_i) \geq 0] \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

The logit model assumes that the probability distribution of $\mu_i$ follows the logistic probability distribution, which can be written as:

$$P_i = \frac{1}{1+e^{-Y_i}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where $P_i$=Probability of participation in the labor force (i.e. $Y_i$=1) and

The probability that $Y_i$=0, that is, the woman is not participating in the labor market can be given by:

$$1 - P_i = \frac{1}{1+e^{Y_i}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

We can estimate model (1) for its nonlinear not only in X but also in the parameters $\beta s$ using simple transformation to make the mode linear in the Xs and the coefficients. Taking the ratios of Equations (1) and (2), that is the probability that the woman is participating against the probability that the woman is not participating in the labor market. We obtain:

$$\frac{P_i}{1-P_i} = \frac{1+e^{Y_i}}{1+e^{-Y_i}} = e^{Y_i} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

The ratio $\frac{P_i}{1-P_i}$ is simply the odds ratio in favor of woman participating in the labor market-the ratio of the probability that a woman is a participant to the probability that she is not a participant in the labor market.

In logistic analysis it is assumed that the explanatory variables affect the response variable by an appropriate transformation of the odds ratio. Thus, the transformation of the logistic regression becomes a convenient link function of P and we call it the logit-link and the transformation is as follows:

Now take the natural logarithm of Eq (5):

Log it (p) = $= ln(\frac{P_i}{1-P_i}) = ln(\frac{1+e^{Y_i}}{1+e^{-Y_i}}) = ln(e^{Y_i})$

After some algebraic simplification we obtain a very interesting result, namely the logit-link given as:

$$L_i = ln(\frac{P_i}{1-P_i}) = Y_i = \mathbf{\beta X} + \mu_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

In words, Eq. (4) states that the log of the odds ratio is a linear function of the $\boldsymbol{\beta s}$ as well as the $X_s$. $L_i$ is known as the **logit** (log of the odds ratio) and hence the name **logit model** for models like equation (4).

Equation (6) can be written as follow below after substituting the explanatory variables.

$$L_i = \beta_0 + \beta_1 AgeW + \beta_2 \text{PlR}esid + \beta_3 \text{Nu}\text{Sexhh} + \beta_5 EcoSt +$$
$$\beta_6 \text{CoUse} + \beta_7 \text{HEL} + \beta_8 \text{CuPreg} + \beta_9 \text{HuEdL} + \beta_{10} \text{HuEmpSt} + \beta_{11} \text{NuhhM} + \beta_{12} \text{YD} + \mu_i \ldots (7)$$

### 3.3.3. Parameter Estimation

In logistic regression analysis, we need to estimate parameters. In order to do this, we should use the method of maximum likelihood (ML) because this is the appropriate procedure. In the maximum likelihood estimation method, there are assumptions that need to be considered. In the maximum likelihood estimation observed distributions are known except for a finite number of unknown parameters. Thus, the maximum likelihood method provides a method to estimate a set

of distributions. So we can easily introduce the maximum likelihood estimation method in a discrete setting in which the dependent variable Y_i has a finite number of outcomes.

It is possible to define the sample likelihood function in terms of the joint probability function of a random variable. Now let us assume the sample size is n in which its observations are: $y_{1,} \dots, y_n$. And let the corresponding random variables be $Y_1 Y_{2,..,} Y_n$ .Since $Y_i$ is a Bernoulli random variable, then the probability mass function of $Y_i$ is:

$f_i(y_{i,}) = P_i^{y_i}(1 - P_i)^{1-y_i}$…… (9)

$Y_i$=1 or o and i=1, 2…, n

It is assumed that the observations to be independent, and then the likelihood function can be obtained as the product of the terms and after some algebraic manipulation we get the likelihood function.

L =$\prod_i^n P(y_i)^{y_i}\left(1 - P(y_i)\right)^{1-y_i}$……. (10)

L=$\prod_i^n P(y_i)^{y_i} \left(\frac{1}{1-P(y_i)}\right)^{y_i}$(1-P($y_i$))…….....(11)

L=$\prod_i^n \left(\frac{P(y_i)}{1-P(y_i)}\right)^{y_i}$(1-P($y_i$))……...(12)

This is the likelihood function that we obtained. We want to maximize the likelihood function that is obtained in equation (6) by taking that partial derivative. However, since the likelihood function is a product function it will not be convenient to differentiate, so we need to transform equation (11) into sums using logarithms. Taking log on both sides of equation (12) we obtain the following result.

$logL(\beta)$=$\sum_i^n y_i \; log\left(\frac{P(y_i)}{1-P(y_i}\right)$+$\sum_i^n \; log(1 - P(y_i))$…… (13)

But we know that $log\left(\frac{P(y_i)}{1-P(y_i}\right)$= **βX……. (14)**

Now substituting equation (11) into equation (10) we obtain the following:

$logL(\beta)$=$\sum_i^n y_i$ **βX** +$\sum_i^n \; log(1 - P(y_i))$…… (15)

Now we choose values of $\beta$ that make this equation as large as possible. We want to choose $\beta's$ that maximizes the probability of observing the data we have. In order to get the value of β which maximizes L (β) it is appropriate to differentiate L (β) with respect to β and equate to zero the resulting expression. We call these equations the likelihood equations.

## 3.4. Logistic regression model test for the goodness- of- fit test

### 3.4.1. Likelihood ratio test

The Likelihood Ratio (LR) test is performed by estimating two models and comparing the fit of one model to the fit of the other. Removing predictor variables from a model will almost always make the model fit less well (i.e., a model will have a lower log likelihood), but it is necessary to test whether the observed difference in model fit is statistically significant. The likelihood ration test does this by comparing the log likelihood of the two models, if this difference is statistically significant, then the less restrictive mode l(the one with more variables) is said to fit the data significantly better than the more restrictive model. If one has the log likelihoods from the models, the likelihood ratio test is fairly easy to calculate. The likelihood ratio test is performed to test the overall significance of all coefficients in the model on the basis of test statistics:

$G= [(-2\ln L_0) – (-2\ln L_1)]$

Where, $L_0$ is the likelihood of the null model and $L_1$ is the likelihood of the saturated model. The statistic G is distributed chi-squared with degrees of freedom equal to the difference in the number of degrees of freedom between the two models and plays the same role in logistic regression as the numerator of the partial F-test does in linear regression.

### 3.4.2. Akaike's (AIC) and Bayesian (BIC) Information Criteria

#### 3.4.2.1. Akaike's Information Criteria (AIC)

One of the most commonly used information criteria is Akaike's Information Criteria (AIC). The idea of AIC is to select the model that minimizes the negative likelihood penalized by the number of parameters as specified in the equation below.

$AIC=-2\ln p(L)+2p$

Where L refers to the likelihood under the fitted model and p is the number of parameters in the model.

Specifically, AIC is aimed at finding the best approximating model to the unknown true data generating process and its applications.

### 3.4.2.2. Bayesian Information Criteria BIC)

Another widely used information criteria is the Bayesian Information Criteria (BIC). Unlike Akaike Information Criteria, BIC is derived with a Bayesian framework as an estimate of the Bayes factor for two competing models. BIC is defined as:

BIC=-2lnp (L)+pln(n)

Specifically, BIC differs from AIC only in the second term which now depends on sample size n. Models that minimize the Bayesian Information Criteria are selected. From a Bayesian perspective, BIC is designed to find the most probable model given the data.

## 3.4.3. Hosmer-Lemeshow goodness-of-fit test

After the logistic regression model is fitted, goodness of fit test is important to assess the appropriateness of the fitted model in explaining the relationship between the response variable and the explanatory variables. We need the goodness of fit test in binary logistic regression because the interpretation between the response and explanatory variables could be wrong. Goodness of fit test is usually applied to assess how well a given probability distribution fits the data as well as how a statistical regression model fits the data. Many tests of goodness of fit test evaluate the differences between the observed values, the actual data and the expected values from the model.

Mainly the goodness of fit test examines three important criterion and these are the appropriateness of the logistic link, the sufficiency of the linear combination of the explanatory variables and whether the underlying distribution for the outcome variable is Bernoulli or not. In this regard, the Hosmer-Lemeshow goodness of fit test is applied to assess whether the number of expected events from the logistic regression model reflect the number of observed events in the data. In Hosmer-lemeshow's goodness of fit test subjects are divided into deciles on the basis of predicted probabilities and then a chi-square is computed from observed and expected frequencies. By applying this grouping strategy, the Hosmer-Lemeshow goodness of fit statistic,$\hat{C}$ can be obtained by computing the Pearson chi-square statistic from the gx2 table of observed and estimated expected frequencies. Therefore the calculation of $\hat{C}$ can be performed by the following formula.

$$\hat{C} = \frac{\sum_{k=1}^{g} (O_k - \grave{n}_k \bar{\pi}_k)^2}{\grave{n}_k \bar{\pi}_k (1 - \bar{\pi}_k)}$$

Where g is number of groups, $\grave{n}_k$ is total number of subjects in the $k^{th}$ $c_k$ the number of covariate patterns in the $k^{th}$ decile.

$O_k = \sum_{j=1}^{c_k} y_j$ is the total number of responses among the $c_k$ covariate pattern and

$\overline{\pi_k} = \sum_{j=1}^{c_k} \frac{m_j \overline{\pi_j}}{\grave{n}_k}$ is the average estimated probability.

This statistics has an approximate chi-square distribution with (g-2) degrees of freedom. If the calculated value of the Hosmer-lemeshow goodness of fit test statistic is greater than 0.05, we will not reject the null hypothesis that there is no difference between observed and model predicted values, implying that the model estimates are adequate to fit the data at acceptable level.

# CHAPTER FOUR

# 4. STATISTICAL DATA ANALYSIS AND RESULTS

## 4.1. Introduction

The purpose of this chapter is to find out the socio-economic and demographic factors/challenges that determine women's labor force participation in Ethiopia based on the 2011 and 2016 pooled cross sectional data of Ethiopian Demographic Health Survey (EDHS) data. The total number of observation in this study is pooled cross sectional data consisting of 21236 women. Out of this total observation 11338 are observation from 2011 and 9898 are from 2016 CSA survey. The response variable of this study is "women's labor force participation (WLFP)" that assumes binary outcomes "participate" or "not participate" in the labor market. To measure the effect of the determinants of women's labor force participation we apply the method of descriptive and binary logistic regression. For comparisons purpose of percentages of the status of women's labor force participation in Ethiopia using the 2011 and 2016 cross sectional data we use the descriptive statistics. To identify the factors that determine women's labor force participation both descriptive and logit/logistic regression are employed. The analysis considers two procedures for both descriptive and logit/logistic parts. These are the overall pooled cross sectional sample and pooled cross sectional subsample. The binary logistic analysis is applied using pooled cross sectional data of 2011 and 2016 to identify the determinants of women's labor force participation in Ethiopia.

## 4.2. Summary of descriptive statistics for the overall pooled sample

Table 4.1 below shows summary statistics of women's labor force participation for the overall pooled sample. The total pooled sample observation is 21236. Accordingly, from the table we observe that 71.7 percent of the women are not engaged in the labor market whereas only 28.3 percent participate in the labor market. Women whose age group 25-29 consists of the highest working status that accounts 30.7 percent followed by women whose age group 30-34 which amount about 21.3 percent. When we consider the variable Place of residence, 82.7 percent of women who are participating in the labor market lives in rural areas and while the rest 17.3 percent of urban women who participate in the labor market live in urban areas. When we take into account the variable Number of Children, 77.7% of Women who have children from 1to 2

whose age five and under participate in the labor market while only 18.3% of women who have children from 3 to 4 participate in the labor market. In the case of Sex of the Household, if the household is male 82.2% of the women participate in the labor market and the remaining 17.8% of women participate in the labor market if the household is female. In the variable economic status there are three categories poor, middle and rich. Here 51.7% of women who are poor participate in the labor market followed by 33.2% rich women. For the variable contraceptive use, 76.4% of women who do not use contraceptive participate in the labor market whereas 23.6% women who use contraceptive do not participate in the labor market. With regard to Level of Education, 67.6% of who do not have primary education participated in the labor market followed by 25% of women who have primary education. Interestingly women who have secondary and higher education have lees participation in the labor market. When we consider the variable currently pregnant,88.8% of women who said no pregnancy or unsure participate in the labor market whereas 11.2% who are pregnant participate in the labor market. Women whose husband works have the highest labor force participation and in this case 93.9% of women participate in the labor market. In the case of the variable Number of household member, 49.9% and 38.5% of women whose Number household are from 4 to 6 and above 7 participate in the labor market while 11.5% women whose number of household member is from 1 to 3 participate in the labor market.

**Table4. 1.Descriptive Statistics for the overall pooled sample**

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| **WLFP** | . | . | . | . | . |
| No | 21236 | .717 | .45 | 0 | 1 |
| Yes | 21236 | .283 | .45 | 0 | 1 |
| **AgeW** | . | . | . | . | . |
| 15-19 | 21236 | .039 | .194 | 0 | 1 |
| 20-24 | 21236 | .202 | .401 | 0 | 1 |
| 25-29 | 21236 | .307 | .461 | 0 | 1 |
| 30-34 | 21236 | .213 | .41 | 0 | 1 |
| 35-39 | 21236 | .156 | .363 | 0 | 1 |
| 40-44 | 21236 | .062 | .241 | 0 | 1 |
| 45-49 | 21236 | .02 | .141 | 0 | 1 |
| **PlResid** | . | . | . | . | . |
| Urban | 21236 | .173 | .378 | 0 | 1 |
| Rural | 21236 | .827 | .378 | 0 | 1 |
| **NuCh** | . | . | . | . | . |
| Not have Childrean | 21236 | .035 | .184 | 0 | 1 |
| From 1 to 2 Children | 21236 | .777 | .416 | 0 | 1 |
| From 3 to 4 Children | 21236 | .183 | .387 | 0 | 1 |
| 5 Children and Above | 21236 | .005 | .073 | 0 | 1 |
| **Sexhh** | . | . | . | . | . |
| Male | 21236 | .822 | .382 | 0 | 1 |
| Female | 21236 | .178 | .382 | 0 | 1 |
| **EcoSt** | . | . | . | . | . |
| Poor | 21236 | .517 | .5 | 0 | 1 |
| Middle | 21236 | .151 | .358 | 0 | 1 |
| Rich | 21236 | .332 | .471 | 0 | 1 |
| **CoUse** | . | . | . | . | . |
| Not Use Contracept~e | 21236 | .764 | .425 | 0 | 1 |
| Use Contraceptive | 21236 | .236 | .425 | 0 | 1 |
| **HEL** | . | . | . | . | . |
| No education | 21236 | .676 | .468 | 0 | 1 |
| Primary | 21236 | .25 | .433 | 0 | 1 |
| Secondary | 21236 | .049 | .216 | 0 | 1 |
| Higher | 21236 | .026 | .158 | 0 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| **CuPreg** | . | . | . | . | . |
| No or unsure | 21236 | .888 | .316 | 0 | 1 |
| Yes | 21236 | .112 | .316 | 0 | 1 |
| **HuEdL** | . | . | . | . | . |
| No education | 21236 | .508 | .5 | 0 | 1 |
| Primary | 21236 | .346 | .476 | 0 | 1 |
| Secondary | 21236 | .085 | .278 | 0 | 1 |
| Higher | 21236 | .058 | .234 | 0 | 1 |
| Don't know | 21236 | .004 | .059 | 0 | 1 |
| **HuEmpSt** | . | . | . | . | . |
| Did not work | 21236 | .061 | .24 | 0 | 1 |
| Works | 21236 | .939 | .24 | 0 | 1 |
| **NuhhM** | . | . | . | . | . |
| From 1 to 3 | 21236 | .115 | .319 | 0 | 1 |
| From 4 to 6 | 21236 | .499 | .5 | 0 | 1 |
| 7 and above | 21236 | .385 | .487 | 0 | 1 |

## 4.3. Summary of descriptive statistics for the pooled subsample urban-rural

### 4.3.1. Summary of descriptive statistics for the pooled subsample urban

Table 4.2 below shows summary statistics of women's labor force participation for the pooled subsample urban. Overall women in the urban areas who participate in the labor market is 39.4% whereas those who are not participating in the labor market are 60.6%.Women's labor force participation in the age group 25-29 is 35.7% which is the highest one followed by the age group 30-34 that accounts 22.1%.The lowest women's labor force participation is observed in the age group 45-49 with 7%. In the variable number of children age five years and under women's labor force participation is observed for those mothers who have children from 1 to 2 with 80.9% which is followed by mothers who have children from 3 to 4 that is found to be 13%.The lowest women's labor force participation is observed for those mothers who have children from 5 and above which account 0.03%.Concerning the variable Sex of the Household, women's labor force participation is 73.2% if the household is male and 26.8% of women participate in the labor market if the household is female. With regard to the variable economic status, 91.5% of women from the Rich category participate in the labor market. For the variable education, women with

no education and primary education have 34.1% and 34.5% participation in the labor market. Those women who have secondary and higher education have 19% and 12.5% participation in the labor market. Women whose husband does not work have the lowest participation in the labor market. Those 93.9% of women who participate in labor market are from whose husbands work. For the variable Number of household, women's labor force is observed to be 52.7% for those whose number of household is from 4 to 6 which are followed by women whose number of household is 7 and above. Women whose husbands have primary, secondary and higher education have considerable labor force participation. In this respect 33.6%, 24%, and 21% of women whose husbands have primary, secondary and higher education respectively participate in the labor market.

**Table4. 2.Descriptive Statistics for the subsample urban**

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| **WLFP** | . | . | . | . | . |
| No | 3665 | .606 | .489 | 0 | 1 |
| Yes | 3665 | .394 | .489 | 0 | 1 |
| **AgeW** | . | . | . | . | . |
| 15-19 | 3665 | .028 | .165 | 0 | 1 |
| 20-24 | 3665 | .207 | .405 | 0 | 1 |
| 25-29 | 3665 | .357 | .479 | 0 | 1 |
| 30-34 | 3665 | .221 | .415 | 0 | 1 |
| 35-39 | 3665 | .138 | .344 | 0 | 1 |
| 40-44 | 3665 | .043 | .203 | 0 | 1 |
| 45-49 | 3665 | .007 | .081 | 0 | 1 |
| **NuCh** | . | . | . | . | . |
| Not have Childrean | 3665 | .058 | .234 | 0 | 1 |
| From 1 to 2 Children | 3665 | .809 | .393 | 0 | 1 |
| From 3 to 4 Children | 3665 | .13 | .337 | 0 | 1 |
| 5 Children and Above | 3665 | .003 | .052 | 0 | 1 |
| **Sexhh** | . | . | . | . | . |
| Male | 3665 | .732 | .443 | 0 | 1 |
| Female | 3665 | .268 | .443 | 0 | 1 |
| **EcoSt** | . | . | . | . | . |
| Poor | 3665 | .067 | .25 | 0 | 1 |
| Middle | 3665 | .018 | .132 | 0 | 1 |
| Rich | 3665 | .915 | .278 | 0 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| **CoUse** | . | . | . | . | . |
| Not Use Contracept~e | 3665 | .526 | .499 | 0 | 1 |
| Use Contraceptive | 3665 | .474 | .499 | 0 | 1 |
| **HEL** | . | . | . | . | . |
| No education | 3665 | .341 | .474 | 0 | 1 |
| Primary | 3665 | .345 | .475 | 0 | 1 |
| Secondary | 3665 | .19 | .392 | 0 | 1 |
| Higher | 3665 | .125 | .331 | 0 | 1 |
| **CuPreg** | . | . | . | . | . |
| No or unsure | 3665 | .916 | .277 | 0 | 1 |
| Yes | 3665 | .084 | .277 | 0 | 1 |
| **HuEdL** | . | . | . | . | . |
| No education | 3665 | .208 | .406 | 0 | 1 |
| Primary | 3665 | .336 | .472 | 0 | 1 |
| Secondary | 3665 | .24 | .427 | 0 | 1 |
| Higher | 3665 | .21 | .407 | 0 | 1 |
| Don't know | 3665 | .007 | .081 | 0 | 1 |
| **HuEmpSt** | . | . | . | . | . |
| Did not work | 3665 | .061 | .24 | 0 | 1 |
| Works | 3665 | .939 | .24 | 0 | 1 |
| **NuhhM** | . | . | . | . | . |
| From 1 to 3 | 3665 | .197 | .398 | 0 | 1 |
| From 4 to 6 | 3665 | .527 | .499 | 0 | 1 |
| 7 and above | 3665 | .276 | .447 | 0 | 1 |

### 4.3.2. Summary of descriptive statistics for the pooled subsample rural

Table 4.3 below shows summary statistics of women's labor force participation for the pooled subsample rural. On average 74% of women do not participate in the labor market whereas only 26% of women participate in the labor market in rural areas. When we consider women's labor force participation according to their age group women in the age group 25-29 have 29.7% participation and followed by the age group 30-34 that accounts 21.2%.The lowest women's labor force participation is observed in the age group 45-49 which is 2.3%. In the variable number of children age five years and under women's labor force participation is observed for those mothers who have children from 1 to 2 with 77% which is followed by mothers who have

children from 3 to 4 that is found to be 19.4%.The lowest women's labor force participation is observed for those mothers who have children 5 and above which account 0.6%.Concerning the variable Sex of the Household, women's labor force participation is 84.1% if the household is male and 15.9% of women participate in the labor market if the household is female. With regard to the variable economic status, 61.1% of women from the poor category participate in the labor market. For the variable education, 74.6% of women with no education participate in the labor market and 23% of women with primary education participate in the labor market.0.5% of the women which have higher education participate in the labor market. When we take into account the variable current pregnancy, 88.2% of women who are not pregnant or unsure about their pregnancy participate in the labor market. 81.4% of women who do not use contraceptive participate in the labor market while 18.6% of women who use contraceptive participate in the labor market. Concerning the variable Husbands employment, women whose husbands work have the highest participation in the labor market. Accordingly, women who participate in the labor market account 93.9%.For the variable Number of household, women's labor force is observed to be 49.4% for those whose number of household is from 4 to 6 which is followed by women whose number of household is 7 and above and this found to 40.8%

**Table4. 3.Descriptive Statistics for the subsample rural**

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| **WLFP** | . | . | . | . | . |
| No | 17571 | .74 | .439 | 0 | 1 |
| Yes | 17571 | .26 | .439 | 0 | 1 |
| **AgeW** | . | . | . | . | . |
| 15-19 | 17571 | .041 | .199 | 0 | 1 |
| 20-24 | 17571 | .2 | .4 | 0 | 1 |
| 25-29 | 17571 | .297 | .457 | 0 | 1 |
| 30-34 | 17571 | .212 | .408 | 0 | 1 |
| 35-39 | 17571 | .16 | .367 | 0 | 1 |
| 40-44 | 17571 | .066 | .249 | 0 | 1 |
| 45-49 | 17571 | .023 | .151 | 0 | 1 |
| **NuCh** | . | . | . | . | . |
| Not have Childrean | 17571 | .03 | .171 | 0 | 1 |
| From 1 to 2 Children | 17571 | .77 | .421 | 0 | 1 |
| From 3 to 4 Children | 17571 | .194 | .395 | 0 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| 5 Children and Above | 17571 | .006 | .077 | 0 | 1 |
| **Sexhh** | . | . | . | . | . |
| Male | 17571 | .841 | .366 | 0 | 1 |
| Female | 17571 | .159 | .366 | 0 | 1 |
| **EcoSt** | . | . | . | . | . |
| Poor | 17571 | .611 | .488 | 0 | 1 |
| Middle | 17571 | .178 | .383 | 0 | 1 |
| Rich | 17571 | .211 | .408 | 0 | 1 |
| **CoUse** | . | . | . | . | . |
| Not Use Contracept~e | 17571 | .814 | .389 | 0 | 1 |
| Use Contraceptive | 17571 | .186 | .389 | 0 | 1 |
| **HEL** | . | . | . | . | . |
| No education | 17571 | .746 | .435 | 0 | 1 |
| Primary | 17571 | .23 | .421 | 0 | 1 |
| Secondary | 17571 | .02 | .138 | 0 | 1 |
| Higher | 17571 | .005 | .071 | 0 | 1 |
| **CuPreg** | . | . | . | . | . |
| No or unsure | 17571 | .882 | .323 | 0 | 1 |
| Yes | 17571 | .118 | .323 | 0 | 1 |
| **HuEdL** | . | . | . | . | . |
| No education | 17571 | .57 | .495 | 0 | 1 |
| Primary | 17571 | .348 | .476 | 0 | 1 |
| Secondary | 17571 | .052 | .223 | 0 | 1 |
| Higher | 17571 | .026 | .16 | 0 | 1 |
| Don't know | 17571 | .003 | .054 | 0 | 1 |
| **HuEmpSt** | . | . | . | . | . |
| Did not work | 17571 | .061 | .24 | 0 | 1 |
| Works | 17571 | .939 | .24 | 0 | 1 |
| **NuhhM** | . | . | . | . | . |
| From 1 to 3 | 17571 | .098 | .297 | 0 | 1 |
| From 4 to 6 | 17571 | .494 | .5 | 0 | 1 |
| 7 and above | 17571 | .408 | .492 | 0 | 1 |

## Table 4.4 .Logistic regression for the overall sample

| Logistic regression for the overall sample<br>Log pseudolikelihood =-12004.424 | | | Number of obs = 21,236<br>Wald chi2(26) = 1189.2<br>Prob > chi2 = 0.0000<br>Pseudo R2 = 0.051 | | | |
|---|---|---|---|---|---|---|
| WLFP<br>Age group of Women | Odds Ratio | Robust Std. Err. | Z | P>\|z\| | [95%Conf.Interval] | |
| 20-24 | 1.131276 | 0.1081216 | 1.29 | 0.197 | .9380259 | 1.364338 |
| 25-29 | 1.672669 | 0.1566327 | 5.49 | 0.000 | 1.392199 | 2.009641 |
| 30-34 | 1.971608 | 0.1896508 | 7.06 | 0.000 | 1.632836 | 2.380666 |
| 35-39 | 1.864513 | 0.1849038 | 6.28 | 0.000 | 1.535153 | 2.264535 |
| 40-44 | 1.960001 | 0.217078 | 6.08 | 0.000 | 1.577547 | 2.435176 |
| 45-49 | 2.031348 | 0.2876643 | 5.00 | 0.000 | 1.539017 | 2.681175 |
| Place of Residence | | | | | | |
| Rural | .9716094 | 0.0513457 | -0.55 | 0.586 | .8760101 | 1.077641 |
| Number Children five years of age and under | | | | | | |
| From 1 to 2 Children | .8470369 | 0.0707782 | -1.99 | 0.047 | .7190783 | .9977655 |
| From 3 to 4 Children | .694226 | 0.0642935 | -3.94 | 0.000 | .5789881 | .8324002 |
| 5 Children and Above | .7100233 | 0.1714958 | -1.42 | 0.156 | .4422595 | 1.139903 |
| Sex household head | | | | | | |
| Female | 1.328028 | 0.05518 | 6.83 | 0.000 | 1.224164 | 1.440705 |
| Economic Status | | | | | | |
| Middle | 1.202469 | 0.0561634 | 3.95 | 0.000 | 1.097279 | 1.317743 |
| Rich | 1.289584 | 0.0562435 | 5.83 | 0.000 | 1.183929 | 1.404668 |
| Contraceptive Use | | | | | | |
| Use Contraceptive | 1.440148 | 0.057392 | 9.15 | 0.000 | 1.331942 | 1.557144 |
| Highest Education Level | | | | | | |
| Primary | 1.214417 | 0.0498113 | 4.74 | 0.000 | 1.12061 | 1.316077 |
| Secondary | 1.31162 | 0.1084329 | 3.28 | 0.001 | 1.115419 | 1.542331 |
| Higher | 5.940798 | 0.7075959 | 14.96 | 0.000 | 4.70392 | 7.502908 |
| Currently Pregnant | | | | | | |
| Yes | .8660096 | 0.0467952 | -2.66 | 0.008 | .7789824 | .9627593 |
| Husband's Education Level | | | | | | |
| Primary | 1.425475 | 0.0531145 | 9.51 | 0.000 | 1.325083 | 1.533473 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Secondary | 1.078182 | 0.0727854 | 1.12 | 0.265 | .9445601 | 1.230707 |
| Higher | 1.051869 | 0.0898656 | 0.59 | 0.554 | .8896925 | 1.243608 |
| Husband's Employment Status | | | | | | |
| Works | 1.538126 | 0.1176531 | 5.63 | 0.000 | 1.323984 | 1.786905 |
| Number of household Members | | | | | | |
| From 4 to 6 | 1.055342 | 0.0587355 | 0.97 | 0.333 | .9462789 | 1.176975 |
| 7 and above | 1.021011 | 0.064084 | 0.33 | 0.740 | .9028273 | 1.154666 |
| year | | | | | | |
| 2016 | .8163123 | 0.0268935 | -6.16 | 0.000 | .7652677 | .8707616 |
| _cons | .127513 | 0.0193353 | -13.58 | 0.000 | .0947291 | .1716427 |

## 4.4. Logistic regression result for the overall pooled Sample

Table 4.4 presents the correlates of women's labor force participation in Ethiopia. In table 4.4 it is observed that the age group of the women has positively and significantly related to the women's labor force participation in Ethiopia. The level of women's labor force participation increases with the increase in age of the women. Specifically, women in the age group 20-24 with odd ratio 1.131 shows that women in this age group have more chance of 13.1% to participate in the labor market compared to those women in the age group 15-19. Women in the age groups 25-29, 30-34, 35-39, 40-44, and 45-49 have a significant chance to participate in the labor market. Women in these age groups have more chances to participate in the labor market compared to those who are in the age group 15-19 which accounts for 67.3%, 97.2%, and 86.5%, 96%, and 3% respectively. We realize that as women's age gets older and older their chance of participation in the labor market increases. It is evident that women's in the age group of bearing and raring children have lower labor force participation than those who are out of these age groups. According to Mulugeta et.al (2017) findings the chance of women's employment in the labor market increases as their age increases.

Concerning the variable place of residence, women who are living in a rural area are negatively and significantly related to women's labor force participation. This implies that women have less chance of participating in the labor market. The odd ratio of 0.972 indicates that a woman who is living in rural areas has a 2.8% less chance to participate in the labor market when compared to that of a woman who is living in urban areas.

The variable number of children ages five and under is negatively and significantly related to women's labor force participation. This implies that women who have higher number of children whose age five year and under have less chance to participate in the labor market. The odd ratios 0.847, 0.694 0.710 indicate that women who have 1 to2 and 3 to 4 and 5and above children have 15.3% 30.6% and 29% less chance to participate in the labor market compared to those women who have no children. This result is in line with the findings of Che and Sundjo (2018)

Concerning the variable Economic status, women whose economic status is middle and rich is positively and significantly related to women's labor force participation. That means women whose economic status middle and rich have more chance to participate in the labor market. Specifically, with odds ratios 1.1202 and 1.290 for economic status middle and rich, women

have 12.02% and 29% more chance to participate in the labor market when compared to the reference category poor respectively. As it is observe in both cases an increment an income of women is positively and significantly associated with women's labor force participation. The reason behind this may be as the income of women increase women will be encouraged to supply more labor to the labor market. This finding is in contradiction to economic theory. The economic theory says as income of workers increase. workers will supply less labor to the labor market.

With regard to the variable sex of the household the variable female is positively and significantly related to women's labor force participation. This implies that a household with more number of women has more chance in the labor force participation than those with less number of women in the household. The odd ratio 1.328 indicates that a household with more number of women have 32.8% more chance to participate in the labor market.

In the case of the use of contraceptive women who use contraceptive participate in the labor market than those who did not use contraceptive. With the odds ratio, 1.440 use of contraceptives is positively and significantly related to women's labor force participation having a chance of 44% compared to those nonusers of contraceptive.

The variable education level of women is positively and significantly related to women's labor force participation than those who are not educated. With odd ratio 1.214 and 1.312 women who have primary and secondary education have 21.4% and 31.2% more chance to participate in the labor market respectively than those who do not have primary and secondary education. Higher education with odd ratio 5.941 indicates that women have 94.1% more chance to engage in the labor market when compared to those who are not education. This finding is in agreement with the findings suggested by Varol F (2017).

The variable Pregnancy is also the one that affects women's labor force participation. The variable Pregnancy with an odds ratio of 0.866 is related to women's labor force participation. Women who are pregnant have a 13.4% less chance to participate in the labor market compared to those who are not pregnant.

The variable Husband's education at primary level indicates that there is a significant correlation to women's labor force participation. Husband's education with odds ratio at primary, 1.425, are

more likely to participate in the labor market compared to non-educated husbands. Interestingly, on the other hand women whose husbands have secondary and higher education is not related to women's labor force participation. That is husbands' education level secondary and higher are insignificant for women's labor force participation and this finding is in contradiction to many other research findings. Many research findings indicate that as husbands' education level increase women's labor force participation also increases due to their husbands' encouragement.

The variable husband's employment status is positively and significantly related to women's labor force participation. With an odd ratio of 1.538 women whose husbands working have a 53.8% more chance to participate in the labor market compared to those women whose husbands are not working.

The variable number of household members is insignificant for women's labor force participation. However, many research findings suggested that as the number of household members increase women's labor force participation also increases to complement their families' income.

The year dummy is negatively and significantly related to women's labor force participation. With odds ratio 0.816 women in the year 2016 are 18.4% less likely to participate in the labor market. This implies that as year increase women's labor force participation decreases with a significant amount. But findings suggest that as year increase women are more likely to supply more labor to the labor market.

## 4.5. Logistic regression result for pooled subsample

Table 4.5 presents the results of the urban-rural subsample. The variable age group for both urban and rural is positively and significantly related to women's labor force participation similar to that of the overall results obtained. We observe that women who are age 40-44 and 45-49 with an odds ratio of 4.184 and 4.616 living in urban have 18.4% and 61.6% more chances to participate in the labor market compared to the age group 15-19. Whereas the rural areas with an odds ratio of 1.765 and 1.917 have more chances to participate in the labor market compared to the age group 15-19. This may be because women in the older age group are out of bearing and raring children in urban and rural areas.

The variable number of children age five and under has the same sign as that of the overall

pooled cross-sectional sample result. Especially women who have children from 1 to 2 in urban areas with an odds ratio of 0.499 have 50.1% less chance to engage in the labor market compared to those who do not have children. But women who have children from 1 to 2 in the rural is related positively and significantly to the labor force participation. This may because of the differences in the socio-cultural setting that exists in urban and rural areas. In urban areas, there is a strong social attachment that may help rural women to participate in the labor market because of the chance of getting who look after their children. That means women who are living in urban areas have less social attachment than those who are living in rural areas.

The variable sex of household head for subsample urban-rural has the same sign-positive to that of the overall sample. Concerning the variable sex of the household head, women who are living in rural areas with an odds ratio of 1.335 have a 7.9% more chance compared to those who are living in urban areas. Women with a higher level of education might migrate to urban areas living women with less level of education in rural areas. As a result, women who remained in rural areas might have better access to jobs in rural areas. The variable wealth index for pooled cross-sectional subsample urban-rural with middle and rich income status have the same sign-positive to that of the overall pooled cross-sectional sample.

Concerning the variable economic status women who reside in the rural areas with economic status middle and rich whose, odds ratios are 1.195 and 1.268 related positively and significantly to women's labor force participation.

The Variable Contraceptive use with an odds ratio of 1.544 is positively and significantly related to women's labor force participation. Women who use contraceptives have a 54.4% more chance to participate in the labor market compared to those who do not use contraceptives.

The variable pregnancy for pooled subsample urban and rural has the same sign as that of the overall pooled sample and it is negatively and significantly related to women's labor force participation. During pregnancy, there are health issues that might affect women's labor force participation.

The variable Husband's education for women who reside in rural areas is positively and significantly related to women's labor force participation. Women with the variable Husband's education in which its odds ratio 1.448, 1.278, and 1.413 at a primary, secondary, and higher-level have more chance to participate in the labor market compared to women who reside in

urban areas.

The variable level of education for the pooled subsample has the same sign-positive and significantly related to women's labor force participation as for the overall pooled sample regression. Women who are living in rural areas have more chances to engage in the labor force when compared to those who are living in urban areas. Women in rural areas with variable levels of education having odd ratios of 1.221 and 7.910 at primary and higher education level have 4.4% and 2.3% more chance to participate in the labor market compared to their counterparts who reside in the urban areas. This may be due to a lack of educated women in the rural areas than in the urban areas and in addition to these most women leave school to be married and hardship responsibilities that might come after marriage. So due to this few educated women in rural areas can easily be employed than those who are in the urban areas. The work of Che G, Sundjo(2018) found similar results in Cameroon.

The variable Husband's employment status for urban-rural pooled cross-sectional subsample is positively and significantly related to women's labor force participation similar to that for the overall pooled cross-sectional sample. Women for the pooled subsample rural have more chance to participate in the labor market than those women in the overall pooled sample. Women in the pooled subsample rural with an odds ratio of 1.717 have a 71.7% more chance to participate in the labor market compared to women in the overall pooled sample.

The variable number of households for pooled subsample urban and rural whose number of household members from 4 to 6 with odds ratio 1.151 and 1.011 is positively and significantly related to women's labor force participation.

The year dummy 2016 both for urban and rural with odds ratio 0.798 and 0.820 is positively related to women's labor force participation. Women in both urban and rural have 20.2% and 18% less chance to participate in the labor market compared to the year 2011.

## Table 4.5. Logistic regression for urban subsample

| Logistic regression for urban subsample | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Number of obs = | 3,655 | |
| | | | | Wald chi2(24) = | 349.40 | |
| | | | | Prob > chi2 = | 0.0000 | |
| Log pseudolikelihood =-2252.4953 | | | | Pseudo R2 = | 0.0813 | |
| WLFP | Odds Ratio | Robust Std. Err. | Z | P>\|z\| | [95% Conf. | Interval |
| Age group of Women | | | | | | |
| 20-24 | 1.472219 | 0.3745182 | 1.52 | 0.128 | .8942007 | 2.423873 |
| 25-29 | 2.464263 | 0.6133547 | 3.62 | 0.000 | 1.512945 | 4.013756 |
| 30-34 | 2.861834 | 0.7288084 | 4.13 | 0.000 | 1.737294 | 4.714281 |
| 35-39 | 2.870266 | 0.7536956 | 4.02 | 0.000 | 1.715566 | 4.802163 |
| 40-44 | 4.183872 | 1.26119 | 4.75 | 0.000 | 2.317349 | 7.553797 |
| 45-49 | 4.61584 | 2.3944 | 2.95 | 0.003 | 1.669946 | 12.75848 |
| Number of Children five years of age and under | | | | | | |
| From 1 to 2 Children | .4990696 | 0.0807475 | -4.30 | 0.000 | .3634462 | .6853021 |
| From 3 to 4 Children | .3571759 | 0.0698967 | -5.26 | 0.000 | .2433931 | .5241506 |
| Sex of household head | | | | | | |
| Female | 1.256331 | 0.1035087 | 2.77 | 0.006 | 1.068991 | 1.476503 |
| Economic Status | | | | | | |
| Middle | 1.002454 | 0.3275382 | 0.01 | 0.994 | .5283792 | 1.901879 |
| Rich | 1.2115 | 0.1906141 | 1.22 | 0.223 | .8900161 | 1.649108 |
| Contraceptive Use | | | | | | |
| Use Contraceptive | 1.228429 | 0.1029756 | 2.45 | 0.014 | 1.042308 | 1.447784 |
| Highest Education Level | | | | | | |
| Primary | 1.17738 | 0.1165812 | 1.65 | 0.099 | .9696897 | 1.429554 |
| Secondary | 1.57618 | 0.1907894 | 3.76 | 0.000 | 1.243288 | 1.998204 |
| Higher | 6.887288 | 1.057323 | 12.57 | 0.000 | 5.097689 | 9.305143 |
| Currently Pregnant | | | | | | |
| Yes | .6628122 | 0.0940869 | -2.90 | 0.004 | .5018357 | .875426 |
| Husband's Education Level | | | | | | |
| Primary | 1.103455 | 0.1207445 | 0.90 | 0.368 | .8904568 | 1.367403 |
| Secondary | .6981761 | 0.0882021 | -2.84 | 0.004 | .5450431 | .8943325 |
| Higher | .6189183 | 0.0862732 | -3.44 | 0.001 | .4709571 | .8133645 |
| Husband's Employment Status | | | | | | |
| Works | 1.261741 | 0.2097612 | 1.40 | 0.162 | .9108775 | 1.747754 |
| Number of household Member | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| From 4 to 6 | 1.151386 | 0.1176815 | 1.38 | 0.168 | .942369 1.406763 |
| 7 and above | 1.11636 | 0.1417523 | 0.87 | 0.386 | .8704045 1.431817 |
| year | | | | | |
| 2016 | .7979835 | 0.0595535 | -3.02 | 0.002 | .689396 .9236748 |
| _cons | .2579933 | 0.0913894 | -3.82 | 0.000 | .1288504 .5165721 |

## Table4.6. Logistic regression for rural subsample

Logistic regression for rural subsample

Number of obs = 17,571
Wald chi2(25) = 685.19
Prob > chi2 = 0.0000
Log pseudolikelihood =-9704.8317 Pseudo R2 = 0.0357

| WLFP | Odds Ratio | Robust Std. Err. | z | P>\|z\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| Age group of Women | | | | | | |
| 20-24 | 1.108643 | 0.1143894 | 1.00 | 0.318 | .9056594 | 1.35712 |
| 25-29 | 1.60345 | 0.1627193 | 4.65 | 0.000 | 1.314241 | 1.956303 |
| 30-34 | 1.898975 | 0.1979977 | 6.15 | 0.000 | 1.54799 | 2.32954 |
| 35-39 | 1.776714 | 0.1909908 | 5.35 | 0.000 | 1.439184 | 2.193405 |
| 40-44 | 1.764659 | 0.2118098 | 4.73 | 0.000 | 1.394736 | 2.232695 |
| 45-49 | 1.918667 | 0.2877189 | 4.35 | 0.000 | 1.430064 | 2.574209 |
| Number of Children five years of age and under | | | | | | |
| From 1 to 2 Children | 1.062996 | 0.1113356 | 0.58 | 0.560 | .8657228 | 1.305222 |
| From 3 to 4 Children | .8794765 | 0.0995022 | -1.14 | 0.256 | .7045648 | 1.097811 |
| 5 Children and Above | 1.005155 | 0.2541968 | 0.02 | 0.984 | .6123077 | 1.650046 |
| Sex of household head | | | | | | |
| Female | 1.33475 | 0.0646154 | 5.96 | 0.000 | 1.213929 | 1.467597 |
| Economic Status | | | | | | |
| Middle | 1.195162 | 0.0568107 | 3.75 | 0.000 | 1.088845 | 1.311861 |
| Rich | 1.268001 | 0.0581102 | 5.18 | 0.000 | 1.159072 | 1.387166 |
| Contraceptive Use | | | | | | |
| Use Contraceptive | 1.544151 | 0.0703121 | 9.54 | 0.000 | 1.412312 | 1.688297 |
| Highest Education Level | | | | | | |
| Primary | 1.220987 | 0.0549061 | 4.44 | 0.000 | 1.117979 | 1.333485 |
| Secondary | 1.102138 | 0.1493409 | 0.72 | 0.473 | .8450784 | 1.43739 |
| Higher | 7.90963 | 2.198849 | 7.44 | 0.000 | 4.586962 | 13.63914 |
| Currently Pregnant | | | | | | |
| Yes | .9014172 | 0.0526414 | -1.78 | 0.076 | .8039276 | 1.010729 |
| Husband's Education Level | | | | | | |
| Primary | 1.448071 | 0.0575463 | 9.32 | 0.000 | 1.339563 | 1.565368 |
| Secondary | 1.278296 | 0.1084777 | 2.89 | 0.004 | 1.082424 | 1.509612 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Higher | 1.413183 | 0.1685231 | 2.90 | 0.004 | 1.118645 | 1.785274 |
| Don't know | 1.648424 | 0.5240031 | 1.57 | 0.116 | .8840729 | 3.073619 |
| Husband’s Employment Status | | | | | | |
| Works | 1.716763 | 0.1510327 | 6.14 | 0.000 | 1.44486 | 2.039835 |
| Number of household Members | | | | | | |
| From 4 to 6 | 1.010551 | 0.067174 | 0.16 | 0.875 | .8871086 | 1.151172 |
| 7 and above | .9825478 | 0.0721594 | -0.24 | 0.811 | .8508256 | 1.134663 |
| year | | | | | | |
| 2016 | .8195523 | 0.0302566 | -5.39 | 0.000 | .7623451 | .8810524 |
| _cons | .0928052 | 0.01542 | -14.31 | 0.000 | .0670102 | .1285296 |

## 4.6. Logistic regression model test for the goodness of fit

After logistic regression had been fitted it is important to apply a global test of goodness of fit. So it is important to check whether the fitted model is appropriate or not. Accordingly, most of the time we use Chi-square test, Hosmer-Lemeshow test, and the Wald test to check whether the model is working well.

### 4.6.1. Likelihood-Ratio Test

In order to test the goodness of fit of the model, we apply the likelihood ratio test by comparing two nested models. To do so we consider one model with a little number of explanatory variables and the other model with more additional explanatory variables. That is two models are compared one model with no variable called the empty (intercept only) model and the other one with all variables called the saturated (full) model.

We can formulate the null hypothesis as follows:

H0: There is no significant difference between the empty model and the saturated model

H1: not H0

**Table4. 3 Goodness of fit measure**

| **Goodness of fit measure** | **Empty model** | **Full model** |
|---|---|---|
| **Log Likelihood** | **-1264.061** | **-12023.717** |
| **AIC** | **25300.12** | **24062.85** |
| **BIC** | **25308.08** | **24277.86** |

From the above table we observe that -2Loglikelihood statistic for the full model is 24047.434 and the statistic for the model that has only the intercept is -2LL0=252981.122.As we observe

the inclusion of the parameters reduced the -2LogLikelihood statistic by 252981.122-24047.434=1933.688.Since log likelihood ratio test is Chi-square distributed with 27 degrees of freedom ($\chi 2$=1933.688, d.f=27 p-value<0.000) we can reject the null hypothesis of no significant difference between the two models. Further we use the AIC and the BIC values to determine the better model. In the above table as we can see the full model is better than the empty model since AIC and BIC in the full model are smaller than the empty model.

### 4.6.2. Hosmer-Lemeshow Goodness of Fit Test

According to Hosmer-Lemeshow goodness of fit test subjects are divided into deciles based on predicted probabilities. Consequently it computes a Chi-square from expected and observed frequencies. Therefore, a non-significant Chi-square indicates as there is no difference between the observed and the model predicted values. Hence, this tells us that the model fit the data well. Therefore, the overall goodness of fit of the model was evaluated by Hosmer-Lemeshow goodness of fit test.

We can formulate the null hypothesis as follows:

H0: the model adequately fit the data

H1: the model does not adequately fit the data

As we observe the p-value that we obtained is 0.222.It is evident to see that the p-value is greater than 0.05.This implies that we do not reject the null hypothesis that there is no difference between the observed and predicted values by the model. This indicates that the model estimates the data at an acceptable level.

**Table4. 4 Hosmer-Lemeshow Goodness of Fit Statistics**

| **Hosmer-Lemeshow Goodness of Fit Test** | | |
|---|---|---|
| **Chi-square** | **DF** | **significance** |
| **10.66** | **8** | **0.222** |

# CHAPTER FIVE

# 5. DISCUSSIONS, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

## 5.1. Discussions and conclusions

This research paper was focused on investigating the determinants of women's labor force participation in Ethiopia. The regression analysis employed logit/logistic regression. The dependent variable: Women's labor force participation has a dichotomous nature. The independent variables included: Age of women, Place of residence, Number of children, Sex of household head, Economic status, education level of women, Husband's employment, and Number of household members, Contraceptive use, Currently pregnant, Husband's education level., Place of residence, age of women, Husband's employment status, Sex of household head, Economic status of the household, Educational level, and Presence of a child aged five years and under in the household, Currently pregnant, Husband's education were found to be important determinants of women's labor force participation. Based on the findings of the previous chapter, the study arrives at the following conclusions.

Women's age affects positively and significantly the labor force participation in the labor market. The finding indicated that as women become older their chance in the labor market also increased. This may be because as a woman becomes older and older the burden of childbearing and rearing considerably decreases and this gave a woman more chance to participate in the labor market.

Concerning the place of residence, women who reside in rural areas have less chance to participate in the labor market compared to those who live in urban areas. Women in urban areas have more access to education compared to those women who live in rural areas and the chance for urban women to be educated might facilitate situations to participate in the labor markets.

The number of children whose age five years and under negatively and significantly affect women's labor force participation. As the number of children increases women have less chance in the labor market compared to women with few children. This may be because women with

more children should spend more time taking care of their children than women with few children.

Sex of the household head had its own implication in women's labor force participation. Sex of the household head affects positively and significantly women's labor force participation. That is female household heads had more chance in the labor force participation compared to those who are not household head.

Pregnancy of women negatively and significantly affects women's labor force participation. Most of the time women during pregnancy spend much of their time at home to follow up on their health conditions. Many organizations do not want to hire women who are especially in the age of bearing children. As a result, there will be a drawback to women's labor force participation in the labor market.

Husband's education has a positive contribution to women's labor force participation. Educated husbands might encourage their wives to participate in the labor market compared to those who are not educated, husbands.

Women's education level had positively and significantly related to women's labor force participation. Women who have primary, secondary and higher education had more chances to participate in the labor market compared to those who had no primary education.

Women whose husbands employed had more chance to participate in the labor market compared to those women whose husbands are not working.

The number of household members affected women's labor force participation positively and significantly. As the number of household members increases women's labor force participation also increased significantly.

Concerning the year dummy, from the pooled regression we observed that women's labor force participation is less in the year 2016 compared to women's labor force participation in the year 2011.

## 5.2. Implications to economic development

We know that in Ethiopia women constitutes almost half of the total population-that is 49.5 percent according to the 2007 censuses. It should be noted that missing women in the economic

activity would cause a loss to economic development and this may be equivalent or more to what men contribute to economic development by some evidences. This fact tells us that women's labor force participation has a complementarity effect on economic development.

Facilitating the situation for women to participate fully in the labor market should be the prime concern of the society and the government so that the full potential of women's labor is utilized like their counterpart male in the labor market. The participation of women in the labor market implies a lot to the household and the society at large. When women participate in the labor market with remuneration they could help their families for instance by sending children to better schools so that children get better education that might in turn induce invention and innovation which in turn helps to accelerate economic development. As a result this would lead to more economic activity in the society and at large in the country.

From the regression analysis we observed that there are factors/challenges that affect women's labor force participation negatively. Thus, alleviating these factors/challenges that hinder women's labor force participation should not be a matter of choice rather it should be an obligation of the society and the government.

## 5.3. RECOMMENDATIONS

The results obtained from this research study play an important role for policy makers who are concerned with women's labor force participation in Ethiopia. The problem of women's labor force participation has negative effect on immediate family members and at large on the society. In order to formulate policies to control the rising problem of women's labor force participation in Ethiopia it is important to understand the effects of reforms concerning labor force participation among women. The problem of women's labor force participation should also be considered with the reference to demographic and economic characteristics. Accordingly in this research paper the following possible solutions are recommended in order to tackle the problem of women's labor force participation in Ethiopia.

- Policy makers should consider the provision of education for women so as to induce job opportunities. For instance, this could be done by reducing drop out of school girls and giving skill trainings for those women who have less education. As a result this might encourage more women to participate in the labor market.

- The government should give due attention to place of residence with less women's labor force participation in Ethiopia. Further research on demographic and socioeconomic factors should be done to investigate what makes large variations in women labor force participation among women of different place of residence so that appropriate policies could be implemented that promote more uniform labor markets for women.
- The government should reconsider policy issues of family planning so as to control for the number of children that affects women's labor force participation in Ethiopia.
- The government should look for policies that promote even distribution of jobs between urban and rural areas that could enhance women's labor force participation. To do so the government should narrow the differences in the level of economic growth between urban and rural and raise the lower level of socioeconomic status which shows less women's labor force participation.

# REFERNCES


Agresti, A. (2007). An Introduction to Categorical Data Analysis. Published by John Wiley and Sons, Inc, Hoboken, New York

Aguirre, D., Hoteit, L., Rupp, C. and Sabbagh, K., 2012. Empowering the Third Billion: Women and the World of Work in 2012. Booz and Company.

Becker, G . S. (1975). Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education, 2nd ed.: NBER Vol.ISBN:0-226-04109-3 pp-22-0

Becker, G .S (1965).A Theory of the Allocation of Time. The Economic Journal,Vol.75,No.299,pp 493-517

Blundell, R. and S. Bond (1998). Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics87,115-143.

Che G, Sundjo F (2018) Determinants of female labor force participation rate in Cameroon: International Journal of Applied economics, finance and accounting. ISSN 2577-767X, Vol.3,No.2, pp.88-103

CSA (2007) Ethiopian Summary and Statistical Report of the 2007population and housing census. Federal Democratic Republic of Ethiopia Population Census Commission

Cuberes, D. and Teignier, M., 2016. Aggregate Effects of Gender Gaps in the Labor Market: A Quantitative Estimate. Journal of Human Capital, Vol.10, No.1, pp.1-32.

Duflo, E., (2012). "Women Empowerment and Economic Development." Journal of Economic Literature ,Vol.50,No. 4, pp1051-1079.

Durand, J. (1975). The Labor force in economic development: A comparison of international Census Data, 1946-1966.

E.Bloom, D.Canning, G. Fink, & J.Finlay, (2007). Fertility, Female Labor Force Participation, and the Demographic Dividend. NBER Working Paper, 13583.

E.Canon,M, Fessenden, H, and Kudlyak,M (2015) Why are women leaving the labor force ?Economic Brief,EB15-11

Ehrenberg, R. G., & Smith, R. S. (2012). Modern Labor Economics: Theory and Public Policy (11th ed.).11th ed.School of Industrial and Labor relations. Cornell University

Gaddis, I., Klasen, S. (2014). Economic Development, Structural change, and Women's Labor Force Participation, Journal of Population Economics,Vol.27 issue.3, pp. 639-681

Gobebo, G,,Mulugata, W, and Yaekob, T (2017).Determinants of Women Unemployment: Evidence from Ethiopia (Case of Halaba town SNNPR).International Journal of Development Research.Vol.07,Issue11,pp.16630-16639

Goldin, C. (1994). The U-shaped Female Labor Force Functions in Economic Development and Economic History. NBER Working Paper No. 4707.

Greulich,(2009) Female labor market participation and economic growth: International Journal if Innovation and sustainable development

ILO (2017) World employment social outlook: International Labor Office: Geneva

ILO (2018) World employment social outlook: International Labor Office: Geneva

ILO (2019) World employment social outlook: International Labor Office: Geneva

IMF (2018).The Federal Democratic republic of Ethiopia: IMF country report No.18/354

Klasen S and Pieters,.J (2015). What Explains the Stagnation of Female Labor Force Participation in Urban India? Policy Research Working Paper 7222.World Bank Economic Review 29(3): 449-478

Lincove, J. (2008). Growth, Girls' Education, and Female labor: A Longitudinal analysis.The Journal of Developing Areas, Vol.41, No.2 pp. 45-68.

Ma Qinfen (2017) Female labor force participation in Malaysia: Time-series evidence

Mammen, K., Paxson, C. (2000). Women's Work and Economic Development. The Journal of Economic Perspectives-vol 4, number 4, page 141-164

Mincer (1981) Human capital and economic growth: National bureau of economic research 1050 Massachusetts Avenue Cambridge MA 02138

Mincer, J. (1958). 'Investment in Human Capital and Personal Income Distribution'. Journal of Political Economy, vol. 66,No.4 , pp. 281–302.

Mincer, J. (1962b). ‘Labor Force Participation of Married Women: Aspects of Labor Economics, pp. 63–106, Princeton University Press.

Misikir M,(2020).Determinants of women unemployment:Evidence from Southern Region of Ethiopia (case of Wolaita Sodo Town)

MOE (2017) Education statistics annual abstract: Federal democratic republic of Ethiopia, ministry of education

Mohammed G,(2011).Demographic and socio-economic determinants of female labor force participation in the informal sector in Hawassa city Administration, SNNPR.Center for population studies Institute of development studies.

panel data evidence. Economic Letters, forthcoming

Psacharopoulos G and Tzannatos Z (1989) Female Labor Force Participation: An International Perspective.World Bank Research observer 4(2):187-201.doi:10.1093/wbro/4.2.187

Ryan, T. (1997). Modern Regression Methods. Wiley, Inc., New York

Schultz, T.P (1961) Human Capital Investment in Women and Men: Micro and Macro evidence of economic growth and publication. Working paper

Sen (1987) Gender and cooperative conflicts: wider working papers

Shubha Chakrarary,Smita das,,Julia Vaillant (2017) Gender and youth Employment in Sub-Saharan Africa

Sorsa P, Mares J, Didier M, Guimaraes C, Rabat M, Tang G and Tuske A (2015) Determinants of the Low Female Labor Force Participation in India. Economics department working papers No.1207.

Tam,H. (2010). U-shaped female labor participation with economic development

Tansel, A. (2001). Economic Development and Female Labor Force Participation in Turkey: Time Series Evidence and Cross-Province Estimates. Article in SSRN Electronic Journal. in Economics 01/05.

Tsani, S., Paroussos, L., Fragiadakis, C., Charalambidis, I., Capros, P. (2013). Female Labor Force Participation and Economic Growth in the South Mediterranean countries, Economics Letters,120(2),323-328.

UNDP (2018) Human development indices and indicators: statistical update

UNFPA (2008) gender inequality and women's employment: Ethiopian society of population studies

Varol,F (2017).The Determinants of Labor Force Participation of Women in Turkey: A Binary Logit. Journal of History Culture and Art research, 6(2), 92-108.

Virginie Comblen, Anne-Sophie Robilliard, Francois Roubaud(2017) Gender analysis of labor force market outcomes in Sub-Saharan Africa: Recent evidence from Cameron and Mali

Wooldridge, J. M. (2004). Introductory Econometrics: A modern Approach. Michigan State university

Yuko Morikawa (2015) the opportunities and challenges for female labor force participation in Morocco. Global Economy & Development Working Paper 86

Zaheer R,Qaiser S (2016).Factors that Affect the Participation of Female Labor Force: A macro level study of Pakistan. Journal of economics and finance.vol.7, Issue 2.p-ISSN:2321-5925,pp20-24

# APPENDIXES

APPENDIX 1: Syntax in do-file for descriptive and logit/logistic regression

**//Descriptive statstics for the overall pooled sample**

**asdoc sum i.WLFP i.AgeW i.PlResid i.NuCh i.Sexhh i.EcoSt i.CoUse i.HEL i.CuPreg i.HuEdL i.HuEmpSt i.NuhhM,replace**

**// Descriptive statistics with regard to place of residence**

***********************************************

***descriptive statstics of pooled cross section for urban residence ***

***********************************************

**asdoc sum i.WLFP i.AgeW i.NuCh i.Sexhh i.EcoSt i.CoUse i.HEL i.CuPreg i.HuEdL i.HuEmpSt i.NuhhM if PlResid==1,replace**

**************************************************************

***descriptive statstics of pooled cross section for rural residence ***

**************************************************************

**asdoc sum i.WLFP i.AgeW i.NuCh i.Sexhh i.EcoSt i.CoUse i.HEL i.CuPreg i.HuEdL i.HuEmpSt i.NuhhM if PlResid==2,replace**

**//logit/logistic regression for the overall pooled sample data**

**logit WLFP i.AgeW i.PlResid i.NuCh i.Sexhh i.EcoSt i.CoUse i.HEL i.CuPreg i.HuEdL i.HuEmpSt i.NuhhM i.year,robust**

**outreg2 using results,replace word e(r2_p)sideway noparen obs ctitle(model1,coefficient)dec(3)label ///**

**title (Factors Determining women's labor force participation Overall sample ) ///**

**addnote (model1 represents logit regression,model2 representes logistic regression)**

**logistic WLFP i.AgeW i.PlResid i.NuCh i.Sexhh i.EcoSt i.CoUse i.HEL i.CuPreg i.HuEdL i.HuEmpSt i.NuhhM i.year,robust**

**outreg2 using results,append word e(r2_p) sideway noparen obs ctitle(model2,odds ratio) dec(3) nodepvar eform noci label**

**//logit/logistic regression for subsample of place residence**

***************************************************************

***logit/logistic regression for subsample of urban**

***************************************************************

**logit WLFP i.AgeW i.NuCh i.Sexhh i.EcoSt i.CoUse i.HEL i.CuPreg i.HuEdL i.HuEmpSt i.NuhhM i.year if PlResid==1,robust**

**outreg2 using results,replace word ctitle(model1,coefficient)dec(3)label ///**

**title(factors Determining women's labor force participation for subsample urban) ///**

**addnote(model1 represents logit regression.model2 representes logistic regression)**

**logistic WLFP i.AgeW i.NuCh i.Sexhh i.EcoSt i.CoUse i.HEL i.CuPreg i.HuEdL i.HuEmpSt i.NuhhM i.year if PlResid==1,robust**

**outreg2 using results,append word ctitle(model2,odds ratio) dec(3) eform nodepvar noci label**

***************************************************************

***logit/logistic regression for subsample of rural**

***************************************************************

**logit WLFP i.AgeW i.NuCh i.Sexhh i.EcoSt i.CoUse i.HEL i.CuPreg i.HuEdL i.HuEmpSt i.NuhhM i.year if PlResid==2,robust**

**outreg2 using results,replace word ctitle(model1,coefficient) dec(3) label ///**

**title(factors Determining women's labor force participation for subsample rural) ///**

**addnote(model1 represents logit regression.model2 representes logistic regression)**

**logistic WLFP i.AgeW i.NuCh i.Sexhh i.EcoSt i.CoUse i.HEL i.CuPreg i.HuEdL i.HuEmpSt i.NuhhM i.year if PlResid==2,robust**

**outreg2 using results,append word ctitle(model2,odds ratio) dec(3) eform nodepvar noci label**

**//subsample results of the determinants of women's labor force participation**

**logit WLFP i.AgeW i.NuCh i.Sexhh i.EcoSt i.CoUse i.HEL i.CuPreg i.HuEdL i.HuEmpSt i.NuhhM i.year if PlResid==1,robust**

**outreg2 using results,replace word e(r2_p) ctitle(subsample urban,coefficient)dec(3)label ///**

**title(Factors Determining women's labor force participation for subsample urban) ///**

**addnote(model1&2 represent logit & logistic regression for urabn subsample,model3&4 represent logit & logistic regression for rural subsample)**

**logistic WLFP i.AgeW i.NuCh i.Sexhh i.EcoSt i.CoUse i.HEL i.CuPreg i.HuEdL i.HuEmpSt i.NuhhM i.year if PlResid==1,robust**

**outreg2 using results,append word ctitle(subsample urban,odds ratio) dec(3) eform nodepvar noci label**

**logit  WLFP i.AgeW i.NuCh i.Sexhh i.EcoSt i.CoUse i.HEL i.CuPreg i.HuEdL i.HuEmpSt i.NuhhM i.year if PlResid==2,robust**

**outreg2 using results,append word e(r2_p) ctitle(subsaple rural,coefficient) dec(3) label ///**

**title(Factors Determining women's labor force participation for subsample rural) ///**

**addnote(model1 represents logit regression.model2 representes logistic regression)**

**logistic WLFP i.AgeW i.NuCh i.Sexhh i.EcoSt i.CoUse i.HEL i.CuPreg i.HuEdL i.HuEmpSt i.NuhhM i.year if PlResid==2,robust**

**outreg2 using results,append word ctitle(subsample rural,odds ratio) dec(3) eform nodepvar noci label**

**//post estimation**

**//A.obtaining Homsmer-Lemeshow test results(non-signicicant indicates good fit)**

**estat gof,group(10)**

**//B.obtaining Pearson Chi-square test results(non-signicicant indicates good fit)**

**estat gof**

**//C.AIC and BIC**

**estat ic**

## Appendix 2: logistic regression for the pooled overall sample and subsamples

```
. logistic WLFP i.AgeW i.PlResid i.NuCh i.Sexhh i.EcoSt i.CoUse i.HEL i.CuPreg i.HuEdL i.HuEmpSt i.NuhhM i.year,robust

Logistic regression                             Number of obs     =     21,236
                                                Wald chi2(26)     =    1189.20
                                                Prob > chi2       =     0.0000
Log pseudolikelihood = -12004.424               Pseudo R2         =     0.0510
```

| WLFP | Odds Ratio | Robust Std. Err. | z | P>\|z\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| AgeW | | | | | | |
| 20-24 | 1.131276 | .1081216 | 1.29 | 0.197 | .9380259 | 1.364338 |
| 25-29 | 1.672669 | .1566327 | 5.49 | 0.000 | 1.392199 | 2.009641 |
| 30-34 | 1.971608 | .1896508 | 7.06 | 0.000 | 1.632836 | 2.380666 |
| 35-39 | 1.864513 | .1849038 | 6.28 | 0.000 | 1.535153 | 2.264535 |
| 40-44 | 1.960001 | .217078 | 6.08 | 0.000 | 1.577547 | 2.435176 |
| 45-49 | 2.031348 | .2876643 | 5.00 | 0.000 | 1.539017 | 2.681175 |
| PlResid | | | | | | |
| Rural | .9716094 | .0513457 | -0.55 | 0.586 | .8760101 | 1.077641 |
| NuCh | | | | | | |
| From 1 to 2 Children | .8470369 | .0707782 | -1.99 | 0.047 | .7190783 | .9977655 |
| From 3 to 4 Children | .694226 | .0642935 | -3.94 | 0.000 | .5789881 | .8324002 |
| 5 Children and Above | .7100233 | .1714958 | -1.42 | 0.156 | .4422595 | 1.139903 |
| Sexhh | | | | | | |
| Female | 1.328028 | .05518 | 6.83 | 0.000 | 1.224164 | 1.440705 |
| EcoSt | | | | | | |
| Middle | 1.202469 | .0561634 | 3.95 | 0.000 | 1.097279 | 1.317743 |
| Rich | 1.289584 | .0562435 | 5.83 | 0.000 | 1.183929 | 1.404668 |
| CoUse | | | | | | |
| Use Contraceptive | 1.440148 | .057392 | 9.15 | 0.000 | 1.331942 | 1.557144 |
| HEL | | | | | | |
| Primary | 1.214417 | .0498113 | 4.74 | 0.000 | 1.12061 | 1.316077 |
| Secondary | 1.31162 | .1084329 | 3.28 | 0.001 | 1.115419 | 1.542331 |
| Higher | 5.940798 | .7075959 | 14.96 | 0.000 | 4.70392 | 7.502908 |
| CuPreg | | | | | | |
| Yes | .8660096 | .0467952 | -2.66 | 0.008 | .7789824 | .9627593 |
| HuEdL | | | | | | |
| Primary | 1.425475 | .0531145 | 9.51 | 0.000 | 1.325083 | 1.533473 |
| Secondary | 1.078182 | .0727854 | 1.12 | 0.265 | .9445601 | 1.230707 |
| Higher | 1.051869 | .0898656 | 0.59 | 0.554 | .8896925 | 1.243608 |
| Don't know | 1.293555 | .3774858 | 0.88 | 0.378 | .7301077 | 2.291833 |
| HuEmpSt | | | | | | |
| Works | 1.538126 | .1176531 | 5.63 | 0.000 | 1.323984 | 1.786905 |
| NuhhM | | | | | | |
| From 4 to 6 | 1.055342 | .0587355 | 0.97 | 0.333 | .9462789 | 1.176975 |
| 7 and above | 1.021011 | .064084 | 0.33 | 0.740 | .9028273 | 1.154666 |
| year | | | | | | |
| 2016 | .8163123 | .0268935 | -6.16 | 0.000 | .7652677 | .8707616 |
| _cons | .127513 | .0193353 | -13.58 | 0.000 | .0947291 | .1716427 |

```
. logistic WLFP i.AgeW i.NuCh i.Sexhh i.EcoSt i.CoUse i.HEL i.CuPreg i.HuEdL i.HuEmpSt i.NuhhM i.year if PlResid==1,robust
note: 3.NuCh != 0 predicts failure perfectly
      3.NuCh dropped and 10 obs not used

Logistic regression                             Number of obs     =      3,655
                                                Wald chi2(24)     =     349.40
                                                Prob > chi2       =     0.0000
Log pseudolikelihood = -2252.4953               Pseudo R2         =     0.0813
```

| WLFP | Odds Ratio | Robust Std. Err. | z | P>\|z\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| AgeW | | | | | | |
| 20-24 | 1.472219 | .3745182 | 1.52 | 0.128 | .8942007 | 2.423873 |
| 25-29 | 2.464263 | .6133547 | 3.62 | 0.000 | 1.512945 | 4.013756 |
| 30-34 | 2.861834 | .7288084 | 4.13 | 0.000 | 1.737294 | 4.714281 |
| 35-39 | 2.870266 | .7536956 | 4.02 | 0.000 | 1.715566 | 4.802163 |
| 40-44 | 4.183872 | 1.26119 | 4.75 | 0.000 | 2.317349 | 7.553797 |
| 45-49 | 4.61584 | 2.3944 | 2.95 | 0.003 | 1.669946 | 12.75848 |
| NuCh | | | | | | |
| From 1 to 2 Children | .4990696 | .0807475 | -4.30 | 0.000 | .3634462 | .6853021 |
| From 3 to 4 Children | .3571759 | .0698967 | -5.26 | 0.000 | .2433931 | .5241506 |
| 5 Children and Above | 1 | (empty) | | | | |
| Sexhh | | | | | | |
| Female | 1.256331 | .1035087 | 2.77 | 0.006 | 1.068991 | 1.476503 |
| EcoSt | | | | | | |
| Middle | 1.002454 | .3275382 | 0.01 | 0.994 | .5283792 | 1.901879 |
| Rich | 1.2115 | .1906141 | 1.22 | 0.223 | .8900161 | 1.649108 |
| CoUse | | | | | | |
| Use Contraceptive | 1.228429 | .1029756 | 2.45 | 0.014 | 1.042308 | 1.447784 |
| HEL | | | | | | |
| Primary | 1.17738 | .1165812 | 1.65 | 0.099 | .9696897 | 1.429554 |
| Secondary | 1.57618 | .1907894 | 3.76 | 0.000 | 1.243288 | 1.998204 |
| Higher | 6.887288 | 1.057323 | 12.57 | 0.000 | 5.097689 | 9.305143 |
| CuPreg | | | | | | |
| Yes | .6628122 | .0940869 | -2.90 | 0.004 | .5018357 | .875426 |
| HuEdL | | | | | | |
| Primary | 1.103455 | .1207445 | 0.90 | 0.368 | .8904568 | 1.367403 |
| Secondary | .6981761 | .0882021 | -2.84 | 0.004 | .5450431 | .8943325 |
| Higher | .6189183 | .0862732 | -3.44 | 0.001 | .4709571 | .8133645 |
| Don't know | .5410349 | .3148131 | -1.06 | 0.291 | .1729557 | 1.69245 |
| HuEmpSt | | | | | | |
| Works | 1.261741 | .2097612 | 1.40 | 0.162 | .9108775 | 1.747754 |
| NuhhM | | | | | | |
| From 4 to 6 | 1.151386 | .1176815 | 1.38 | 0.168 | .942369 | 1.406763 |
| 7 and above | 1.11636 | .1417523 | 0.87 | 0.386 | .8704045 | 1.431817 |
| year | | | | | | |
| 2016 | .7979835 | .0595535 | -3.02 | 0.002 | .689396 | .9236748 |
| _cons | .2579933 | .0913894 | -3.82 | 0.000 | .1288504 | .5165721 |

```
. logistic WLFP i.AgeW i.NuCh i.Sexhh i.EcoSt i.CoUse i.HEL i.CuPreg i.HuEdL i.HuEmpSt i.NuhhM i.year if PlResid==2,robust

Logistic regression                             Number of obs     =     17,571
                                                Wald chi2(25)     =     685.19
                                                Prob > chi2       =     0.0000
Log pseudolikelihood = -9704.8317               Pseudo R2         =     0.0357
```

| WLFP | Odds Ratio | Robust Std. Err. | z | P>\|z\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| AgeW | | | | | | |
| 20-24 | 1.108643 | .1143894 | 1.00 | 0.318 | .9056594 | 1.35712 |
| 25-29 | 1.60345 | .1627193 | 4.65 | 0.000 | 1.314241 | 1.956303 |
| 30-34 | 1.898975 | .1979977 | 6.15 | 0.000 | 1.54799 | 2.32954 |
| 35-39 | 1.776714 | .1909908 | 5.35 | 0.000 | 1.439184 | 2.193405 |
| 40-44 | 1.764659 | .2118098 | 4.73 | 0.000 | 1.394736 | 2.232695 |
| 45-49 | 1.918667 | .2877189 | 4.35 | 0.000 | 1.430064 | 2.574209 |
| NuCh | | | | | | |
| From 1 to 2 Children | 1.062996 | .1113356 | 0.58 | 0.560 | .8657228 | 1.305222 |
| From 3 to 4 Children | .8794765 | .0995022 | -1.14 | 0.256 | .7045648 | 1.097811 |
| 5 Children and Above | 1.005155 | .2541968 | 0.02 | 0.984 | .6123077 | 1.650046 |
| Sexhh | | | | | | |
| Female | 1.33475 | .0646154 | 5.96 | 0.000 | 1.213929 | 1.467597 |
| EcoSt | | | | | | |
| Middle | 1.195162 | .0568107 | 3.75 | 0.000 | 1.088845 | 1.311861 |
| Rich | 1.268001 | .0581102 | 5.18 | 0.000 | 1.159072 | 1.387166 |
| CoUse | | | | | | |
| Use Contraceptive | 1.544151 | .0703121 | 9.54 | 0.000 | 1.412312 | 1.688297 |
| HEL | | | | | | |
| Primary | 1.220987 | .0549061 | 4.44 | 0.000 | 1.117979 | 1.333485 |
| Secondary | 1.102138 | .1493409 | 0.72 | 0.473 | .8450784 | 1.43739 |
| Higher | 7.90963 | 2.198849 | 7.44 | 0.000 | 4.586962 | 13.63914 |
| CuPreg | | | | | | |
| Yes | .9014172 | .0526414 | -1.78 | 0.076 | .8039276 | 1.010729 |
| HuEdL | | | | | | |
| Primary | 1.448071 | .0575463 | 9.32 | 0.000 | 1.339563 | 1.565368 |
| Secondary | 1.278296 | .1084777 | 2.89 | 0.004 | 1.082424 | 1.509612 |
| Higher | 1.413183 | .1685231 | 2.90 | 0.004 | 1.118645 | 1.785274 |
| Don't know | 1.648424 | .5240031 | 1.57 | 0.116 | .8840729 | 3.073619 |
| HuEmpSt | | | | | | |
| Works | 1.716763 | .1510327 | 6.14 | 0.000 | 1.44486 | 2.039835 |
| NuhhM | | | | | | |
| From 4 to 6 | 1.010551 | .067174 | 0.16 | 0.875 | .8871086 | 1.151172 |
| 7 and above | .9825478 | .0721594 | -0.24 | 0.811 | .8508256 | 1.134663 |
| year | | | | | | |
| 2016 | .8195523 | .0302566 | -5.39 | 0.000 | .7623451 | .8810524 |
| _cons | .0928052 | .01542 | -14.31 | 0.000 | .0670102 | .1285296 |

APPENDIX 3: Post estimations for the goodness of fit test of the model

A) Hosmer-Lemeshow test

```
. estat gof,group(10)

Logistic model for WLFP, goodness-of-fit test

(Table collapsed on quantiles of estimated probabilities)

      number of observations =     21236
           number of groups =        10
     Hosmer-Lemeshow chi2(8) =        10.66
               Prob > chi2 =         0.2220
```

B) Pearson Chi-square test

```
. estat gof
```

**Logistic model for WLFP, goodness-of-fit test**

```
      number of observations =     21236
number of covariate patterns =      4644
         Pearson chi2(4617) =   7047.95
               Prob > chi2 =      0.0000
```

C) Akaike’s information criterion and Bayesian information criterion

```
. estat ic

Akaike's information criterion and Bayesian information criterion
```

| Model | Obs | ll(null) | ll(model) | df | AIC | BIC |
|---|---|---|---|---|---|---|
| . | 21,236 | -12649.06 | -12004.42 | 27 | 24062.85 | 24277.86 |

Note: N=Obs used in calculating BIC; see **[R] BIC note**.