Determinants of Female Labor Force Participation in Economic Activities in Burundi

By

Ida Ornella Butoyi

Division of International and Areas Studies

The Graduate School

Pukyong National University

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부룬디 경제 활동에 참여하는 여성 노동의 결정 요인

By

Ida Ornella Butoyi

Advisor: Prof. Utai Uprasen

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Approved by:

Prof. Jong-Hwan Ko
(Chairman)

Prof. Moon-Chan Choi
(Member)

Prof. Utai Uprasen
(Member)

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Dedication

This thesis is dedicated to my lovely parents and sisters not forgetting my little sister, Johanna who passed away ten years ago.

Acknowledgments

I would like to thank the God almighty for the strength he gave me each day for his protection and the opportunity he offered me to make this research study and complete it successfully.

I would like also to thank my supervisor Professor Utai Uprasen for his patient guidance, encouragement on this research work. Without his able supervision, this thesis would not have been finished.

May God's blessings be upon my parents for their support and for always being there in my life. This would not have been possible without their love given to me.

Many thanks to my classmates for their advice and help, to my friends who always offered support and love.

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Butoyi Ida Ornella

Department of International and Areas Studies,

The Graduate School,

Pukyong National University

Abstract

The target of this study is to analyze the determinants of female labor force participation in economic activities in Burundi by using data from the survey on living conditions and households conducted between August 2013 and April 2014.There are some factors related to female entering into labor market. For example, residence, poverty, the household headed by female. Female labor force participation has become an essential element in the determination of the performance of economic development both developed and developing countries.

However, a large number of women in Burundi still have low productivity activities while few of them have high productivity activities. In order to examine the connection between poverty and the female labor market, it is important to understand the labor supply of each individual, not as an isolated decision taken on the assumption of her own characteristics but as dependent decision on the strategy of a large group: household. Logit regression technique is employed to evaluate the women's integration in the labor market. The result confirms that female living in poor household and female living in the rural areas increases the probability of female to enter into labor market.

Keywords: Female labor force participation, Poverty, Residence, Logit regression, Burundi

부룬디 경제 활동에 참여하는 여성 노동의 결정 요인

Butoyi Ida Ornella

한글 요약

이 연구의 목표는 2013 년부터 2014 년까지 수집된 생활환경과 가계에 관한 설문조사의 데이터를 이용하여 여성노동참여의 결정요인을 조사하는 것이다. 여성이노동시장에 뛰어드는 많은 요인들이 있다. 예를 들자면 거주지역, 빈곤, 여성에 의한 가정 등이 있다. 여성노동참여의 선진국과 개발도상국, 둘 다에서 경제적성장의 성과를 결정하는 중요한 요소가 되었다.

그러나 부룬디의 여성들은 여전히 적은 고생산성 활동보다는 저생산성 활동에 많은 숫자를 차지한다. 빈곤과 여성노동시장의 연결고리를 분석하기 위해서 개인의 선호에 기초한 고립된 결정이 아닌 거대한 집단의 전략에 따른 변화와 함께 각각의 개인의 노동 공급를 이해하는 것이 중요하다. 이 연구는 가계 전략의 뼈대안에서 개개인의 노동 공급을 설명하는 생존전략 이론을 사용했다. Logit regression technique 여성노동참여의 결정요인을 추산하기 위해서 사용되었다. 그결과 가난한 가정의 여성과 시골 지역의 여성은 노동시장에 참여할 확률이 높다는 것을 확인하였다.

핵심 키워드: 여성노동참여,Logit regression, 빈곤, 거주, 부룬디

CHAPTER I. Introduction

1.1 Background of the Study

In African countries, females are abundant and they can, therefore, contribute more if appropriate economic policies allow the mobilization of all potential labor in productive activities. Female labor force participation is a primary expression of the extent to which women take part in the economic activities of any country (Abena et al. 2017).

Female labor force participation is measured by female labor force participation rate (FLFPR). Female labor force participation rate is the percentage of female population ages 15 and older that is able to work, active or looking for work (Mupunga, 2013). Furthermore, female labor force participation rates are also used for analyzing the supplied labor of female for the production of goods and services during a certain period.

Some economists believe that female labor force participation and economic development have a strong relationship. Apart from that women contribute significantly in agricultural activities and the labor market is dominated by male because employment in the formal sector is contingent upon participant's education and skill acquisition and because women have financial, institutional and cultural problems (Abena et al. 2017). The international community has long taken stock of this inequality. It has repeatedly stressed the importance of women's activities in development (International Conference on Population and Development, 1994 in Cairo; Beijing International Conference, 1995).

In many African countries, including Burundi, recognition of the importance of participation of women in economic activity is reflected at national level through many debates and works on the development of national gender policy and by integrating this policy into national poverty reduction strategies.

This study aims to analyze the situation of women participation in the labor market of Burundi and the determinant of women's integration into labor market.

1.2 Problem Statement

Burundi is a landlocked country with an underdeveloped manufacturing sector. The high poverty rate, poor education rate, low economic development and poor transportation network are the results of the ethnic war in 2015. Its economy is rural and is based on agriculture and livestock and the economy cannot be developed taking account the agricultural sector only.

Therefore, according to the Burundi economic outlook report (2016), agriculture is the largest contributor to the economy of Burundi. It contributes 40% of the gross domestic product of the country and employs more than 80% of Burundians. Some of the agricultural production is for export (coffee and tea). The main staple crops are banana, cassava, sweet potato and beans.

Gender in Burundi is considered firstly as a human right issue which means that there are inequalities between men and women. The article 57 of Burundian constitution states that "with equal experiences or competencies, every person has the right to equal pay for equal work without any discrimination". Secondary, gender is considered as a poverty issues which means that women are the poorest people because of their gender. In the second place, women represent (58%) of the Burundian population, which means that national development cannot

be planned without paying attention to the values and interests of women. In addition, Women are more dominant in low productivity. However, despite the recognition of the important role of women in economic development, African women in particular still occupy an unfavorable position in the labor market.

There are formal and informal sectors in Burundi and informal sector is divided into two sectors that are primary sector (fishing, agriculture and livestock) and secondary sector (construction and industry). Formal sector employment is considered as tertiary sector more concentrated in urban areas while that of the informal sector is in rural areas. Female in the non-agricultural sector in Burundi is still low compared to other sectors. According to the national employment policy report, in 2008, only 19.8% of women occupied the secondary sector and 36.8% of women were in the formal sector. Otherwise, 54.2% of women occupied primary sector. Women have a large number of low productivity activities while few in high productivity activities. Women's earnings are insignificant compared to men's (national employment policy of Burundi, 2014).

In Burundi, early marriage is a big challenge for women to integrate into the labor market. Once they get married, they have a lot of household responsibilities which make them unable to get employment. Women are to take care of the home activities while men are to get jobs to sustain the family (national employment policy of Burundi, 2014).

1.3 Research Objectives

1. To study the general determinants of women's integration into labor market.
2. To study the effect of poverty on women's integration into labor market.

1.4 Research Questions

1. What factors do determine women's integration into labor market in Burundi?
2. Does poverty play role on women's integration into labor market?

1.5 Research Hypothesis

Higher poverty increases female labor force participation.

1.6 Organization of the Study

This study allows to examine the determinants of women in the labor market in Burundi and the mechanisms that lead to this position. It is organized as follows: the first chapter deals with the introduction, the second chapter presents the status of the labor market in Burundi, the third chapter presents the literature review which has 2 parts (Theoretical Framework and Empirical Framework of the supply of female labor). The fourth chapter presents the research methodology, the fifth chapter presents the presentation of the result and discussion. Finally, this research ends with the six chapter which is conclusion and Policy recommendations followed by references and appendices

CHAPTER II: Status of the Labor Market in Burundi

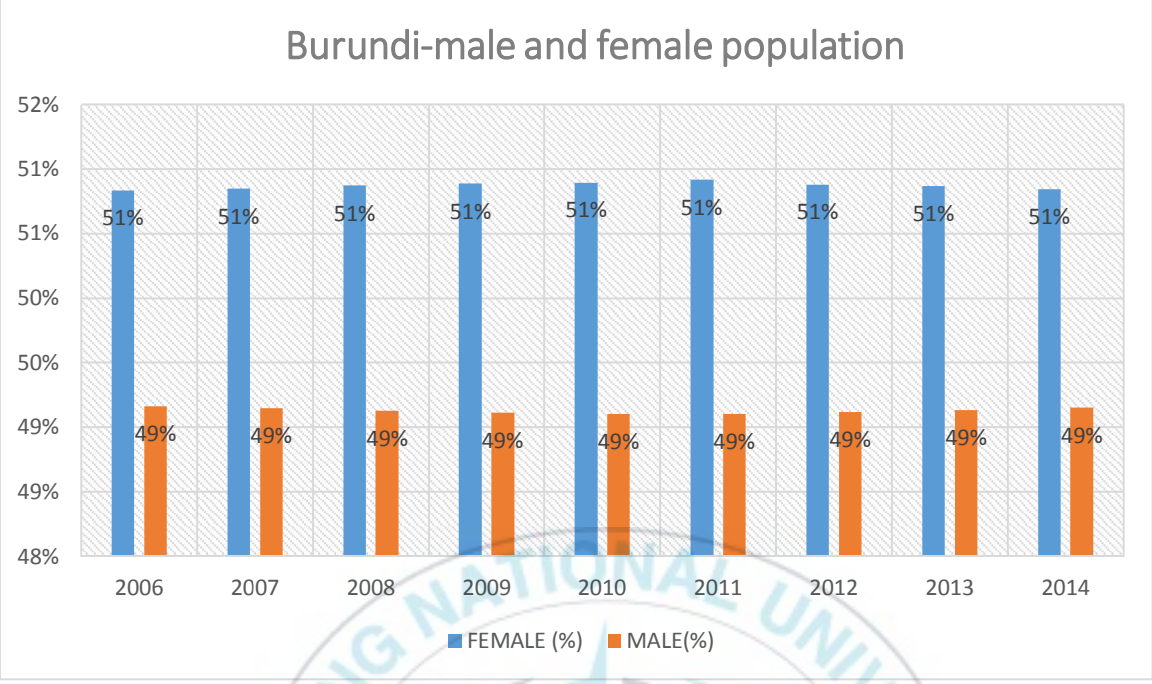
2.1 Introduction

The chapter provides descriptive statistics relating to the status and evolutions of selected labor market indicators between 2007-2016.The study focus on female labor force participation (FLFP). The discussion utilizes data from a survey on the living conditions of households conducted for Burundi in 2013 and in 2014.

2.2 Population Characteristics

Based on actual, Burundian population in 2018 is around 12, 21 million and 49.1% are men and 50.9% are women (Burundi population ,2018). The survey on the livings conditions of households estimated the 2014 population at 10, 64 million and sex ratio was about 96 males per 100 females for 2015. The table 2.1 shows the percentage of male and female population of Burundi (2006-2014, % of population).

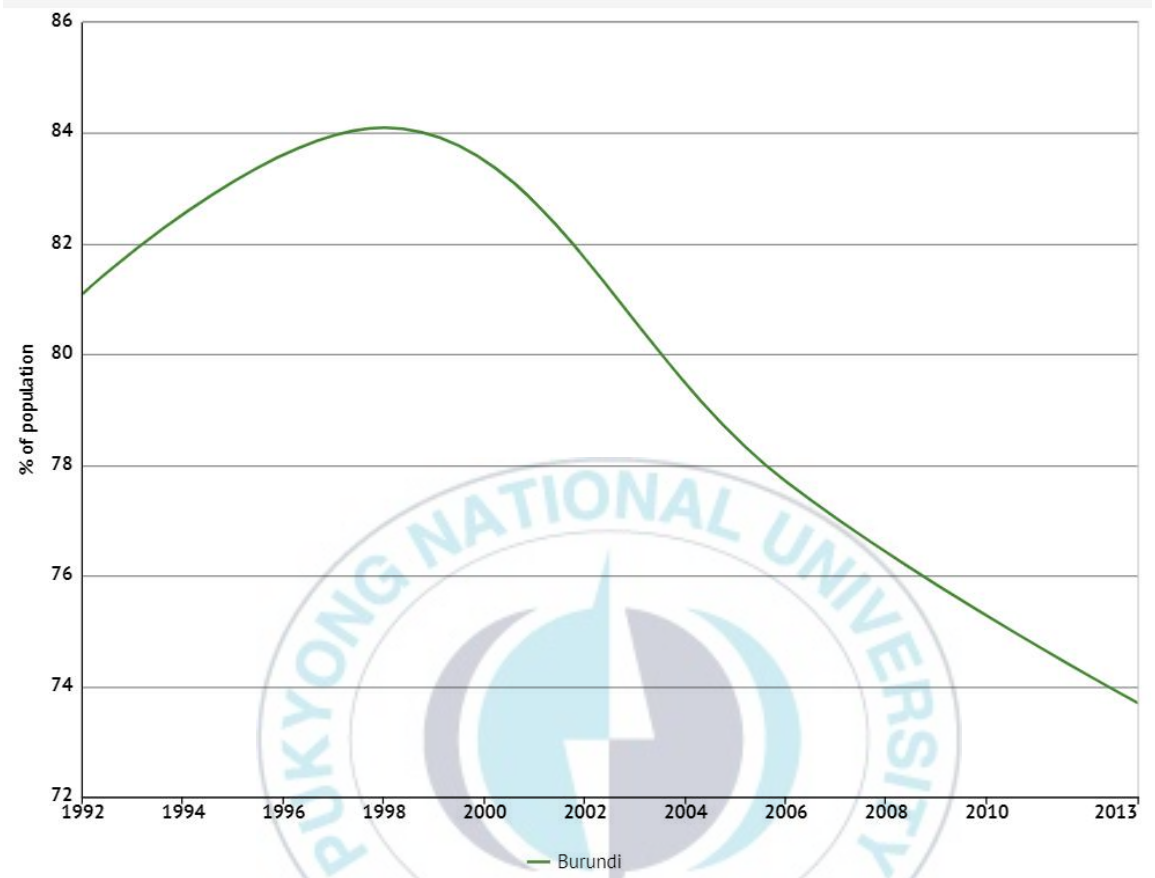
Figure 2. 1 Percentage of Male and Female Population of Burundi (2006-2014, % of Population).



Source: World Bank data

Figure 2.1 shows the percentage of male and female population in Burundi from 2006 to 2014. The female has 51% and male has 49% in all period. This shows that the population of female is higher than male population.

Figure 2. 2 Poverty Headcount Ratio at $1.90 a Day (2011 PPP, % of Population) in Burundi



Source: World Bank data

Figure 2.2 shows the percentage of population living below the $1.90 per day. From 1992 to 1998, the percentage was increased due to the beginning of civil war between Burundi's ethnic. The percentage of population living below the $1.90 start to decrease from 1998 because there was the beginning of mediating talks in Arusha. Even though the percentage was decreased, the country still has a high percentage of population living below a given poverty line.

Table 2. 1 Population Characteristics of Burundian's Labor Force (2007-2016)

Population Characteristics	2007	2010	2013	2016
Average	46.5	49.8	51.1	58.5
Female	47.8	52.6	53.8	60.5
Male	45.1	46.9	48.4	56.3
Total population (millions)	8 ,046.1	8, 454.2	9, 420.2	11, 215.0
Female	4, 161.5	4 ,298.2	4 ,796.0	5 ,682.4
Male	3 ,884.6	4 ,156.1	4 ,624.3	5 ,532.7
Sex ratio	93.3	96.7	96.4	97.4
Population Under 15 years (millions)	3, 682.6	3, 704.9	4 ,131.0	5, 079.4
Female	1, 853.9	1 ,886.0	2, 098.1	2, 575.2
Male	1, 828.6	1 ,818.9	2 ,035.9	2 ,504.1
Population aged 15 and 64 years (millions)	4,125.1	4, 531.7	4, 965.4	6 ,084.7
Female	2 ,128.4	2 ,299.0	2, 531.6	3, 097.1
Male	1, 996.7	2 ,232.7	2, 433.8	2 ,987.6
Population aged 64 and above (millions)	305.4	217.7	217.7	289.9
Female	179.2	113.2	115.0	151.6
Male	126.3	104.5	102.6	138.3
Demographic Dependency Ratio (%)	96.7	86.6	87.6	88.2
Gross Primary School Enrollment Rate (%)				
Average	113.8	136.2	130.6	114.4

Female	108.9	132.5	129.7	115.0
Male	118.7	140.1	131.7	113.8
Net Primary School Enrollment Rate (%)				
Average	80.7	90.2	98.7	86.5
Female	79.3	93.6	90.5	87.6
Male	82.2	86.6	89.0	85.5

Source: Institute of statistics and economic studies in Burundi (ISTEEBU)

Table 2.1 shows the population characteristics of Burundian's labor force from 2007 to 2016.It can clearly be seen that the year of life expectancy at birth of female has increased in comparison to the one of male. Survey on living conditions of household present that Female live longer compared to male. For the population under 15 years, ages 64 and above, ages 15 and 64 years, the number of female remains majority over all period (2007-2016) than that of the male. The data from general census of population and housing (GCPH 1990, 2008) yield a population of 8041.1 and 11215.0 (millions) from 2007 to 2016.The distribution of the population by sex indicates that the male population is lower than that of female over all period. The sex ratio shows that there is a predominance of female in all of the years (from 2007 to 2016). For demographics dependency ratio, the table shows that for every 100 workers, there are 96.7% dependents in 2007, 86.6% in 2010, 87.6% in 2013 and 88.2% in 2016.The gross primary school enrolment rate for male and female exceed 100% over all period means that there is over aged and under aged pupils than the official age group. For net enrolment rate, the graph shows that out of every 100 children within the official age group for primary education, percentages of male are higher than that of female over all period which means that there are a large number of male of the official primary school age who register in primary education That men are more educated than women.

2.3 Key Labor Market Indicators

We will discuss about three important labor market variables like: employment, labor force participation and unemployment. First, the employment rate shows the percentage of persons of working age who are employed. The employment rate is obtained by calculating the ratio between employed and working age population. The employment rate is also used by economist for more understanding the state of economy. Second, the labor force participation rate (LFPR)is the proportion used to analyze the working age population (15-64) in the economy, employed or seeking employment. Third, the rate of unemployment is defined as the percentage of inactive workers in the total number of labor force.

2.3.1 Employment

Employment consists of active population for economic activities. The employment is measured as a ratio of the population. The employment to population ratio shows the percentage of the labor force employed to the total working–age population (persons in the 15 to 64 age) of a country. The ratios of population are used to explain the degree of balance between males and female.

Table 2.2 Employment - Population Ratio Age and Sex Distribution in Burundi, 2018

Sex	Age	Burundi (%)	Eastern Africa (%)
Men and women	15 years and above	82%	74%
Men	15 years and above	81%	79%
Women	15 years and above	83%	69%

Sources: ILO, key indicators of the labor market

This table shows that women have a higher employment to population ratio than men in Burundi (83%) and the working age of population in eastern Africa is 74%. High total employment to population ratio is lifted up by women as active on the labor market. By comparing the 2 countries, there is a high ratio in Burundi .81% of men from Burundi is employed and in Eastern Africa, there is 79% of men. The working age of women is 83 % in Burundi and 69% in Eastern Africa. In conclusion, the table shows that the ratio of women in Burundi is higher because their education is limited and they are responsible for various tasks at home which can stop them from seeking paid employment and take up any work available.

Employment in Burundi changes according to formal and informal sectors. There are formal and informal sectors in Burundi and informal sector is divided in two sectors that are primary sector (fishing, agriculture and livestock) and secondary sector (construction and industry). Formal sector employment is more concentrated in urban areas while that of informal sector is in rural areas. Female in non-agricultural sector in Burundi is still low compared to other sectors. According to the national employment policy report, in 2008, only 19.8% of women occupied the secondary sector and 36.8% of women were in formal sector. Otherwise, 54.2% of women occupied primary.

Table 2.3 Share of Female Employment in Selected Sectors (1990-2014) in Burundi (%).

Activities Sectors	1990	1998	2008	2009	2012	2014
Agriculture, breeding, forestry, hunt, and peach	55.2	55.6	54.3	50.7	46.2	49.3
Mining industry	3.3	6.4	11.5	5.3	12.1	12.3
Manufacturing industry	28.8	29.5	32.0	7.7	23.5	27.4
Electricity, gas, and water	3.9	12.4	15.4	16.7	14.3	6.9
Buildings, and publics works	1.5	3.6	9.2	3.7	3.5	6.8
Wholesale and livestock, restaurants and hotels	23.8	30.3	31.4	26.4	29.8	25.4
Transport, workhouses and communications	3.7	4.3	6.7	7.2	1.4	3.1
Bank , insurance, real estate and services	30.8	36.3	38.8	27.3	45.0	22.6

Source: ISTEEBU (Institute of Statistics and Economic Studies in Burundi)

Table 2.3 shows the percentage of female employed in selected sector (1990-2014) in Burundi. We have activities sectors such as agriculture, mining industry, manufacturing industry, electricity. We can see that only in the agriculture, breeding, forestry, hunt and peach sector in 1998, there are more female than in the other sector. We can see that female is lowest in transport, workhouses, communications sectors and electricity, gas, water, buildings and publics works sectors compared to other sectors.

2.3.1.1 Employment in the Formal Sector

Formal sector is a sector which contains all jobs with normal hours and regular salary paid per month (e.g: bank, insurance, service). All that jobs are recognized as income sources and the income taxes must be paid The informal sector is not only an important source of employment; it is also a source of production of goods and services. Employment in the formal service includes 6% of the total employment but formal employment is very dominated by the service sector such as housekeeping, tours, nursing, teaching (labor market profile in Burundi, 2018).

Formal sector is highly dominated by male because employment in the formal sector depends on participants 'education, skill acquisition and others need that tend to be met more by males than females (Abena et al.2017).

In Burundi, employment in sectors such as mining industry, manufacturing industry, construction, and wholesale trade has decreased in recent years (labor market profile in Burundi, 2018).

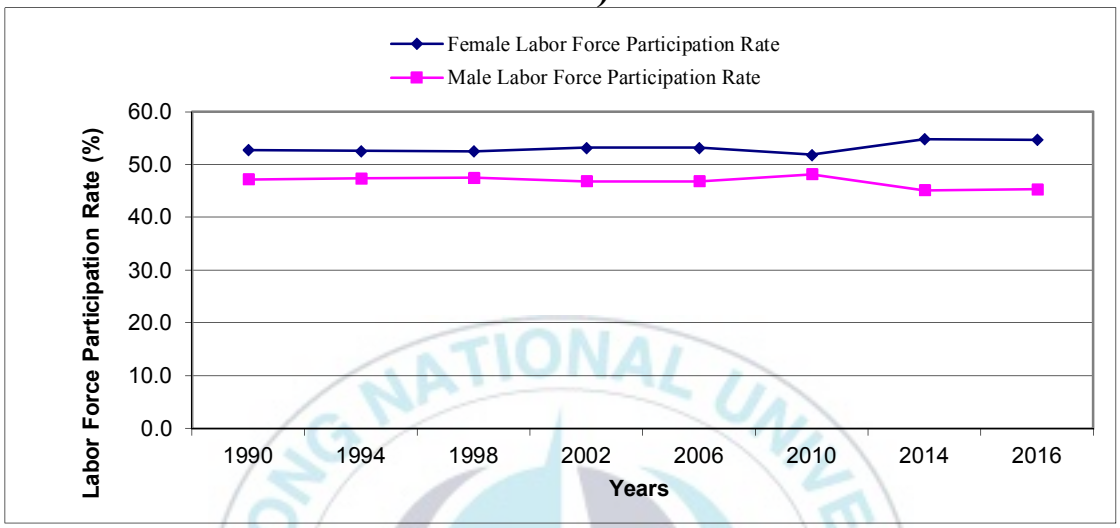
2.3.1.2 Employment in the Informal Sector

Informal sector is the opposite of formal sector. It is a sector which taxes are not paid (agriculture, forestry, hunt, peach, livestock) According to the data from the living conditions of household survey (LCHS 2013-2014), about eight out of 10 Burundians are in the informal sector.

Women are mostly working in the agricultural sector in Burundi. About 56% of workers in informal sector who receive payment in kind are women and nearly 60% of workers who don't have any forms of income are also women (Labor market profile in Burundi, 2018). In informal sector, most employment in this sector allows getting needs of foods and health. Women tend to be excluded in the formal sector because they suffer more from discrimination and from

social, cultural barriers that obstruct them from seeking work reason why they choose to work in the informal sector. Therefore, women in Burundi are responsible for the care of children and for households' responsibilities.

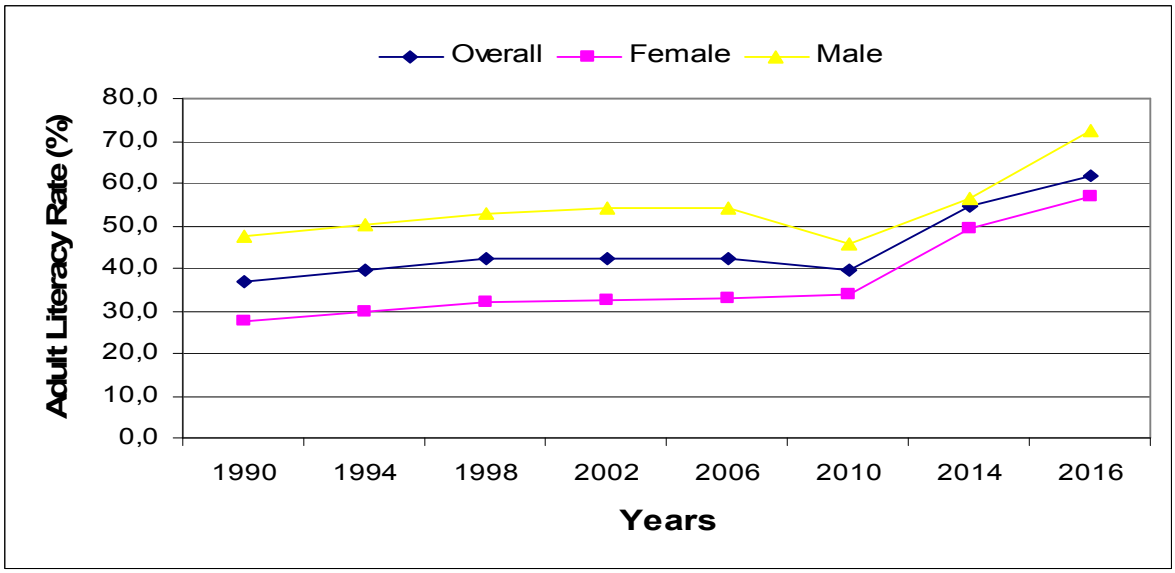
Figure 2.3 Trend in Labor Force Participation in Burundi (1990-2016)



Source: ISTEEBU based on data from the last general census of population and housing in 2008.

Figure2.3 shows the labor force participation rate of female and male from 1990 to 2016.The vertical axis presents the labor force participation rate measured in percentage and the horizontal axis presents the years. According to the data from the recent general population and housing census in 2008, women represent more than 50.8%. From 1990 to 2016, female labor force participation rate (FLFPR) remains majority than that of male. The figure shows that there was only a decline of female labor force participation rate from 2006 to 2010 and an increase of male labor force participation rate. From 2010 to 2016, female labor force participation rate increase again and male labor force participation fall down. In 2016, female and male labor force participation rate remains stable but female labor force participation rate still higher than that of male.

Figure 2.4 Trend in Adult Literacy Rate in Burundi (1990-2016)

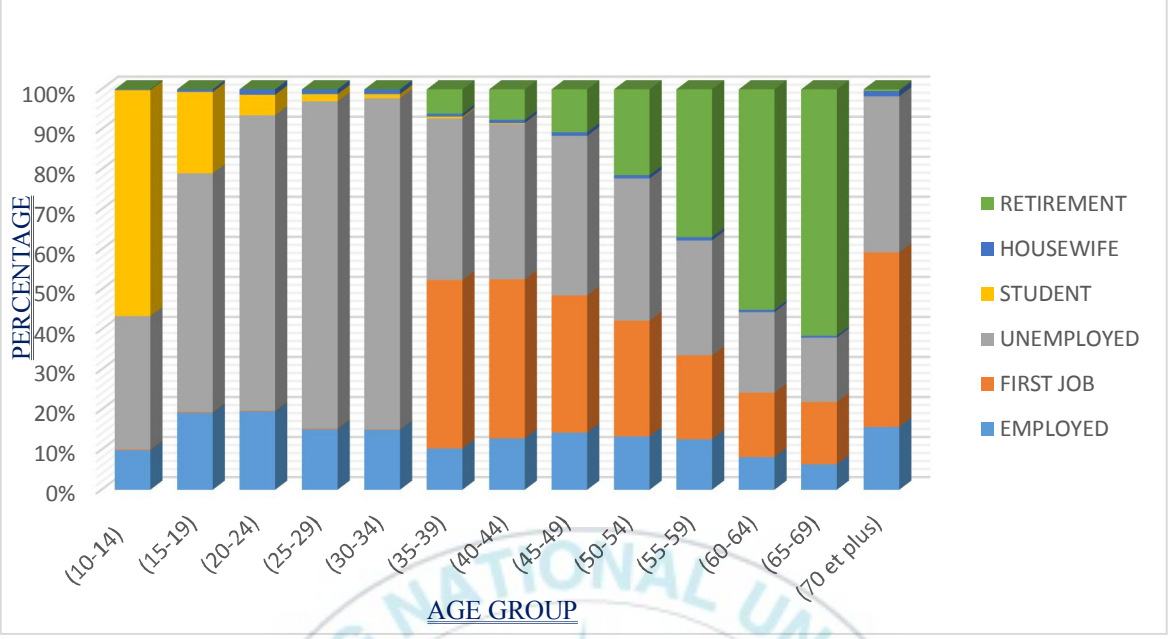


Source: Institute of statistics and economic studies in Burundi (ISTEEBU)

Figure2.4 shows that after an upward trend since 1990, the adult literacy rate has dropped from 2006 to 2010.The graph shows that over all period, the male has the higher literacy compared to the female. Therefore, for both gender, the lowest literacy rate was in 1990 with 37.1% and the highest rate in 2016 with 62.0%.

The female has lower literacy rate in 1990 with 27.4% and higher literacy rate in 2016 with 56.8%. For the men, the literacy rate is lowest in 2010 with 45.6% and highest in 2016 with 72.3%. In Burundi, the major progress in adult literacy is due to the fact that there are various policies such as free primary schooling and new education system. All of these policies have improved women's level of education, training and literacy.

Figure 2.5 Distribution of Female Population by Age and Sector Activities (2014).



Source: ISTEEBU based on data from the last general census of population and housing in (2008).

Figure 2.5 shows that unemployed female is higher for all age group category and the education of female starts to increase from (10-14) age groups and starts to decrease from (40-44) age groups. The figure shows also that we have a small number of female employed.

2.3.2 Unemployment

Unemployment is the situation where an individual who has been looking for employment is unable to find a job. According to the labor market profile (2018), many Burundians choose casual and informal work. The issue is the phenomenon of underemployment: there is no available data on this aspect. The more there is high level of agricultural sector and informal economy, the more there is higher underemployment rate.

Table 2.4 Unemployment in Burundi and the Eastern Africa, 2018 (%)

	Gender	Burundi (%)	Eastern Africa (%)
Unemployment	Total	1.7	6.5
	Men	1.4	5.2
	Women	2.0	7.9

Sources: ILO, key indicators of the labor market

Table 2.4 shows that women are more affected with an unemployment rate of 2.0 % compared to that of men (1.4%) in Burundi. In Eastern Africa women have also a high unemployment rate (7.9%) compared to that of men (5. 2%).By comparing the 2 countries, Eastern Africa have a higher unemployment rate (6.5%) than Burundi (1. 7%).This situation shows that in Eastern Africa, there is a weaker skill, less business and consumer spending. The more there is higher unemployment rate, the more individuals stop looking for a new job. The economic growth and labor productivity are reduced.

CHAPTER III: Literature Review

3.1 Introduction

This chapter will present the theories of the literature connected with female labor supply and the empirical research on female labor.

3.2 Theoretical Framework

The theoretical framework of this study follows a “household production theory” by Mincer and Becker (1965), “the neoclassical theory of consumer behavior” by Michael and Becker (1973), “classical labor supply theory” or “theory of employment” by Keynes (1936).

3.2.1 Theory 1: Role of Household Headed by Female and Household Size on Participation Rate; Household Production Theory (Mincer and Becker, 1965).

Household production theory is just the study of household production, household consumption and household time allocation. Household’s production theory defines the production of household as the production of goods and services by the members of household by using their own wages to maximize their utility and household consumption is defined as all things which are consumed by the member of households like foods, sleep and leisure. Household production theory is used for more understanding the allocation of time of people and for identifying all the variables we need in our lives to maximize our satisfaction.

3.2.2 Theory 2: Role of Number of Children on Participation Rate; The Neoclassical Theory of Consumer Behavior (Michael and Becker, 1973).

This theory is used to study the household demand for child quality. It shows that the household doesn't only derive satisfaction from the number of children raised but also from the quality outcome associated with each child. In the household's utility function, children are considered as a special type of good where satisfaction is derived with a cost of time and money in order to raise them up. In other words, the household must invest in the schooling and health of the child both in terms of money and time.

3.2.3 Theory 3: Role of Poverty on the Participation Rate; Classical Labor Supply Theory or Theory of Employment (Keynes, 1936)

This theory shows that to hold a paid job or to participate in labor market, you must first have decided to do so. In practice, when the income of household is below the poverty line, the household has more economic difficulties. We expect that the decision to work in the market will be dominated by economic factors and affect the probability of being employed. In addition, the individuals who live below the poverty line are stressed by economic problems. However, they have to work more than those living above the poverty line.

3.2.4 Theory 4: Role of Age on the Participation Rate

We will follow this theory based on the previous paper written by Mpunga (2013) which report that according to the European Commission (2010) for developed countries, ageing is moreover one of the factors that significantly affect FLFP. The ageing of the population exerts a negative force on labor supply. As a result, the output will eventually be reduced because the labor force will contract as aged workers retire. Therefore, offsetting changes in FLFP would help to avert problems caused by population ageing.

3.3 Empirical Framework

In this section, an assay is made to review the literature on studies relating to working women. The issue of female labor force participation has been studied by several studies in different situations.

Abraham (2017) examined female labor force participation and their choice of employment between the formal and informal sectors. The data came from Ghana's 2010 population and housing census. The techniques employed are logit regression and multinomial logit to estimate the parameters. The results indicate that education remains an important factor in the determination of women to work in the formal sector. Education and marital status were positively related to determine women's participation in the formal sector.

Baah-Boateng (2013) investigated the impact of fertility and education on women's integration in labor force participation. The study utilized the Ghana living standard survey (GLSS) and used a logistic regression estimation technique to estimate the female education and fertility effect of women's integration in the labor market. The result of the logistic regression technique indicated that there is significant relationship for women. With children, there are significant positive marginal effects for women. The result suggested to have more children in the

household increases the likelihood of female to participate in the labor market. The paper indicated also that women with education have a higher capacity of participation compared with those with no education. The study established a positive relationship between the female in good health and the level of participation.

Chen (2014) examined factors that influence FLFP in China by using data from the survey of China health and nutrition (CHNS). This paper explained the factors that influenced the female labor force participation workers in urban and rural areas. First, considering individual factors, the results showed that female education and age were both significant for female lives in urban and rural. Second, when considering family factors, the result suggested that husband work had significant effects on women live in rural areas but childcare and the family scale did not. For urban female, work's husband and childcare were significant but the family scale was not.

Narayana and Shongwe (2010) investigated the determinants of women's participation in the Swaziland agricultural sector. This study uses data from the Swaziland integrated labor force survey 2007/2008 collected by the central statistics office, Swaziland. The results of the probit and multinomial logit models indicated that about 7% of females participate in the agricultural sector. The variables used in the analysis are FLFP, age, marital status, level of education, land ownership, employment status, credit accessibility, and household headship. The study found that if one year of schooling increase by one in the years of schooling, the likelihood of female to participate in the agricultural sector reduces. The findings showed also that lack of private /permanent land ownership rights by households increases the chances of females of being in agricultural; the credit accessibility increases the participation of females in the agricultural sector.

Omotoso and obembe (2016).They use the theory of allocation of time and logit econometric technique is used to analyze data and the result shows that female's age is significant and has a

positive effect on FLFP, education has a positive effect on FLFP, because higher educational attainment is usually associated with higher participation in the labor force participation, for marital status, the result shows that women who are married have more chances to be in the labor market, for areas residence , urban residence has a positive effect on FLFP because women in urban areas have more chance to be in the labor market than women in rural areas.

Kiani (2009) examined the determinant of female labor force participation. He used data from Labor Force survey and Household Integrated Economic Survey (HIES). The dependent variable was FLFP and independent variables were earner female, earner male, annual expenditure per household, female education, female head, male head annual income per household, male literacy. They didn't mention the theory used in this study and Tobit model was used to study which factor determining work participation and labor supply. The results showed that female earner had a negative sign but significant. Normally we know that if the earners of female increases, then it will increase the female labor force participation. Female literacy has a positive sign but insignificant, male literacy has a negative effect on FLFP but insignificant and expenditure per household has a positive sign.

Andrei (2017) examined the main determinant of labor participation in the case of Metropolitan Roma people. Three models were used in this study: linear, probit, and logit models and they used census data for the Bucharest metropolitan area from the 2011 Romanian population and household census. The results showed that all variables had a significant relationship between the dependent variables.

Emran S.M., (2017) didn't mention the theory but I think they use household production theory because the theoretical literature said that the household produces and then consumes goods to maximize the utility. The empirical result shows that the simple Ordinary Least Squares

regressions indicate that land restriction and wages have a negative relationship with female labor force participation.

Nuhu (2016) examined education in female labor force participation in Nigeria. The dependent variable is FLFP and the independent variables are age, marital status, religion, urban, noeduc (no education), primary school, middle school, high school and higher education. A logit regression model was applied in this study and the data used came from the Nigeria General Household Survey for the year 2013 prepared by the National Bureau of Statistics. The results showed that age, marital status, urban, primary school, middle school, high school are significantly affected by FLFP.

Muhammad et al. (2014) conducted a study on female labor force participation in third world countries by using cross-sectional data from Pakistan. The dependent variable is FLFP and independent variables are age, education, marital status, household income, household financial status, family size, family type, location. The findings concluded that education and married female participate more in labor market and rural females are less likely to participate as compared to urban female.

Tasseven (2016) examined the determinants of labor force participation of female for OECD countries. The study used data from World Bank database and covers the period between 1990 and 2013.Female labor force participation is the dependent variable and independent variables are fertility rate, GDP per capita, the ratio of female to male tertiary enrollment, unemployment rate, number of waged and salaried workers. A panel logit model was used to estimate those independent variables. The result shows that the variables other than FMTE (ratio female to male tertiary enrollment) are found to statistically significant. UNEMP(unemployment) and GDP variables which are very significant have very close proportion difference values.FR (fertility rate) has a higher effect on female labor force participation.

Siphambe H. and Mostwapong M. (2005) investigated female participation in the labor market of Botswana. The dependent variable is FLFP and independent variables are age, residence, headship, primary education, secondary education, tertiary education, marital status, household number and non-formal education. Data used in this study came from labor force survey conducted from 2005 to 2006.The probit and logit models were used to estimate the independent variables, the probit model was used to find out which factors explain decision of female to participate in the labor market and the logit model was used to make the employment choice of female. The result from probit model shows that age has a positive sign and has an important role in determining of female to participate in the labor market, age squared has a negative sign because at a certain age, female have less chance to participate in the labor force, residence has a positive sign, household headship has a positive sign, primary education has a positive sign, secondary education has a positive sign, tertiary education has a positive sign, marital status has a negative sign and household number has a positive sign and insignificant. The result from logit shows that age squared, residence, tertiary and non-formal education have a negative sign but others variables have a positive sign.

Kaur (2016) examined the determinants influencing female labor force participation in North East India. The study used data from the work force population, national sample survey organization and also the census of India, The Ordinary Least Squares regression technique was employed. Female labor force participation is the dependent variable and independent variables are SER (Sex Ratio), MWPR (Male Work Participation Rate), FLR, D1 and D2 are 2 dummy variables D1=1 for 1991 and 0 otherwise, D2=1 for 2001 and 0 otherwise. The result shows that SER (Sex Ratio) has a negative sign.

Varol (2017) investigated the factors of women's participation in the labor market in Turkey. He used the binary logit model on the world values survey of 2007.The dependent variable is labor force participation of women and independent variables are employment status, marital

status, highest educational level, age, number of children, income level, and chief wage earner. It finds that a high level of education, high level of income, and being chief wage earner in the household have a positive relationship with female labor force participation in Turkey. While the ageing of women has a positive impact until the age of mid-30s, its effect is negative after the age of mid-30s.Marriage and the increasing number of children have also negative impacts on the labor force participation women.

Abazi and Atanasovska (2016) investigated the determinants of female labor participation in Macedonia. They use household survey data conducted by the South East European University in cooperation with UNDP Macedonia in 2009.Probit model was used in estimation to examine the variables. They found that education, age, marriage, ethnicity, income, living in urban areas have positive and significant impact on FLFP.

Table 3. 1 Summary of Literature Review

No.	Author	Methodology	Dependent variables	Independent variables	Studies Variables
1	Baa-Boeteng (2013)	Logistic regression model	FLFP	Number of children below 15 year, education, age, marital status, residence, cost of healthcare, time spent on housekeeping.	Education(+), fertility(+), Age(+), Number of children(+),Residence(+)for rural areas and (-) for urban areas
2	Abraham (2017)	Logit regression techniques and Multinomial logit model	FLFP	Education, wealth, marital status, age, husband's education, location, household size, residence, number of children	Education (+), Marital status (+), Age (+).
3	Chen (2014)	Probit model	FLFP	Education, age, childcare, husband work, family size,	Education (+) in rural and urban areas, Age (-) in rural and urban areas, Childcare (+) urban women and (-) rural women, husband work(+),childcare(-).
4	Narayana and Shongwe (2010)	Probit model	FLFP	Age, marital status, level of education, household headship, landownership, employment status, residence, and credit availability.	Age(-) for lower and higher cohort, positive for the middle cohort, education(+),marital status(+) for married women and (-) for separated or divorced women, household heads(+)for female who are household heads, land ownership(+),residence(-) in rural areas.
5	Omotoso and Obembe (2016)	Logit econometric technique	FLFP	Age, marital status, education, residential location, time spent on household, ownership of generator washing machine, ownership of generator with freezer, ownership of gas cooker.	Education (+), marital status (+) for married women, residence (+) for urban residence.

6	Kiani(2009)	Tobit model	FLFP	Earner female, Earner male, Annual expenditure per household, education of female, household headed by female, male head, annual income per household, male literacy	Female earner(-), Earner male(+), female literacy(-), but insignificant, male literacy(-) but insignificant, expenditure per household(+), female head(-) insignificant, male head(-)insignificant, Expenditure per household(+).
7	Andrei(2016)	Linear, Logit and Probit models	LFP	Person's age, sex, ethnicity and educational level	Person's age(+), sex(+), ethnicity(+) and educational level(+)
8	Nuhu(2016)	Logit model	FLFP	Age, marital status, religion, urban, noeduc, primary school, middle school, high school and higher education.	Age, marital status, religion, urban, noeduc, primary school, middle school, high school and higher education.
9	Muhammad(2014)	Probability and Logistic models	FLFP	Age, education, marital status, household income, household Financial status, Fail size, family type, location	Age(+), education(+), marital status(+), household income(-), household Financial status(-), family size(+), family type(+), location(-)
10	Tasseven(2016)	Panel logit model	FLFP	Fertility rate, GDP per capita, Ratio of female to male tertiary enrollment, unemployment rate, number of waged and salaried workers	Fertility rate (+),GDP per capita(+), Ratio of female to male tertiary enrollment(+), unemployment rate(+), number of waged(+) and salaried workers(+)
11	Siphambe and Mostwapong (2005)	Probit and logit models	FLFP	Age, age squared, residence, headship, marital status, primary education, secondary education, tertiary education, non-formal and household number.	Age(+), age squared(+), residence(+), headship(+), marital status(-), primary education(+), secondary education(+), tertiary education(+),,non-formal and household number.

12	Kaur(2016)	Ordinary Least Squares regression	FLFP	Sex ratio, workforce participation of males, male work participation,D1 and D2 : 2 dummy variables.	Sex ratio(-),workforce participation of males(+),male work participation(+),D1(+) and D2(+) : 2 dummy variables.
13	Varol(2017)	Binary logit model	LFPW	Employment status, marital status, educational level, age ,number of children, income level, chief wage earner	Employment status(+),marital status(+),educational level[(primary school(-), secondary school(+),college(+)],age(+) ,number of children(-), income level[low income(-),high income(+)],chief wage earner[age(+), age squared(-)
14	Abazi and Atanasovska (2016)	Probit model	FLFP	Education, fertility, heath, age, marital status, household income and remittance, additional control variable(ethnicity, residence)	Education(+), fertility(-), heath(), age(+), marital status(-), household income and remittance(+),additional control variable{ethnicity(+),residence: urban(+),rural(-)}

Note: (+) = positive, (-) =negative, GDP = Gross Domestic Product, FLFP=Female Labor Force Participation, LFPW=Labor Force Participation of Women, FLFPR=Female Labor Force Participation Rate.

By comparing the models that other authors have used, we conclude that the logit model is more useful when we are dealing with an individual's choice. There are other models that have been used by other authors such as probit model, tobit model and panel probit model. We found that education, age, number of children are the variables most useful in the study of female in the labor market. In this study, female labor force participation is the dependent variable which is a binary variable (participate in the labor market = 1 and not participate in the labor market = 0). Probit and logit models are all probability models. The use of probit model is supposed to be similar to the logit model but the strong point of this model is that the interpretation of the probit coefficient is rather easier than it is for logit model but the weak point of the probit is that it uses only a single regression equation.

The tobit model has nothing for binary outcomes but has a form of linear regression. The weak point is that this model allows the regression of continuous dependent variable and it is only used for censored data which means that the data contains incomplete information about their survival time.

In our study, we choose to use the logit model because it is a choice model and it estimates a multiple linear regression and it is also used for a large sample size. But the weak point of this model is that this model is difficult for interpretation.

CHAPTER IV. Research Methodology

4.1 Introduction

In this section, we will present the methodological approach used to achieve our objectives. Our analysis will attempt to highlight the factors that motivate women to enter the labor market. The study adopts the logit regression model used by Abraham (2017) to find the determinants of FLFP in Burundi. In addition, the study enlarges the variables that have been used in the previous studies by adding one variable such as poverty.

Abraham's equation is specified as:

$$FLFP = \beta_0 + \beta_1 EDUC + \beta_2 WEALT + \beta_3 MSTATUS + \beta_4 AGE + \beta_5 HEDUC + \beta_6 L + \beta_7 HSIZE + \beta_8 R + \beta_9 NCH + \varepsilon_i \quad (1)$$

Where:

FLFP = female labor force participation

EDUC = education

WEAL T=wealth

MSTATUS = marital status

AGE = age

HEDUC = husband's education level

L = women's residence (location)

HSIZE = household size

R = religion

NCH = number of children under six years in the home

ε_i = error term

4.2 Model Specification

In our study, the key variable of interest is poverty of female labor. Due to the incomplete information of education data and the unavailability of wealth, marital status and husband's education data, all variables are excluded in our study. The effect of determinants identified in the theoretical review on labor force participation will be estimated by using logit model which is specified as:

$$FLFP = \beta_0 + \beta_1 AG + \beta_2 H\ SIZE + \beta_3 IND\ RESID + \beta_4 NCHLD + \beta_5 POV + \beta_6 FHH + \varepsilon_i \quad (2)$$

Where:

$FLFP$ = female labor force participation

AG = age,

$H\ SIZE$ = household size,

$IND\ RESID$ = residence of individuals

$NCHLD$ = number of children,

POV = poverty,

FHH = female household head and

ε_i = error term.

There is no concrete theoretical foundation explains the role of residence variable on participation rate obviously. However, by following Abraham (2017), Muhammad (2014) and Siphambe (2005), this variable is included into our study since we want to observe the effect of increase in residence on female labor force participation rate.

4.3 Estimation Techniques

Before we make this study, equation number (2) is the framework of our empirical estimation. According to the literature review, the logit model is a choice model to model a binary dependent variable and our study uses binary data. It describes the probability of women being employment or not reason. The reason why the logit model will be our main estimation technique is just because it's used to predict the probabilities of a binary outcome given predictor variables. However, in order to increase the robustness of our study, we also employed other estimation techniques which are: probit model and tobit model.

4.3.1 The Binary Logistic Model

The binary logistic model is the function to model a binary variable. The goal of binary logistic regression is to estimate "p" which is the probability of working in the labor market and "q=1-p" is the probability of not working in the labor market. The Maximum likelihood estimation or (MLE) can be used to calculate the coefficients for logistic regression. The maximum likelihood estimation in the logistic regression, there is a link function that can tie together our linear combination of variables and that link function is called the natural log of the odds ratio [Logit p or ln (odds)].

The binary logistic regression model can be specified as follow:

$$P(Y = 1|X|) = F(X\beta)$$

Logit (p) $=\ln\left(\frac{p}{1-p}\right) = \beta_0+\beta_1 x_1 + \cdots \varepsilon_i$

Where:

P = probability

F = the logistic probability function

Y= the dependent variable which take the two values (1 and 0)

x_i= independent variables

β = parameters

Therefore, in this study, the binary logistic regression will look like follow:

Logit*(FLFP)*= $\beta_0 + \beta_1 AG + \beta_2\, H\,SIZE + \beta_3 IND\,RESID + \beta_4\, NCHLD + \beta_5 POV + \beta_6 FHH + \varepsilon_i$ (3)

In other to see how strongly a variable is associated with the outcome of interest and also understand the interpretation of the result, the Odds ratio can simplify an equation like this:

$$Odds\,ratio = e^{\beta_i} \quad , i = 1, \ldots 6 \qquad (4)$$

Where:

$\beta_0 =$ constant

$\beta_1 \ldots\ldots \beta_6 =$ coefficient to be estimated

Logit *(FLFP)* = the probability of female labor force participation

$Odds\ ratio(FLFP)$= a measure association between female labor force participation and outcome

$FLFP$ = female labor force participation

P = 1 (participating in the labor market)

q = (1-p) = 0 (not participating in the labor market)

AG = age,

$H\ SIZE$ = household size,

$IND\ RESID$ = residence of individuals

$NCHLD$ = number of children,

POV = poverty,

FHH = female household head and

ε_i = error term.

In the logit model, we use the logistic probability function and is defined as follows:

-The probability of participating in the labor market = P(y=1) = $\frac{e^{\beta_0+\beta_1 x_1}}{e^{\beta_0+\beta_1 x_{i+1}}}$

- The probability of not participating into labor market =1- P(y=0) = q = 1- $\frac{e^{\beta_0+\beta_1 x_1}}{e^{\beta_0+\beta_1 x_{i+1}}}$

The estimator is the maximum likelihood estimator and the log odds is determined by taking logistic distribution.

4.3.2 Tobit Model

Tobit model is also called a censored regression model, because some observations on y_i are censored in this model, we estimate the parameters β and ϑ, in the other words the latent variable if $y^* > 0$.

For example, let y be the " female labor force participation", then $Y > 0$ if the female participates in the labor market, and y= 0 if female does not participate in the labor market. A tobit model is a statistical model which describes the connection between a non-negative dependent variable and an explanatory variable. In Tobit model, there are 2 different estimators of sample: the least squares estimator and the maximum likelihood estimator. The least squares estimator is inconsistent and it is not easy to give a general result on the type of bias of this estimator and the maximum likelihood estimator does not require too much calculation. With the development of computer, it can be treated quickly.

A simple Tobit model is defined by the following equation.

$$y_i = \int_0^{y^*} if\ y_i > 0\ and\ if\ y_i \leq 0$$

Where $y_i = x_i\beta + u_i$ $y_i = 0 \quad if\ x_i\beta + u_i > 0$ $x_i\beta + u_i \geq 0$

i=1, 2, ..., *N*

y_i = the dependent variable of the labor force participation

x_i = a vector of exogenous explanatory variable values

β = a vector of unknown coefficients.

u_i = error term

N = the number of observations.

The tobit model in this study is specified as follows:

$$FLFP = \beta_0 + \beta_1 AG + \beta_2\, H\ SIZE + \beta_3 IND\ RESID + \beta_4\, NCHLD + \beta_5 POV + \beta_6 FHH + \varepsilon_i \quad (6)$$

Where:

$\beta_0 =$ constant

$\beta_1 \ldots\ldots \beta_6 =$ coefficient to be estimated

$FLFP$ = female labour force participation

AG = age,

$H\ SIZE$ = household size,

$IND\ RESID$ = residence of individuals

$NCHLD$ = number of children,

POV = poverty,

FHH = female household head and

ε_i = error term.

4.3.3 Probit Model

The probit model is a type of regression model. The dependent variable takes only two values. The objective of this model is to estimate the probability having an observation with particular characteristics. It employs the same set of issues as does logistic regression by using the same techniques. In probit model, we observe only y_i, as the following

$y_i = \int_1^0 if\ y_i \leq 0\ and\ y_i > 0$

The probit model takes the form as follow:

Pr(y=1) = $\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots \beta_k x_k$

$\Pr(Y = 1|X|) = \Phi(X\beta)$

Where:

Pr = probability

Y= dependent variable

Φ = the cumulative distribution of the standard normal distribution

X= independent variables

B = parameters

This equation defines the conditional probabilities of Y = 1 given x

The female participation's equation by using the probit model is written as follows:

$$\Pr(FLFP = 1) = \beta_0 + \beta_1 AG + \beta_2\ H\ SIZE + \beta_3 IND\ RESID + \beta_4\ NCHLD + \beta_5 POV + \beta_6 FHH + \varepsilon_i \quad (7)$$

Where:

$\beta_0 =$ constant

$\beta_1 \ldots\ldots \beta_6 =$ coefficient to be estimated

$FLFP$ = female labor force participation

AG = age,

$H\ SIZE$ = household size,

$IND\ RESID$ = residence of individuals

$NCHLD$ = number of children,

POV = poverty,

FHH = female household head and

ε_i = error term.

The marginal effect can be calculated based on the following equations:

$$\frac{\partial y}{\partial xij} = \frac{\partial(\beta_0 + \beta_1 xij + \cdots \beta_j xij + \cdots \beta_k xik}{\partial xij}$$

In order to get the coefficient of marginal effect of probit model, the coefficients of probit model are converted by using the following equation:

$$\frac{\partial FLFP}{\partial xij} = \frac{\partial(\beta_0 + \beta_1 AGE + \beta_2 FHH + \beta_3 HSIZ + \beta_4 IND\ RESID + \beta_5 NCHLD + \beta_6 POV}{\partial xij} \quad (8)$$

4.4 Diagnostic Tests

4.4.1 The Goodness of Fit Test for Logistic and Probit Regression

The goodness of fit is a statistical test for binary logistic regression model. A likelihood-ratio test is a test normally used to check if the two statistical models have the goodness of fit. It tests the null model (representing the null hypothesis) against an alternative model (Alternative hypothesis) to see if the model used fits the data. This tests examines also whether the predicted frequency and observed frequency match closely. In this study, we calculated the goodness of fit by using the Hosmer-Lemeshow test and the following formula is used to calculate it:

$$G_{HL}^2 = \sum_{J=1}^{10} \frac{(O_J - E_J)}{E_J(1 - \frac{E_J}{n_j})} \sim x_8^2$$

Where:

$x^2 = \text{chi} - \text{squared}$

$O_J = \text{number of observed cases in the J}^{\text{th}}\text{ group}$

$\text{n}_\text{j} = \text{number of observations in the j}^{\text{th}}\text{ group}$

$O_J = \text{number of expected cases in the j}^{\text{th}}\text{ group}$

The test is run by using Eviews, then we observe the chi-square value and a p-value.

If P-value < 5% means that the model is not a good fit, if P-value > 5% means that the model is a good fit.

H0: the model is a good fit

H1: the model is not a good fit

4.4.2 The Wald Test for Logistic Regression

The Wald test is a test which helps us to discover if explanatory variables in a model are significant. In our study, we use logistic regression where we have the dependent variable which is a binary outcome variable and more explanatory variables. For each explanatory variable, there is an associated parameter. We are interested in checking the null and alternative hypothesis.

H0:$\beta_1 = 0$

H1:$\beta_1 \neq 0$

If the parameters of the explanatory variables do not equal to zero, then the Wald test is significant.

If the parameters of the explanatory variables are equals to zero, the Wald test is not significant.

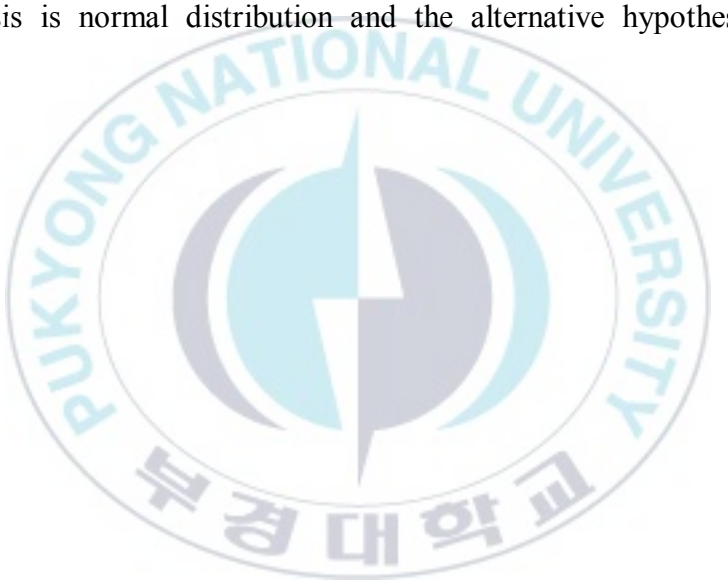
4.4.3 Multicollinearity Test

Multicollinearity exists when the independent variables are correlated in the model. If there exists a high correlation between any 2 independent variables, problems of multicollinearity arise and if there is a high standard error, the t-value decreases and p-value become high. Multicollinearity makes it difficult to separate the impacts of individual explanatory variables on the dependent variable. In this study to check whether there is collinearity or not, the variance inflation factor (VIF) will be used. Using VIF will help us to identify the problem of multicollinearity).If VIF starts with the 1 value shows that there is no relationship between the explanatory variables and any others. To correct for multicollinearity, the least important amongst the two correlated variables will be dropped from the model or a proxy variable for one of the variables will be used.

4.4.4 Normality Test for Tobit Model

The determination of normality test is applied to see whether the data has been drawn from a normally distributed population. The simple way to test the normality is to identify a histogram of the sample data by comparing a curve of normal probability.The histogram should be bell-shaped and look like the normal distribution but this can be so hard to see if the sample data is small.The dependent variable or one explanatory variable may have the wrong functional type or important variable may be removed if the residuals are not normally distributed.

The null hypothesis is normal distribution and the alternative hypothesis is not normal distribution.



4.5 Definition of the Explanatory Variables

4.5.1 Age

The age variable was used as the age female in making labor force participation decisions. It is a discrete variable which means that it can take on a finite number of values. It varies from 18 to 98 years old. In our study, we divided the age variable into four groups. The first group is the age group (18-24), the age group (25-49), the age group (50-74) and the age group (75-98). we will try to discover how age groups affect the Female labor force participation rate in Burundi. Therefore, the expected sign of the coefficient for age on FLFP can either be positive or negative. The expected positive signs of the age variable are that labor force participation increases with age and the expected negative sign of the age variable is that labor force participation starts to decrease when the individuals retire.

4.5.2 Household size

The household size variable is a continuous variable which is a variable that has an unlimited number of possible values which indicates the number of individuals in the household, in the other word the member of the household. They can be children, cousins, uncles living in that household, it is also a discrete variable. The number varies from 1 to 15 individuals. The expected sign of this variable is positive for households where there is the presence of the elderly because that members might increase financial burdens of the family which leads the heads of the family to participate into labor market.

4.5.3 Residence

The residence variable is a dummy variable. It has 2 values: the value 1 if the household resides in rural areas and 0 otherwise. Individuals can have two places of living such as one in the rural areas and the other one in urban areas. In general, rural areas are areas that are located outside towns and cities and urban areas are areas surrounding a city. Urban areas are very developed, they have a large density of human constructions such as houses, commercial buildings, roads and bridges. In Burundi, there are seventeen provinces located in rural areas and one province located in urban areas which is the capital of Burundi. In addition, they are a large number of female living in rural areas compared to those living in urban areas. The report of LCHS shows that women living in the urban are twice as much inactive as their sisters from rural areas (40.1% compared to 17. 1%). The positive sign is expected for women living in rural areas because female participation in the market in rural areas is higher than female living in urban areas.

4.5.4 Number of children

The number of children variable is also a continuous variable. This variable indicates the number of children living in the household. From our data, it varies from 0 to 5 children per household. The expected sign of this variable is positive for women who have children over 5 years old.

4.5.5 Poverty

The variable is also a dummy variable. The value 1 shows poor household and 0 for the rich household. In Burundi, Households in rural areas are considered to be poor in living conditions compared to those living in urban areas. The Burundi poverty assessment also states that there are many characteristics showing that the households are poor. Poor households have a higher

number of children under 14 than non-poor households. When there is a lot of children in the household, there is an inability to invest in the human capital of their children. Burundian households with handicapped or disabled members present a higher incidence of poverty than families without handicapped or disabled members. The expected sign of this variable is either positive or negative. The positive sign is for poor household and a negative sign is for rich household. The household's poverty status is defined as a household where its daily per-person money is less than the 1.90$/day (Simple poverty scorecard, 2017).

4.5.6 Household headed by female

The household headed by a female is a dummy variable. The value 1 shows that the head of household is a woman and 0 otherwise. In Burundi, more than eight out of ten households (82.2%) are headed by men. (LCHS). The household headed by female is expected to have a positive sign because heads individuals are responsible to support their family.

Table 4. 1 Expected Sign of Coefficients

Dependent Variable	Description	Expected sign	Reason
Female labor force participation	=1 if women participate into labor market =0 otherwise		
Independent Variables			
Age (AGE)	= age of woman respondent. It varies from 18 to 98 years old.	+	As women's age increases, female have Chance to participate into labor market. Age has a non-linear effect on female labor force participation. It starts increasing first and decreasing later in life.
Household size(HSIZE)	Number of individuals (1- 15)	+	a large number of individuals in the household motivate female to find a work
Individual's residence(RESIDNC)	=1 if the household is in rural areas =0 if the household is in urban areas	+	Female residing in urban areas: most of them are educated.
Number of children(NCHLD)	varies from 1 to 5	+	Female having children are more likely to find work in order to care of their children.
Poverty (POV)	=1 if the household is poor =0 if the household is rich	+	If there is poverty, female should be motivated to find a work.
Household headed by female(FHH)	1 if the head of household is woman and 0 otherwise	+	Households headed by female have more responsibilities in order to sustain their family

4.6 Data Source and Description

4.6.1 Source of Data

The data in this study comes from the survey on living conditions and households conducted between August 2013 and April 2014 in Burundi. The survey was done on the whole population of the country (urban areas and rural areas). It was combined in four components: (i) Unified questionnaire of basic indicators of well-being and employment; (ii) informal sector; (iii) expenses of Household consumption; and (iv) prices of goods and services. A questionnaire was used to gather the data in the 17 provinces with 7092 households at a rate of 756 households in urban areas composed by 1 province and 396 households in each rural province and rural areas is composed by 16 provinces. The data from the census shows that 89.9% of population lives in rural areas and 10.1 % of the population live in urban areas. On the case of households, the data shows that 8 out of 10 households are headed by males. The census indicates that 44.5 % of population has never been to school, 47.44 % of the population has a primary school and 7.4% of the population has a secondary school and 1% of population has a higher level of education. On the level of economic activity, the data shows that the majority of the active population is in the formal sector. In urban areas 20.1% of population is in the informal sector, 11.9% are staying in the households, 68% are in the informal sector. In rural areas, 2.3% of populations are in formal sector, 1.8% in the households and 96% of the population are in the informal sector. Data shows that the proportion of men in the formal sector is higher than that of women.

4.6.2 Description of Data

The indicated statistics in Table 4.2 comprise the number of observations, mean and Standard deviation value as well as the minimum and maximum of all considered variables. Subsequently, a concise comparison points out main variations between the four surveys Samples.

Table 4. 2 Selected Descriptive Statistics

Variables	Observations	Mean	Median	Std. deviation	Min	Max
Age	7810	36.708	32	15.409	18	98
Household headed by female	7810	0.284	0	0.451	0	1
Female Labor Force Participation	7810	0.749	1	0.433	0	1
Size of household	7810	5.387	5	2.365	1	15
Number of children	7810	1.031	1	0.995	0	5
Poverty	7810	0.524	1	0.499	0	1
Residence	7810	0.679	1	0.466	0	1

Source: ISTEEBU, Living conditions of households survey (LCHS 2013-2014).

Table 4.2 shows the descriptive statistics survey conducted from 2013 to 2014.The mean values in the table shows the average value for each of the variables. For age is (36.70), household headed by female (0.28), female labor force participation(0.74),size of household(5.38),number of children(1.03),poverty(0.52),residence(0.67).The median means the middle value for each of these variables, age is 32, household headed by female is 0, female labor force participation is 1, size of household is 5, number of children is 1, poverty is 1, and residence is 1.the maximum and minimum values means the highest and lowest figures in each of these variables and the standard deviation means the deviation from the sample mean with respect to each of the variables.

CHAPTER V. Empirical Result

5.1 Determinants of FLFP: Results from Logit Model

This section tries to find out the factors that can affect female labor force participation in Burundi by using logistic regression model. For robustness check of the result, we also use probit model and tobit model.

Table 5. 1 Logit Regression of Female Labor Force Participation

Variables	Coefficient	Z-Statistic	P-Value	Odds Ratio
AGE	0.0082***	5.2546	0.0000	1.0082
H_SIZE	-0.1348***	-10.2956	0.0000	0.8738
RESIDNC	0.9659***	16.1302	0.0000	2.6272
N_CHLD	0.3935***	12.1369	0.0000	1.4821
POV	0.1501**	2.5204	0.0124	1.1620
FHH	-0.4009***	-6.2329	0.0000	0.6696

***, **, and * denote the significance level at 1%, 5%, and 10% respectively.

In this study. the variable Age is included in the women's integration in the labor force participation function as a series of 4 dummy variables: from 18 to 24 years old, 25 to 49 years old, 50 to 74 years old, 75 to 98 years old. The reason why this variable was broken up into four groups is that we want to see if each age category has the opportunity to participate in the labor market and if we go to the interpretation of age, which means that if one-year increases by one, the chance of female to participate in the labor market will increase. This doesn't make sense. Normally the age category of female (18-24) years of age also known as young adulthood is considered as the omitted category because women of these age category are less sure about

what it means for changes in cognitive development, behavior and intelligence. Some are students and others are not reason why they have more chances to be out of the labor. About the age category of female (50-74) and (75-98) years old, women of these categories are the oldest women and have less chances to participate in the labor force. The age category of female (25-49) is considered as median age at first marriage which is the age of which individuals enter into their first marriage.

Table 5. 2 Result for Prime Age Categories (18-24) of Female from Logit Model

Variables	Coefficient	Z-Statistic	P-Value	Odds Ratio
AGE	0.0210	0.7400	0.4610	1.0212
H_SIZE	-0.3788***	-14.8900	0.0000	0.6846
RESIDNC	1.2501***	10.5600	0.0000	3.4909
N_CHLD	0.6976***	10.9600	0.0000	2.0090
POV	0.3516***	2.9200	0.0030	1.4214
FHH	-0.4341***	-3.4500	0.0010	0.6478

***, **, and * denote the significance level at 1%, 5%, and 10% respectively

Table 5. 3 Result for Prime Age Categories (25-49) of Female from Logit Model

Variables	Coefficient	Z-Statistic	P-Value	Odds Ratio
AGE	0.0365***	5.1300	0.0000	1.0371
H_SIZE	-0.0608***	-2.6000	0.009	0.9409
RESIDNC	1.1118***	11.6900	0.0000	3.0399
N_CHLD	0.1903***	3.6200	0.0000	1.2096
POV	-0.0304*	-0.3200	0.0751	0.9700
FHH	-0.0246	-0.2200	0.822	0.9756

***, **, and * denote the significance level at 1%, 5%, and 10% respectively

Table 5. 4 Result for Prime Age Categories (50-74) of Female from Logit Model

Variables	Coefficient	Z-Statistic	P-Value	Odds Ratio
AGE	-0.0876***	-8.5300	0.0000	0.9161
H_SIZE	-0.1240***	-3.2500	0.0010	0.8833
RESIDNC	0.5774***	3.6400	0.0000	1.7814
N_CHLD	0.1516	1.2500	0.1940	1.1637
POV	0.0699	0.5000	0.6490	1.0724
FHH	-0.4429**	-2.9100	0.0030	0.6421

***, **, and * denote the significance level at 1%, 5%, and 10% respectively

Table 5. 5 Result for Prime Age Categories (75-98) of Female from Logit Model

Variables	Coefficient	Z-Statistic	P-Value	Odds Ratio
AGE	-0.1273***	-3.0000	0.0030	0.8804
H_SIZE	-0.3123**	-2.2000	0.0280	0.7317
RESIDNC	0.4497	0.9800	0.3270	1.5679
N_CHLD	0.5887	1.6700	0.0940	1.8017
POV	-0.0968	-0.2500	0.8060	0.9076
FHH	-0.1085	-0.2400	0.8130	0.8971

***, **, and * denote the significance level at 1%, 5%, and 10% respectively

Empirical Results Explanations

The result in the table shows that all the estimates are significantly different from zero out of six variables, five are significant with α =0.01 namely age, household size, residence, number of children, and household headed by female, only poverty is significant with α = 0.05 with a chi-square of 626.87. The result shows also that the pseudo R-squared is 0.0713 which check the goodness of fit of the model. P-value is 0.0000 which means that the model is statistically significant.

Age

Age is the most important in the determination of women in the labor force. With respect to the decision of whether to work or not to work in the labor market. The age variable has a positive and significant coefficient from the main result. The probability of being employed increases with age. The result indicate that female age is 1.0082 times more likely to enter into labor market. The results indicate that female who participate in the agricultural sector is more likely

to increase with age as compared to other sectors. This may be because in agricultural sector, it is believed that female work in order to maximize their utility. The results are similar with the findings of Baa-Boeteng (2013), Narayana and Shongwe (2010). Table II shows that the prime age categories of 18-24 years are not significant. Being in the prime age categories of 25-49 years tend to be associated with higher probability of female to participate in the market. On the other hand, the prime age categories of 50-74 years and 75-98 years have negative sign and significant effect on female labor force participation.

Size of household

In terms of size of household, the result shows that it has a negative sign and significant coefficient. It implies that an increase in one unit of number of family member, it implies that with a household who has a big number of family member is 0.5679 times less likely to enter into labor market. This means that the great the number of family member, the fewer the number of women that participate in the workforce. This means that if there is one member of the family who works, the women are less likely to enter in the workforce. The results are similar with the findings of Ali Khan and Tamsin Khan (2009), Iweagu and Yuni (2015). They found that if there is an excess of labor supply within the household, the probability of women to participate into labor market became low.

Residence

In terms of residence, the variable has a positive sign as predicted. This shows that female live in rural areas increases the motivation to participate in the labor market by 1%. This means that females who live in the rural areas are 1.5679 times more likely to participate into labor market than female living in urban areas. As expected, we find significant results for the samples as well. The results are similar with the findings of Baa-Boeteng (2013) where he found that women living in urban areas are less likely to participate while female living in rural areas are

more likely to participate. In contrast to Narayana (2010) who found that they are more likely to participate in urban areas and less likely to participate in rural areas.

Number of children

In terms of number of children, the result indicates a positive relationship between the number of children and the participation of women in the labor market. It implies that an increase in one unit of the number of children, the log odds value will increase by 1.8070 units, the variable has a positive sign and significant coefficient which means that having more children leads female to participate into labor market. The results are similar with the findings of Abena (2017).

Poverty

The result of poverty has a positive sign. A household which is poor is 0.9076 times more likely to participate into labor market, the positive coefficient means that when there is poverty, female could be motivated to search work. The results are similar with Iweagu and Yuni (2015).

Household headed by female

In terms of household headed by female, females who are head of household are 0.6687 times less likely to participate into labor market. The negative sign means if there is one family member who works means that the women are less likely to enter in the workforce. The LCHS (2013/2014) reports that households headed by women are less poor than household headed by men.

5.2 Determinants of FLFP: Results from Probit Model

The probit model has a linear function of the independent variables and applies a nonlinear transformation. In this case, the normal distribution function is used. The interpretation of coefficients is considered as qualitative effects. So, for example, a negative coefficient in the model means that a female has less chances to participate in the labor, and a positive coefficient means that a female has more chances to participate in the labor force. In other to more understand the interpretations of the results we need to compute the marginal effect. Marginal effects differentiate between dummy variables and continuous variables.

Table 5. 6 Probit Regression of Female Labor Force Participation

Variables	Coefficient	Z-Statistic	P-Value	Marginal Effect	
				dy/dx	Std.err
AGE	0.0040***	3.8340	0.0001	0.0011	3.8400
H_SIZE	-0.0790***	-10.2133	0.0000	-0.0233	-10.3900
RESIDNC	0.5772***	16.2112	0.0000	0.1701	16.9800
N_CHLD	0.2264***	12.1627	0.0000	0.0667	12.4400
POV	0.0860***	2.4711	0.0135	0.0253	2.4700
FHH	-0.2403***	-6.3304	0.0000	-0.0708	-6.3700

***, **, and * denote the significance level at 1%, 5%, and 10% respectively

Table 5. 7 Result for Prime Age Categories (18-24) of Female from Probit Model

Variables	Coefficient	Z-Statistic	P-Value	Marginal Effect	
				dy/dx	Std.err
AGE	0.0095	0.5600	0.5740	0.0037	0.0065
H_SIZE	-0.2243***	-15.5100	0.0000	-0.0872	-0.0056
RESIDNC	0.7455***	10.6300	0.0000	0.2883	0.2883
N_CHLD	0.4098***	11.2100	0.0000	0.1594	0.0142
POV	0.1985***	2.8200	0.0050	0.0769	0.0272
FHH	-0.2600***	-3.4600	0.0010	-0.1022	0.0296

***, **, and * denote the significance level at 1%, 5%, and 10% respectively

Table 5. 8 Result for Prime Age Categories (25-49) of Female from Probit Model

Variables	Coefficient	Z-Statistic	P-Value	Marginal Effect	
				dy/dx	Std.err
AGE	0.0189***	4.9000	0.0000	0.0043	0.008
H_SIZE	-0.0326**	-2.4600	0.0140	-0.0075	0.0030
RESIDNC	0.6206***	11.7200	0.0000	0.1582	0.0145
N_CHLD	0.1005***	3.4700	0.0010	0.0230	0.0066
POV	-0.0212	-0.4000	0.6900	-0.0048	0.0122
FHH	-0.0161	-0.2600	0.7910	-0.0037	0.0141

***, **, and * denote the significance level at 1%, 5%, and 10% respectively

Table 5. 9 Result for Prime Age Categories (50-74) of Female from Probit Model

Variables	Coefficient	Z-Statistic	P-Value	Marginal Effect	
				dy/dx	Std.err
AGE	0.0505***	-8.5900	0.0000	-0.0142	0.0016
H_SIZE	-0.0686**	-3.1000	0.0020	-0.0193	0.0062
RESIDNC	0.3530***	3.7900	0.0000	0.1073	0.0301
N_CHLD	0.0890	1.2600	0.2060	0.0251	0.0198
POV	0.0268	0.3300	0.7380	0.0075	0.0226
FHH	-0.2560**	-2.9500	0.0030	-0.0723	0.0244

***, **, and * denote the significance level at 1%, 5%, and 10% respectively

Table 5. 10 Result for Prime Age Categories (75-98) of Female from Probit Model

Variables	Coefficient	Z-Statistic	P-Value	Marginal Effect	
				dy/dx	Std.err
AGE	-0.0717**	-3.0800	0.0020	-0.0202	0.0008
H_SIZE	-0.1585**	-2.1600	0.0310	-0.0075	0.0030
RESIDNC	0.2954	1.1300	0.2580	0.1582	0.0145
N_CHLD	0.3176	1.6100	0.1070	0.0230	0.0066
POV	-0.0503	-0.2200	0.8290	-0.0048	0.0122
FHH	-0.0764	0.2800	0.7760	-0.0037	0.0141

***, **, and * denote the significance level at 1%, 5%, and 10% respectively

Empirical Results Explanations

Age

The result shows that age increases the probability of participating into labor market by 0.1%.the probit model is also a binary choice model. In consideration of different age categories, I also checked the participation of women in the labor market by breaking up the age variable into four age categories and the results show that from age categories 18 to 74 years old, the age variable has positive sign and the female have more chance to work in the labor market.

Size of household

The number of family members also presents a very significant (at 1 per cent significant level). This implies that the number of family members decreases the probability of female to participate into labor market by 2%. This means that having a small number of family's members in the household leads to increase female finding work. In all age categories, the variable has negative sign but significant at 5%. From age category 75-98, the variable has also negative sign and insignificant.

Residence

Female living in rural areas increases the probability of participating into labor market by 17%. This means that female living in rural areas have more chance to work because they don't need education than those living in urban areas. The rural areas are not equally developed and the focus of development is rather on the urban areas. It is reasonable that there is a higher female labor force participation in rural areas, according to data from living conditions and household survey,68 % of female live in rural areas and 32 % live in urban areas. For all age categories, the variable residence has positive sign but it is insignificant only for age category 75-98 years old of female.

Number of children

A household having a lot of children living in the household increases the probability of female to participate into labor market by 6%. This means that having more children in the household leads female to find work in other to sustain the children.

Poverty

Poverty was found out as an important socioeconomic factor for the probabilities of female to participate in the labor market. In estimated model, poverty variable was statistically important at significant level 5%. According to marginal effects, for the household which is poor, the probability of female to participate into labor market increases by 2%. This means that the poverty leads female to seek a job.

Household headed by female

Household headed by female is one of the factors affecting female to participate in the labor market. The negative and statistically significant coefficients imply that female who are heads of household decreases the probability to participate in the labor market by 7%. For all age categories, the variable has negative sign. From age category 75-98 and 25-49, the variable is insignificant.

Table 5. 11 Determinants of FLFP: Results from Tobit Model

Variables	Coefficient	Z-Statistic	P-Value
AGE	0.0023***	4.7869	0.0000
H_SIZE	-0.0346	-10.7722	0.0000
RESIDNC	0.2495***	17.0171	0.0000
N_CHLD	0.0932***	12.6321	0.0000
POV	0.0390***	2.7391	0.0062
FHH	-0.0723***	12.6321	0.0000

***, **, and * denote the significance level at 1%, 5%, and 10% respectively

Table 5. 12 Result for Prime Age Categories (18-24) of Female from Tobit Model

Variables	Coefficient	Z-Statistic	P-Value
AGE	0.8011	0.1300	0.8960
H_SIZE	-0.1329***	-16.6400	0.0000
RESIDNC	0.4279***	11.0300	0.0000
N_CHLD	0.2266***	11.6800	0.0000
POV	0.1195***	3.2800	0.0010
FHH	-0.1197***	-2.9100	0.0040

***, **, and * denote the significance level at 1%, 5%, and 10% respectively

Table 5. 13 Result for Prime Age Categories (25-49) of Female from Tobit Model

Variables	Coefficient	Z-Statistic	P-Value
AGE	0.0057***	5.3500	0.0000
H_SIZE	-0.0106***	-2.8200	0.0050
RESIDNC	0.1885***	12.4300	0.0000
N_CHLD	0.0316***	3.8900	0.0000
POV	-0.0025	-0.1800	0.8590
FHH	-0.0056	-0.3400	0.7370

***, **, and * denote the significance level at 1%, 5%, and 10% respectively

Table 5. 14 Result for Prime Age Categories (50-74) of Female from Tobit Model

Variables	Coefficient	Z-Statistic	P-Value
AGE	-0.0198***	-9.2700	0.0000
H_SIZE	-0.0289***	-3.6300	0.0020
RESIDNC	0.1345***	3.9100	0.0000
N_CHLD	0.0361	1.4700	0.1410
POV	0.0361	0.5900	0.5550
FHH	-0.0951	-3.1400	0.0020

***, **, and * denote the significance level at 1%, 5%, and 10% respectively

Table 5. 15 Result for Prime Age Categories (75-98) of Female from Tobit Model

Variables	Coefficient	Z-Statistic	P-Value
AGE	-0.0849***	-3.0500	0.0030
H_SIZE	-0.1846**	-2.1800	0.0300
RESIDNC	0.3428	1.1500	0.2520
N_CHLD	0..3651	1.6100	0.1090
POV	0.0434	-0.1700	0.8690
FHH	-0.0935	-0.3100	0.7590

***, **, and * denote the significance level at 1%, 5%, and 10% respectively

Empirical Results Explanations

Age

If female increases her age by one unit, the participation of female will increase by 0.0023 unit. For age categories, the variable “age” has the same result got from logit model. The table 5.19 and table 5.20 show that the variable “age” has positive sign but for table 5.21 and table 5.22, the variable has negative sign.

Household Size

If an additional members of family increases by one unit, the participation of female will decrease by 0.0034 unit.

Residence

If female living in rural areas increases by one unit, her chance to participate into labor market will increase by 0.2495 unit.

Number of children

If the number of children in the household increases by one unit, the probability of female to participate into labor market increases by 0.0932 unit.

Poverty

If the poverty increases in the household by one unit, female will have the chance to work by 0.0390 unit.

Household headed by female

If the household headed by female increases by one unit, then the motivation of female to participate in the labor market will decrease by 0.0723 unit

Table 5. 16 Comparison of Results from Different Binary Models

Variables	Logit model	Probit model	Tobit model
AGE	0.0082***	0.0040***	0.0023***
H.SIZE	-0.1348***	-0.0790***	-0.0346***
RESIDNC	0.9659***	0.5772***	0.2495***
NCHLD	0.3935***	0.2264***	0.0932***
POV	0.1501**	0.0860**	0.0390***
FHH	-0.4009***	-0.2403***	-0.0964***

***, **, and * denote the significance level at 1%, 5%, and 10% respectively

In order to make my estimation more understandable and compare the results from different models, Table 5.2.4 shows the comparison of different results, we observed that all variables in all models are significant and only 2 variables (household size and household headed by female) still have a negative sign.

5.3 Test for Goodness of Fit

In terms of the goodness of fit, the P-value of logit and probit models are higher than 5%. The table (A5) shows that the probability of having a chi-square equals to 0.1411 for logit and 0.4612 for probit. This shows that we accept the null hypothesis and reject the alternative hypothesis. We conclude that our model is a good fit.

5.4 Test for Wald Test

The null hypothesis: the parameters are equals to zero

The alternative hypothesis: the parameters are not equals to zero

The table (A6) shows that the p-value is less than 0.05. This shows that we reject the null hypothesis and accept the alternative hypothesis. The parameters of the explanatory variables are not equal to zero and all variables should be included in the model. We conclude that the Wald test is significant.

5.5 Test for Multicollinearity

The multicollinearity test was checked by using the variance inflation factor (VIF). The problem of collinearity exists when the variance inflation factor (VIF) is higher than 10. From the table, the means VIF =1.25. In this case, we conclude that there is no presence of multicollinearity, the standards errors of the regression are not large and all variables in the model are significant.

5.6 Test for Normality

The normality test was checked by using the histogram. We use the histogram because it is the easiest and simplest graphical plot. It gives idea about skewness, kurtosis. The data are normally distributed when they have a bell-shaped curve and when the p-value is more than 0.05. The table A.7 shows that the data are not normally distributed and the probability is less than 0.05 which means that we accept the alternative hypothesis. To solve this problem, we have to convert all variables into log but the data still have the problem of non-normal distributed.

CHAPTER VI. Conclusions and Policy Recommendations

6.1 Conclusions

This study started with the concept that the agriculture sector of Burundi is more dominated by female because most of them live in rural areas and are not educated. The target of this study is to discover the family factors that might affect the probability of female labor to participate into labor market not only in informal sector but also in formal sector. The decision of female to work or not to work in the labor market is used for the whole sample of women. Our main model is logit model from (Abraham 2017) but we added more three models in other to compare the result. First from logit model, the results indicate that the number of children has a positive relationship with female labor force participation. With regards to poverty, our study confirms our hypothesis that there is a strong positive relationship between poverty and labor force participation. The household size and household headed by female have a negative sign but still significant. Second, individuals' factors including age and residence were significantly positive. The most important determinant of labor force participation of women is age. The result shows that in the prime age categories of 18-24, age is insignificant and in the prime age categories of 25-49, the age has a positive sign and is significant. In the prime age of 50-74 and 75-98, the age has a negative connection with women's integration in the labor market. Second, the result from other models shows that all variables are significant and two variables (household size and household headed by female still have negative sign.

6.2 Policy Recommendations

The established negative effect of household headed by female on FLFP points to the need for government to promote female who is a head to participate in the labor market by conditioning the support. This would stop the laziness of female

The findings of our study show that the government should adopt a system which reduces the birth-rate so that the family members can be reduced. This would raise the level of FLFP.

To achieve higher participation of females, the government should also create the jobs for females living in urban area and raise the funds.

Even though the poverty has a positive effect on FLFP, the government should increase the taxes on personal income so that the government should create more opportunities of job. As a consequence, the female labour force will increase and the poverty will not increase among families.

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Appendices

Table A.1 Estimation Results from Logistic Model

Dependent Variable: FLFP
Method: ML - Binary Logit (Newton-Raphson / Marquardt steps)
Date: 03/19/19 Time: 21:57
Sample: 1 7810
Included observations: 7810
Convergence achieved after 3 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.591811	0.112625	5.254681	0.0000
AGE	0.008219	0.001898	4.330589	0.0000
FHH	-0.400941	0.064326	-6.232988	0.0000
HOUS_SIZ	-0.134819	0.013095	-10.29561	0.0000
N_OF__CH	0.393515	0.032423	12.13692	0.0000
POVERTY	0.150179	0.059584	2.520479	0.0117
RESIDNC	0.965948	0.059884	16.13024	0.0000

McFadden R-squared	0.071439	Mean dependent var	0.749168
S.D. dependent var	0.433520	S.E. of regression	0.415026
Akaike info criterion	1.047812	Sum squared resid	1344.043
Schwarz criterion	1.054053	Log likelihood	-4084.706
Hannan-Quinn criter.	1.049951	Deviance	8169.412
Restr. deviance	8797.928	Restr. log likelihood	-4398.964
LR statistic	628.5157	Avg. log likelihood	-0.523010
Prob(LR statistic)	0.000000		

Table A.2 Estimation Results from Probit Model

Dependent Variable: FLFP
Method: ML - Binary Probit (Newton-Raphson / Marquardt steps)
Date: 03/25/19 Time: 08:34
Sample: 1 7810
Included observations: 7810
Convergence achieved after 3 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.393311	0.065893	5.968961	0.0000
AGE	0.004069	0.001061	3.834090	0.0001
FHH	-0.240303	0.037960	-6.330490	0.0000
HOUS_SIZ	-0.079093	0.007744	-10.21337	0.0000
N_OF__CH	0.226411	0.018615	12.16279	0.0000
POVERTY	0.086011	0.034806	2.471140	0.0135
RESIDNC	0.577272	0.035609	16.21121	0.0000

McFadden R-squared	0.071217	Mean dependent var	0.749168
S.D. dependent var	0.433520	S.E. of regression	0.415214
Akaike info criterion	1.048062	Sum squared resid	1345.258
Schwarz criterion	1.054303	Log likelihood	-4085.683
Hannan-Quinn criter.	1.050201	Deviance	8171.365
Restr. deviance	8797.928	Restr. log likelihood	-4398.964
LR statistic	626.5628	Avg. log likelihood	-0.523135
Prob(LR statistic)	0.000000		

Obs with Dep=0	1959	Total obs	7810

Table A.3 Estimation Results from Tobit Model

Dependent Variable: FLFP
Method: ML - Censored Normal (TOBIT) (Newton-Raphson / Marquardt
steps)
Date: 03/26/19 Time: 07:15
Sample: 1 7810
Included observations: 7810
Left censoring (value) at zero
Convergence achieved after 5 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.522846	0.027189	19.23016	0.0000
AGE	0.002313	0.000451	5.125937	0.0000
FHH	-0.096471	0.015346	-6.286219	0.0000
HOUS_SIZ	-0.034668	0.003176	-10.91607	0.0000
N_OF__CH	0.093279	0.007346	12.69828	0.0000
POVERTY	0.039082	0.013655	2.862006	0.0042
RESIDNC	0.249566	0.014710	16.96572	0.0000
	Error Distribution			
SCALE:C(8)	0.540848	0.005453	99.18280	0.0000

Mean dependent var	0.749168	S.D. dependent var	0.433520
S.E. of regression	0.418288	Akaike info criterion	1.765389
Sum squared resid	1365.079	Schwarz criterion	1.772522
Log likelihood	-6885.845	Hannan-Quinn criter.	1.767833
Avg. log likelihood	-0.881670		

Left censored obs	1959	Right censored obs	0
Uncensored obs	5851	Total obs	7810

Table A.4 Goodness of Fit: Andrews and Hosmer-Lemeshow Test

Goodness-of-Fit Evaluation for Binary Specification

Andrews and Hosmer-Lemeshow Tests

Equation: UNTITLED

Date: 04/01/19 Time: 03:33

Grouping based upon predicted risk (randomize ties)

	Quantile of Risk		Dep=0		Dep=1		Total
	Low	High	Actual	Expect	Actual	Expect	Obs
1	0.2378	0.5603	403	402.302	378	378.698	781
2	0.5605	0.6358	305	310.971	476	470.029	781
3	0.6358	0.7025	275	255.956	506	525.044	781
4	0.7025	0.7502	225	211.320	556	569.680	781
5	0.7502	0.7863	157	179.780	624	601.220	781
6	0.7863	0.8131	144	156.087	637	624.913	781
7	0.8131	0.8368	132	136.607	649	644.393	781
8	0.8368	0.8557	126	119.725	655	661.275	781
9	0.8557	0.8794	96	103.903	685	677.097	781
10	0.8794	0.9516	96	82.3493	685	698.651	781
		Total	1959	1959.00	5851	5851.00	7810

H-L Statistic	12.2339	Prob. Chi-Sq.(8)	0.1411
Andrews Statistic	13.6842	Prob. Chi-Sq.(10)	0.1879

P-value =0.1411 is higher than 0.05, we accept the null hypothesis where the estimated model fits the data well because the HL(Hosmer-lemeshow's) and Andrews tests are not statistically significant.

Table A.5 Wald Test for Logit Model

Wald Test:
Equation: EQ01

Test Statistic	Value	df	Probability
F-statistic	97.15236	(6, 7803)	0.0000
Chi-square	582.9141	6	0.0000

Null Hypothesis: C(2)=0, C(3)=0, C(4)=0, C(5)=0, C(6)=0,
C(7)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	0.008219	0.001898
C(3)	-0.400941	0.064326
G/page(4)	-0.134819	0.013095
C(5)	0.393515	0.032423
C(6)	0.150179	0.059584
C(7)	0.965948	0.059884

Table A.6 Multicollinearity Test

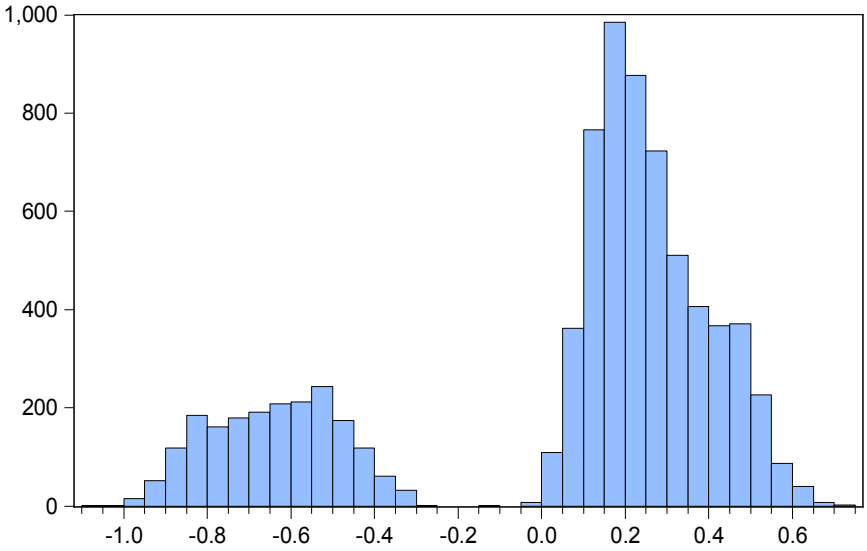
We check whether the variance inflation factor (VIF) is too high

Collinearity exists if VIF >5. If there is no collinearity, VIF should be less than 5

Variable	**VIF**	**1/VIF**
HOUSSIZ	1.40	0.716770
NOFCH	1.34	0.747277
FHH	1.21	0.827244
AGE	1.18	0.844036
POVERTY	1.18	0.844124
RESIDNC	1.18	0.849605
Mean VIF	1.25	

Here the VIF is equal to 1. There is no multicollinearity problems which means that the standards errors are not being inflated by a factor of 2 or more.

Table A.7 Normality Test for Tobit Model



Series: Residuals	
Sample 1 7810	
Observations 7810	
Mean	0.037309
Median	0.183599
Maximum	0.739537
Minimum	-1.050781
Std. Dev.	0.416433
Skewness	-0.983502
Kurtosis	2.572919
Jarque-Bera	1318.427
Probability	0.000000