FACTORS INFLUENCE ON FEMALE LABOUR FORCE PARTICIPATION IN SRI LANKA

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DECLARATION

Hereby I state and declare that this project report is the product of my own and is based on a research that I conducted independently without the participation of any other person or authority. The references made to other research in here have been acknowledged appropriately and with appreciation. The source of data and information external to the dissertation and the research has been acknowledged appropriately. In form or substance this research has never been submitted for any other degree, anywhere else. I hereby give my consent to making this available by photocopy for inter-library loans, and for the title and summary of the dissertation to be made available for use by other institution of learning.

Signature: Date: 27 May 2015.

The above candidate has carried out research for the Master thesis under my supervision.

Signature of the supervisor: Date:

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ABSTRACT

This study is attempt to identify the factors that influence female labour force participation (FLFP) in Sri Lanka using explanatory variables as age group, marital status, relationship to household head, religion, level of education, sector, province, number of dependants, literacy in English, currently attending to an educational institute in Sri Lanka and compare this results that for male labour force participation (MLFP). The necessary data was obtained from Sri Lanka Quarterly Labour Force Survey 2012 (QLFS 2012) conducted by the Department of Census and Statistics (DCS). Full of The original data set is used for this study consists with 62,299 person records in the data file. The statistical analyses used were bi- variant Chi-square test and binary logistic models. It was found that FLFP is significantly lower than that of MLFP. Low levels of labour force participation was mainly among females who currently engage in studies, who have low levels of education, who are illiterate in English, who have more household responsibilities, place of residence is urban or not in the Western province and who are Muslims. The study recommends that improving human capital, expanding more opportunities for female and providing facilities to working female such as reliable welfare centers for their dependants will support to increase female labour force participation in the country. In literature there are lots of micro level studies on related subjects which were done in other countries but found very few for Sri Lanka. Therefore, findings of this study will be very useful to see the female labour force conditions in the country. The results of this study confirm some previous findings and thus the results can be effectively used for various levels of planning.

Keywords: Binary Logistic Regression, Chi-Square Test, Labour Force Participation Rate, Omnibus Tests

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INTRODUCTION

1.1 Background

Female labour force participation (FLFP) is the prime indication of the extent to which females participate in the economic activities of society. Across the world, despite their increasingly important economic role, women remain more at disadvantage in the labour market than men, and the situation in Sri Lanka is no exception (ILO,2013).In recent years, seminars, workshops are being held over the world to discuss women issues and women progression in all area of life. That is because of the most significant features of the global labour market in the last half of the twentieth century, which is increasing the participation of women (Bombuwela and Chamaru,2013).The full integration of women into the economy has become one of the most important goals of development efforts (Charles,2009).In this regard, the equity and efficiency related Millennium Development Goals (MDGs), in particular, eliminating gender disparities in primary and secondary education, improving maternal health, reducing child mortality and in promoting gender equality and empowering women, are desirable goals (Suwarna,2007). Yet, women are still under represented in the wage sector in both developed and developing countries (WBDI,2012).

Various factors such as age, marital status, education, husband's income and the number of children, may influence on the decision of a woman to be in the workforce. The degree of association between each variable and the female labour force participation (FLFP) rate varies from country to country which has achieved different levels of economic development. An economic development of the country creates better employment opportunities and better social welfare programs for women and children

(OECD,2004). In the case of Sri Lankan women, it is expected that determinants of FLFP would be different from those of other countries.

According to the Sri Lankan history men and women were equal partners of the economy in technology primitive and gathering societies where production was home based and with limited needs of life. As a result of industrialization many of the home based activities were transformed into factory based activities. Men began to work in factories and offices while women had to stay at home and to engage in household activities such as cooking and cleaning and taking care of children …etc. These household activities cannot be considered as economic activities since most of them fall outside the economic boundary defined in the System of National Accounts (SNA). Predominantly Sri Lanka has been an agricultural country in the South Asian region mainly with a patriarchal society where father is considered as the main income earner and the decision maker while mother plays a main role as a housewife (DCS,2007).

The culture and some other social factors such as religion and patriarchy also influence women's participation in labour force. Also educated young women are more adversely affected than their male counterparts as a result of opinions of private sector employers who prefer to recruit males than females (Nanayakkara,2004). Nature of the job also affects the female participation, many of the studies have shown that more females engage in low skill activities such as agricultural supporting activities, garments manufacturing, and clerical work. It is important to understand the reasons behind the prevailing low FLFP rates (Nisha, 2012; Myat Mon, 2000).

1.2 Labour Force in Sri Lanka

Official statistics for Sri Lanka published by the Department of Census and Statistics (DCS) confirms that overall labour force participation rate is around 50% and has been remaining in the same level for more than two previous decades. Labour force participation rate is defined as the percentage of economically active population or

labour force to the total working age population (DCS,2012). The working age prior to 2012 was 10 years but after 2012 it has been increased to age of 15. However, the LFP rate prior to 1950 was 37% (Karunatilaka,2006). The working age population can be divided into two main groups such as economically active and economically inactive. The current economically active population is called labour force and it is defined as the sum of the number of employed and unemployed population in an area or the country during the current reference period (usually the preceding week of the survey week) (DCS,2012).Basic statistics of labour force in Sri Lanka is shown in Table 1.1

Table 1.1: Population and Labour Force-2012.

	Population (15years & over)	Labour Force	Labour force participation rate	Employed population	Employment Rate
Sri Lanka	16,081,285	8,454,364	52.6	8,118,362	96.0
Male	7,508,356	5,629,617	75.0	5,469,759	97.2
Female	8,572,929	2,824,747	32.9	2,648,603	93.8

Source: Department of Census and Statistics (2012)

Figures in Table 1.1 indicates that the total household population (age 15 and above) is about 16 million and total labour force of the country has estimated at about 8 million. From that Lobour force 2.82 million are female and that account for 33 percent of the total labour force. The female labour force participation (33%) is much lower than male labour force participation (75%). This indicates that more females in working age engage in non-economic activities than males.

Economically active population is divided into two groups employed and unemployed. Employment to population ratio indicates the capacity of country's economy to create jobs. According to Labour and Social Trends in Sri Lanka (2011),if the above ratio is more than 70% then it is considered as a high percentage and if that is less than 35 % is considered as a low percentage. Many of the develop countries show higher percentages

while it is in opposite trend for least develop countries.The developing countries also show higher percentages but many of the articles (Ali Fakih 2013, GENPROM 2001,and Karunatilaka2006)indicate that other related indicators also should take into consideration to get the real condition of those countries since the lower productivity of the employment may also affect or higher levels of employment to population ratio.This ratio for Sri Lanka is 72.8 % for males and 30.8 % for females in year 2012.

Labour force participation by gender and age group as shown in figure 1.1 is indicates that the labour force participation rates among age groups irrespective of gender has increased up to a point as the age group advances and declines thereafter. This peak age group is 30- 39 years and this is true for both male and female. Nevertheless in Sri Lanka majority enters the labour force between ages 15 to 24 years while Most of the graduates enter the labour force between the ages 25 to 30 years (Nanayakkara, 2004).

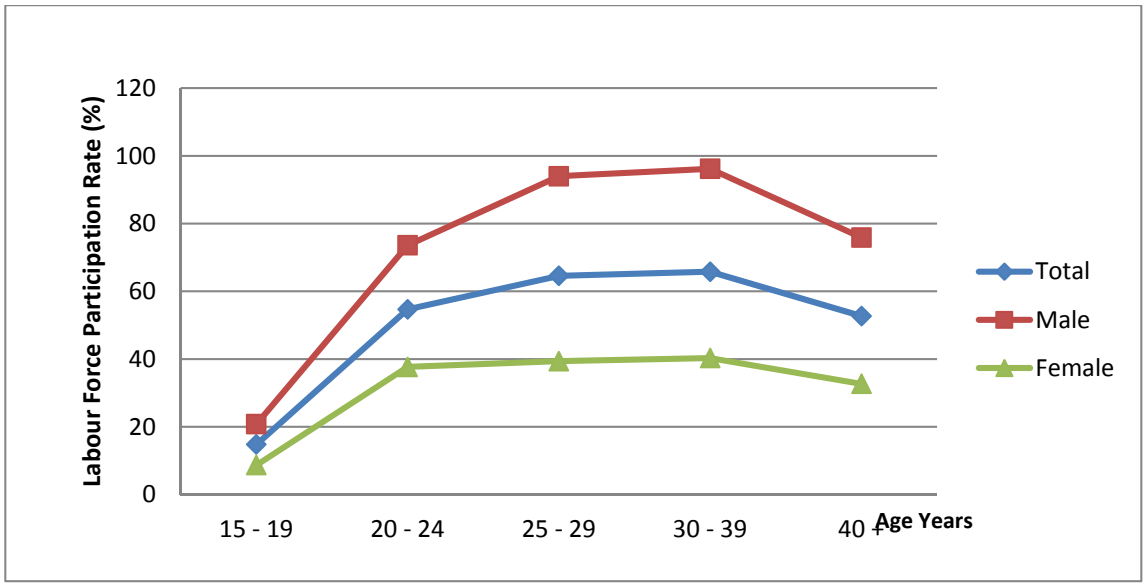

Figure 1.1:Labour Force Participation Rates by Gender and Age group - 2012

Source: Department of Census and Statistics (2012)

1.3 Female Labour Force in Sri Lanka

Sri Lanka has been a developing country for many years in South Asian region and by now it is becoming a middle income level country. Also Sri Lanka is a country with a high Human Development Index in the Asia Pacific region. The high levels of literacy that is 93% in 2012, high school enrolments, and high life expectancies at birth…etc. reveal that the country is leading to a better condition compared to other neighboring countries in the region. Yet the female labour force participation is very low compared to male and unemployment among young women is high. The employed females in managerial and equal positions still remain at very low percentages.Gender indicators in Sri Lanka are in many ways more favorable compared to other developingcountries, and indeed, even compared to some developed countries, in terms of gender gaps in health, education, economic opportunity and political participation. According to the 2011Global Gender Gap report issued by the World Economic Forum, Sri Lanka ranked 31st in the world out of 135 countries, ahead of industrialized countries such as France (48), and Italy(74) However, in terms of labour participation rate and types of employment that they are engaged in, which gender discrimination manifests in the most visible manner, there remain gender gaps, and there is clearly a need for substantial improvement. (ILO, 2001-2002)

The gap between male and female labour force participation has been slightly decreasing over the years and remains in current level and the percentage increase of female labour force participation is only 1% for last two decades. It is very clear from the recent official statistics of the DCS (2012). Even though women represent more than half of the population in Sri Lanka, their labour force participation rate is less than men. Men's participation in labour force is twice as women's.The rapid increase in labour force participation in mid 80's was mainly due to the arrival of females into labour market through open economic framework and also structural reforms that created new job opportunities for females in private sector. Improvement of female labour force participation further more job opportunities should be place in their areas of living as females find it difficult to be away from their families especially when they have young

children or dependants (Nanayakkara, 2004).Sri Lanka has virtually eliminated gender disparities at all levels of education as women students were 49% of students in primary grades, 51% of students in secondary grades and 53% of university students in 2004, reveals by the report on Gender Dimensions, of the Millennium Development Goals in Sri Lanka- policy perspectives. Therefore number of study papers argues that lower participation may be due the mismatching between education and the required qualifications for jobs especially in private sector (RamaniGunathilaka, 2008).The current education system of the country provides free education for both male and female children. Both school and higher education are freely available for children and there are enforced rules by the government so as every child to get access to education without any discrimination. As a result of the current education system of the country Sri Lanka is considered as an early achiever of the Millennium Development Goal 2, "Achieve universal primary education". So it is vital to see the reasons for remaining lower labour force participation while the level education is increasing (Suwama,2007).

1.4 Unemployment Rate in Sri Lanka

The unemployment rate is a useful indicator of the state of the economy. Booms are associated with low levels of unemployment and recessions are associated with high levels of unemployment (Mupunga G,2013).Unemployment is the other subset of the labour force and constitutes people who are neither working nor have a certain job to return to, but are actively seeking employment opportunities or are willing to accept a job, if offered. The unemployment rate is the number of unemployed people as a ratio of the total labour force. . The unemployment rate is one of the important final target variables of macroeconomic management. The unemployment rate indicates the degree of usage of productive resources available in an economy. Therefore, almost all societies strive to achieve fairly low and stable unemployment rates, as high unemployment rates are root causes for various socioeconomic problems and political unrest (Karunatilaka, 2006). Unemployment rate by gender and age group is shown Table in 1.2.

Table 1.2:Unemployment Rate(%)-2012

Age group	Unemployment Rate(%)		
	Total	Male	Female
15 - 19	18.9	17.5	22.5
20 - 24	16.8	12.8	23.8
25 - 29	6.6	4.3	11.4
30 - 39	2.5	1.4	4.7
40 +	0.8	0.5	1.5
Total	4.0	2.8	6.2

Source: Department of Census and Statistics (2012)

According to result in table 1.2 explains that female unemployment rate (6.2 %) is higher than that of male (2.8 %) irrespective of age group. Further, it is clear from this available statistics youth female(20-24) unemployment (23.8%) is much severe compared to those of other age groups and also compared to male youths in same age group (12.8 %).The following figure1.2, show the trend of unemployment rate over 10 years (2003-2012). It is clear that over the years unemployment is comparatively decreasing but the gap between male and female has been remaining over past years. Furthermore the gap between the males and the females are approximately same in 2008.

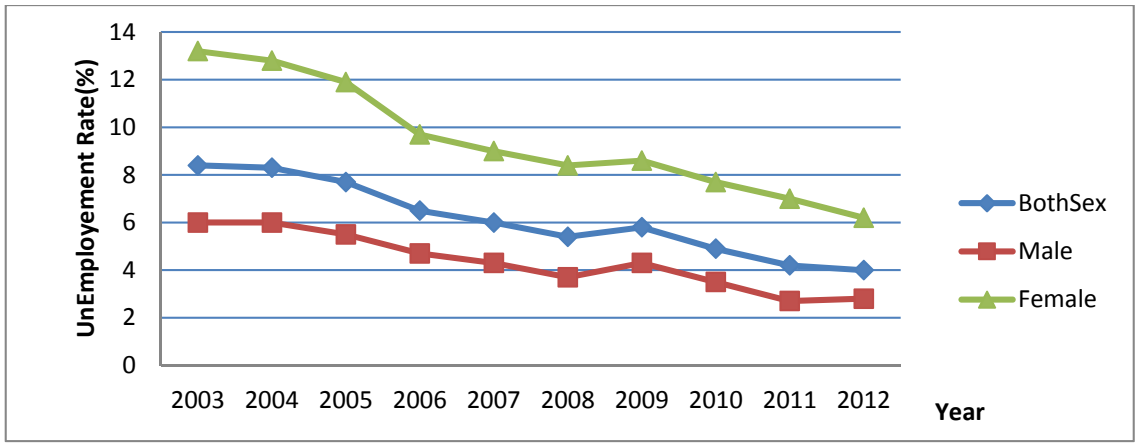

Figure 1.2: Unemployment Rates by Gender 2003-2012
Source: Department of Census and Statistics (2012)

1.5 Distribution of Employment Status by Gender

Report on Gender Dimensions, of the Millennium Development Goals in Sri Lanka, 2007 explains that the majorities of female workers are in informal sector, outside the protection of labour legislation moving from one low income low skill occupation to another or are confined to unpaid family labour in agriculture. Further the report point outs that the quality of wage employment deteriorated as an outcome of demand for low cost female labour in international and domestic markets. The following figure1.2: shows the Distribution of employment by employment status and gender in2012.

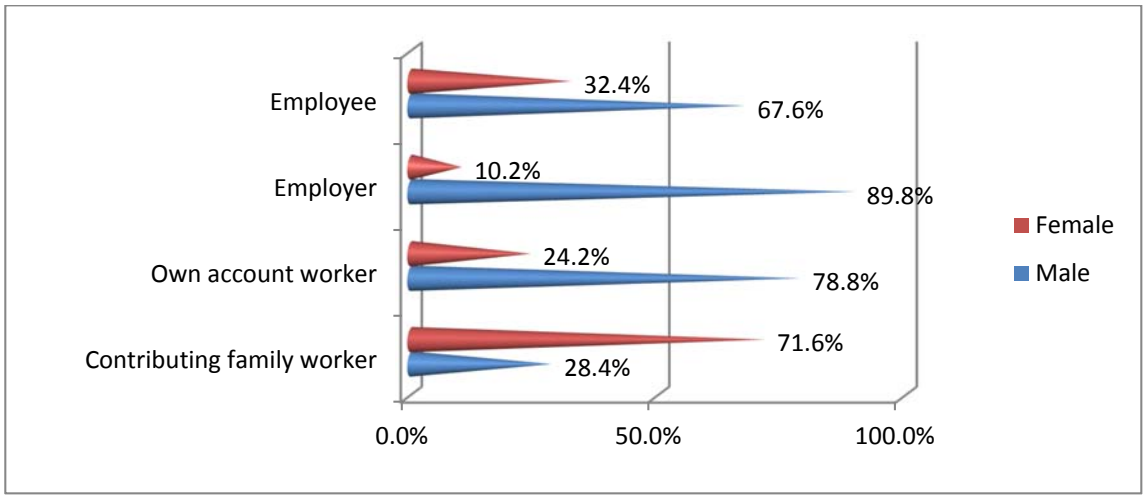

Figure 1.3:Distribution of Employment by Employment Status and Gender -2012

Source: Department of Census and Statistics (2012)

Figure 1.3 indicates that about 71.6% of total unpaid family workers are females while only 10.2% of total employers are females.

1.6 Female Employee in Government and Privet Sector

According to the World Bank definition Employees are people who work for a public or private employer and receive remuneration in wages, salary, commission, tips, piece rates, or pay in kind. The public sector, in fact, does provide better salaries, social benefits coverage and job security, as compared to the private sector in Sri Lanka (ILO, 2013). The increase of both male and female labour force participation was due to

improved education facilities and increased job opportunities of the country. The rapid increase in labour force participation in mid 80's was mainly due to the arrival of females into labour market through open economic framework and also structural reforms that created new job opportunities for females in private sector (Nanayakkara, 2004). Distribution of employee population by Gender in public and private sector in Sri Lanka is shown in table 1.3.

Table 1.3: Distribution of Employee Population by Gender in Public and Private Sector-2012.

Sector	Total	Gender			
		Male		Female	
	Number	Number	%	Number	%
Total Employee	4586066	3099330	67.6	1486736	32.4
Public	1230398	702415	57.0	527983	43. 0
Private	3355668	2396915	71.4	958754	28.6

Source: Department of Census and Statistics (2012)

Considering the Table 1.3,it is estimated that the total public sector employees is about 1.2 million. Although there is a big difference between male and female contribution of the participation on privet sector, there indicated small difference the percentage of male and female inthe public sector.

1.7 Female Employment Occupation in Sri Lanka

Women play a critical role in the Sri Lankan economy and are the backbone of several of the most economically important sectors for the country – tea, garments, and migrant workers (Nisha,2014).Majority of those employed in managerial and technical jobs in the garment industry are men, 80% of factory workers are female, concentrated at the bottom of employment structure without much opportunity for promotions. Occupational segregation tends to confine women to 'feminine' areas of employment in

the services sector and limited access to technical employment (Suwarna, 2007). According to the Labour Force Survey - Annual Report 2012 Occupation of Sri Lankan employed persons as follows.

Table: 1.4Employed Population by Occupation

Occupation	Total	Gender		% Contribution of females to the total employment
		Male	Female	
Senior Officials & Managers	1.8	1.9	1.5	28.4
Professionals	6.4	3.8	11.7	59.9
Technical & Associate Professionals	5.7	5.6	5.8	33.5
Clerks	4.4	3.5	6.3	46.8
Proprietors & Managers of Enterprises	3.8	4.2	3.0	25.4
Sales & Service workers	10.8	11.1	10.1	30.6
Skilled Agri. & Fishery Workers	21.5	21.0	22.4	34.0
Craft & Related workers	17.0	17.3	16.2	31.2
Plant/Machine operators & Assemblers	8.6	11.5	2.8	10.6
Elementary occupations	19.6	19.4	19.9	33.3
Unidentified	0.5	0.7	0.2	13.7
Total	100.0	100.0	100.0	32.6

Source: Department of Census and Statistics (2012)

Table 1.4 shows the occupational summary of women and men and also this compares the proportion of men and women employed in different occupational categories. Women are heavily concentrated in certain occupations and 22.4 percent of them are employed in “Skilled Agricultural and Fishery Workers” occupation compared with 21.0 percent of males. Also, 11.7 percent of females work in “Professional” occupation

compared with 3.8 percent of males. This table also shows the contribution of females to the total employment by each occupational group. This clearly shows that 59.9 percent of professional are women. Report mentioned reasons for that, because the occupation group of "Professionals" includes Teachers, Nurses...etc. In Plant / Machine Operators and Assemblers occupational group, physical ability of men may be reason for showing high rates by them than women. However it is not applicable to the senior ranks as well, since that levels work not purely because of their physical ability but also their mental ability. However, noted women's rate on Senior Officials & Managers and Proprietors & Managers of Enterprises occupational groups. They show different rates than men and also their contribution to the employment also less.

1.8 Significance of the Study

Compared to the other countries in the South Asian region Sri Lanka has gained remarkable improvements in the areas of education and health infrastructure but the female labour force participation still remains lower compared to that for male. Therefore it is very important to investigate the levels and trends of female labor force participation. Also it is very important to find out the reasons for the remaining gender gaps in different sectors in Labour market.

In literature there exist some studies focusing on labour force participation in Sri Lankan perspectives but it was hard to find any recent micro level study on female labour force participation. Therefore this study will provide strong base for future studies and also findings of the study may support for better planning procedures. Further findings of this study will be helpful to identify remedies to some labour related problems of the country.

1.9 Objectives of the Study

- On view of the above, the objective of to identify and examine the factors that influence female labor force participation (FLFP) in Sri Lanka.
- To model fit female labour force participation, using some explanatory variables.
- To compare the factors influence on Female labour force participation and male labour force participation.

1.10 Outline of the Report

The report structures as follows, the first chapter includes the introduction of the study, the second chapter consists with the literature review on both national and international studies which were done on related issue. The third chapter provides the information on data and discusses research methodologies use in the study such as the definitions of labour force statistics, methods of variable selection for the chi-square test, binary logistic regression and the methods of checking model adequacy. The forth fifth and sixth chapters of the report will cover the analysis and interpretation, the final chapter consist of the conclusions recommendations.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter focuses to give an idea about the literature related to female labour force participation in Sri Lanka and other countries. Furthermore, this find out demography and socio-economic variables mostly impact on Female labour force participation.

2.2 Literature Review in Sri Lanka

There are few studies in Sri Lanka which have been done by past researchers related to this topic.The study 'Entry versus success in labour force: Young women's employment in Sri Lanka' which was done by Anju Malhota (1997) to study the behavior in developing societies through household level analysis of young single women in Sri Lanka explained that higher education levels lead to greater labour force participation and also highly educated females are more likely to be unemployed than employed. Further the study mentioned that the lack of sustained economic growth, high level of education, favorable female position in household collectively made the unfavorable situation for young female labour force participation.

A study conducted by Ramani Gunatilaka, (2008) Informal Employment in Sri Lanka: Nature, Probability of Employment, and determinants of Wages attempts to look at the extent of informal employment and the informal economy in Sri Lanka; analyze the determinants of wages in the economy at large and the role played by employment in the informal sector, or informal employment, in determining wages; analyze the determinants of wages in the informal sector relative to the factors that determine employment in the formal sector; and assess the factors that determine the probability of an individual being employed in the informal sector.The findings of the study show that the majority of the employed in Sri Lanka are working in informal work arrangements. The employments conditions are precarious and only about 6 per cent have permanent

tenure. Compared to females, males comprise a larger portion of the employed in the informal economy. It is also evident that informal job creation has had a direct impact on reducing unemployment by generating more employment opportunities than formal job creation.

A research conducted Bombuwela P. M., De Alwis A. and Chamaru, (2013)was entirely designed by centering the focal problem of the effect of Glass Ceiling on Women Career Development. The overall study was structure based on the conceptual framework built up using the information of literature survey. The study was conducted with the aim of obtaining the following objective. That was "To find out the Effect of Glass Ceiling on Women Career Development with regard to female executive level employees who are working in private sector organizations." At the same time, hypotheses are developed to find out whether there is a significant effect of Individual Factors, Family Factors, Organizational Factors and Cultural Factors on Women Career development. Merely this study has been completed with an empirical survey which was thoroughly conducted using a self-administered questionnaire and the sample consisted of 150 women executives. For presenting and analyzing the data both descriptive and inferential statistics were used. The findings reveal that the Glass Ceiling and Women Career Development have a moderate negative relationship, and also show that Individual Factors, Organizational Factors and Cultural Factors have a significant effect on Women Career Development whereas Family Factor has effects on the Glass Ceiling. Following the study results, a conclusion was eventually made that there are significant effects of the Glass Ceiling on Women Career Development of Executive level female employees working in private sector organizations in Sri Lanka.

2.3 Literature Review in Other Countries

Although the number of micro level studies on determinants of female labour force participation in Sri Lankan perspective is limited, it can be found number of studies on

this topic in different countries in various levels so the literature is quite extensive on this subject.

Betilde Rincon de Munoz (2007),the purpose of his study was to fill the gap in research about women in Venezuela by investigating the determinants of their labor force participation between 1995 and1998. The Central Office of Statistics and Information in Venezuela had provided cross sectional data collected semiannually about individual, demographic, socio-economic and geographical characteristics of individuals living in Venezuela during that period. on his study used binomial and multinomial logit models to test a number of hypotheses. The full sample of women between 15 and 60 years old is used to investigate the importance of individual, demographic, socioeconomic, and geographical characteristics in the labor force participation decision, also controlling for a time trend. The same decision is also analyzed for three sub samples: married women, single women, and women heads of household. The results of these analyses show considerable differences in motivating factors among the three groups. The results of his study shows that education has a strong impact on women's decision to participate in the labor market and age is one of the most important determinants of labor force participation of women. Furthermore married and divorced women are more likely to participate in the labor market than single women.

Labor Force Participation of Married Women in Punjab (Pakistan) ,Economic and Social Research 11(2) 2009 by Rana Ejaz Ali Khan & Tasnim Khan , This paper highlights the factors that influence the decision of married women (in the age group of 16-60 years) to participate in labor force activities. Employing the probit model on 3911 observations it is found that women's age, women as head of the household, women's education, household poverty, family size, number of girls (5-15 years), number of daughters over 15 years of age, husband's unemployment and low income, and rural locality have a significant positive effect on labor force participation of married women. On the other hand, ownership of assets by the household, household per capita income, being a

nuclear family, number of infants, number of sons over 15 years of age, and husband's education have shown a negative effect. Poverty in an overall perspective is found to be the major determinant of the labor force participation of married women. They analyzed the effect of women's age, education, household per-capita income, number of dependents in the household, and predicted male and female wages on the time allocation of women. They found that home-time allocation for participating women is significantly and negatively dependent upon her age, education and the predicted wages of the males in the household. Another significant variable is the distance of the main market from the home because this increases the transportation cost and travelling difficulties as well as the cost of market goods for which substitutes can be produced at home. An increase in the distance means a decrease in time to work in the market.

Mupunga G.(2013) conducted a study **"**Determinants of female labor force participation in zimbabwe", to identify the determinants of female labor force participation (FLFP) in Zimbabwe based on time series analysis of data from 1980 to 2012. The study also seeks to examine if education and economic development increase FLFP,further estimated a log linear model for female labor force participation in Zimbabwe. The study established that the major factors that determine FLFP in Zimbabwe are real wages offered in the non-agricultural sectors that are dominated by men, gross domestic product per capita, female education and the male unemployment rate.

Determinants of Female Labour Force Participation in Burma, is a study conducted by Myat Mon. For his study the data from the socio-economic survey of urban women undertaken in Rangoon, Burma, during May to July 1998, are analyzed by the logistic regression model. A number of potential variables for inclusion in the logistic regression are identified on the basis of results of the chi-squared tests and also on the basis of theoretical models which explain female participation in the labour force. He found out husband's income and marital status is important factors while educational attainment

does not significantly affect (less significant forunmarried women than for married women) Burmese urban women entering into the labour force.

One of the other main reasons discussed in literature is the investment on human capital. A study done in North Cyprus, "Determinants of female labour force participation" by Fatma G.L. and Feyza B. explained in their study that education is the main factor increasing women's likelihood of participation while age and the place of residence are also significant factors influencing the women's labour supply in North Cyprus.

Dante Contreras (2008) found in their study in Chile that level of education is a positive factor while number of children is a negative factor for female participation in Chile. Further the study revealed some cultural factors like being conservative have more negative effects over level of education

Factors determining the decision of female labour supply can be explained by patriarchal structures, characteristics of female and male labour supply and incentives and disincentives created by national employment system, according to Olukemi I. Lawanson (2008) patriarchy in household, state and culture is one of the reasons affecting women labour supply negatively.

Maire D. and Scheuer C. (2005) in a panel data analysis for Denmark explained that determinants of labor force participation for selected groups with weak labour market attachment; partner income was only an exogenous factor for housewives for their participation in labour. Further they revealed that women who have more traditional attitudes towards gender roles exhibit lower participation. Also the study found that education and traditional gender attitudes are negatively correlated and therefore by improving the level of education of the women may give positive impacts in two ways such as education itself is a positive factor to enter labour market and also education may help women to overcome traditional attitudes.

Factors Influencing Female Labor Force Participation in South Africa in 2008 by Yakubu A Yakubu, investigated in his paper, dynamics in the South African labor force, uses the Human Capital Theory (HCT), which postulates that the education of women is positively related to the likelihood of their labor force participation. Data for the study were extracted from the 2008 Quarterly Labor Force Survey of Statistics South Africa. Logistic regression modeling was used to estimate the influence of education on labor force participation, while controlling for other demographic and economic factors.

Female Labour Force Participation in MENA's Manufacturing Sector: The Implications of Firm-Related and National Factors by Ali Fakih (2013). The Middle East and North Africa (MENA) region falls behind several other geo-economic regions in terms of women's participation rates in the labour market. This paper examines the implications of firm-related and national factors for Female Labour Force Participation rates(FLFP) in manufacturing firms located in the MENA region. The empirical investigation uses data derived from the World Bank's Enterprise Surveys database and applies fractional logit models to carry out the estimations.

2.4 Summary

It was noted that there are some studies focusing on labour force participation in Sri Lankan perspectives but it was not found any recent micro level study on female labour force participation. The results helpful to identify remedies to some labour related problems of the country and carry out the analysis of this study. However, the review would be provided the empirical evidence about female labour force participation.

CHAPTER 3

MATERIAL AND METHODS

3.1 Data Source

3.1.1 Background of the data

This study draws data from Sri Lanka Quarterly Labour Force Survey 2012 (QLFS 2012) conducted by the Department of Census and Statistics, Sri Lanka. The survey is an annual household survey and normally the annual sample size is 22,500 housing units and it conducts annually in twelve monthly rounds. The survey was not conducted in the first quarter 2012, due to heavy work load of the Census of Population and Housing – 2011. Hence the 2012 report is based on an annual sample of 19,420 housing units and provides national, provincial and district level estimates with a stipulated standard errors of labour force characteristics as reported in the relevant reference period. QLFS is the main source for labour statistics of the country which provides quarterly and annual estimates on levels and trends of labour force, employment, unemployment and other labour related statistics. The survey has a rich data series since 1990. The survey collects information on demographic characteristics of the usual residents of the household, economically active and inactive conditions, employment and unemployment characteristics, underemployment and informal sector employment information.

3.1.2 Sampling methodology of the QLFS

The QLFS uses a two stage stratified sampling scheme and the sample frame is the list of all housing units of the country that had prepared during the Census of population and Housing in 2011. The Primary sampling unit (PSU) is a Census block prepared at the population Census which consists with a list of housing units and this has geographical boundaries, each Grama Niladari Division is divided into number of census blocks with 150 housing units around. The secondary sampling unit (SSU) is a housing unit. At the

first stage of sample selection the census blocks are selected considering probability proportionate to size (PPS) method and 10 secondary sampling units are selected from each selected PSU using systematic sampling method. In 2012, 1942 primary sampling units were allocated among districts and sector by considering Neymann Allocation and also considering the variance of unemployment rate. Since a probability known sampling method is used populations estimates and their variances can be calculated.

3.2 Concepts and Definitions

The concepts and definitions used by the Department of Census and Statistics to disseminate labour force information will be used for this study. The recommended statistical definitions for labour statistics are as follows. The Figure 3.1 shows the flow of working age population by labor market status.

I. Labour force: The labour force is composed of the economically active population age 10 and over in the reference period(usually one week,the inquiry relates to activity or status is referred in the preceding week of the survey week). Officially the Department of Census and Statistics used the lower age limit as 10 up to 2012 but a very small number of cases are reported in 10-14 age groups therefore from 2013 lower age limit as age 15 and above is considered as the working age population and upper age limit is not defined.

II. Economically Active Population**:** This is defined as those persons who are/were employed or unemployed during the reference period of the survey.

III. Employed: The persons, who during the reference period, worked as paid employees, employers, own account workers (self employed), or unpaid family workers are said to be employed. This includes persons with a job but not at work during the reference period.

IV. Unemployed: The persons who are seeking and available for work, but had no employment during the reference period.

V. Currently Economically Active**:** The persons who were employed or unemployed during the current reference period are considered to be currently economically active.

VI. Not in the Labour Force (not economically active): The persons who were neither working not available/looking for work are classified as "not in the labour force". The persons who are not in the labour force for such reasons as: full time care of the household, full time students, retired or old age, infirmed or disabled, or are not interested in working for one reason or another.

Labour force population is divided into two groups as employed and unemployed. Unemployed are those who seek and available for a job during the reference period and employed are those who engage in an economic activity. There exist internationally defined standard statistical definitions for employment status to accommodate comparability among countries. Sri Lanka is using the same definitions. The following employment categories with definitions are available from the Survey. The employment status definition is approved by the United Nation Statistical Commission in 1958.

(a) *Employer**:*** a person who operates his or her own economic enterprise, or engages independently in a profession or trade, and hires one or more employees. Some countries may wish to distinguish among employers according to the number of persons they employ.

(b) *Own-account worker**:*** a person who operates his or her own economic enterprise, or engages independently in a profession or trade, and hires no employees.

(c) *Employee:* a person who works for a public or private employer and receives remuneration in wages, salary, commission, tips, piece-rates or pay in kind.

(d) *Unpaid family worker**:*** usually a person who works without pay in an economic enterprise operated by a related person living in the same household.

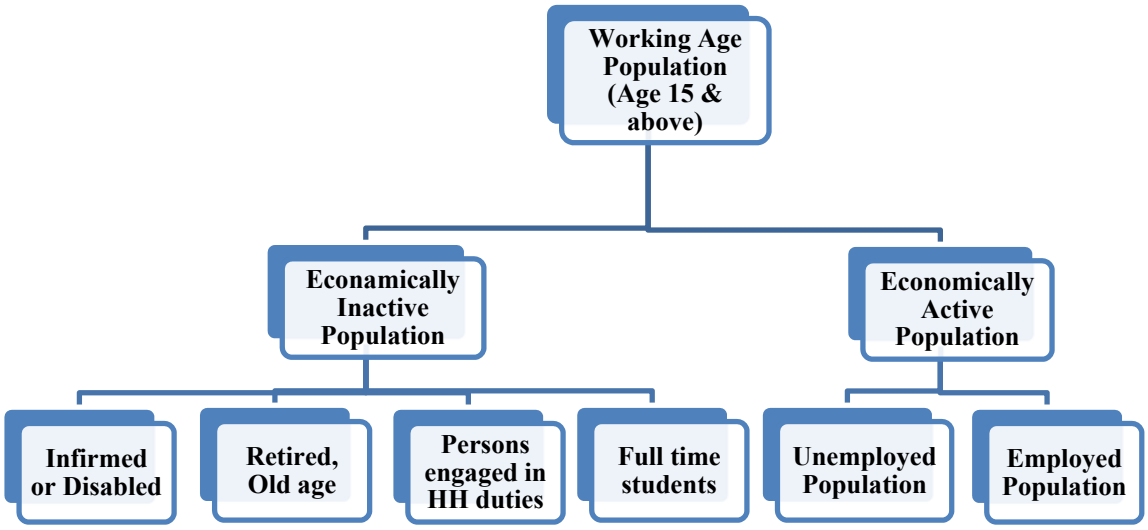

Figure :3.1 Distribution of Working age population by labour market status

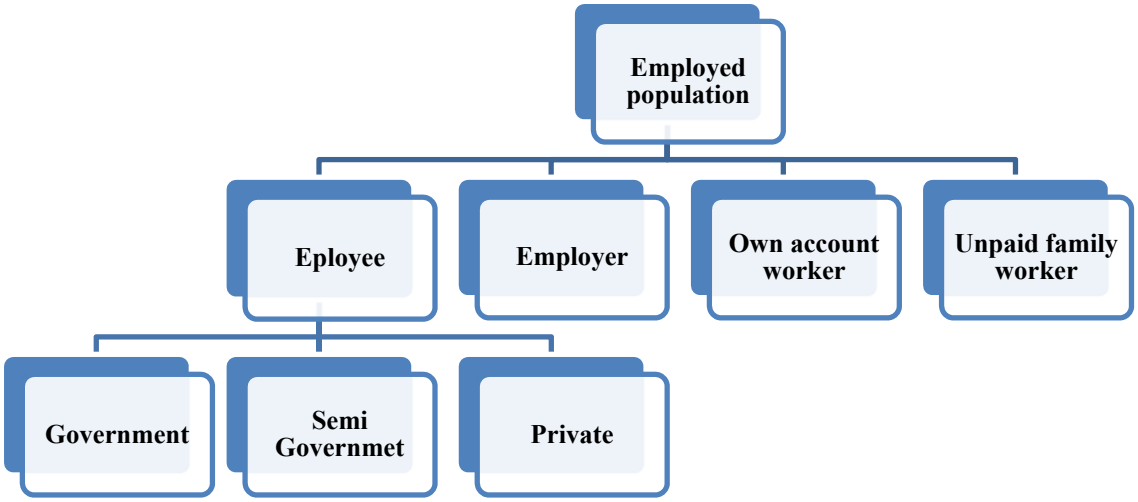

Figure: 3.2 Distribution of employed population by status of occupation

3.3 Data Used for the Study

Full of The original data set is used for this study consists with person records and it covers following information. There are about 62,299 total number of person records in the data file.

1. Geographical Information of households such as province, administrative district, sector, .etc.
2. Demographic characteristics of persons such as relationship to head of household, age, sex, ethnicity, religion, marital status, level of education, literacy, .etc,
3. Information which are needed to identify employed, underemployed, unemployed and economically inactive persons.

3.4 Variables Used for the Analysis

Most of the variables collected through the survey are categorical in nature. Using the original data set some new variables like labour force, economically active, economically inactive, employed and unemployed were created by considering the statistical concepts and definitions. All the control variables included in the analysis were categorically coded. The categorization of the control variables was based on theoretical grounds. Some variables in the original data set are re-categorized by considering the homogeneity of the groups and to help statistical procedures such as to minimize small cell sizes. For an example age groups are created by regrouping the original variable 'completed age at last birthday' into five year age groups and last category kept open as 40 and above. The information on literacy for three languages are available two of them are local languages such as Sinhala and Tamil, and the other is an international language English. The basic variable categorization used for the study is in Table: 3.1.

Table: 3.1 List of Variables used for Labour Force Participation Analysis

Variable	Type	Code
Age Group	Categorical	
15-19		1
20-24		2
25-29		3
30-34		4
35-39		5
40 and above		6
Marital Status	Categorical	
Never Married		1
Married		2
Separated/Widowed		3
Relationship to household head	Categorical	
Head of household		1
Spouse		2
Son/Daughter		3
Other		4
Religion	Categorical	
Buddhist		1
Hindu		2
Muslim		3
Other		4
Ethnicity	Categorical	
Sinhala		1
Tamil		2
Moor		3
Other		4
Level of Education	Categorical	
No Schooling		1
Primary		2
Lower Secondary		3
Ordinary Level		4
Advanced Level		5
Degree & above		6
Sector	Categorical	
Urban		1
Rural		2
Estate		3
Province	Categorical	
Western		1
Central		2
Southern		3
Northern		4
Eastern		5
North Western		6
North Central		7
Uva		8
Sabaragamuwa		9
Literacy in English	Categorical	
Literate		1
Illiterate		2
Currently attending to an educational institute	Categorical	
Attending		1
Not Attending		2
No. of dependants age <15	Categorical	
No children		1
2 or less		2
3 or more		3

3.5 Statistical Methods Used

The analytical part of the study performs in several stages. Mainly computer packages SPSS, (Statistical Package for Social Scientists) and MS Excel is used to conduct statistical tests and to calculate statistics of the study. At the first stage descriptive statistics is utilized to explore the objectives. The standard error and the coefficient of variation are calculated for each estimated value using SPSS computer package. The weighting factor which is calculated considering the selection probability of the sample is used to get the population estimates. At the next stage bi- variant analysis such as Chi-square test uses to identify important variables for the models and then binary logistic analysis will be conducted to identify and to quantify the determinants of labour force participation.

There are three common statistics can used to analysis of 2-D table(when A and B are two factors, each factors has two levels)

- Pearson's Chi-Square Test(exact) = $\chi 2$ $= \Sigma \frac{(Observed - Expected)^2}{Expected}$
- Yetes correction Chi-Square Test= $\Sigma \frac{(Observed - Expected - 0.5)^2}{Expected}$
- Likelihood Ratio $= \Sigma Observed * log\left(\frac{Observed}{Expected}\right)$

  (Peiris, 2013)

3.5.1 Pearson's Chi-Square Test

Pearson Chi-Square test is used to identify relationship between categorical variables.

(i) **Hypotheses**

Null: There is no association between the two variables.

Alternate: There is an association between the two variables.

(ii) Chi-Square test statistic

Consider two variables A and B and have "i" and "j" categories respectively. If "O" represents observed frequency and "E" represents expected frequency, for i and j possible computations,

$$\chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{(O_{i,j} - E_{i,j})^2}{E_{i,j}}.$$

The number of degrees of freedomis equal to the number of cells *rc*, minus the reduction in degrees of freedom, *p*, which reduces to $(r - 1)$ $(c - 1)$. The null distribution of the Pearson statistic with *i* rows and *j* columns is approximated by the chi-square distribution with $(i - 1)$ $(j - 1)$ degrees of freedom. For the test of independence, a chi-square probability of less than or equal to 0.05 (or the chi-square statistic being at or larger than the 0.05 critical point) is commonly interpreted by applied workers as justification for rejecting the null hypothesis that the row variable is independent of the column variable.

(iii) **Limitations:**

Chi-Square test can be used only to find the association between two factors. The simultaneous effect many factors or interaction between two or more factors cannot be tested.Pearson Chi-Square test is valid only if no more than 20% of the categories should have expected frequencies of less than five. In such problematic situations combining two or more neighboring classes with small frequencies to form a class sufficiently large or use non parametric test to test the association between variables will be a good solution

(iv) Assumptions used in Chi-square test

The following assumptions are used with the standard approximation to a chi-square distribution

- Random sample – A random sampling of the data from a fixed distribution or population.
- Expected Cell Count – Adequate expected cell counts. Some require 5 or more, and others require 10 or more. A common rule is 5 or more in all cells of a 2-by-2 table, and 5 or more in 80% of cells in larger tables, but no cells with zero expected count. When this assumption is not met, Yates' correction is applied.

- Independence – The observations are always assumed to be independent of each other.

Note: If degrees of freedom=1 (for 2 x 2 table), it is advisable to use Yates' continuity correction. In this case Pearson chi-square statistics is

$$X^2_{cal} = \sum [Oij - E_{ij} - 0.5]^2 / E_{ij} < X^2_{(1),\,\alpha\%}$$

(Agresti, 1996)

3.5.2 Logistic regression analysis

The goal of logistic regression is to predict the dichotomous characteristic of dependant variable on the basis of continuous and /or categorical independents and to determine the percent of variance in the dependant variable explained by the independents, to rank the relative importance of independents, to assess the interaction effects, and to understand the impact of covariate control variables. Logistic regression comes under the family of generalized linear models. The impact of predictor variables is usually explained in terms of odds ratios.

- **Odds ratio**

Logistic regression works with rather than proportions. The odds are simply the ratio of the proportions for the two possible outcomes. If p is the proportion for the one outcome then, (1-p) is the proportion for the second outcome.

$$\text{Odds} = \frac{p}{1-p}$$

Further mathematical transformation (log transformation) is needed to normalize the distribution.log transformation and square root transformation moved skewed distributions closer to normality. This log transformation of the p values creates a log distributionwhich enables to create a link with the normal regression equation. The log distribution (or logistic transformation of p) is also called the logit of p or logit (p)

$$\text{Logit}\,(p) = \log[\frac{p}{1-p}]$$

Whereas p can only range from 0 to1, logit(p) scale ranges from - ∞ to +∞ and is symmetrical around the logit (0.5) which is 0

Another important concept is the odds ratio which estimates the change in the odds of membership in the target group for one unit increase in the predictor. It is calculated by using the exp(exponent) of the regression coefficient of the predictor. Log (odds ratio) is represented as Exp(B) in the SPSS(Wuensch,2011).

Logistic regression applies maximum likelihood estimation after changing the dependant into a logit variable. Estimation in logistic regression chooses parameters that maximize the likelihood function. Continuous variables are not used as dependant variables in logistic regression and also there can be only one dependant variable.

3.5.2.1 Binary logistic regression

Binary logistic regression is a form of regression which is used when the dependant is a dichotomy and the independents are of any type. Suppose X_{1i}, $X2i$.....$X_{ki}$are the explanatory variables for the i^{th} individual. The response is a dichotomous variable (two outcomes). Then the binary logistic model which gives the relationship between response and explanatory variables is as follows.

$\text{Log}\ (P_i / 1 - P_i) = \beta 0 + \beta_1 X_{1i} + \ldots.. + \beta_k X_{ki}$ $\quad i = 1, 2 \ldots. N;\quad X_{i0} = 1$ for all i= 1, 2 … n

P_i is the probabilities of occurrence of the response of interest of the i^{th} individual.

The Model can alternatively be expressed in the form of,

$P_i = \exp(\beta_0 + \beta_1 X_{1i} + \ldots\ldots.. + \beta_k X_{ki}) / 1 + \exp(\beta_0 + \beta_1 X_{1i} + \ldots\ldots.. + \beta_k X_{ki})$

Where i=1, 2, n (Scott W. Menard, 2002)

- **Fitting the binomial logistic model**

  The coefficients β_i of the model are to be estimated. The maximum likelihood method is used as the estimation method.

- **Maximum likelihood method (MLE)**

MLE is used to estimate logit coefficients and ML methods seek to maximize the log likelihood (LL), which reflects how likely it is (the odds) that the observed values of the dependant variable may be predicted from the observed values of the independents.

The likelihood for a given observation is:

$$L_i = \left(\frac{\exp(X_i \beta)}{1 + \exp(X_i \beta)} \right)^{Y_i} \left[1 - \left(\frac{\exp(X_i \beta)}{1 + \exp(X_i \beta)} \right) \right]^{1 - Y_i}$$

- Coefficient estimation

Assuming independent observations we can take the product over all Nobservations to get the overall likelihood:

$$L_i = \prod \left(\frac{\exp(X_i\beta)}{1+\exp(X_i\beta)} \right)^{Y_i} \left[1 - \left(\frac{\exp(X_i\beta)}{1+\exp(X_i\beta)} \right) \right]^{1-Y_i}$$

- Taking the natural logarithm of above equation:

$$\ln L_i \sum_{i=1}^{N} [Y_i \ln \left(\frac{\exp(X_i\beta)}{1+\exp(X_i\beta)} \right) + (1-Y_i) \ln \left[1 - \left(\frac{\exp(X_i\beta)}{1+\exp(X_i\beta)} \right) \right]$$

- Now maximize this log-likelihood by differentiating with respect to the β s to find out the β^. Similarly coefficients for all independent variables can obtain using numerical or iterative procedures. The method known as "Newton Raphson Method" is used to solve the equations to obtain coefficients(Agresti, 1996).

➢ **Model selection procedure**

Forward selection method is utilized to select the most suitable model. This method starts with the null model (simplest model with only the intercept). Then most significant variable (main effect) is added to the model. The variable with lowest p-value (at a given significant level) or highest deviance difference is considered to choose most significant variable. In this way by adding one variable at a time to the each new model finalized model is defined when there is no further improvement (using the test of difference in deviance). At the next step two-way interactions are added using the same method as did for main effects and further higher order interaction terms are added to the model(Agresti, 1996).

- **Test the significance of the binomial logistic regression model**

- **Log likelihood ratio test**

  SPSS provides the likelihood ratio test to test the significance the difference between final model and a reduced model. The difference in -2LL measures how much the final model would be improved over the null model.When the reduced model is the baseline model with the constant only, the likelihood ratio test tests the significance of the researcher's model is significantly different from the one with the constant only. A well fitting model is significant at .05 levels or better. That is a finding of significance (P<=.05) leads to rejection of the null hypothesis that all of the predictor effects are Zero.

- **Deviance test**

  Corrected deviance of a model:

  L_c- Maximized likelihood of the current model

  L_f- Maximized likelihood of the full or saturated model,

  Both contain same number of unknown parameters as they are binary observations.

  Corrected deviance = $D = -2 (\text{Log } L_c - \text{Log } L_f)$.

  The D is also known as the likelihood ratio statistics for comparing a current model with the full model and $D \sim \chi^2_{(n-p),\, \alpha\%}$

  Two logistic models can be compared by examining the difference in deviance when one model contains forms that are additional to the terms of another.

  H_0: Additional term/terms does not improve the fit of the model significantly
  H_1: Additional term/terms improve the fit of the model significantly

Model	Deviance	Degree of freedom
Model 1	D_1	p
Model 2	D_2	k

Where $p < k$

Difference in deviance = $D_1 - D_2$

Difference of degree of freedom = $k - p$

If reduction in deviance is significant at α %, ie$D > X^2_{(k-p),\alpha\%}$, Then model 2 is preferred over the model 1. That implies that additional term should be in the model.

- **Omnibus test of model coefficients**

  This study uses a large sample for the logistic test and large amount of independent variables are categorical therefore Omnibus test of model coefficients is used totest the significance of the last model. It tests the model with predictors is significantly different from the model with only the intercept. The Omnibus test can be interpreted as a test of the capability of all predictors in the model jointly to predict the response (Dependant) variable. Finding of significance (usually at 5%) corresponds to the research conclusion that there is an adequate fit of the data to the model (Agresti, 1996).

- **Test the significance of the individual logistic regression coefficients**

  Wald statistic (test) – This test is commonly used to test the significance of individual logistic regression coefficients for each independent variable, i.e. to check the null hypothesis that in logistic regression that a particular logit coefficient is zero. The Wald statistics is the squared ratio of the UN standardized logistic coefficient to its standard error (Agresti, 1996).

- **Measures of the proportion of variation explained**

  In linear regression one of the useful measurements is R^2 which gives the proportion of variation in the outcome variable being explained by the model. It is roughly equivalent also in logistic regression. There are two statistics as Cox & Snell's R^2Nagelkerke's R^2 (or adjusted R^2) in logistic regression.Cox & Snell's R^2 may not achieve the maximum value of one even when the model predicts all the outcomes perfectly. Nagelkerke's R^2 is an improvement over Cox & Snell's R^2 that can attain a value of one when the model predicts the data perfectly (Wuensch, 2011).

CHAPTER 4

ASSOCIATION BETWEEN DIFFERENT VARIABLES AND FEMALE LABOUR FORCE PARTICIPATION

4.1 Descriptive Results

This part of the analysis investigates the data in order to find out the overall behavior of the labour force statistics. Table: 4.1 gives the basic findings of the survey data such as estimated figures, standard errors, coefficient of variation and the sample size. The statistics are prepared separately for male and female to distinguish any difference in behavior of statistics for two sexes. These basic statistics give some evidence for lower female contribution to the labour market compared to male contribution of the country.

Table: 4. 1 Descriptive Statistics derived from the Sri Lanka Quarterly Labour Force Survey -2012(Age 15 and above population)

Labour Force Characteristic		Estimate	%	Standard Error	Coefficient of Variation	Sample Count
population	male	7,508,356	47	59,175	0.0080	21,534
	female	8,572,929	53	62,063	0.0070	24,660
	Total	16,081,285	100	109,796	0.0070	46,194
Labour force	male	5,514,881	66	51,643	0.0090	15,797
	female	2,818,931	34	37,058	0.0130	7,950
	Total	8,333,812	100	73,387	0.0090	23,747
Inactive	male	1,993,475	26	31,702	0.0160	5,737
	female	5,753,998	74	57,222	0.0100	16,710
	Total	7,747,473	100	73,387	0.0090	22,447
Employed	male	5,290,804	68	47,991	0.0090	15,126
	female	2,516,618	32	37,845	0.0150	6,990
	Total	7,807,422	100	68,964	0.0090	22,116
Unemployed	male	224,077	42	10,555	0.0470	671
	female	302,312	58	13,677	0.0450	960
	Total	526,389	100	18.543	0.0350	1,631

** Author's calculations using the Labour Force Survey data including all districts

According to the result in above table, the estimated population, (age 15 and above) is 16 million and estimated labour force of the country is 8.3 million. Further the result indicates that estimated economically inactive population is around 7.7 million and of that 74% are females.

4.2. Results of the Chi- Square Test

This part of the analysis seeks the relationship between FLFP and explanatory variables. The results of all the independent variables with labour force cross tabulation depict in Table: 4.2 - 4.12. The Pearson Chi-square test result also included for each independent variable separately, considering the labour force participation as the dependant. Eleven independent categorical variables are considered. In order to association between two factors, relevant hypothesis was tested using Chi- Square test.

4.2.1 Influence of age group for labour force participation

The table 4.2 shows the cross tabulation of the FLFP within their age group.

Table : 4. 2 The Cross Tabulation of Age group * Labour Force

Age Group		Labour Force		Total
		Yes	No	
15-19	Count	294	2229	2523
	% within Age	11.7%	88.3%	100.0%
20-24	Count	905	1401	2306
	% within Age	39.2%	60.8%	100.0%
25-29	Count	934	1400	2334
	% within Age	40.0%	60.0%	100.0%
30-34	Count	970	1672	2642
	% within Age	36.7%	63.3%	100.0%
35-39	Count	1182	1637	2819
	% within Age	41.9%	58.1%	100.0%
40& above	Count	3665	8371	12036
	% within Age	30.5%	69.5%	100.0%
Total	Count	7950	16710	24660
	% within Age	32.2%	67.8%	100.0%
Chi- Square statistics- $\chi^2_5 = 768.95$ (p=0.000)				

In the table 4.2 The Chi- Square statistics (768.95) is highly significant (p=0.000) and so the null hypothesis is rejected. Therefore, it can be concluded that there is a significant association between female labour force participation and age groups.

According to the result in Table 4.2 the total female labour force participation rate is 32.2%, as the definition of labour force participation rate is the percentage of economically active population or labour force to the total working age population. Of the young adults who are in the age groups (35-39) shows the highest participation rate (41.9%) in labour force. Also it is found that the age groups 15-19 lowest (11.7%) labour force participation rate, and 40 and above indicate lower than other groups,where all the students and elderly persons can be allocated.

4.2.2 Influence of marital status for labour force participation

The table 4.3 shows cross tabulation of the female labour force with their marital status.

Table : 4.3**Marital Status * Labour Force Crosstabulation**

			Labour Force		
	Marital Status		Yes	No	Total
	Never Married	Count	1835	3499	5334
		% within marital	34.4%	65.6%	100.0%
	Married	Count	5204	10513	15717
		% within marital	33.1%	66.9%	100.0%
	Separated/ Widowed	Count	911	2698	3609
		% within marital	25.2%	74.8%	100.0%
Total		Count	7950	16710	24660
		% within marital	32.2%	67.8%	100.0%

Chi- Square statistics-χ^2_2 = 97.76 (p=0.000)

In order to association between two factors hypothesis was tested using Chi- Square test and above table 4.3 shows, the Chi- Square statistics (97.76) is highly significant (p=0.000 and so the null hypothesis is rejected. Therefore, it can be concluded that there is a significant association between female labour force participation and marital status.

According to the result in table 4.3 the female labour force participation rate is higher among never married than married. This explains the higher expectations of those who are entering to labour market. Never married female those who are young and comparatively with less responsibilities and search for jobs until they get a job to their satisfaction and this causes increase in female labour force participation opposite to the situation of married female.

4.2.3 Influence of relationship to household head for labour force participation

Table : 4. 4 Relationship to Household Head * Labour Force Crosstabulation

Relationship to Household Head		Labour Force		Total
		Yes	No	
Head of household	Count	1259	2597	3856
	% within Relation	32.7%	67.3%	100.0%
Spouse	Count	3815	7509	11324
	% within Relation	33.7%	66.3%	100.0%
Daughter	Count	2010	3740	5750
	% within Relation	35.0%	65.0%	100.0%
Other	Count	866	2864	3730
	% within Relation	23.2%	76.8%	100.0%
Total	Count	7950	16710	24660
	% within Relation	32.2%	67.8%	100.0%

Chi- Square statistics- $\chi^2_3 = 169.62$ (p=0.000)

The results in table 4.4 indicate that the Chi- Square statistics (169.62) is highly significant (p=0.000) confirming that there is a significant association between female labour force participation and relationship to household head.

Approximately equal participation rates within family member categories.35% of daughters whose relationship to household head is slightly higher rate than females who are heads of the house hold or spouses. Here other relationship includes parents, other relations, borders, domestic servants, ect.., and out of this population 76.8% shows economically inactive.

4.2.4 Influence of Ethnicity for Labour Force Participation

Table : 4.5**Ethnicity * Labour Force Crosstabulation**

			LabourForce		
	Ethnic Group		Yes	No	Total
	Sinhala	Count	6055	11136	17191
		% within Ethnic	35.2%	64.8%	100.0%
	Tamil	Count	1574	3507	5081
		% within Ethnic	31.0%	69.0%	100.0%
	Moor	Count	309	2007	2316
		% within Ethnic	13.3%	86.7%	100.0%
	Other	Count	12	60	72
		% within Ethnic	16.7%	83.3%	100.0%
Total		Count	7950	16710	24660
		% within Ethnic	32.2%	67.8%	100.0%

Chi- Square statistics- $\chi^2_2 = 460.30$ (p=0.000)

According to the result in table 4.5,as the Chi- Square statistics is highly significant it can be concluded with 95% confidence that the ethnic group is significantly associated with female labour force participation.

The females of Sinhalese and Tamils are almost same in female labour force participation rates. The moor group shows the lowest (13.3%) rate and this explains the cultural factors effect on female labour force participation rate. Further it is found that a cultural factor ethnicity is significant factor for female labour force participation rate.

4.2.5 Influence of religion for labour force participation

Table : 4. 6Religion * Labour Force Crosstabulation

	Religion		Labour Force		Total
			Yes	No	
	Buddhist	Count	5725	10385	16110
		% within Religion	35.5%	64.5%	100.0%
	Hindu	Count	1285	2768	4053
		% within Religion	31.7%	68.3%	100.0%
	Muslim	Count	317	2046	2363
		% within Religion	13.4%	86.6%	100.0%
	Other	Count	623	1511	2134
		% within Religion	29.2%	70.8%	100.0%
Total		Count	7950	16710	24660
		% within Religion	32.2%	67.8%	100.0%

Chi- Square statistics- $\chi^2_3 = 473.08$ (p=0.000)

There is a another cultural factor, which is significant for female labour force participation rate according to the above shown table 4.6..the Muslim female population group shows the lowest(13.4%) participation rate.

4.2.6 Influence of education level for labour force participation

Table : 4.7**Education * Labour Force Crosstabulation**

Level of Education		Labour Force		Total
		Yes	No	
No Schooling	Count	312	872	1184
	% within Education	26.4%	73.6%	100.0%
primary	Count	1168	2886	4054
	% within Education	28.8%	71.2%	100.0%
Lover Secondary	Count	3080	7774	10854
	% within Education	28.4%	71.6%	100.0%
Ordinary Level	Count	1452	3398	4850
	% within Education	29.9%	70.1%	100.0%
Advanced Level	Count	1437	1653	3090
	% within Education	46.5%	53.5%	100.0%
Degree& Above	Count	501	127	628
	% within Education	79.8%	20.2%	100.0%
Total	Count	7950	16710	24660
	% within Education	32.2%	67.8%	100.0%

Chi- Square statistics- $\chi^2_2 = 1063.99$ (p=0.000)

The results in table4.7, reveals that the level of education increases the female labour force participation is increasing. Females who are obtain degree and above educational qualification group shows the highest labour force participation rate. In order to association between two factors hypothesis was tested using Chi- Square test. TheChi-

Square statistics (1063.99) is highly significant (p=0.000).then the null hypothesis is rejected. Therefore, it can be concluded that there is a significant association between female labour force participation and their level of education.

4.2.7 Influence of sector for labour force participation

Table: 4. 8 Sector * **Labour Force Crosstabulation**

Sector			Labour Force		Total
			Yes	No	
	Urban	Count	1226	3131	4357
		% within Sector	28.1%	71.9%	100.0%
	Rural	Count	6152	13018	19170
		% within Sector	32.1%	67.9%	100.0%
	Estate	Count	572	561	1133
		% within Sector	50.5%	49.5%	100.0%
Total		Count	7950	16710	24660
		% within Sector	32.2%	67.8%	100.0%
Chi- Square statistics- χ^2_2 = 206.39 (p=0.000)					

When the distribution of female labour force among sectors is considered in table 4.8,reveals that there is a significant association between female labour force participation and sector as the Chi- Square statistics (206.39) is highly significant (p=0.000).

Further, the result in table 4.8, show, and the highest female participation(50.5%) in the Estate sector compared to other two sectors. The sector is an independent variable which is explains the place of residential of female. When urban females considered approximately 72% of them are economically inactive.

4.2.8 Influence of province for labour force participation

Table : 4. 9**Province * Labour Force Crosstabulation**

Province		Labour Force		Total
		Yes	No	
Western	Count	1719	3894	5613
	% within Province	30.6%	69.4%	100.0%
Central	Count	1040	1767	2807
	% within Province	37.1%	62.9%	100.0%
Southern	Count	1265	2621	3886
	% within Province	32.6%	67.4%	100.0%
Northern	Count	677	2231	2908
	% within Province	23.3%	76.7%	100.0%
Eastern	Count	452	1444	1896
	% within Province	23.8%	76.2%	100.0%
North Western	Count	893	1794	2687
	% within Province	33.2%	66.8%	100.0%
North Central	Count	482	806	1288
	% within Province	37.4%	62.6%	100.0%
Uva	Count	560	778	1338
	% within Province	41.9%	58.1%	100.0%
Sabaragamuwa	Count	862	1375	2237
	% within Province	38.5%	61.5%	100.0%
Total	Count	7950	16710	24660
	% within Province	32.2%	67.8%	100.0%

Chi- Square statistics- $\chi^2_8 = 318.92$ (p=0.000)

The result in table 4.9 shows, that the Chi- Square statistics (318.92) is highly significant (p=0.000) and the null hypothesis is rejected. Therefore, it can be concluded that there is a significant association between female labour force participation and province of their residential.

This independent variable explain the Place of residential affect same as sector to the decision or the probability of labour force participation. When considered the result in table 4.9 both Northern and Eastern provinces show higher participation rate gap in female labour force than other provinces.The females who live in both of that provinces are highly economically inactive in rates. The highest female labour force participation rate (41.9%) obtains in Uva province.

4.2.9 Influence of literacy in English for labour force participation

The information on literacy for three languages are available two of them are local languages such as Sinhala and Tamil, and the other is an international language English. Literacy is directly related to level of education but literacy in English language is crucial factor to enter into current labour market in the country. This study selects only the literacy in English to minimize multicollinearity problem at the modeling stage

Table : 4. 10**Literacy in English * Labour Force Crosstabulation**

Literacy inEnglish		Labour Force		Total
		Yes	No	
Litterate	Count	1579	2224	3803
	% within EnglishLiteracy	41.5%	58.5%	100.0%
Illiterate	Count	6371	14486	20857
	% within EnglishLiteracy	30.5%	69.5%	100.0%
Total	Count	7950	16710	24660
	% within EnglishLiteracy	32.2%	67.8%	100.0%
Chi- Square statistics- χ^2_1 = 177.31 (p=0.000)				

According to the result in table 4.10 Females who have English literacy show higher participation rate in labour force. The Chi- Square statistics (177.31) is highly significant (p=0.000).then the null hypothesis is rejected. Therefore, it can be concluded that there is a significant association between female labour force participation and Literacy in English.

4.2.10 Influence of currently attending to an educational institute for labour force participation

Table : 4.11Currently attending to an Educational Institute * Labour Force Crosstabulation

Currently attending to an educational institute			Labour Force		
			Yes	No	Total
	Attending	Count	173	2154	2327
		% within currEdu	7.4%	92.6%	100.0%
	Not Attending	Count	7777	14556	22333
		% within currEdu	34.8%	65.2%	100.0%
Total		Count	7950	16710	24660
		% within currEdu	32.2%	67.8%	100.0%

Chi- Square statistics- χ^2_1 = 723.64 (p=0.000)

Result in table4.11 shows female labour force participation rate is about 7.4% among those who are currently attending educational institute. In other words economically inactive female population is higher among those who are currently attending to an educational institute. Further the Chi- Square statistics (723.64) is highly significant (p=0.000).It can be concluded that there is a significant association between female labour force participation and currently attending to an educational institute

4.2.11 Influence of number of dependents (age lessthan15)for labour force participation

Table : 4.12**Depsum * Labour force Crosstabulation**

			Labour force		
			Yes	No	Total
depsum	No dependents	Count	3726	6890	10616
		% within depsum	35.1%	64.9%	100.0%
	2 or less	Count	3658	8240	11898
		% within depsum	30.7%	69.3%	100.0%
	3 or more	Count	566	1576	2142
		% within depsum	26.4%	73.6%	100.0%
Total		Count	7950	16706	16706
		% within depsum	32.2%	67.8%	67.8%
		Chi- Square statistics- χ^2_1 = 85.03 (p=0.000)			

According to the result in table 4.12, the female labour force participation is decreasing when the number of persons in a household whose age is less than 15 (Number of dependants age < 15)' is increased. The Chi- Square statistics (85.03) is significant (p=0.000).It can be concluded that there is a significant association between female labour force participation and Number of dependantsin the household.

4.3 Summary

Chi-Square analysis for each variables divulge that all the variables considered, have a significant (p=0.000) impact on female labour force participation. That identified significant factors are age group, marital status, ethnicity, religion, relationship to head of the household, sector, level of education, province, literacy in English,currently attending to an educational institute, andnumber of dependants in the household.

CHAPTER 5

MODELLING FEMALE LABOUR FORCE PARTICIPATION USING BINARY LOGISTIC MODEL

5.1 Introduction

In this chapter effects of all significant factors are analyzed simultaneously using binary logistic model.To identify the best fitted model were developed forward stepwise and backward elimination under both criteria of LR and Wald.

5.2 Fitting Binomial Logistic Regression Model

The dichotomous variable is female participation which indicates whether the female is participating in labour force or not. The following codes for participation is used to fit a binary logistic regression and list of variables used for the model label and name are shown in table 5.1.

$$\text{Participation} = \begin{cases} \mathbf{1}, & \text{if female is participating in labour force} \\ \mathbf{0}, & \text{if female is not participating in labour force} \end{cases}$$

Table 5.1: The List of Variables Used for the Model Label and Name

Variable Label	**Variable Name**
Age group	newage
Marital Status	newmari
Relationship to Head of HH	newrela
Religion	newreli
Level of education	newedu
Sector	Sector
Province	Province
Literacy in English	eng
Currently attending to an educational institute	eduattend
Number of dependants in the household	depsum

5.3 Use Forward –LR Method

The forward and stepwise selection method is used to select variables for the model.This modelstarts with the constant-only model and then one best main effect is addedtothemodel in eachstep. This process continues until there is nofurtherimprovement in the fitted model by addingnew variables. When LR is specified, the added of a variable to the model is based on the significance of the change in the log likelihood. The likelihood ratio test is a test ofsignificance of the difference between the likelihood ratio (-2LL) for the current modelminus (-2LL) of reduced model. This difference is called "model chi-square" and significance of this shows the model significance at each step.Totally ten effects (ten independentvariables) are added to the model, the order of entering variables into themodel shows the last column of Table 5.2.

Table 5.2: Step Summary, of Variable Addition to the Model- Female LFP

	Improvement			Model				
Step	Chi-square	df	Sig.	Chi-square	df	Sig.	Correct Class %	Variable
1	1001.83	5	0.000	1001.83	5	0.000	69.30%	IN: newedu
2	997.8	1	0.000	1999.629	6	0.000	69.20%	IN: eduattend
3	440.428	2	0.000	2440.057	8	0.000	71.00%	IN: newmari
4	479.506	3	0.000	2919.563	11	0.000	70.20%	IN: newreli
5	324.813	8	0.000	3244.376	19	0.000	70.60%	IN: Province
6	254.335	3	0.000	3498.711	22	0.000	71.20%	IN: newrela
7	174.084	5	0.000	3672.795	27	0.000	71.50%	IN: newage
8	113.817	2	0.000	3786.612	29	0.000	71.70%	IN: sector
9	31.67	1	0.000	3818.282	30	0.000	71.70%	IN: eng
10	30.674	2	0.000	3848.956	32	0.000	71.80%	IN: depsum

In this analysis the first categorical group is considered as reference category and the corresponding group shownin Table 5.3.

Table 5.3: ConsideredReference Category Variables to the Model- Female LFP

Variables	Reference category
Age Group	15-19
Religion	Buddhist
Marital Status	Un Married
Level of Education	No Schooling
Province	Western
Sector	Urban
Relationship to Household head	Household Head
Literacy in English	Literate
Currently attending to an educational institute	Attending
Number of dependents	No dependents

The next step is to add interaction terms into the model and first two way interactions are checked. Since many of the independent variables are categorical in nature the interaction terms add more complexity to the model and also it is found that those do not improve the model further, and since there are enough number of main effects in the model and to overcome the complexity of the model to have parsimony it is decided not to include interaction terms to the model.According to the above result in Table 5.2,the final model for female labour force participation can be written as,

$$\text{Log } (P/1\text{-}p) = \alpha + \beta_1^{(newedu)} + \beta_2^{(eduattend)} + \beta_3^{(newmari)} + \beta_4^{(newreli)} + \beta_5^{(province)} + \beta_6^{(newrela)} + \beta_7^{(newage)} + \beta_8^{(sector)} + \beta_9^{(dep\text{-}sum)} + \beta_{10}^{(eng)}$$ (The estimated parameters are depicted in Table 5.5)

5.3.1 Goodness of Fit of the Fitted Model –Female LFP

The goodness of fit for the overall model can be discussed by using model Chi-Square test. When the reduce model is the baseline model with the constant only the likelihood ratio test the model as a whole. The Table 5.4 and Table 5.5 show the results for overall significance of the model.

Table 5.4: Model Summary – Female LFP

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	30000.258[a]	.040	.056
2	29002.459[b]	.078	.109
3	28562.031[b]	.094	.132
4	28082.525[b]	.112	.156
5	27757.712[b]	.123	.172
6	27503.377[b]	.132	.185
7	27329.293[b]	.138	.193
8	27215.476[b]	.142	.199
9	27183.806[b]	.143	.200
10	27153.132[b]	.145	.202

The result in table 5.4, Cox & Snell's R^2 (0.145) and Nagelkerke's R^2 (0.202)are not achieve the maximum value of one, even when the model predicts all the outcomes. That can be concluded the model predicts the data perfectly.

Table5.5: Omnibus Tests of Model Coefficients –Female LFP

		Chi-square	df	Sig.
Step 10	Step	30.674	1	.000
	Block	3848.956	32	.000
	Model	3848.956	32	.000

According to the above table 5.5, at the step 10 when all variables are added to the model change in -2LL is 3848.956 and degrees of freedom is 32 and change is statistically significant at 5% level of significance. The finding of the significance leads to rejection of null hypothesis that all of the predictor effects are zero. When this likelihood is significant at least one of the predictors is significantly related to the dependant variable. Therefore it can be concluded that there is an adequate fit of the data to the model.

Table 5.6: Marginal Effects of Binomial Logistic Estimates with Categorized Variables- Probability of being economically active Female (Age 15 & above)

Variables in the Equation	B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B) Lower	Upper
Age Group			189.0772	5	0.0000			
20-24	0.8151	0.0893	83.2352	1	0.0000	2.2593	1.8964	2.6917
25-29	0.8778	0.0952	84.9564	1	0.0000	2.4056	1.996	2.8992
30-34	0.8904	0.0969	84.3702	1	0.0000	2.4361	2.0146	2.9459
35-39	1.1743	0.097	146.5324	1	0.0000	3.2360	2.6757	3.9137
40 and above	0.7242	0.0937	59.7844	1	0.0000	2.0631	1.7171	2.4788
Religion			305.7638	3	0.0000			
Hindu	-0.0312	0.0632	0.2439	1	0.6214	0.9693	0.8564	1.097
Muslim	-1.1992	0.0703	291.3703	1	0.0000	0.3014	0.2627	0.3459
Other	-0.1065	0.0603	3.1145	1	0.0776	0.8990	0.7988	1.0118
Marital Status			250.9061	2	0.0000			
Married	-0.9188	0.0619	220.6497	1	0.0000	0.3990	0.3534	0.4504
Married(alone)	-1.0157	0.0742	187.4093	1	0.0000	0.3621	0.3131	0.4188
Level of Education			443.5416	5	0.0000			
Primary	0.2649	0.0788	11.2988	1	0.0008	1.3033	1.1168	1.521
Lower Secondary	0.2625	0.0761	11.9079	1	0.0006	1.3001	1.1201	1.5092
O/L	0.3741	0.0819	20.8897	1	0.0000	1.4537	1.2382	1.7067
A/L	0.9007	0.0873	106.5611	1	0.0000	2.4613	2.0744	2.9204
Degree & above	2.328	0.134	301.757	1	0.0000	10.2577	7.88881	13.3391
No. OfDependants age <15			30.5742	2	0.0000			
2 or less dependents	-0.0159	0.0339	22.0153	1	0.0000	0.8527	0.7978	0.9114
3or more dependents	-0.0274	0.0612	20.0613	1	0.0000	0.7600	0.674	0.857
Province			154.6803	8	0.0000			
Central	0.3128	0.056	31.125	1	0.0000	1.3673	1.225	1.5261
Southern	0.0676	0.0508	1.7661	1	0.1839	1.0700	0.9684	1.1822
Northern	-0.3501	0.0739	22.4054	1	0.0000	0.7046	0.6095	0.8145
Eastern	0.0815	0.0743	1.2027	1	0.2728	1.0849	0.9379	1.255
North Western	0.2106	0.0561	14.0864	1	0.0002	1.2345	1.1059	1.3781
North Central	0.4083	0.0712	32.3695	1	0.0000	1.5043	1.3083	1.7297
Uva	0.4913	0.0697	49.5613	1	0.0000	1.6346	1.4256	1.8742
Sabaragamuwa	0.3488	0.0586	35.3758	1	0.0000	1.4175	1.2635	1.5902
Sector			121.0993	2	0.0000			
Rural	0.189	0.0441	18.3219	1	0.0000	1.2081	1.1079	1.3173
Estate	0.9745	0.08865	121.0551	1	0.0000	2.6500	2.225277	3.1524
Relationhip to Household Head			214.9035	3	0.0000			
Spouse	-0.0255	0.0525	0.2358	1	0.6272	0.9748	0.8793	1.0806
Son/Daughter	0.1011	0.0671	2.2675	1	0.1321	1.1065	0.9699	1.2622
Other	-0.6421	0.05854	120.7319	1	0.0000	0.5260	0.469	0.5898
Literacy in English								
illiterate	-0.2725	0.0496	30.0903	1	0.0000	0.7615	0.6908	0.83993
Currently Attending to an Educational Institute								
Not attending	2.4727	0.0978	639.0327	1	0.0000	11.8552	9.7869	14.3603
Constant	-3.3093	0.149	493.1651	1	0.0000	0.0365		

According to the above result in Table 5.6, all the other age groups compared to the reference age group (15-19) show significantly increasing odds of female labour force participation. The most significant increasing factor (3.2360) shows for age group 35-39 compared to a women in age group 15-19 when the other variables are controlled.Religion is significantly decreasing affect for female labour force participation. The odds of female in labour force decrease (by a factor 0.3014) to a woman in Muslim compared to a Buddhist woman, but the odds for Hindu woman takes higher value (0.9693). Odds of participating labour force of a married (not alone) women decreases by a factor 0.3990 compared to a never married woman as well as a decreasing factor which shows number of dependents. The model results depict that the odds of participation in the labour force increase for a person in any other education group compared to a person in 'no schooling' group. The odds of participating in labour force of a woman with Degree and above level of education increase by a factor 10.2577 compared to a woman with no education when the other variables in the model are controlled. It can be seen from the results odds of a woman participate in labour force who is illiterate in English decreases by a factor 0.7615 compared to a literate woman. The odds of participating increased for a woman who is not attending by a factor 11.8552 compared to a currently attending woman when the other variables are controlled.

Both of selected residential factors which are province and sector are significant for female labour force. The odds of participating labour force of a woman in Northern province decrease by a factor 0.7046 and it is increased by a factor 1.6346 in Uva province compared to a women in Western province and odds of a woman participate in labour force increase to a woman in estate sector by a factor of 2.6500 compared to a woman in urban sector.

5.4 Use Forward –Wald Method

The forward and stepwise selection method is used to select variables for the model.This modelstarts with the constant-only model and then one best main effect is addedtothemodel in eachstep. This process continues until there is nofurtherimprovement in the fitted model by addingnew variables. When Wald is specified,the added of a variable to the model is based on the significance of the Wald statistics.The asymptotic distribution of the Wald statistic is chi-square with degrees of freedom equal to the number of parameters estimated.The Table 5.7 is thesummery table of added variables to the model.

Table 5.7: Step Summary, of Variable Addition to the Model- Female LFP

Step	Improvement			Model			Correct Class %	Variable
	Chi-square	df	Sig.	Chi-square	df	Sig.		
1	1001.83	5	0.000	1001.83	5	0.000	69.30%	IN: newedu
2	997.8	1	0.000	1999.629	6	0.000	69.20%	IN: eduattend
3	440.428	2	0.000	2440.057	8	0.000	71.00%	IN: newmari
4	479.506	3	0.000	2919.563	11	0.000	70.20%	IN: newreli
5	324.813	8	0.000	3244.376	19	0.000	70.60%	IN: Province
6	254.335	3	0.000	3498.711	22	0.000	71.20%	IN: newrela
7	174.084	5	0.000	3672.795	27	0.000	71.50%	IN: newage
8	113.817	2	0.000	3786.612	29	0.000	71.70%	IN: sector
9	31.67	1	0.000	3818.282	30	0.000	71.70%	IN: eng
10	30.674	2	0.000	3848.956	32	0.000	71.80%	IN: depsum

. No more variables can be deleted from or added to the current model.

According to the above result in table 5.7,the final model for female labour force participation can be written as,

$$\text{Log } (P/1\text{-}p) = \alpha + \beta_1^{(newedu)} + \beta_2^{(eduattend)} + \beta_3^{(newmari)} + \beta_4^{(newreli)} + \beta_5^{(province)} + \beta_6^{(newrela)} + \beta_7^{(newage)} + \beta_8^{(sector)} + \beta_9^{(dep\text{-}sum)} + \beta_{10}^{(eng)}$$

The estimated parameters are depicted in Table 5.10

5.4.1 Goodness of Fit of the Fitted Model –Female LFP

Table 5.8: Model Summary – Female LFP

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	30000.258[a]	.040	.056
2	29002.459[b]	.078	.109
3	28562.031[b]	.094	.132
4	28082.525[b]	.112	.156
5	27757.712[b]	.123	.172
6	27503.377[b]	.132	.185
7	27329.293[b]	.138	.193
8	27215.476[b]	.142	.199
9	27183.806[b]	.143	.200
10	27153.132[b]	.145	.202

The result in table 5.8, Cox & Snell's R^2 (0.145) and Nagelkerke's R^2 (0.202)are not achieve the maximum value of one, even when the model predicts all the outcomes. That can be concluded the model predicts the data perfectly.

Table5.9: Omnibus Tests of Model Coefficients –Female LFP

		Chi-square	Df	Sig.
Step 10	Step	30.674	1	.000
	Block	3848.956	32	.000
	Model	3848.956	32	.000

According to the above table 5.8, at the step 9 when all variables are added to the model change in -2LL is 3848.956 and degrees of freedom is 32 and change is statistically significant at 5% level of significance. The finding of the significance leads to rejection of null hypothesis that all of the predictor effects are zero. When this likelihood is significant at least one of the predictors is significantly related to the dependant variable. Therefore it can be concluded that there is an adequate fit of the data to the model.

Table 5.10: Marginal Effects of Binomial Logistic Estimates with Categorized Variables- Probability of being economically active Female (Age 15 & above)

Variables in the Equation	B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B) Lower	Upper
Age Group			189.0772	5	0.0000			
20-24	0.8151	0.0893	83.2352	1	0.0000	2.2593	1.8964	2.6917
25-29	0.8778	0.0952	84.9564	1	0.0000	2.4056	1.996	2.8992
30-34	0.8904	0.0969	84.3702	1	0.0000	2.4361	2.0146	2.9459
35-39	1.1743	0.097	146.5324	1	0.0000	3.2360	2.6757	3.9137
40 and above	0.7242	0.0937	59.7844	1	0.0000	2.0631	1.7171	2.4788
Religion			305.7638	3	0.0000			
Hindu	-0.0312	0.0632	0.2439	1	0.6214	0.9693	0.8564	1.097
Muslim	-1.1992	0.0703	291.3703	1	0.0000	0.3014	0.2627	0.3459
Other	-0.1065	0.0603	3.1145	1	0.0776	0.8990	0.7988	1.0118
Marital Status			250.9061	2	0.0000			
Married	-0.9188	0.0619	220.6497	1	0.0000	0.3990	0.3534	0.4504
Married(alone)	-1.0157	0.0742	187.4093	1	0.0000	0.3621	0.3131	0.4188
Level of Education			443.5416	5	0.0000			
Primary	0.2649	0.0788	11.2988	1	0.0008	1.3033	1.1168	1.521
Lower Secondary	0.2625	0.0761	11.9079	1	0.0006	1.3001	1.1201	1.5092
O/L	0.3741	0.0819	20.8897	1	0.0000	1.4537	1.2382	1.7067
A/L	0.9007	0.0873	106.5611	1	0.0000	2.4613	2.0744	2.9204
Degree & above	2.328	0.134	301.757	1	0.0000	10.2577	7.88881	13.3391
No. OfDependants age <15			30.5742	2	0.0000			
2 or less dependents	-0.0159	0.0339	22.0153	1	0.0000	0.8527	0.7978	0.9114
3or more dependents	-0.0274	0.0612	20.0613	1	0.0000	0.7600	0.674	0.857
Province			154.6803	8	0.0000			
Central	0.3128	0.056	31.125	1	0.0000	1.3673	1.225	1.5261
Southern	0.0676	0.0508	1.7661	1	0.1839	1.0700	0.9684	1.1822
Northern	-0.3501	0.0739	22.4054	1	0.0000	0.7046	0.6095	0.8145
Eastern	0.0815	0.0743	1.2027	1	0.2728	1.0849	0.9379	1.255
North Western	0.2106	0.0561	14.0864	1	0.0002	1.2345	1.1059	1.3781
North Central	0.4083	0.0712	32.3695	1	0.0000	1.5043	1.3083	1.7297
Uva	0.4913	0.0697	49.5613	1	0.0000	1.6346	1.4256	1.8742
Sabaragamuwa	0.3488	0.0586	35.3758	1	0.0000	1.4175	1.2635	1.5902
Sector			121.0993	2	0.0000			
Rural	0.189	0.0441	18.3219	1	0.0000	1.2081	1.1079	1.3173
Estate	0.9745	0.08865	121.0551	1	0.0000	2.6500	2.225277	3.1524
Relationship to Household Head			214.9035	3	0.0000			
Spouse	-0.0255	0.0525	0.2358	1	0.6272	0.9748	0.8793	1.0806
Son/Daughter	0.1011	0.0671	2.2675	1	0.1321	1.1065	0.9699	1.2622
Other	-0.6421	0.05854	120.7319	1	0.0000	0.5260	0.469	0.5898
Literacy in English								
illiterate	-0.2725	0.0496	30.0903	1	0.0000	0.7615	0.6908	0.83993
Currently Attending to an Educational Institute								
Not attending	2.4727	0.0978	639.0327	1	0.0000	11.8552	9.7869	14.3603
Constant	-3.3093	0.149	493.1651	1	0.0000	0.0365		

According to the above result in Table 5.7 and Table 5.10, it is clear that age group,religion, marital status, level of education, number of dependants, province,sector,relationship to head of the household, literacy in English,and currently attending to an educational instituteare significant variables at the 5% level of significance.

5.5 Use Backward –LR Method

Backward methods start with a model that includes all of the predictors which are entered at once. Then variables are removed one at a time, until all the predictors in the model are significant. The removal of a variable from the model is based on the significance of the change in the log- likelihood. If LR is specified, the model must be re- estimated without each of the variables in the model. This process can substantially increase computational time. In this case the step summary can't be found, as this is a removing process.The estimated parameters are shown in Table 5.13.

5.5.1 Goodness of Fit of the Fitted Model –Female LFP

The Table 5.11and Table 5.12show the results for overall significance of the model

Table 5.11: Model Summary – Female LFP

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	27153.132[b]	.145	.202

Table5.12: Omnibus Tests of Model Coefficients –Female LFP

		Chi-square	Df	Sig.
Step 1	Step	3848.956	32	.000
	Block	3848.956	32	.000
	Model	3848.956	32	.000

The result in Table 5.11 Cox & Snell's R^2 (0.145) and Nagelkerke's R^2 (0.202)are not achieve the maximum value of one, andTable 5.12 showslikelihood is significant.Therefore it can be concluded that there is an adequate fit of the data to the model.

Table 5.13: Marginal Effects of Binomial Logistic Estimates with Categorized Variables- Probability of being economically active Female (Age 15 & above)

Variables in the Equation	B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B) Lower	Upper
Age Group			189.0772	5	0.0000			
20-24	0.8151	0.0893	83.2352	1	0.0000	2.2593	1.8964	2.6917
25-29	0.8778	0.0952	84.9564	1	0.0000	2.4056	1.996	2.8992
30-34	0.8904	0.0969	84.3702	1	0.0000	2.4361	2.0146	2.9459
35-39	1.1743	0.097	146.5324	1	0.0000	3.2360	2.6757	3.9137
40 and above	0.7242	0.0937	59.7844	1	0.0000	2.0631	1.7171	2.4788
Religion			305.7638	3	0.0000			
Hindu	-0.0312	0.0632	0.2439	1	0.6214	0.9693	0.8564	1.097
Muslim	-1.1992	0.0703	291.3703	1	0.0000	0.3014	0.2627	0.3459
Other	-0.1065	0.0603	3.1145	1	0.0776	0.8990	0.7988	1.0118
Marital Status			250.9061	2	0.0000			
Married	-0.9188	0.0619	220.6497	1	0.0000	0.3990	0.3534	0.4504
Married(alone)	-1.0157	0.0742	187.4093	1	0.0000	0.3621	0.3131	0.4188
Level of Education			443.5416	5	0.0000			
Primary	0.2649	0.0788	11.2988	1	0.0008	1.3033	1.1168	1.521
Lower Secondary	0.2625	0.0761	11.9079	1	0.0006	1.3001	1.1201	1.5092
O/L	0.3741	0.0819	20.8897	1	0.0000	1.4537	1.2382	1.7067
A/L	0.9007	0.0873	106.5611	1	0.0000	2.4613	2.0744	2.9204
Degree & above	2.328	0.134	301.757	1	0.0000	10.2577	7.88881	13.3391
No.OfDependants age <15			30.5742	2	0.0000			
2 or less dependents	-0.0159	0.0339	22.0153	1	0.0000	0.8527	0.7978	0.9114
3or more dependents	-0.0274	0.0612	20.0613	1	0.0000	0.7600	0.674	0.857
Province			154.6803	8	0.0000			
Central	0.3128	0.056	31.125	1	0.0000	1.3673	1.225	1.5261
Southern	0.0676	0.0508	1.7661	1	0.1839	1.0700	0.9684	1.1822
Northern	-0.3501	0.0739	22.4054	1	0.0000	0.7046	0.6095	0.8145
Eastern	0.0815	0.0743	1.2027	1	0.2728	1.0849	0.9379	1.255
North Western	0.2106	0.0561	14.0864	1	0.0002	1.2345	1.1059	1.3781
North Central	0.4083	0.0712	32.3695	1	0.0000	1.5043	1.3083	1.7297
Uva	0.4913	0.0697	49.5613	1	0.0000	1.6346	1.4256	1.8742
Sabaragamuwa	0.3488	0.0586	35.3758	1	0.0000	1.4175	1.2635	1.5902
Sector			121.0993	2	0.0000			
Rural	0.189	0.0441	18.3219	1	0.0000	1.2081	1.1079	1.3173
Estate	0.9745	0.08865	121.0551	1	0.0000	2.6500	2.225277	3.1524
Relationship to Household Head			214.9035	3	0.0000			
Spouse	-0.0255	0.0525	0.2358	1	0.6272	0.9748	0.8793	1.0806
Son/Daughter	0.1011	0.0671	2.2675	1	0.1321	1.1065	0.9699	1.2622
Other	-0.6421	0.05854	120.7319	1	0.0000	0.5260	0.469	0.5898
Literacy in English								
illiterate	-0.2725	0.0496	30.0903	1	0.0000	0.7615	0.6908	0.83993
Currently Attending to an Educational Institute								
Not attending	2.4727	0.0978	639.0327	1	0.0000	11.8552	9.7869	14.3603
Constant	-3.3093	0.149	493.1651	1	0.0000	0.0365		

According to the above result in Table 5.13, it is clear that age group,religion, marital status, level of education, number of dependants in the household, province,sector,relationship to head of the household, literacy in English,and currently attending to an educational instituteare significant variables at the 5% level of significance.

5.6 Use Backward –Ward Method

Backward methods start with a model that includes all of the predictors. Therefore, all independent variables are entered at once. Then variables are removed one at a time, until all the predictors in the model are significant. When Wald is specified, the added of a variable to the model is based on the significance of the Wald statistics. The estimated parameters are shown in Table 5.11.

5.6.1 Goodness of Fit of the Fitted Model –Female LFP

The Table 5.14 and Table 5.15 show the results for overall significance of the model

Table 5.14: Model Summary – Female LFP

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	27153.132[b]	.145	.202

Table5.15: Omnibus Tests of Model Coefficients –Female LFP

		Chi-square	Df	Sig.
Step 1	Step	3848.956	32	.000
	Block	3848.956	32	.000
	Model	3848.956	32	.000

The result in Table 5.14 Cox & Snell's R^2 (0.145) and Nagelkerke's R^2 (0.202)are not achieve the maximum value of one, andTable 5.15 showslikelihood is significant.Therefore it can be concluded that there is an adequate fit of the data to the model.

Table 5.16: Marginal Effects of Binomial Logistic Estimates with Categorized Variables- Probability of being economically active Female (Age 15 & above)

Variables in the Equation	B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B) Lower	Upper
Age Group			189.0772	5	0.0000			
20-24	0.8151	0.0893	83.2352	1	0.0000	2.2593	1.8964	2.6917
25-29	0.8778	0.0952	84.9564	1	0.0000	2.4056	1.996	2.8992
30-34	0.8904	0.0969	84.3702	1	0.0000	2.4361	2.0146	2.9459
35-39	1.1743	0.097	146.5324	1	0.0000	3.2360	2.6757	3.9137
40 and above	0.7242	0.0937	59.7844	1	0.0000	2.0631	1.7171	2.4788
Religion			305.7638	3	0.0000			
Hindu	-0.0312	0.0632	0.2439	1	0.6214	0.9693	0.8564	1.097
Muslim	-1.1992	0.0703	291.3703	1	0.0000	0.3014	0.2627	0.3459
Other	-0.1065	0.0603	3.1145	1	0.0776	0.8990	0.7988	1.0118
Marital Status			250.9061	2	0.0000			
Married	-0.9188	0.0619	220.6497	1	0.0000	0.3990	0.3534	0.4504
Married(alone)	-1.0157	0.0742	187.4093	1	0.0000	0.3621	0.3131	0.4188
Level of Education			443.5416	5	0.0000			
Primary	0.2649	0.0788	11.2988	1	0.0008	1.3033	1.1168	1.521
Lower Secondary	0.2625	0.0761	11.9079	1	0.0006	1.3001	1.1201	1.5092
O/L	0.3741	0.0819	20.8897	1	0.0000	1.4537	1.2382	1.7067
A/L	0.9007	0.0873	106.5611	1	0.0000	2.4613	2.0744	2.9204
Degree & above	2.328	0.134	301.757	1	0.0000	10.2577	7.88881	13.3391
No.ofDependants age <15			30.5742	2	0.0000			
2 or less dependents	-0.0159	0.0339	22.0153	1	0.0000	0.8527	0.7978	0.9114
3or more dependents	-0.0274	0.0612	20.0613	1	0.0000	0.7600	0.674	0.857
Province			154.6803	8	0.0000			
Central	0.3128	0.056	31.125	1	0.0000	1.3673	1.225	1.5261
Southern	0.0676	0.0508	1.7661	1	0.1839	1.0700	0.9684	1.1822
Northern	-0.3501	0.0739	22.4054	1	0.0000	0.7046	0.6095	0.8145
Eastern	0.0815	0.0743	1.2027	1	0.2728	1.0849	0.9379	1.255
North Western	0.2106	0.0561	14.0864	1	0.0002	1.2345	1.1059	1.3781
North Central	0.4083	0.0712	32.3695	1	0.0000	1.5043	1.3083	1.7297
Uva	0.4913	0.0697	49.5613	1	0.0000	1.6346	1.4256	1.8742
Sabaragamuwa	0.3488	0.0586	35.3758	1	0.0000	1.4175	1.2635	1.5902
Sector			121.0993	2	0.0000			
Rural	0.189	0.0441	18.3219	1	0.0000	1.2081	1.1079	1.3173
Estate	0.9745	0.08865	121.0551	1	0.0000	2.6500	2.225277	3.1524
Relationship to Household head			214.9035	3	0.0000			
Spouse	-0.0255	0.0525	0.2358	1	0.6272	0.9748	0.8793	1.0806
Son/Daughter	0.1011	0.0671	2.2675	1	0.1321	1.1065	0.9699	1.2622
Other	-0.6421	0.05854	120.7319	1	0.0000	0.5260	0.469	0.5898
Literacy in English								
illiterate	-0.2725	0.0496	30.0903	1	0.0000	0.7615	0.6908	0.83993
Currently attending to an educational institute								
Not attending	2.4727	0.0978	639.0327	1	0.0000	11.8552	9.7869	14.3603
Constant	-3.3093	0.149	493.1651	1	0.0000	0.0365		

According to the above result in Table 5.16, it is clear that age group,religion, marital status, level of education, number of dependants in the household, province,sector,relationship to head of the household, literacy in English,and currently attending to an educational instituteare significant variables at the 5% level of significance.

5.7 Summary

The best fitted Logistic method of selection was invariant of the identified significant variables are the same for both forward and backward methods under LR and Wald criteria. Age group, marital status, religion, relationship to head of the household, sector, level of education, province, literacy in English, Currently attending to an educational institute, andnumber of dependants in the household are found as significant variables.

CHAPTER 6

EMPIRICAL RESULTS DERIVED FROM LOGISTIC REGRESSION MODELS FOR LABOUR FORCE PARTICIPATION

6.1 Introduction

For the purpose of comparison the factors influence of LFP on male and female, the male labour force participation also considered.The methodology discussed in the chapter 5, forward method under LR is used for this part of the study and same independent variables are considered.

6.2 Variables Influence on Male Labour Force

The following table 6.1 shows that the result of separate Chi- Square test done in order to find an association between labour force participation on male considering the labour force participation as the dependant. The same hypothesis which was used in chapter5 was tested.

Table 6.1: Results of the Chi-Square test

Independent Variable	Pearson chi-square value	Df	Significance(2-sided)
Age Group	8256.03	5	0.000
Marital Status	1909.13	2	0.000
Relationship to Head of HH	810.94	3	0.000
Ethnicity	1.53	3	0.674
Religion	4.88	3	0.183
Level of education	252.33	5	0.000
Number of dependents	244.35	2	0.000
Sector	42.363	2	0.020
Province	59.99	8	0.000
Literacy in English	115.14	1	0.000
Currently attending to an educational institute	5770.77	1	0.000

All the Chi- Square statistics shows in the table 6.1 are highly significant (p=0.000) except ethnicity, and religion at 5% level of significance. It is clear the null hypothesis is rejected for that significant variable. Therefore, it can be concluded that there is a significant association between age group,marital status, and relationship to head of the household, level of education, province, literacy in English, Currently attending to an educational institute and male labour force participation.

Also it is clear that at 5% level of significance some variables like ethnicity and religion are not significant for males though those are significant for females. This further explains that some cultural factors affect female labour force participation in the country while those are not affecting for males at higher testing accuracy levels. Statistically significant variables at this stage are used for the advance analysis.

6.3 Fitting Binary Logistic Regression Model for Male Labour Force

Using the same method discussed in chapter 5, explanatory variables are added to the model. Forward stepwise method is used and the model starts with the constant-only model and then one best main effect is added to the model in each step. This process continues until there is no further improvement in the fitted model by adding new variables. In this part only the summery table of adding variables to the model is included.

(i) Adding variables to the model

Table 6.2 Step Summary[a] of variable addition to the model

Step	Improvement			Model			Correct Class %	Variable
	Chi-square	df	Sig.	Chi-square	df	Sig.		
1	5273.315	1	0.000	5273.315	1	0.000	82.40%	IN: newattend
2	1398.518	5	0.000	6671.832	6	0.000	82.40%	IN: newage
3	454.377	2	0.000	7126.209	8	0.000	82.90%	IN: newmari
4	145.919	5	0.000	7272.128	13	0.000	83.00%	IN: newedu
5	114.122	3	0.000	7386.250	16	0.000	83.20%	IN: newrela
6	108.640	1	0.000	7494.890	18	0.000	83.00%	IN: depsum
7	28.730	1	0.000	7523.620	19	0.000	83.00%	IN: eng
8	41.885	8	0.000	7565.505	27	0.000	83.10%	IN: Province
9	13.168	2	0.001	7578.678	29	0.000	83.10%	IN: Sector

a. No more variables can be deleted from or added to the current model.

(ii) The final model for male LFP

$$\text{Log } (P/1\text{-}p) = \alpha + \beta_1^{(\text{eduattend})} + \beta_2^{(\text{Newage})} + \beta_3^{(\text{newmari})} + \beta_4^{(\text{Newedu})} + \beta_7^{(\text{Newrela})} + \beta_6^{(\text{dep-sum})} \beta_5^{(\text{province})} + \beta_8^{(\text{eng})} + \beta_8^{(\text{sector})}$$ The estimated parameters are depicted in Table 6.5

Here also the first category considered as the reference category same in female model.

(iii) Fitting interaction terms to the model

Similar to the female model the next step is to add interaction terms into the model and first two way interactions are checked. Since many of the independent variables are categorical in nature the interaction terms add more complexity to the model and also it is found that those do not improve the model further, and since there are enough number of main effects in the model and to overcome the complexity of the model to have parsimony it is decided not to include interaction terms to the model.

6.4 Goodness of fit of the fitted model –male LFP

The goodness fit for the overall model is discussed by using model Chi-Square test. When the reduce model is the baseline model with the constant only the likelihood ratio test the model as a whole. The Table 6.3 and Table 6.4 show the results for overall significance of the model.

Table: 6.3 Model Summary – Male LFP

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
9	17384.942a	.297	.432

The result in table Cox & Snell's R^2 (0.297) and Nagelkerke's R^2 (0.432) are not achieve the maximum value of one, even when the model predicts all the outcomes. That can be concluded the model predicts the data perfectly.

Table : 6.4 Omnibus Tests of Model Coefficients- Male LFP

Step		Chi-square	Df	Sig.
9	Step	13.168	2	.001
	Block	7578.673	29	.000
	Model	7578.673	29	.000

According to the above table 6.5,at the step 9 when all variables are added to the model change in -2LL is 7578.673 and degrees of freedom is 29 and change is statistically significant at 5% level of significance. The finding of the significance leads to rejection of null hypothesis that all of the predictor effects are zero. When this likelihood is significant at least one of the predictors is significantly related to the dependant variable.Therefore it can be concluded that there is an adequate fit of the data to the model.

Table :6.5 Marginal Effects of Binomial Logistic Estimates with categorized variables -Male

Probability of being economically active(in Labour force) - Male (Age 15 & above)								
						Exp(B)	95.0% C.I.for EXP(B)	
Variables in the Equation	B	S.E.	Wald	df	Sig.		Lower	Upper
Age Group			829.4944	5	0.0000			
20-24	1.1563	0.0988	132.5565	1	0.0000	3.1351	2.5696	3.7848
25-29	2.0429	0.1267	253.1562	1	0.0000	7.3423	5.8548	9.6199
30-34	1.7333	0.1306	170.7247	1	0.0000	5.1258	4.2651	7.1165
35-39	1.4279	0.1361	104.5885	1	0.0000	3.6130	3.0811	5.2533
40 and above	-0.0414	0.1118	0.6171	1	0.4321	0.7677	0.7357	1.1403
Marital Status			247.2961	2	0.0000			
Married	0. 4866	0.0828	41.3305	1	0.0000	1.6267	1.4478	2.0029
Married(alone)	-0.7087	0.1072	39.5013	1	0.0000	0.4923	0.4132	0.6290
Level of Education			169.0613	5	0.0000			
Primary	0.5736	0.1117	26.1755	1	0.0000	1.7747	1.4227	2.2044
Lower Secondary	1.0390	0.1095	90.6489	1	0.0000	2.8263	2.2884	3.5151
O/L	0.9069	0.1177	59.9970	1	0.0000	2.4765	1.9762	3.1350
A/L	1.1968	0.1309	83.9377	1	0.0000	3.3095	2.5677	4.2900
Degree & above	1.3580	0.1759	59.9674	1	0.0000	3.8885	2.7664	5.5133
No.OfDependants age <15			106.9676	2	0.0000			
2 or less	0.3959	0.0415	90.9121	1	0.0000	1.4857	1.3696	1.6116
3 or mor	0.5088	0.0801	40.4012	1	0.0000	1.6633	1.4218	1.9459
Province			33.6523	8	0.0000			
Central	-0.0399	0.0721	0.3487	1	0.5549	0.9609	0.8321	1.1037
Southern	0.0250	0.0640	0.2279	1	0.6331	1.0253	0.9095	1.1688
Northern	0.0040	0.0711	0.0034	1	0.9537	1.0041	0.8664	1.1448
Eastern	0.1968	0.0836	5.6288	1	0.0177	1.2193	1.0351	1.4364
North Western	0.2586	0.0751	11.6684	1	0.0006	1.2951	1.1156	1.4974
North Central	0.0682	0.0951	0.5966	1	0.4399	1.0705	0.8932	1.2967
Uva	0.2787	0.0966	8.4036	1	0.0037	1.3214	1.0949	1.5988
Sabaragamuwa	0.2404	0.0779	9.4140	1	0.0022	1.2717	1.0902	1.4795
Sector			13.6654	2	0.0011			
Rural	0.1861	0.0531	12.2705	1	0.0005	1.1987	1.0854	1.3366
Estate	0.2788	0.1084	6.6132	1	0.0101	1.3301	1.0686	1.6345
Relationhip to Household head			126.6287	3	0.0000			
Spouse	-0.3807	0.1368	7.7448	1	0.0854	0.6830	0.5226	0.8935
Son/Daughter	-0.1308	0.0833	2.4697	1	0.1161	0.8718	0.7453	1.0329
Other	-0.7397	0.0701	111.4113	1	0.0000	0.4695	0.4160	0.5475
Literacy in English								
illiterate	0.2752	0.0637	19.8114	1	0.0000	1.3168	1.1623	1.4919
Currently attending to an educational institute								
Not attending	3.9349	0.1121	1240.0804	1	0.0000	51.9973	41.7325	64.7871
Constant	-4.7048	0.1872	631.5417	1	0.0000	0.0091		

6.5Comparison of Results in Chapter 5 and 6

It was found all the variables are significant on both female and male labour force except religion. Religion was found not significant for male. However among the common significant factors the impact on male and female are not the same. It is briefly explained bellow. (According to the result in Table 5.6 in chapter 5 and Table 6.5 in Chapter 6)

- **Effected of the Age**

This study divides the variable 'Age' into six five-year age groups so considered as a categorical variable for the model, age 15-19 group is considered as the reference category and the last category is age 40 and above. It is found that for male model age is the second most important factor. All the other age groups compared to the reference age group (15-19) show significantly increasing odds for both male and female. Further compared to female factors the values of male factors are higher except age group40 and above.

- **Effected of the cultural factors**

The study uses only two variables as cultural factors namely ethnicity and religion. It is unarguable that in a country like Sri Lanka ethnicity religion are highly related and correlated. Further it can be noticed in literature that many of the social habits strictly related to religion than to the ethnicity. Therefore this study mainly considers religion as a cultural. It is found that though the religion is a significant factor for female labour force participation, it is not a significant factor for male labour force participation where the literature gives lot of evidence in this regard. Hence the study finds religion as one of the cultural factors which significantly affect female labour force participation over male labour force participation. Further this is not strong as level of education and therefore by chi-square test analysis (Table 4.6) it can be seen that for higher levels of education the female labour force participation is higher irrespective of religion (Table 4.5).

- **Effected of the Marital status affects**

This study uses marital status in threecategories never married, married (not alone), married but alone due to separation, divorce or being widowed. Many studies in literature found that marriage as a negative factor for labour force participation of female. Similar results were found in the study. For an example odds of participating labour force of a married (not alone) women decreases by a factor 0.3990 compared to a never married woman but for male being married (not alone) significantly increase the odds of labour force participation by a factor 1.6267 compared to never married male.

- **Effected of the level of education**

It is found that the level of education is the most significant factor of female model. The reference category is "No Schooling" i.e. those who had never being to school among the age 15 and above population. The model results depict that the odds of participation in the labour force increase for a person in any other education group compared to a person in 'no schooling' group. For an example the odds of participating in labour force of a woman with Degree and above level of education increase by a factor 10.2577 compared to a woman with no education when the other variables in the model are controlled this factor for male is 3.8885 Further the results indicate that the level of education is a highly encouraging factor for females.

- **Effected of the Household factors**

Two household factors are used for the current study. These two variables are the person's relationship to head of household and the number of person age less than 15 living in a household (dependants). It is found that as the number of persons less than age 15 increases the odds of participating in labour force is decreasing for female and this shows the negative effect of young dependants for females. However for males

having young dependents at home is a positive factor when the number of dependants is increasing the male labour force participation is increasing.

- **Effected of the Place of residence**

The survey data provides information on place of residence, some such variables are province, district and sector. Province and sector are used in the models. A province is a collection of adjacent districts. Generally adjacent districts are common in some characteristics such as in geographically, environmentally and economically therefore province is selected as an independent variable to represent in the model. Western province is considered as the reference, where more opportunities, facilities and resources available compared to other provinces of the country. The result of cross tabulation statistics reveals that the labour force female participation rates are different in provinces.

The sector is the other variable related to place of residence and it is significant for both urban sectors are the reference group. The test results say that odds of a woman participate in labour force increase to a woman in estate sector by a factor of 2.6500 compared to a woman in urban sector and it higher than for male factor. Rural sector also show positive odds compared to urban sector.

- **Effected of the currently attending to an educational institute**

The explanatory variable “eduattend” is an important factor among the selected variables for both female and male models. It is the most significant factor for male model and it is the second most important factor for female model. Logistic analysis considers a person ‘currently attending’ as reference. The odds of participating increased for a woman who is not attending by a factor 11.8552 compared to a currently attending woman when the other variables are controlled. This factor for male is 51.9972.The

difference between female and male odds explains that more possibility of males to enter labour force over female when they are not currently attending to an educational institute.

- **Effected of the English literacy**

The reference category is literate in English. It can be seen from the results odds of a woman participate in labour force who is illiterate in English decreases by a factor 0.73 compared to a literate woman. For males this is different and the factor is positive 1.32.

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The study finds that if a person whose age 15 and above is currently attending to an educational institute then it is a very important factor affecting to the decision of labour force participation of that person. It is strongly affects negatively for that person's labour force participation. This phenomenon is true for both male and female. Therefore it is found that one of the main reasons for low labour force participation is engage in studies either full time or part-time. Also the results of the study reveal that as the level of education increases the labour force participation is increasing. This shows less skills or less human capital attainment affect significantly for lower female labour force participation. Furthermore this shows that acquiring knowledge is important to face the competitiveness in the job market and therefore the persons in prime ages of labour force get ready to enter the labour market with good qualifications.

It was found that some cultural factors also affect females' decision of participating in labour force. It is very important to note that though the religion is a significant factor for female labour force participation it is not significant for male. Furthermore the results show that the Muslim women show comparatively lower participation rates. But it is also important to see that for higher levels of education there is no significant difference in labour force participation rates among religions.

The marital status of a female also affects on their labour force participation. Being married reduces the females in labour force and this is opposite for males. Getting married causes a woman to have lot of household responsibilities prevent females entering to labour force specially those who are with low levels of education. But for

males who have the main responsibility of household economy increases likelihood of participating in labour force as they get married.

The above factors are further explained by other significant household factors in the model, such as relationship to head of household and number of young dependants at home. The results of the study show that when the number of young dependants are increasing female labour force participation is decreasing but male labour force participation is increasing. The place of residence is also found as an important factor affecting for female labour force participation. Two variables related to place of residence were considered i.e. sector and province. Residential sector is a significant factor for female as well as male labour force participation. Further results reveal the females in both Rural and Estate sector are more likely to be in labour force compared to urban The study results further explain residential province as a significant factor for labour force participation. All the provinces other than Northern show higher female labour participation compared to Western province.

It was found that having literacy in English is a positive factor for labour force participation and irrespective of gender. However, that female who is illiterate in English less likely to enter labour force compared to those with English literacy.

The results obtained in this study can be effective used for policy planning and some recommendations are give in section 7.2.

7.2 Recommendations

7.2.1 Policy recommendations

- The age group 15-24 can be considered as the prime age of entry to the labour force of the country, irrespective of gender.
- To establish welfare centers such as child day care centers, adult day care centers where working women can keep their dependants safely while they are at work.
- In order to improve the involvement of women in the labour force, there is a need for economic planners to identify industrial sub-sectors of the economy with high concentration of women and see that additional resources are invested in these particular sectors. Such a strategy would tend to perpetuate the clustering of women in low skill, low income jobs with limited promotion possibilities. The perpetuation of women workers in a few occupational categories within a small number of industries would also make them vulnerable to technological development.
- Economic planners can also identify growth sectors and analyze the job descriptions to pinpoint those areas which require appropriate female skills. Then they should develop appropriate women's training and placement programmed.
- In Sri Lanka more population is concentrated in rural sector and high labour under utilization also reported from rural sector. This may be due to lack of opportunities or under development in those areas. Therefore employers should be persuaded to start new factories or offices in rural sector. Infrastructure should be provided.
- Self employment is not a bad option for women who have some constraints like having dependants, household activities and not having enough education....ect. It is important to promote females for own account works since that will eventually help their family's economy and country's economy. Therefore it is very important to provide them more facilities like training, credit facilities, and subsidies….ect.

7.2.2 Recommendations for future studies

- ✓ The data source for this study is a household survey which has a multiple stage sampling design and data has a hierarchical structure where data can be observed in clusters. It has explained that with this kind of data observations within the cluster are correlated while observations between clusters are not correlated (Zeger&Liang, 1986) that leads to a major statistical problem with cluster correlated data arise from intra cluster correlation or potential for cluster mates to respond similarly. This causes over dispersion or biased estimates. In literature number of remedies has identified to overcome this kind of problem and one of these is Generalized Estimation Equations (GEE) approach introduced by Zeger and Liang (1986), a multilevel analysis specially to work with binary logistic analysis. Then it is recommended to incorporation GEE offer to this analysis.

- ✓ This study completely depends on the available data from the survey. However it would be better if variables such as family income, poverty, health conditions, can included for the labour force survey conducted by DCS.

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