A MULTILEVEL ANALYSIS OF FACTORS AFFECTING THE WOMEN EMPLOYMENT IN PAKISTAN

By

Atta Muhammad Asif

Reg. No 18-FBAS/MSST/S-13

Department of Mathematics & Statistics
Faculty of Basic and Applied Sciences
International Islamic University, Islamabad
Pakistan
2015

Multinomial logistic (Polytomous)
Logistic regression analysis
Women - Employment

A MULTILEVEL ANALYSIS OF FACTORS AFFECTING THE WOMEN EMPLOYMENT IN PAKISTAN

By

Atta Muhammad Asif

Supervised by

Dr. Irshad Ahmad Arshad

Department of Mathematics & Statistics
Faculty of Basic and Applied Sciences
International Islamic University, Islamabad
Pakistan
2015


بسم الله الرحمن الرحيم
ILIA

A MULTILEVEL ANALYSIS OF FACTORS AFFECTING THE WOMEN EMPLOYMENT IN PAKISTAN

By

Atta Muhammad Asif

A Dissertation
Submitted in the Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE (MS)
IN
STATISTICS

Supervised by

Dr. Irshad Ahmad Arshad

Associate Professor

Department of Mathematics and statistics

Department of Mathematics & Statistics
Faculty of Basic and Applied Sciences
International Islamic University, Islamabad
Pakistan
2015

Certificate

A MULTILEVEL ANALYSIS OF FACTORS AFFECTING THE WOMEN EMPLOYMENT IN PAKISTAN

By

Atta Muhammad Asif

A DISSERTATION SUBMITTED IN THE PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF THE ***MS IN STATISTICS***

We accept this dissertation as conforming to the required standard.

1. _____
Dr. Noor Muhammad Larik
(External Examiner)

2. _____
Dr. Ishfaq Ahmad
(Internal Examiner)

3. _____
Dr. Irshad Ahmad Arshad
(Supervisor)

4. _____ 11/6/15
Dr. Rahmat Ellahi
(Chairman)

Department of Mathematics & Statistics
Faculty of Basic and Applied Sciences
International Islamic University, Islamabad
Pakistan
2015

Dedication

This thesis is dedicated to my parents
for their love, endless support
and encouragement

Forwarding Sheet by Research Supervisor

The thesis entitled **"A MULTILEVEL ANALYSIS OF FACTORS AFFECTING THE WOMEN EMPLOYMENT IN PAKISTAN"** submitted by **Atta Muhammad Asif** (Registration # 18-FBAS/MSST/S13) in partial fulfillment of MS degree in Statistics has been completed under my guidance and supervision. I am satisfied with the quality of his research work and allow him to submit this thesis for further process to graduate with Master of Science degree from Department of Mathematics and Statistics, as per IIU Islamabad rules and regulations.

Dated_____

Dr. Irshad Ahmad Arshad,

Associate Professor,

Department of Mathematics & Statistics,

International Islamic University,

Islamabad.

Acknowledgements

Firstly, I attribute all praises, acclamations and appreciation to almighty Allah, the most merciful, gracious and beneficent, whose bounteous and countless blessings enabled me to attain this achievement and perceive higher ideas of life. All praises to His Holy Prophet Muhammad (S.A.W) whose teachings enabled me to recognize our lord and creator and brought to us a real source of knowledge from Allah that is the Quran a role model for us in every aspect of life.

Secondly, I would like to express my sincere gratitude to my advisor **Dr. Irshad Ahmad Arshad** for his continuous support of my MS study and research, patience, motivation, enthusiasm, and immense knowledge. His guidance helped me in all the time of research and writing of this thesis. My sincere thanks also go to **Dr. Zahid Iqbal**, **Dr. Ashfaq Ahmed**, and **Dr. Muhammad Akbar Awan**, for their endless guidance throughout the whole time I spent in the Department of Mathematics and Statistics.

I thank my fellows, Dr. Azhar Ali Mirza, Dr. Muhammad Raheel, Nasir Ali, Aamar Abbas, Muhammad Ahmed, Umer Younas and Rafaqat Ali, for the stimulating discussions, for the sleepless nights we were working together before deadlines, and for all the fun we have had in the last two years. Also I thank in particular to **Dr. Babur Waseem Arif** for enlightening me the first glance of research. Last but not the least; I would like to thank my wife and Children for their encouragement and support.

Atta Muhammad Asif

DECLARATION

I hereby declare that this thesis, neither as a whole nor a part of it, has been copied out from any source. It is further declared that I have prepared this dissertation entirely on the basis of my personal efforts made under the supervision of my supervisor **Dr. Irshad Ahmad Arshad.** No portion of the work, presented in this dissertation, has been submitted in the support of any application for any degree or qualification of this or any other learning institute.

Signature: _____

Atta Muhammad Asif
MS (Statistics)
Reg. No. 18-FBAS/MSST/S-13
Department of Mathematics and Statistics,
Faculty of Basic and Applied Sciences,
International Islamic University Islamabad, Pakistan.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ABBREVIATIONS

UN: United Nations

OECD: Organization for Economic Co-Operation and Development

ESCAP: Economic and Social Commission for Asia and the Pacific

ILO: International Labor Organization

LFS: Labor Force Survey

PBS: Pakistan Bureau of Statistics

WBPHC: World Bank's Poverty Head Count

PDHS: Pakistan Demographic and Health Survey

HIES: Household Income and Expenditure Survey

PHIS: Pakistan Household Integrated Survey

THLF: Turkish Household's Labor Force

CHNS: China Health and Nutrition Survey

NRJ: National Research of Japan

WHO: World Health Organization

AIC: Akaike Information Criteria

BIC: Baysian Information Criteria

NIPS: National Institute of Population Studies

OLS: Ordinary Least Square

ML: Maximum Likelihood

GB: Gilgit Baltistan

KPK: Khyber Pakhtun Khaw

ABSTRACT

The female labor force participation plays a very important role in determining socio-economic growth and poverty reduction. The main objective of this study is to identify and describe the Demographic and Socio-economic determinants of women employment in Pakistan. This study utilizes the secondary data from the nationally representative Pakistan Demographic and Health Survey (PDHS) 2012-13. The data are analyzed in three stages; first stage showed that Out of 13,558 women 10,833 are unemployed that means 80% of the women have no job, while just 20% of women are employed at the time of survey. Stepwise procedure of variable selection is used in the next stage to identify the significant predictors of women employment. Accordingly, provinces, place of residence, women education, women age, husband education, husband working field, sex of household head, presence of children under five years of age, migration status and wealth status are found to be significant determinant of women employment in Pakistan. In the third stage multilevel modeling is applied to analyze the nested sources of variability in hierarchical data, taking into account the variability associated within each level of the hierarchy. The value of intra class correlation (ICC) is 0.133, which implies that 13.3 % of the variation in women employment can be explained by grouping the women in different regions (level-2 units), while remaining 86.7% of the variation in women employment is explained within regions ((level-1 units). The results of the multilevel logistic regression analysis show that variables reported to be significant in logistic regression analysis are also found to be significant. The effect of these significant variables is the same for each region but the effect of education is not the same for each region in Pakistan.

CHAPTER # 1

INTRODUCTION

According to the Statistics Division, United Nations (UN) (2010), the number of women engaged in paid labor force in the world during 1990-2010 is 52%. The number of working women differs by country or region, for example in European Union this figure is 45% while in Northern Africa and Western Asia working women make up less than 30%.The employment rates are 30% lower for women than for men as reported by the Organization for Economic Co-Operation and Development (OECD) (2012). The race, class back ground, immigration status and marital status of women are also influencing occupational engagement of women. These factors are also influenced by the type of jobs accepted for women. Women are primarily employed in more developed economies (Gemelli, 2014).

Women are almost half of the world population and the other half also depends on them directly or indirectly. Despite their key role in development of the nation, their status in the society is not equal to men in a major part of the world (Rahman and Naoroze, 2007). Women have fewer opportunities to obtain education, good and well-paid jobs which reflect their inferiority in the society. About two billion people in the world are considered to be poor and out of these two third are women (ESCAP, 2002). Women have to earn little even though they work for more hour than men (UN, 2007). Despite their big contributions to world economy and hard work, women have just one percent of the world's assets in their names (Al Mughairy, 2004).

More than half billion of women in the world live in nearly in fifty Muslim majority countries. Many women reside in the South Asian region. Women living in Islamic world are encountering more troubles as compared to the rest of the world. They have restricted access to the world outer their house. They are trapped in male dominated system of families,

headed by the males who are considered as protectors of women. Furthermore, early premature marriages, honor killing and limited control over assets, less sovereignty of choice are the common issues of the Muslim women (Kishor, 2000, Sidani, 2005).

The female labor force participation play a very essential role in determining socio-economic growth and poverty reduction (Afridi *et al*, 2009). In Pakistan due to restrictions on women's autonomy and development over the past two decades gradually has acknowledged as one of the core impediments to the economic growth. Lack of education and low social status bound them to participate in economic growth. Low literacy level inhibits them from taking major decisions (survey report on "Status of women in trade unions in Pakistan, 2007")

Unemployment is becoming a serious problem for Pakistan after the economic slowdown in last few years. A range of economic and political factors negatively impact the Pakistan in recent years, including persistent inflation driven by high oil prices, low level of investment, unreliable supply of energy and deteriorating security situation in the country. In addition, Pakistan has been buffeted by a series of natural disasters such as floods in 2010 and 2011. Consequently, employment growth has not been on the increase with the majority of workers still in informal employment. Structural transformation in terms of an increasing share of workers in industry and services has accelerated with a higher proportion of workers in the agricultural sector than a decade earlier. Specific challenges persist for women, who face considerable disparities in accessing the labor market, though the gender gap in employment is slowly decreasing (International Labor Organization (ILO), 2013).

In general, unemployment has a significant impact on poverty, homelessness and family structure. It caused hopelessness and other social evils. The persistence of high unemployment rate in recent years has become a major problem in Pakistan. According to the Labor Force Survey (LFS) 2010-11 the overall rate of unemployment in Pakistan is 6 percent

while the unemployment rate among women is as high as 8.9 percent. This unemployment rate, in 2012-13, increased to 6.2 percent as a whole and for women increase to 9 percent (Labor Force Survey, 2013). These results suggest that unemployment rate among women is much higher than among men.

Beyond looking at trends in labor force participation rates, there are different indicators of the quality of employment in Pakistan, which all reveal the persistence of major decent work deficits, notably for women. Firstly, agriculture accounted for 3 out of 4 jobs for women, but only around 1 out of 3 jobs for men in 2010-11. Working environment in agriculture often lag behind other sectors partly due to lower productivity levels. Agricultural productivity in 2010-11, for example, was 28 times lower than levels in the mining sector, around 8 times lower than the electricity and gas sector and 5 times lower than the finance sector (Pakistan Employment Trends 2011, PBS). Greater investments in agriculture could help boost aggregate labor productivity in Pakistan, which was fifth lowest in a comparable sample of 19 Asia-Pacific economies in 2012, and improve job quality overall(Labor productivity ranking from ILO,2011) .

Secondly, the share of women in vulnerable employment (own-account workers plus unpaid family workers) increased from 66.7 per cent in 1999-2000 to 78.3 per cent in 2010-11, while the comparable rate for men declined from 62.5 per cent to 57.0 per cent during the same period (Pakistan Bureau of Statistics). Many of these vulnerable workers are informally employed with low earnings and limited protection. Overall, around 4 in 5 non-agricultural workers were in informal jobs, with informal employment rates as high as 96.7 per cent and 96.1 per cent in construction and trade, respectively (ILO, 2012). Moreover, for women who were capable to protect a remunerated job, their monthly earnings on average were three-fifths than that of men.

Thirdly, rather than a problem of time-related underemployment, many men in Pakistan toil in jobs involving excessive hours of work. In 2010-11, 47.2 percent of men worked 50 hours or more per week. In comparison, women were more likely to be underemployed. In the same year, 31.1 percent of women worked 29 hours or less, though this includes individuals who did not seek to work more hours (ILO, September 2013)

There are many social and cultural barriers faced by the Pakistani women that concern the integration of women in labor market, such as restriction on women mobility, restrictions on the high level and technical education, lack of moral support by the family members, unequal distribution of jobs in every sector of economy and insufficient remuneration for female workers etc, limit their desire for good job. So it is important to make some affective policies by the government to control these disparities to improve women's economic status in the society. As the strength of women is more than that of men according to population census, so it is necessary to take steps for women employment, because economy could grow well with women's participation in labor market.

1.1 Significance of the study

According to the study of World Bank's Poverty Head Count (WBPHC) 2014, if per capita income in Pakistan is taken as $1.25 per day, then 21.04% of the population lives under the poverty line (according to 2008 population measures) while if the poverty line is increased to $2 per day in keeping with international criteria for average income countries, then 60.19% of the population falls below the poverty line (Daily DAWN, Jun 03, 2014). So, women pleasure seeking is of great significance in developing countries like Pakistan.

The main purpose of this study is to identify the key determinants that limit the number and magnitude of women employment at workplace in Pakistan. Understanding the different factors in female labor supply is of utmost importance in targeting valuable policy

interferences to facilitate all women to join in the job market, and to acquire the policy of enhanced female labor force participation (Mulu, 2012). So, this study intends to create awareness for policy makers to take suitable measures and planes to enhance the existing level of female labor force participation.

Most of the studies about female work participation in Pakistan were based on household integrated survey data or Labor Force Survey data which could not capture the effect of demographic variables on female labor force participation, so we used the Pakistan Demographic and Health Survey (PDHS) data to identify the demographic and socio-economic determinants of women employment in Pakistan.

In many past studies researchers used logit or probit model to identify the determinants of women employment but we have tried to check the variations in women employment both with logit model and on multilevel base as well. We have tried to check the variation regarding women employment between provinces and also within provinces using multilevel analysis technique.

Mulu, M. (2012) applied the logit model to find determinants of women unemployment in Ethiopia using demographic and health survey data. He concluded that region (provinces), place of residence, age, marital status, exposure to any mass media, husband's occupation, and sex of household head, economic status, education level and presence of children under 5 year of age are the significant determinants for women unemployment.

Faridi *et al.* (2009) examined the demographic factors affecting the women employment using the cross-sectional data collected through field survey for Bahawalpur district. They used the logit model and conclude that female belongs to age group 25-34 years, female belongs to age group 45-54 years, marital status, family setup and husband's

education and number of children influences the work participation of women positively and significantly.

In view of the above discussed studies our interest built up to make some extensions and study some socio-economic and demographic factors for Pakistan which may affect women employment.

The following are the main objectives of this study.

- To identify the factors associated with women employment in Pakistan.
- To identify and describe the Demographic and Socio-economic determinants of women employment in Pakistan.
- To examine the extent of the variation in women employment status within Regions (Punjab, Khyber Pukhtunkhaw, Sindh, Baluchistan, Gilgit Baltistan, Islamabad) of Pakistan.
- To make an inter-regional comparison of women employment.
- To study the Correlation Structure among the factors affecting the women employment.

1.2 Limitations of the Study

The definition of employment used in this study may underestimate the real definition by ILO. Moreover the age for women in this study ranges from 15-49 years which is similar to that of limit used by Naqvi and Shahnaz, 2002 and Ejaz, 2011.

The main focus of this study is to identify the factors that are expected to influence women employment in Pakistan. However due to lack of data relevant to microeconomic and macroeconomic variables such as investment, inflation and political issues, the study could not incorporate these influential issues.

CHAPTER # 2

REVIEW OF LITERATURE

According to ILO's definition those persons who want to do some work and have the ability to work but are without work, are considered as unemployed. Unemployment has considerable impact on poverty and affects family structure. It causes desperation and other societal evils in the society.

By understanding the positive impact of women employment for economy growth, many scholars from various disciplines began to identify the significant factors of women employment in different areas of the world. There are various studies that investigated the determinants of women employment. Some of these are as follows.

Avazalipour *et al* (2012) used Household Income and Expenditure Survey (HIES) data to study the contribution of women headed household of Iran's economy which is based on evaluation of their role in economic activities. Also in a logistic model, gender roles and other significant features of socio-economic variables of the households about the probability of being employed is studied. The results have exposed that an immense role of women's economic activities in the household levels. So that on average women plays a major role in handling the domestic expenditure compared to men. Technical review of gender in a logistic model in 2006 proposed that households which are head by men, have more odds of being employed compared to those households whose heads were women. Generally, according to these results, though female headed households have less possibility of being employed than male heads of households, but if women headed households have college degree, they are more likely to be employed than men.

Mehmood *et al* (2011) studied the basic causes of unemployment amongst the educated segments in Peshawar Division of Pakistan. They used the data of 442 individuals who belong to Peshawar Division and are capable of any professional or technical job whether they are employed or not. They used the Logistic regression for their study. The final model concludes that high growth population (HP), lack of resource (LR), HP*RL (function of attitude in receiving high level jobs), HP*NEJ (Non coordination between education and job opportunity), NEJ*RB (red ribbon)*RL are important determinants of unemployment rate in Peshawar Division. Their analysis shows that 69.6% of the males and 30.4% of the female educated and unemployed and thus the percentage of overall employment is relatively lower than developed countries. The backward elimination method with the initial model by Brown method have revealed that high growth of population (HP) and lack of resources (LR) are the main effects and HP*RL, HP*NEJ, NEJ*RB*RL are the interaction effects that are significantly causing unemployment among the educated segments.

Tansel and Tasci (2004) identified the factors effecting the unemployment period for men and women in turkey. They used the results of the Household Labor Force Surveys of 2000 and 2001 to make cross section of durations of unemployment spells and investigate the determinants of chance of leaving unemployment or the vulnerability rate. They also examined the role of the individual and household characteristics and the local labor market situation. They used Non-Parametric and Parametric evaluation method to control the unobserved heterogeneity. The analysis was carried out separately for men and women demonstrating that women's rate of unemployment is elevated than men. The effect of local unemployment rate is big and negative.

Khan and Khan (2009) highlighted the determinants that effect the decision of married women of the age group of 16-60 years, to be a part of labor force activities. They used the probit model on 3911 observations and establish that age of women, women as

leader of the household, education level of women, household poverty, family size, number of girls of age 5-15 years, number of daughters (over 15 years of age), partner's unemployment and low earnings, and rural locality have a considerable association with labor force participation. While the ownership of property by the household, household per capita income, number of children of age under five years, number of sons (over 15 years of age), and partner's education have negative association. Poverty in general perception is found to be the key determinant of the labor force involvement of married women.

Malik *et al* (1994) analyzed the correlates, which affect women labor force involvement in economic activities. They explored that women's age, the number of dependents and education do not determine market time significantly. Female labor supply is considerably and positively exaggerated by women earnings rate and predicted male earnings rate.

Kozel and Alderman (1990) used the ordinary least square and tobit model to analyze the factors upsetting female work participation in the urban areas of Pakistan. They suggested that the female work participation increase with an increase in the probable earnings, remuneration and level of education.

Aly and Quisi (1996) analyzed socio-economic factors that affect Kuwaiti women's work participation choice. The chance of women's work participation was estimated using a nonlinear maximum likelihood function method for cumulative logistic probability function. They conclude that education and females' wage rate are positively related with female work participation rate. While the marital status, age and the number of kids is negatively related with female labor force participation velocity.

Naqvi and Shahnaz (2002) used the cross-sectional data from Pakistan Household Integrated Survey (PHIS) (1998-99) for the age group 15-49 years to inspect the effects of

different demographic and socio-economic factors on female work contribution in economic activities. They have used the probit and multinomial logit models to estimate the parameters. The probit model indicates that marital status, primary education, number of children and female head of households are negatively associated with women's work participation in economic activities.

Chaudhry and Nosheen (2009) investigated the factors effecting the women empowerment in Southern Punjab. Considering multidimensional nature of women empowerment, they estimated the cumulative index for women using four indices i.e. personal autonomy, family decision making, domestic economic decisions and political autonomy. The results showed that women empowerment is significantly affected by education level of women, socio-cultural norms of the society, access to media, job of women and household involvement rate. The major stress of this study was on the women empowerment in terms of their involvement in household economic activities.

Contreras and Plaza (2010) examined women's labor involvement cultural factors in Chile. They used cross-sectional data of variables that may explicate womanly contribution in the economic activity, like age, education, marital status, number of children. Result suggests that education, age, number of children and living in rural areas are imperative clarifying variables to explanation for the manners of women in the work market. Descriptive statistics explained that female labor involvement and Education had association with each other. But on the other side married women who had children but not school going age have wretched effect on female contributions to economic activities.

Rashid *et al* (1989) investigated various demographic and socio-economic determinants of women's labor force contribution behavior in their study for Karachi using probit model. Experimental results indicate that female labor force participation rate rises with increase in the probable earnings, wages and education level. The likelihood that a

woman will work decreased in the families where males are present, while the presence of other women of aged 7 years and above, tend to raise the likelihood of women participation in economic activities. Female labor force participation rate also decrease with foreign and domestic remittances.

Ejaz (2011) analyzed the factors of Female labor force participation in Pakistan. Results showed that there is negative association between female work participation and age while education level and the income of households ensure positive impact on women's labor force participation. Married women were less likely to contribute in the labor market due to high household tasks. Women working in Agricultural field stood most probable to play a part in manual labor market than those of non-agricultural. Different demographic and socio-economic factors decide women's labor force participation judgment for all provinces in Pakistan.

Karaoglan and Okten (2012) examined married women's participation in labor force in Turkey. They suggested that women's whose husband or household's leader was underemployed or unemployed were more likely to contribute in labor force and work more hours. They used the cross-sectional data in this investigation from Turkish Household's Labor Force (THLF) input from the period of (2000-2010). Education and adults have encouraged or increasing outcome on labor input of married while young children have pessimistic impact. Consequence shows that education and age of family had activist but children have pessimistic effect on women's labor force participation. And the number of other adults in the households had positive impact on women's labor force participation.

Yasmin *et al* (2013) investigated the impact of earnings on female labor force participation. They analyzed the data collected through field survey in district Vehari, by employing logistic regression and ordinary least square regression models. Their analysis

shows that women with higher education and living in urban areas have more chance of being employed. They also suggest that information and technical education should be promoted.

Hafeez and Ahmed (2002) employed the probit and logit model on the data collected through field survey in mundi bahauddine, to identify the effect of various demographic and socio-economic variables on female labor force participation. They conclude that there is strong positive relationship between women's education, age household size and female labor force participation while no o working persons in household other than husband and wife, financial assets and monthly income of household are significantly and inversely related to female labor force participation.

Faridi *et al* (2009) used the cross sectional data to identify the demographic and socio-economic correlates of women work participation in Bahawalpur district. They employed the logistic regression and ordinary least square models and conclude that female labor force participation increase with increase in education level. Presence of child, type of residence (rural/urban) and family income negatively affect the women labor force participation.

Shah *et al* (1975) analyzed the effects of different demographic and socio-economic variables on female labor force participation in the four provinces of Pakistan. The association of each predictor with response variable was estimated by looking at the correlation coefficients and partial correlation coefficients. They conclude that female work participation is negatively related with women- child ratio and nuclear family type. Marital status, literacy rates and dependency ratio were found to have positive association with women's work participation.

Sadaquat and Sheikh (2011) studied the female work participation rate in Pakistan due to the traditional, religious, the majestic ideology cultural value and the expansion of social institutions that hold down women entry into the economic activity. They developed the categorization of male and female age groups into three main categories, and examined with

the help of descriptive and mean methodology. Their results show that the women are suffering from market inequity and hence are pushed to split low-status and poorly paid jobs. Majority of women are concentrated in sector known for low level of output, less income stability and low security of employment due to their twofold role at home and workplace. Structured services sector is mostly government services, and provides employment to a small share of women. The rate of unemployment among women is consistently higher than that of men, both in urban and rural areas.

Lee *et al* (2008) examined the correlation between marital status and female work participation in Korea, and suggested that marriage is one of the major obstacles for employment of young Korean women. They concluded that an average married woman is far too prone (by 40–60%) to contribute in the labor force than a unmarried woman in urban Korea and the participation methods among married women shows that work participation rate varies with partner's profession and women age. Lower work participation rate among the young married women is described by demand-side factors, while comparatively higher labor force participation rate among the middle-aged married women is frequently described by the supply-side factors.

Baratali *et al* (2011) illustrated that whether women's employment is associated with their level of higher education. They selected a random sample of 300 women from the population of graduate women who have completed their graduation degree from the programs of post-graduate study in Isfahan city of Iran. The tool for gathering the data was a questionnaire, developed by the researchers and the questions of which were tapped the role of higher education in women's employment. The consistency of the questionnaire remained 90%. Both inferential and descriptive statistical procedures such as chi-square, t-test and one way analysis of variance (ANOVA) were used to explore the data. Their findings exposed that there are good jobs for the women with degrees at higher level of education. They also

concluded that the role of higher education is very important for the enhancement in employment opportunities for women. .

Zaho *et al* (2014) analyzed the factors which effect the women work contribution in rural and urban areas for individual and families prospective using the data of China Health and Nutrition Survey (CHNS) 2006. The used the probit regression technique for individual factors (Education and Age) and family factors (Husband Work Status, Childcare and Family Scale). They concluded that incase of individual factors there exist negative impact of education on female labor force participation for rural women while it was positive for urban women. Age had inverse effect on female labor force participation for both urban and rural areas. They also suggested that husband's work status had significant effects on female labor force participation for both rural and urban areas, while childcare had significant but family scale had insignificant for urban females. Overall family factors were stood more important than individual factors in determination of women work participation and the both factors had different impacts for rural and urban areas.

Smith (2014) analyzed the factors contributing the ups and downs in women's employment from 1970 to 2010 using regression decomposition focusing on whether changes are due to composition of women (the decline in marriage and rise in single motherhood and divorce, reduced fertility and gains in female education) or due to inclinations of women to work for pay. Compositional shifts in education show a positive effect on women's employment across all decades. A positive effect of education was found in all decades, except the 1990s, when the effect was stood negative. Models were estimated separately for married and single women, demonstrates that that the results of family income vary by marital status.

Junko (2014) used the panel data of National Research of Japan (NRJ) (2008-2011) to verify the determinants of women's employment in Japan. He analyzed the data using logistic

regression and concludes that vocational school or university graduates had more chance of work than high school graduates and there was lower probability of women's working if their partner's income is high. Women's employment is effected by youngest child age however a short term reduction in husband's income did not affect the wife's employment.

CHAPTER #3

MATERIALS AND METHODS

3.1 About the Data

This study utilizes the secondary data from the nationally representative Pakistan Demographic and Health Survey (PDHS) 2012-13. This survey maintained all the protocols prescribed by the World Health Organization (WHO, 2000). The primary objective of the PDHS 2012-13 was to provide information about population and health indicators for national and provincial level including rural and urban areas as well as for Gilgit Baltistan (GB) and ICT Islamabad. PDHS adopted a two stage sampling technique to select the households for interview. In the first stage 500 Primary Sampling Units (PSUs) were selected using a probability proportional to size scheme (248 in urban areas and 252 in rural areas). However the requisite information could not be collected from two areas of Baluchistan Province due to law and order situation so the survey was carried out in a total of 498 PSUs (communities). In second stage 28 households were selected from each sampling point using systematic sampling procedure with random start. A total of 14,000 households were selected for interview (6944 in urban areas and 7056 in rural areas).

A total of 14,569 married women of reproductive age (15-49 years) were found to be eligible for interview, however 13,558 were successfully interviewed and used for the analysis in this study, yielding 93% response rate. The response rate stood higher in urban areas than in rural areas.

Variables of the Study.

The response and some explanatory variables were selected after review of literature and consulting the PDHS questionnaire.

Since our response variable is the employment status of women in Pakistan, which we classify as whether a women is employed or unemployed. Therefore, the outcome for the i^{th} woman is represented by a random variable Y_i which take value 1 if the woman is employed and zero otherwise. That is

Y_i $= 1$, *if the* i^{th} *woman is employed*

$= 0$, *otherwise*

Table 3.1 Description of Response Variable

Variables	Variable in survey	Variables label	Categories	Variable code in data
Y_i	V 714	Unemployment status of women	0=unemployed 1=employed	1=employed, otherwise 0

We have selected some demographic and socio economic variables form PDHS data after looking into the questionnaire and by literature reviewed. Some of these are of continuous in nature and some are categorical in nature (rural/urban). For example, age of women, age of husband of women is continuous, while residential area, education level, working status of partner etsectra, are of categorical type. One of the variables labeled (partner working status) has been created by using the variable labeled as partner's occupation in the data. List of the selected explanatory variables for analysis and their detailed description is presented in the table given below:

Table 3.2 Description of Explanatory Variables

Variables	**Variable in survey**	**Variables label**	**Categories**	**Variables codes in data**
X_1	V024	Province	1 =Punjab 2 =Sind 3 = KPK 4 =Baluchistan 5= GB 6= Islamabad	1=Sind, otherwise 0 1=KPK, otherwise 0 1=Baluchistan, otherwise 0 1= GB, otherwise 0 1= Islamabad, otherwise 0
X_2	V025	Type of Residence	0=Urban 1=Rural	1=Urban, otherwise 0
X_3	V106	Women Education Level	0 = No Education 1 = Primary 2 = Secondary 3 = Higher	1=primary, otherwise o 1=Secondary, otherwise 0 1= higher, otherwise 0
X_4	V012	Women Age[1]	0 = Less than 20 1 =20-29 2 =30-39 3 = 40+	1= 20-29, otherwise 0 1=30-39, otherwise 0 1= 40+, otherwise 0
X_5	V701	Partner Education Level	0= No Education 1= Primary 2= Secondary 3= Higher	1=primary, otherwise o 1=Secondary, otherwise 0 1= higher, otherwise 0
X_6	V730	Partner Age	Continuous variable	
X_7	V136	No. HH Members	Discrete Variable	
X_8	V	Partner working status[2]	0 = No Work 1= Work	1= Working, 0 otherwise
X_9	V705	Partner Occupation[3]	0 = Non Agriculture 1 = Agriculture	1=Agri-worker 0 otherwise
X_{10}	V151	Sex of HH Hold	0= Male 1 = Female	1=Female, 0 otherwise
X_{11}	V137	Presence of	0 = No	1= child present,

		Children less than Five Years age	1 = Yes	0 otherwise
X_{12}	V135	Migration Status	0 = Visitor 1 = Usual Resident	1=resident, 0 otherwise
X_{13}	V190	Wealth status[4]	0 = Poor 1 = Medium 2 = Rich	1=middle, otherwise 0 1=rich, otherwise 0
X_{14}	V121	Mass Media/TV	0 = No 1= Yes	1= has TV, 0 otherwise
X_{15}	V153	Telephone access	0 = No 1 = Yes	1= has telephone, 0 otherwise

1. Women age was distributed in four groups (less than 20, 21-29, 30-39 and 40 & above).
2. Partner working in any field of life was considered as working and not working otherwise.
3. Partner working with any source of agriculture (entrepreneur/ agri labor/ land owner) was considered as agri worker and non-agri worker otherwise.
4. Rich or richest household was considered as rich and the poor of poorest are considered as poor in the analysis.

3.2 Methods

Following methods are applied to achieve the objectives.

3.3 Logistic Regression Analysis

In social sciences the response variable are binary in nature often, so we use binary logistic regression for the description of such data as the dependent variable has one of the two categories as employment and unemployment in our case.

Due to the following salient features of logistic regression it has a wide range of applications in case of binary response variable.

- It is less sensitive to the outliers as compared to the probit model and correction of bias is also easy with logit model (Copas, 1988).
- Logistic regression is preferable over the discriminant analysis where the explanatory variables are of categorical or mix of continuous and categorical type (Agresti, 2007).
- Logistic regression neither required the normally distributed variables nor it assume the linearity in the association between explanatory variables and the response variable (Hilbe, 2009).

- It does not assume homoscedasticity and has less restrictive requirements than simple linear regression model (Agresti, 2002).

However we assume that:

a) Coding of variables is meaningful
b) The important variables are present in the model.
c) Sampling techniques have applied adequately.
d) There is low error in explanatory variables.

3.3.1 The Logit Model

As the dependent variable in our study is of dichotomous type, so the possible outcomes are either "being employed" (taken as 1) or "being unemployed" (taken as 0), therefore the magnitude of the relationships of the determinants to carrier outcomes of the women will be analyzed using the logistic regression models for the dependent variable " being employed". To estimate the parameters of the logit model methods of maximum likelihood (ML) is used instead of conventional ordinary least square (OLS) method.

Consider a general (k+1) variable equation as:

$$Y_i^* = \beta' X_i + U_i \qquad \text{for } i = 1, 2 \ldots n \tag{3.1}$$

Here we do not observe Y_i^*, instead, we observe the binary variable:

We can write it as

$$Y_i = \begin{cases} 1 \; if Y_i^* = \beta' X_i + U_i > 0 \\ 0 \; otherwise \end{cases} \tag{3.2}$$

Note that the probability of the observed y_i being one can be written as

$$\Pr(y_i = 1) = \Pr(Y_i^* > 0) \tag{3.3}$$

$$= \Pr(U_i > -\beta' X_i) = 1 - F(-\beta' X_i) \tag{3.4}$$

$$= F(\beta' X_i) \tag{3.5}$$

If we replace $F(\beta' X_i)$ with $\Lambda(\beta' X_i)$

then we have the logit model. Note that $\Lambda(\beta' X_i)$is the logistic cumulative function defined as.

$$\Lambda(\beta' X_i) = \frac{e^{X'\beta}}{1 \quad -e^{X'\beta}} \tag{3.6}$$

In the observations, we have "n" cases of zeros and ones with probability of F $(\beta' X_i)$ for ones and (1 - $F(\beta' X_i)$) *for* zeros. Thus the likelihood function is

$$\Pr(Y_1 = 0, Y_2 = 1, \ldots\ldots\ldots, Y_n = 0) = \prod_{y_{i=0}} [1 - \mathrm{F}(\beta' X_i)] \prod_{y_{i=1}} [\mathrm{F}(\beta' X_i)] \tag{3.7}$$

Or

$$L = \prod_i [[1 - \mathrm{F}(\beta' X_i)]^{1-y_i} [F(\beta' X_i)]^{y_i} \tag{3.8}$$

Taking natural logarithms on both sides, we have

$$\boldsymbol{Ln}\ (\mathrm{L}) = \sum_i [\ (1 - y_i) \ln(1\ - F\ (\beta' X_i) + \ y_i \ln(\mathrm{F}(\beta' X_i)] \tag{3.9}$$

This is the log likelihood function and for logistic case it becomes as

$$\boldsymbol{Ln}\ (\mathrm{L}) = \sum_i [\ (1 - y_i) \ln(1\ - \Lambda(\beta' X_i) + \ y_i \ln \Lambda(\beta' X_i)] \tag{3.10}$$

Or

$$\boldsymbol{Ln}\ (\mathrm{L}) = \sum_{y_{i=0}} \ln(1\ - \Lambda(\beta' X_i) + \sum_{y_{i=1}} \ln(\Lambda(\beta' X_i) \tag{3.11}$$

Where

$\beta' = (\beta_0, \beta_1, \beta_2, \ldots\ldots\ldots \beta_k)$ are the model parameters and $X' = (X_0, X_1, X_2, \ldots\ldots\ldots X_k)$ with X_0 = 1 are the explanatory variables.

3.3.2 Odd-Ratios

Relative odd ratios are found to see that how the prevalence of employment vary with a unit change in a specific independent variable keeping the remaining variables as constant for the data. Since

$$Ln(odd_2) - Ln(odd_1) = Ln\left(\frac{odd_2}{odd_1}\right) = \mathrm{B}, \text{ where}$$

$$odd_2 = P(employment) \text{ and } odd_1 = P(unemployment)$$

$$odd_2/odd_1 = exp\ (B),\ So$$

$$Odd\text{-}Ratio = exp\ (B)$$

3.3.3 Model Evaluation

If the logit model comprising all the explanatory variables demonstrates an improvement over the model without an explanatory variable (null model) then we say that model is fitted betterly to the data. The null model serves as a base line, so we can examine the improvement in model fitting by using LR-Test, Wald's Test and Classification Table.

- **Likelihood Ratio Test**

It can be performed by estimating the two models on the same data set and then we compare the fitness of both models. The fitness of the model becomes worse mostly when we remove the explanatory variables from the model; however, we have to check the significance of the observed difference in model fit. The LR-Test does this by matching the log-likelihood of the two models. If this difference turns out to be significant, the model having more explanatory variables will prefer over the model with less explanatory variables. The test statistic used is:

$$G^2 = LR = [(-2\ln L_0) - (-2\ln L_1)], \quad (3.12)$$

where L_0 and L_1 are the likelihood for the empty and full model respectively. Under the null hypothesis H_0: $\beta_0 = \beta_1 = \beta_2 = \ldots\ldots \beta_k = 0$, G^2 follows chi-square distribution with (k-1) degree of freedom (Hosmer and Lemeshow, 2000).

- **Wald Test**

To test the significance of individual coefficient of predictors in logit model, we apply the Wald Test. In the present analysis, we test the null hypothesis; H_0: $\beta_i = 0$, where $i = 1, 2, 3 \ldots 15$ on the basis of test statistic;

$$W = \left(\frac{\hat{\beta}_1}{SE(\hat{\beta}_1)}\right)^2, \quad (3.13)$$

where $i = 1, 2, 3 \ldots 15$. This test statistic follows the chi- square distribution with one degree of freedom for large sample size (Long and Fareese, 2005).

- **Classification Table**

The classification table is another method to evaluate the predictive accuracy of the logistic regression model. In this table the observed values for the outcome variable and the predicted values are cross-classified (Agrsity, 2007).

3.4 Multilevel Analysis

Multilevel analysis is a procedure for the analysis of data with complex pattern of variability, with a focus on nested sources of variability (Snijders and Bosker, 1999). A multilevel regression model also referred to as random coefficient model, hierarchical model or mixed model (Hox, 2011) can account for lack of independence across levels of nested data (for example women in our example are nested in regions). In conventional logistic regression we assumed that the effect of any variable on the response variable is same across all regions but in multilevel analysis we allow these effects to vary across regions. In multilevel modeling we studied not only the unexplained variation within regions but also between regions, which can be expressed by statistical models with random coefficient.

3.4.1 Testing the Heterogeneity of proportions

The first step for the application of multilevel analysis is to test heterogeneity of proportions between regions and we apply the conventional chi-square test to analyze it. The familiar test-statistic for chi-square is given as:

$$\chi^2 = \sum\left(\frac{(O_i-E_i)^2}{E_i}\right), \tag{3.14}$$

where O_i are the observed values and E_i are expected values. We can write it as

$$\chi^2 = \sum_{j=1}^{g} n_j \left(\frac{(\overline{Y_j}-\bar{P})^2}{\bar{P}(1-\bar{P})}\right), \tag{3.15}$$

where $\overline{Y_{.j}}$ is the average for region and can be calculated by using the formula

$$\overline{Y_{.j}} = \frac{\sum_{i=1}^{n_j} Y_{ij}}{n_j}. \tag{3.16}$$

Is the proportion of success in region "j" and $\widehat{P}$ is the overall proportion of success and can be calculated by using$\frac{1}{n}(\sum_{j=1}^{g}\sum_{i=1}^{n_j} Y_{ij})$. The above discussed test statistics follow the chi-square distribution with (g-1) degree of freedom.

This approximation is considered to be valid if the estimated number of success and of failures in each region, $n_j\overline{Y_{.j}}$ and $n_j(1-\overline{Y_{.j}})$ respectively are at least 1, while 80% of them are at least 5 (Agresti, 1990).

3.4.2 Estimation of between and within group Variance

The variance between the group dependent probabilities can be estimated by the formula

$$\eta^2 = S^2_{Between} - \frac{S^2_{Within}}{\bar{n}}, \tag{3.17}$$

where

$$\bar{n} = \frac{1}{N-1}\left[M - \frac{\sum_j n_j^2}{M}\right] = \bar{n} - \frac{S^2(n_j)}{N\bar{n}}. \tag{3.18}$$

The observed between groups variance for dichotomous outcome variables is closely related to the chi-square statistics (----). They are connected by the formula

$$S^2_{Between} = \frac{\bar{P}(1-\bar{P})}{\bar{n}(N-1)}\chi^2, \tag{3.19}$$

and for within-group variance

$$S^2_{Within} = \frac{1}{M-N}\sum_{j=1}^{N} n_j\,\overline{Y_{.j}}\left(1-\overline{Y_{.j}}\right). \tag{3.20}$$

(Snijders and Bosker, 1999).

3.4.3 Multilevel Logistic Regression Model

Multilevel logistic regression model is useful, for the data collected at more than one levels, to explain the associations at more than one levels (Luke, 2004). Multilevel, mixed effect or hierarchical models are statistical models in regression analysis, where it is assume that some of the coefficients are fixed and others are at random (Snijders and Bosker, 1999).

3.4.4 Two-Level Model

In this study we have used a two-level model, where the level-2 is the regions (provinces) and level-1 is the individuals (women). Within each level-2 unit there are n_j women in the j^{th} region. Consider Y_{ij} be the binary response variable for i^{th} women in j^{th} region. The above model becomes standard logistic model if we drop the error term U_j.

However the above logit model can be written in the form

$$\text{Model for level-1} \qquad \text{Ln}\left(\frac{\pi_{ij}}{1-\pi_{ij}}\right) = \beta_{0j}+\beta_1 X_{ij}, \tag{3.21}$$

and

$$\text{Model for level-2} \qquad \beta_{0j} = \beta_0+U_j. \tag{3.22}$$

3.4.4.1 The Empty Logistic Regression Model

The empty two-level model for a dichotomous outcome variable refers to a population of groups (regions) and specifies the probability distribution for group dependent probabilities without taking further explanatory variables into account. This model only contains random groups and variation within regions. It can be written in logit function as

$$logit(\pi_j) = \beta_0+U_j, \text{ where } U_j \sim N(0, \sigma_u^2), \tag{3.23}$$

where β_0 is the population average of the transformed probabilities and U_j is the random deviation from this average for region j. These models used as a null (no explanatory variables) to estimate between regions effects (provinces in our study) (Luke, 2004).

3.4.4.2 The Random Intercept Logistic Regression Model

The intercepts are allowed to vary in a random intercepts model and therefore, the scores on the dependent variable for each individual observation are predicted by the intercept that varies across regions. The regression coefficients in the model are assumed to be fixed (Cohen, 2003). The logistic random intercept model expresses the log odds as a sum of the linear function of the explanatory variables and random group dependent variation, that is:

$$logit(\pi_{ij}) = \beta_0+\beta_1 X_{1ij} + \beta_2 X_{2ij} + \cdots + \beta_k X_{kij} + U_j, \quad (3.24)$$

or

$$logit(\pi_{ij}) = \beta_{0j} + \sum_{g=1}^{k} \beta_g X_{gij}, \text{ where } \beta_{0j} = \beta_0+U_j, \quad (3.25)$$

where $U_j \sim iid(0, \sigma_u^2)$

β_0 is the log-odds that y=1 when x=0 and u=0, β_g is the effect on log-odds of response variable in same group, U_{0j} is the effect of being in region j on the log odds the u=1 also known as residuals of level-2, σ_0^2 is the level-2 residual. So the model is being split into two parts one is fixed ($\beta_{0j} + \sum_{g=1}^{k} \beta_g X_{gij}$) and the other is random (U_j). That's why it is called mixed model.

3.4.4.3 The Random Coefficient Logistic Regression Model

So far, we have allowed the probability of employment to vary across the regions, but we have assumed that the effects of the explanatory variables are the same for each region. Now we modify this assumption by allowing the difference between explanatory variable

with in a region to vary across the regions. This effect leads to introduce a random coefficient for those explanatory variables.

As our response variable in this study (that is employment status of women) is of binary type and we are using a two-level multilevel regression model in our study. The model, with m level-1 predictors and n level-2 predictors, can be expressed as:

$$\text{Ln}\left(\frac{\pi_{ij}}{1-\pi_{ij}}\right) = logit(\pi_{ij}) = \beta_{0j} + \sum_{g=1}^{m}\beta_g X_{gij} + \sum_{g=1}^{n} U_{gj}X_{gj}, \quad (3.26)$$

where $\beta_{0j} = \beta_0 + U_j$.

In our study $i = 1, 2, 3 \ldots\ldots n_j$, and $j = 1, 2, 3 \ldots 10$

We can write the above model as

$$logit(\pi_{ij}) = \beta_o + \sum_{g=1}^{m}\beta_g X_{gij} + \sum_{g=1}^{n} U_{gj}X_{gj} + U_j. \quad (3.27)$$

The first part of the model is fixed $(\beta_0 + \sum_{g=1}^{m}\beta_g X_{gij})$ and the remaining part is random $(\sum_{g=1}^{n} U_{gj}X_{gj} + U_j)$.

Here X_{gij} is the value of individual level explanatory variable X_m for i^{th} women in j^{th} region. X_{gj} is the value of region level explanatory variable X_n for j^{th} province. U_j is the provincial level residual for j^{th} region.

3.4.5 Parameter Estimation Procedure

There are several estimation procedures available for binary and other categorical response models (Marginal Quasi Likelihood (MQL) and Penalized Quasi Likelihood (PQL)). We used the Stata version 11 command "*xtmelogit*" to estimate the parameter of multilevel logit model which uses direct maximum likelihood procedure via numerical integration as it is more reliable approach and produce statistically more satisfactory results. The additional advantage of using this approach is that it produces more reliable deviance (Snijders and Bosker, 1999). The aim of maximum likelihood estimation is to find the values

of the parameters which maximize the joint probability of obtaining the observed response as a function of unknown model parameters.

Maximum Likelihood via numerical integration is generally preferred for random effect models; however, it may take more time for the estimation of model with several random effects for large sample size.

3.5 Model Selection Criteria: AIC, BIC and Deviance

After the estimation of multilevel models the next step would be the assessment of the fit of the model.

We shall use the Akaike Information Criteria (AIC), Baysian information Criteria (BIC) and Deviance to measure the relative quality of estimated statistical models. These criteria deal with the exchange between the goodness of fit of the estimated models and their complexity.

For any estimated model the value of AIC can be found with the following formula.

$$AIC = -2 \ln(\mathcal{L}) + 2k, \tag{3.28}$$

where "$\mathcal{L}$" the maximized value of the likelihood function and "k" is the number of predictors in the estimated model. A model with minimum value of AIC will be preferred (Akaik, 1974).

For a large sample size the formula of BIC can be defined as

$$BIC = -2 \ln(\mathcal{L}) + k(\ln(n)), \tag{3.29}$$

where "k" is the number of explanatory variables in the model, "n" is the sample size and "$\mathcal{L}$" is the maximized value of the likelihood function. A model with lower value of BIC shall be preferred over the models with higher value (Schwarz, 1978).

The deviance can be calculated by using the formula

$$D = -2 \ln\mathcal{L}(M_{full}), \tag{3.30}$$

Where the degree of freedom equals the N minus the number of parameters.

CHAPTER # 4

RESULTS AND DISCUSSIONS

In this chapter we have identified the different socio-economic and demographic variables, which play an important role in women employment in Pakistan using Pakistan Demographic and Health Survey (PDHS) 2012-13 data. Accordingly, the analysis is carried out in three sections. In first section we have discussed the descriptive analysis of women employment and highlight the different categories which show a high percentage of women employment. In second section we identify and examine the determinants of women employment by using multiple logistic regression model and finally we employed the multilevel logistic regression model and examined the factors and variations in women employment across the regions (subdivided provinces in ten regions) of Pakistan. We have used the statistical software STATA version 11 for both analyses.

4.2 Descriptive Analysis of Women Employment in Pakistan.

The selected socio-economic and demographic variables using female questionnaire of PDHS 2012-13 relative to women employment are presented in Table 4.1. Out of 13,558 women 10,833 are unemployed which means 80% of the women have no job, while just 20% of women are employed at the time of survey.

Women living in different provinces have different status of employment. It is observed that the proportion of women employment is highest (28.8%) in Punjab followed by Sindh (27.2%). The least proportion (6.8%) of women employment has observed in Gilgit Bultistan followed by KPK (7.8%). Some variation is found in the proportion of women employment in different provinces of Pakistan.

The proportion of women employment also differed by place of residence. It is observed that the percentage of women employed in urban areas is 16.6, while it is increased up to 23.3% in the rural areas. The highest percentage of women employment (22.9%) was observed in the age group 30-39 years followed by the age group 40 years and above (22.5 %), while the lowest employment ratio was observed for age group less than 20 years (12.3 %).

It has also observed that percentage of employed women is highest (23.3%) with no education followed by 23% for a women having higher or above education, while the lowest ratio (10.8%) is for the women bearing secondary school certificate. With regard to the husband's education the percentage of employment was observed to be 27.2% (highest also) for a women whose husband has no education while it goes down to 14.7% for the women whose husband's education was higher and above.

The age of husband plays an important role in the employment of women. It has also observed that the percentage of women employment increases gradually as the age of husband increase, such as it was lowest (14.9 %) for a women whose husband's age is 20 years or less while for the women whose husband's age is 40 years or above, it increased to (22.0 %).

Table 4.1 Percentage Distribution of Employed Women for Various Categories

Explanatory Variables		Employment Status of Women			
		Women Employed	Women Unemployed	Total	Percentage of Women Employed
Provinces	Punjab	1094	2706	3800	28.8
	Sindh	801	2140	2941	27.2
	KPK	210	2485	2695	7.8
	Baluchistan	355	1598	1953	18.2
	Gigit Baltistan	83	1133	1216	6.8
	Islamabad	182	771	953	19.0
Type of Residence	Urban	1056	5295	6351	16.6
	Rural	1669	5538	7207	23.2
Women Education	No Education	1773	5852	7625	23.3
	Primary	307	1524	1831	16.8
	Secondary	256	2159	2415	10.6
	Higher and above	389	1298	1687	23.0
Woman Age	less than 20	70	497	567	12.3
	20-29	789	3982	4771	16.5
	30-39	1084	3654	4738	22.9
	40 and above	782	2700	3482	22.5
Husband Education	No Education	1166	3096	4262	27.4
	Primary	416	1403	1819	22.9
	Secondary	677	3624	4301	15.8
	Higher and above	466	2710	3176	14.7
Husband Age	less than 20	15	86	101	14.9
	20-29	407	2317	2724	14.9
	30-39	1057	4008	5065	20.9
	40 and above	1246	4422	5668	22.0
Number OF Household Members	5 or less	438	1381	1819	24.1
	5-9	1551	5751	7309	21.2
	10-14	521	2450	2971	17.5
	15+	215	1251	1466	14.7
Husband's Working Status	Not Working	77	372	449	17.1
	Working	2648	10461	13109	20.2
Husband's Occupation	Non-Agri	2139	9693	11832	18.1
	Agri	586	1140	1726	34.0
Sex of Household Head	Male	2476	9933	12409	20.0
	Female	249	900	1149	21.7
Presence of child under 5-years	No	966	3374	4340	22.3
	Yes	1759	7459	9218	19.0
Migration Status	Migrant	77	348	425	18.1
	Usual Resident	2648	10845	13133	20.1

Wealth Status	Poor	1362	3710	5072	26.9
	Middle	491	2098	2589	19.0
	Rich	872	5025	5897	14.8
Presence of T.V	No	1172	3928	5100	23.0
	Yes	1553	6905	8458	18.4
Telephone Access	No	2464	9336	11800	20.9
	Yes	261	1497	1758	14.8

Total Number of Observations = 13558

The percentage of women employment varies regarding the number of household members. As it was maximum (24.1%) for the household where number of household members is less than "5", while it becomes smaller and smaller as number of household members increase, as it was just 14.7 % for household with 15 or above residents.

The percentage of the employment for women, whose husband has some kind of job, was little better (20.2%) than the women whose husband has no job (17.1%), while if the husband is an agrarian then the percentage of women employment is as much as (34%) than the non-agrarian (18%).

The household where the head of household is woman has better chance of employment (21.7 %), than the household where a man is head (20 %). Presence of children under 5 years of age also affects the women employment status. As seen that the women without child of such age have better chances of employment (22.3 %) than the women who have children of age 5 years or below (19%). There are the better chances to work (20.1 %) for the woman who is usual resident then the migrant (18.1 %).

Wealth status of household affects the women working status. From table 4.1 we have seen that for poor household percentage of employment is maximum (26.9%), while it gradually decreases as the wealth condition of household, become well. The employment just remains 14% for a household whose wealth status is rich.

4.3 Logistic Regression Analysis for Women Employment in Pakistan.

To analyze the effect of explanatory variable on dichotomous variable of women employment, multiple logistic regressions was used. Stepwise procedure of variable selection was used to identify the significant predictors of women employment. Accordingly, provinces, place of residence, women education, women age, husband education, husband working field, sex of household head, presence of child under five year of age, migration status and wealth status are found to be significant determinant of women employment in Pakistan (Table 4.2). Furthermore overall model evaluations, testing of predictors, measure of goodness of fit are also discussed.

Table 4.2 Results of Logistic Regression Analysis

Explanatory Variables	Categories	For All Data		For Rural Data		For Urban Data	
		Estimates	OR	Estimates	OR	Estimates	OR
Provinces	Punjab	Ref					
	Sindh	-0.217*	0.805	-0.190*	0.470	-0.252*	0.777
	KPK	-1.761*	0.172	-2.323*	0.827	-0.791*	0.453
	Baluchistan	-1.005*	0.366	-1.211*	0.097	-0.515*	0.597
	Gigit-Baltistan	-2.161*	0.115	-3.283*	0.297	-1.029*	0.357
	Islamabad	-0.289*	0.749	-0.753*	0.037	0.067	1.07
Type of Residence	Urban	Ref					
	Rural	-0.127*	0.881	-	-	-	-
Women Education	No Education	Ref					
	Primary	-0.155*	0.856	-0.232*	0.92	0.021*	1.021
	Secondary	-0.331*	0.718	-0.191	0.825	-0.274*	0.76
	Higher and above	0.823*	2.277	0.964*	2.623	0.903*	2.486
Woman Age	less than 20	Ref					
	20-29	0.441*	1.554	0.361*	1.434	1.004*	2.73
	30-39	0.824*	2.280	0.683*	1.980	1.525*	4.598
	40 and above	0.754*	2.125	0.583*	1.792	1.534*	4.635
Husband Education	No Education	Ref					
	Primary	-0.181*	0.834	-0.108	0.897	-0.379*	0.684
	Secondary	-0.380*	0.684	-0.299*	0.741	-0.551*	0.576
	Higher and above	-0.544*	0.580	-0.346*	0.707	-0.869*	0.419
Husband's Occupation	Non-Agri	Ref					
	Agri	0.469*	1.598	0.431*	1.538	0.246	1.279
Sex of Household Head	Male	Ref					
	Female	0.207*	1.230	-0.061	0.941	0.541	1.717
Presence of child under 5 years	No	Ref					
	Yes	-0.169*	0.845	-0.190*	0.827	-0.157*	0.854
Migration Status	Migrant	Ref					
	Usual Resident	0.356*	1.428	0.706*	2.026	-0.101	0.904
Wealth Status	Poor	Ref					
	Middle	-0.506*	0.603	-0.662*	0.516	-0.051	0.951
	Rich	-1.140*	0.320	-1.441*	0.237	-0.497*	0.608
Intercept		-.923*	0.198	-1.088*	0.252	-1.780*	0.382

* represents significance at .05 Total number of observations=13558
Agri.= Agriculture

The estimated model will be given by

$$Logit(\hat{\pi}) = \beta_0 + \sum_{i=0}^{6}\beta_{1i}P_i + \sum_{j=0}^{1}\beta_{2j}TR_j + \sum_{k=0}^{3}\beta_{3k}WE_k + \sum_{l=0}^{3}\beta_{4l}WA_l + \sum_{m=0}^{3}\beta_{5m}HE_m + \sum_{n=0}^{1}\beta_{6n}HO_n + \sum_{o=0}^{1}\beta_{7o}SHH_o + \sum_{p=0}^{8}\beta_{8p}PC_p + \sum_{q=0}^{1}\beta_{9q}MS_q + \sum_{r=0}^{2}\beta_{10r}WS_r. \quad (4.1)$$

where

$\hat{\pi}$ = Predicted Probability of Women Employment, β_0 = Intercept,

$P_i = i^{th}$ Province of Pakistan, TR_j = Type of Residence,

WE_k = Women Education for k^{th} level, WA_l = Women Age for l^{th} level,

HE_m = Husband Education for m^{th} level, HO_n = Husband Occupation,

SHH_o = Sex of Household Head, PC_p = Presence of Child under 5 year of age,

MS_q = Migration Status of Women, WS_r= Wealth Status,

Table 4.2 shows that the women residing in Gilgit Baltistan are 88.5 percent likely to be unemployed followed by a woman residing in Khyber Pakhtun Khaw with chance of 82.8 percent of being unemployed as compared to a woman who reside in Punjab province. Although the employment chances of women residing in all provinces are less than Punjab however the women resident of Sindh have 19.5 percent of chance to be unemployed as compared with province Punjab. A women resident of rural areas was 11.9 percent less likely to be employed as compared to the resident of urban area. A woman with primary education is 14.4 percent more likely to be unemployed followed by women with secondary education who are 28.8 percent more likely to be unemployed as compared to the women with no

education. However when the education level of women increased to higher and above then there are more chances of employment (OR= 2.277) than uneducated women.

Employment chances of women was highest for age group 30-39 years (OR=2.28) as compared to the age group 20-29 years (OR=1.554) and 40 year or above (OR=2.125), which reveals that chances of a women to be employed increases up to the age of 39 years and after that it becomes less. The women whose husband has primary education are 16.3 percent less likely to be employed. However this chance increases with improvement in husband education (as for secondary and higher education these are 36.6 percent and 42 percent respectively).

A woman whose husband is an agrarian have 59.8 percent more chance of being employed as compared to a woman whose husband is non-agrarian. Women residing in a female headed households are more likely to be employed as compared to women where head of household is a male (OR=1.23). Presence of a child of age five year or less also affects employment status of women negatively as there are 15.5 percent chances of unemployment for a woman who has a child of age five year or less as compared to a woman with no child of that age.

There are more chances of employment for a women who is permanent resident (OR=1.428) as compared to a migrated women. Wealth statuses also play a significant role regarding women employment. The women with a rich wealth status has 68 percent chances of being unemployed and furthermore there are 40 percent chances of unemployment for a woman who belong to a middle class household as compared to a poor family.

One of the interesting thing we studied during interpretations of the estimates is that , in descriptive analysis the women employment percentage is higher (23.2 %) in rural area than in urban (17 %) and perhaps this is because Pakistan is an agriculture based country

(NIPS report, 2014), while when we run the multiple logistic regression then this relationship turn out to be negative (β= -0.127 with OR =0.881) which means that there are 12 percent more chances for women to be unemployed in rural areas than in urban. The reason behind is that when we compare employment status by place of residence in isolation, women in rural areas are found to have higher employment rate but when we control other socio-economic variables (like provinces, women education, women age, etc.), which are supposed to influence the employment status other than place of residence women living in urban area has more chances of being employed. This indicates those other socio-economic variables are more conducive in urban areas. Furthermore we have re-estimated the logit model with place of residence as a sole explanatory variable and see that our results are consistent (The results are presented in the appendix).

Moreover we have expanded our analysis to the separate analysis of rural and urban areas and try to identify the difference among the rural and urban women regarding their employment status. There are more chances for women to be employed in urban area then rural for Sindh, KPK, Balochistan and GB provinces. The women with primary education have more chances of employment if she is resident of urban areas (OR= 1.021).

As the age of woman increase then there are more chances for her to be employed in urban areas than in rural. There is more chance for a woman to be employed if she is resident of urban area and whose head of household is a female than a resident of rural areas.

Wealth status play significant role among rural and urban areas, if a woman belongs to a middle class family then the results are no more significant for urban areas, while chances of employment for women are less if they belong to a rich family, both in rural and urban area.Based on the results presented in the Table 4.2, the regression equation consisting of the significant variables is given by $Logit(\hat{\pi})$ = -0.923 – 0.217 P_1 - 1.761 P_2 - 1.005P_3 -

$$2.161\ P_4 - 0.289\ P_5 - 0.127\ TR_1 - 0.155 WE_1 - 0.331\ WE_2 + .823\ WE_3 + 0.441 WA_1 + 0.824\ WA_2 + 0.754\ WA_3 - 0.181 HE_1 - 0.380 HE_2 - 0.544 HE_3 + 0.461 HO_1 + 0.207\ SHH_1 - 0.169\ PC_1 + 0.356\ MS_1 - 0.506 WS_1 - 1.140\ WS_2. \quad (4.2)$$

It can be seen that the inclusion of all selected predictors had been made by stepwise procedure and the significant factors are presented in the Table 4.2 and also verified that addition of these significant variables reduced the initial log likelihood value (Deviance) from 13605.98 to 11970.90.

4.4 Model Fit Analysis for Women Employment in Pakistan:

In order to check the fit of the model we used Akaik Information Criteria (AIC), Basian Information Criterion (BIC) and Deviance both for null model (without any explanatory variables) and full model (including all explanatory variables).

TABLE 4.3 Results of Model Fit for Empty Model and Full Model

Criterion	Model without Explanatory variables (Empty Model)	Model with Explanatory variables (Full Model)
AIC	13607.98	12014.90
BIC	13615.50	12180.23
Deviance	13605.98	11970.90

Table 4.3 shows that in all criterions the values of AIC, BIC and Deviance decreases as we include explanatory variables in the model, which implies that model with all explanatory variables, are better than the model without explanatory variables. Moreover the deviance based chi-square shows that at least one of the explanatory variable is significantly related to

the response variable and hence inform that the fit of the model is adequate (χ^2=1635.08, d.f = 21 and p-value < 0.0001).

Table 4.4 Classification Table for the Women Employment in Pakistan.

Observed Values	Predicted Values		
	Employed	Unemployed	Total (Correctly classified %)
Employed	283	218	501 (56.49%)
Unemployed	2442	10615	13057(81.29%)
Total (Correctly classified %)	2725 (10.38%)	10833(97.99%)	13558
Overall Percentage of Correctly Classified Values			80.38%

4.5 Classification Table for Women Employment in Pakistan

In classification table the observed values for the outcome variable and the predicted values are cross classified. We have used it to check the predictive accuracy of the logit model.

Table 4.4 shows that 56.49% of the women being employed were correctly specified whereas 81.29% of the women who were unemployed were correctly specified as unemployed. However the overall percentage of correctly specified values is stood 80.38 percent which shows that the predictive power of the model is adequate.

Table 4.5 Tests for the significance of relationship between response and explanatory variables

TESTS	D.F	Chi-Square Value	P-Value
Likelihood Ratio Test	21	1635.08	<0.0001
Wald Test	21	1306.103	<0.0001

level of significance used = 0.05

Table 4.5 shows that the value of Likelihood Ratio Test is 1635.08 with p-value of less than .01. Similarly the result of Wald Test is also found to be significant which indicates that both tests yield similar conclusions that are the final model with all explanatory variables was more effective than the null model.

Using the derived logistic regression model

$$Logit(\hat{\pi}) = -0.923 - 0.217\,P_1 - 1.761\,P_2 - 1.005P_3 - 2.161\,P_4 - 0.289\,P_5 - 0.127\,TR_1 - 0.155WE_1 - 0.331\,WE_2 + .823\,WE_3 + 0.441WA_1 + 0.824\,WA_2 + 0.754\,WA_3 - 0.181HE_1 - 0.380HE_2 - 0.544HE_3 + 0.461HO_1 + 0.207\,SHH_1 - 0.169\,PC_1 + 0.356\,MS_1 - 0.506WS_1 - 1.140\,WS_2. \quad (4.3)$$

Model (4.3) can be used to calculate the predicted value of the probability of employment for any combination of values of the explanatory variables. For example, a secondary pass 25 year old women without any child of age under 5 year, usual resident of rural areas of Baluchistan province, living in a middle class household headed by a woman and whose husband is an agriculture worker with primary education has 49% lower chance of being employed using above model.

4.6 Model Diagnostics: Influential Observations and Outliers

The adequacy of the fitted model can be checked for possible presence of influential values. We used diagnostic tests to identify the outliers or other influential values. (The results and graphs are presented in appendix). The DFBETAs for estimated parameters, Cook's Distance and Leverage values were observed to be less than unity. DFBETAs less than unity implies that there is no specific impact of an observation on the estimated coefficients of a specific explanatory variable while Cook's influential statistics value less than unity indicates that the observation has no impact on the group of estimated coefficients

(Cook and Weisberg, 1982). A value of leverage statistics less then unity shows that no observation has substantial large impact on the estimated values of the model. Thus from above goodness of fit and diagnostic test we can say our fitted model is adequate.

4.7 Multilevel Logistic Regression Analysis for Women Employment in Pakistan.

As the data used for the study have hierarchical structure, so we used the multilevel analysis technique. Here we use two level structure where regions--that constitute the ten provincial areas (Punjab rural and Punjab Urban, KPK rural and KPK urban, Sindh rural and Sindh urban, Balochistan rural and Blochistan urban, Islamabad is considered as urban and the GB is consider as rural as whole) into which the women are nested--are at level-2 and the individual women are at level-1.

As one of the objectives of this was to model the heterogeneity between regions, a random intercept model was used to achieve that objective. This allows the overall chances of employment to vary across regions. We applied the chi-square test to check the heterogeneity in the proportion of women who were employed among the entire ten regions. The test yield Pearson chi-square = 1000, d.f =9 and p-value< .0001, which shows that there is heterogeneity across regions regarding the women employment.

4.7.1 The Empty Logistic Regression Model

The simplest form of the multilevel logistic model is a model without explanatory variables. Its functional form is

$$logit(\pi_j) = \beta_0 + U_j.$$

Table 4.5 Results of Parameter estimates of Intercept only model

Fixed part				
Fixed effect	**Estimates**	**Standard Error**	**z- value**	**p-value**
Intercept	-1.591	0.226	-7.03	0.000
Random Part				
Random Effect	**Estimates**	**Standard Error**	**z- value**	**p-value**
Var (Uoj)= σ_0^2	0.505	0.229	2.205	0.027*
Deviance Based Chi-Square = 991.13, d.f= 1 and p-value = 0.0000				

Table 4.5 shows that an empty model with random effect is better than the empty model without random effect (Deviance based chi-square= 991.23, d.f = 1 and p-value <0.0001). The variance of random effect parameter reveals that there is significant difference across regions regarding women employment ($\sigma_0^2 = 0.505$, d.f = 1 and p-value <0.05) which shows that hierarchical model is more appropriate as compared to logistic regression model. The estimates of intercept β_0 = -1.590 shows that the probability of women employment everywhere in Pakistan is 0.17 on the average ($e^{-1.59}/(1+e^{-1.59}) = 0.169$).

The empty model with random effects also helps to measure the variation in women employment among regions by using intra-class correlation (ICC) which can be calculated by using formula

$$\text{Intra-Class Correlation} = \frac{\sigma_0^2}{\sigma_0^2 + \frac{\pi^2}{3}} \tag{4.4}$$

The value of ICC is 0.133, which implies that 13.3 % of the variation in women employment can be explained by grouping the women in different regions (level-2 units), while remaining 86.7% of the variation in women employment is explained within regions ((level-1 units).

4.7.2 The Random Intercept Logistic Regression Model

In random intercept logistic regression model we allow the chance of women employment to varies across regions, however the effect of predictors are assumed to be same for each region (slops are fixed) and the intercepts varies across region.

Table 4.6 Results for the random intercept and fixed slope model

Fixed Part					
Explanatory Variables	**Categories**	**Estimates**	**S.E**	**Z-Scores**	**P-Values**
Type of Residence	Urban	ref			
	Rural	-0.990	0.159	-6.22	0.000*
Women Education	No Education	ref			
	Primary	-0.120	0.077	-1.56	0.119
	Secondary	-0.272	0.086	-3.15	0.002*
	Higher and above	0.875	0.095	9.17	0.000*
Woman Age	less than 20	ref			
	20-29	0.468	0.142	3.31	0.002*
	30-39	0.867	0.141	6.15	0.000*
	40 and above	0.803	0.144	5.57	0.000*
Husband Education	No Education	ref			
	Primary	-0.192	0.072	-2.67	0.008*
	Secondary	-0.397	0.063	-6.28	0.000*
	Higher and above	-0.604	0.084	-7.13	0.000*
Husband's Occupation	Non-Agri	ref			
	Agri	0.402	0.065	6.22	0.000*
Sex of Household Head	Male	ref			
	Female	0.225	0.083	2.71	0.007*
Presence of child under 5 years	No	ref			
	Yes	-0.180	0.053	-3.37	0.001*
Migration Status	Migrant	ref			
	Usual Resident	0.331	0.137	2.43	0.015*
Wealth Status	Poor	ref			
	Middle	-0.474	0.069	-6.86	0.000*
	Rich	-1.013	0.079	-12.73	0.000*
Random Part					
Random Effects	**Estimates**	**Standard Error**	**z- value**	**p-value**	
Var (Uoj)= σ_0^2	0.707	0.324	2.182	0.033*	
Deviance Based Chi-Square = 949.23, d.f= 1 and p-value = 0.0000					

* represent significance at 0.05, Agri.= Agriculture

According to the table 5.6 results of the fixed part of random intercept with fixed slope model type of residence (rural/ urban), women education (secondary, higher and above), migration status, presence of child of under five year age, sex of household head, wealth status (middle, rich), husband education (primary, secondary, higher and above), working field of husband and women age were found to be significant determinants of variation in women employment in all the ten regions of Pakistan. The interpretation of the estimated coefficients of the fixed part was similar as in ordinary logistic regression we discussed. However, the additional information obtained through the results of random parts of the multilevel model shows that the intercept variance of the random effect is 0.707 which is slightly bigger than the empty model which is due to inclusion of the explanatory variables, which mean the inclusion of fixed explanatory variables can provide extra predictive value on women employment in each region. The significance of the variance of random effect parameter shows that there is significant variation regarding women employment which implies that there is still unexplained variation in women employment across regions.

4.7.3 The Random Coefficient Logistic Regression Model

So far we have allowed the probability of women employment to vary across regions with this assumption that the effects of explanatory variables are same for each region.

Table 4.7 Results for the random intercept and random slope model

Fixed Part					
Explanatory Variables	**Categories**	**Estimates**	**S.E**	**Z-Scores**	**P-Values**
Type of Residence	Urban	ref			
	Rural	-0.483	0.167	-2.89	0.004*
Women Education	No Education	ref			
	Primary	0.066	0.144	0.45	0.649
	Secondary	0.059	0.257	0.23	0.818
	Higher and above	1.266	0.374	3.38	0.001*
Woman Age	less than 20	ref			
	20-29	0.485	0.142	3.42	0.001*
	30-39	0.902	0.141	6.38	0.000*
	40 and above	0.865	0.144	5.97	0.000*
Husband Education	No Education	ref			
	Primary	-0.159	0.089	-1.77	0.077*
	Secondary	-0.318	0.123	-2.58	0.010*
	Higher and above	-0.527	0.174	-3.02	0.003*
Husband's Occupation	Non-Agri	ref			
	Agri	0.416	0.066	6.29	0.000*
Sex of Household Head	Male	ref			
	Female	0.204	0.084	2.43	0.015*
Presence of child under 5 years	No	ref			
	Yes	-0.180	0.054	-3.33	0.001*
Migration Status	Migrant	ref			
	Usual Resident	0.306	0.137	2.23	0.026*
Wealth Status	Poor	ref			
	Middle	-0.581	0.071	-8.16	0.000*
	Rich	-1.031	0.079	-13.02	0.000*
Random Part					
Random Effects	**Estimates**	**Standard Error**	**z- value**	**p-value**	
Var(Uoj)= σ_0^2	1.850	0.864	2.141	0.032*	
Var(U1j)= σ_1^2	0.023	0.018	1.278	0.201	
Var(U2j)= σ_2^2	0.143	0.070	2.043	0.041*	
Cov(Uoj,U1j)=σ_{01}^2	-0.172	0.111	-1.549	0.121	
Cov(Uoj,U2j)= σ_{02}^2	-0.494	0.236	-2.093	0.036*	
Cov(U1j,U2j)= σ_{12}^2	0.040	0.026	1.538	0.124	
Deviance Based Chi-Square = 1186.92, d.f= 6 and p-value = 0.0000					

* represent significance at 0.05, Agri.= Agriculture

Results from Table 4.7 show that among the variables in fixed part of the random slope multilevel model ; type of residence (rural/ urban), women education (higher and above), migration status, presence of child of age under five year , sex of household head, husband education (secondary, higher and above), working field of husband and women age (20-29, 30-39 and 40+), wealth status(middle, rich) were found to be significant predictors of women employment in all regions of Pakistan. Table 4.5 also shows that the variance component corresponding to slop of women education vary significantly at five percent level of significance across regions whereas the random effect of the slope of husband education is insignificant. Hence the random effects of the husband education have no variation across regions.

Var (Uoj) and Var (U1j) and Var (U2j) are the estimated variances of the intercept, slop of husband education and slope of women education respectively. Among these the variance of intercept and women education are found to be significant which shows that there is variation in women education between regions, whereas variance component of husband education is not significant, which indicates that there is no variation between regions regarding husband education. Also the covariance between intercept and slop of women education is found to be significant at five percent level of significance. The negative sign of the covariance estimate of women education and intercept indicates that region with higher intercepts tend to have tend to have on average lower slope for women education.

Now we compare the three multilevel models considered above, and used AIC, BIC and Deviance for this purpose.

Table 4.8 Summary of Multilevel Logistic Regression Model selection Criteria

Summary Selection Criteria	Multilevel Empty Model	Multilevel Random Intercept Model	Multilevel Random Coefficient Model
Deviance Based Chi-square	991.13	949.23	1186.92
Deviance	12614.86	11896.9	11659.22
AIC	12618.86	11932.9	11705.22
BIC	12633.89	12068.17	11878.06

From table 4.8 the value of AIC for the null model with random intercept (AIC=12618.86) is larger than the value of AIC for the random intercept and fixed coefficient model (AIC=11932.9), which implies that the random intercept with fixed slop model as more predictive power for women employment across regions of Pakistan. More over the significance of deviance – based chi- square value for random intercept with fixes slops model is better than the multiple logistic regression. Furthermore the value of AIC of random coefficient model (AIC=11705.22) is smaller than the random intercept with fixed slops model (AIC=11932.9), which implies that the random coefficient model is the better than the random intercept with fixed slops model in predicting the women employment across regions. Moreover the significance of the deviance based chi-square value indicates that random coefficient model is better than multiple logistic regressions in predicting women employment across regions.

The deviance of empty model with random intercept (Deviance=12614.86) and random intercept with fixed slops model (Deviance=11896.9) shows that random intercept with fixes slops model is better than the empty model. Also the deviance of random intercept and fixed slops model (Deviance=11896.9) and random coefficient model (Deviance=11659.22) indicates that random coefficient model is better than the random intercept with fixes slops model.

CHAPTER # 5

SUMMARY AND CONCLUSION

The current study is based on the secondary data of PDHS 2012-13 and intended to find that the selected socio-economic and demographic variables have significant effect on the women employment. On the basis of descriptive analysis, logistic regression analysis and multilevel analysis, we arrive at the following conclusion.

A total of 13,558 women were identified and 10,833 were found to be unemployed which indicate that 80 percent of the Pakistani women have no job while the rate of women employment stood at 20 percent only.

Women resident of all regions other than Punjab have low chances of being employed and out of these regions, the position of employment is worse in GB. The results demonstrate that the chance of employment increases with an increase in the level of education. However women with primary education have more probability of being unemployed and these results are consistent with other studies (Contreras and Plaza, 2010, Bartali *et al*, 2011, Smith, 2014, Naqvi and Sehnaz, 2002 and Mulu, 2012). This is may be due to the reason that high qualified women can make decisions independently and have high access to job opportunity.

Results also revealed that women with higher age group have more chance of employment as compared to lower one which is similar to the results in Hafeez and Ahmed, 2002, Lee *et al*, 2011 and Mulu, 2012. The Partner's education has strong negative effects on the women working status.

A woman has more chances of being employed if her husband is an agriculturist and perhaps it is due to the reason that Pakistan is agriculture based country and during harvesting season women also work with their husband in the fields. These results are similar to those as

in Ejaz, 2011. Also the women living in a household where the head of household is a female would be more likely to be employed than living in male headed households. There are lower chances of employment for women who have children of age under 5 years than a woman with no child of such age. Same results were presented in Contreras and Plaza, 2010 and Faridi *et al*, 2009. One of the important determinants of the women employment was the wealth status of the household in the study. The results showed that probability of unemployment was 40 % for the middle class and it further increased to 68% for the women who belonged to a household with rich wealth status and the reason might be that as women become wealthy, they have low interests in being employed. These results are also consistent with Faridi *et al*, 2009. After the comprehensive negotiations, it has been understood that the determinants recognized in the present study are well established in the literature.

Multilevel Analysis has also been used to control hierarchical pattern of the data. We have found that there is not a single study in Pakistan that includes multilevel analysis of women employment status. The results of empty model with random intercept showed that there is significant variation between regions regarding women working status and the random effect coefficient model showed that the random effect of women education vary across regions in explaining the women participation in labor force. This model also advocates that there exists disparities in female labor force participation among regions and model with random coefficients is more suitable to demonstrate the regional variation than other models.

5.1 Recommendations

After discussing the results in detail we have come to following recommendations for the improvement in employment status of women in Pakistan.

- Better level of education, vocational training of no or low level educated women could promote the employment of women, so government and non-government organizations should focus on such issues. It will encourage women to get jobs and generate income for the improvement of their living standards.
- There exists high variations between regions of Pakistan in context of women employment and women education has turned out to be one of the reasons for that, so government should recommend same syllabus and provide good institutions for better education in all regions on equal basis. The disparities in women employment status can be brought under control in this way.
- The government should focus on the regions with lower employment status. Socio-economic status should be raised for the low level regions by launching development projects and industry.
- They should work to support the poor and to bring rapid growth in the economy of the country. It is important to develop the community based intervention giving priority to the poor women to take part in the labor market, education and facilities of health.
- Along with the government, it is also important for the society to understand the importance of women employment for the rapid growth of the economy of the Pakistan.

CHAPTER # 6

REFRENCES

Agresity, A. (2007). "An introduction to Categorical Data Analysis" 2nd ed., Jhon Willy and Sons Inc, New York

Avazalipour, M. S., Zandi F., Damankeshideh, M., Hakimipoor, N. and Faramarzi, A. (2012). "The role of women in economic participation and employment: A logistic Model for Iran", *International Journal of Contemporary Mathematical Sciences*, 7(34), 1665-1672.

Akaike, H. (1974). "A new look at the statistical model identification", *IEEE Transactions on Automatic Control*, **19**(6), 716–723.

Al Mughairy, L. (2004). "Women, Education and Culture", Paper presented in 18th IDP Australian Education Conference: The Path to cultural understanding and development 5th to 8th October, 2004. Sydney Conventional Centre, Sydney Australia.

Agresity, A. (2002). "Categorical data Analysis". Willy Interscience, New York

Belsley D. A, Kuh, E. and Welsch, R. E. (1980). "Regression Diagnostics: Identifying Influential Data and Sources of Collinearity", Willy, New York.

Bartali, M. and Yousefy, A. (2011). "Women Employment and Higher Education Schoolings", *Procedia -Social and Behavioral Sciences*, **15**, 3861-3869.

Contreras, D. and Palaza, G. (2010). "Cultural Factors in Women's Labor Force Participation in Chile", *Feminist Economics*, **16**(2), 24-46.

Copas, J. B. "Binary Regression Models for Contaminated Data", *Journal of Royal Statistical Association:* **52**(2), 225-265.

Chaudhry, I. S. and Nosheen, F. (2009). "The Determinants of Women Empowerment in Southern Punjab (Pakistan): An Empirical Analysis", *European Journal of Social Sciences,* **10**(2), 216-229.

Cohen, J., Cohen, P., West, S. G. and Aiken, L. S. (2003). "Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences" Lawrence Erlbaum Associate, Publishers, Mahwah, New Jersey.

Cook, R. and Weisberg, S. (1982). "Residuals and Influence in Regression". Chapman and Hall, New York.

Ejaz, M. (2011). "The Determinants of Female Labor Force Participation in Pakistan: An Instrumental Variable Approach", CREB working Paper No. 01-11, Centre for Research in Economics and Business, Lahore School of Economic, Pakistan .

ESCAP (2002). "Sustainable social development in the period of rapid globalization: challenges, opportunities, and policy options", Economic and Social Commission for Asia and the Pacific, UN, New York.

Faridi, Z., Chaudhry, I. S., and Anwar, M. (2009). "The Socio-Economic and Demographic Determinants of Women Work participation in Pakistan: Evidence from Bahawalpur District", *A Research journal of South Asian Studies*, **24**(2), 351-367.

Gemelli, M. (2014). "Women's Employment", *Encyclopedia of Quality of Life and Well-Being Research*, 7150-7154.

Hosmer, W. D. and Lemeshow, S. (2000). "Applied Logistic Regression" 2nd ed., Jhon Wiley and Sons, New York.

Hilbe, J. M. (2009), "Logistic Regression Models", CRC Press, Taylor & Francis Group, London.

Hox, J. (2010). "Multilevel Analysis: Techniques and Applications", 2nd ed. Routledge 270 Madison Avenue New York, NY 10016.

Hafeez, A. and Ahmed, E. (2002). "Factors Determining the Labor Force Participation decision of Educated Married Women in a district of Punjab", *Pakistan Economic and Social Review*, **XL** (1), 75-88.

ILO (2013). "Pakistan Labor Market updates" International Labor Organization country office Pakistan.

Khan R. E. A. and Khan, T. (2009). "Labor Force Participation of Married Women in Punjab (Pakistan)", *Journal of Economic and Social Research* **11**(2), 77-106.

Kishor, S. (2000). "Empowerment of Women in Egypt and Links to the Survival and Health of Their Infants." In *Women's Empowerment and Demographic Processes*, edited by H. Presser and G. Sen, 119–158. Oxford: Oxford University Press.

Kozel, V. and Alderman, H. (1990). "Factors Determining Work Participation and Labor Supply Decisions in Pakistan's Urban Area", *The Pakistan Development Review*, **29**(1), 1-18.

Karaoglan, D. and Okten, C. (2012). "Labor Force Participation of Married Women in Turkey". IZA Discussion Paper No. 6616.

Long, J. S. and Freese, J. (2005). "Regression Models for Categorical Dependent Variables Using Stata", 2nd ed. Stata Press. 4905 Lake way Drive, College station, Texas 77845

Lee, B. S., Jang, S. and Sarkar, J. (2008). "Women's labor force participation and marriage: The case of Korea", *Journal of Asian Economics*, **19**(2), 138–154.

Labor Force Survey (LFS) (2011). Government of Pakistan Statistics Division Federal Bureau of Statistics, Islamabad.

Luke, D. A. (2004). "Multilevel Modeling", Sage Publications, Thousand Oaks. London.

Mulu, M. (2012). "Determinants of Women Unemployment in Ethiopia: A multilevel model approach" Thesis of MS-Statistics submitted to School of Graduate Student, Addis Ababa University, Ethiopia.

Mehmood, Z. N., Akhtar, M., Amin and Idrees, M. (2011). "Causes of unemployment among the educated segments in Peshawar Division, Pakistan", *Sarhad Journal of Agriculture*, **27**(1) 139 -142.

Malik, S. J., Sultana, N. and Nazli, H. (1994), "Determining of women time allocation in selected districts of rural Pakistan", *The Pakistan Development Review*, **33** (4), 1141-1153.

Naqvi, Z. F. and Shahnaz, L. (2002). "How do women decided to work in Pakistan", *The Pakistan Development Review*, **41**(4), 495-513.

Pakistan Demographic and Health Survey Report 2012-13, National Institute of Population Studies, Islamabad

Pakistan Employment Trends 2011, Pakistan Bureau of Statistics, Islamabad.

Rahman, M. H. and K. Naoroze. (2007). "Women empowerment through participation in an Aqu-aculture: experience of a large scale technology demonstration project in Bangladesh", *Journal of social science*, **3**(4), 164-171.

Snijders, T. A. B. and Bosker, R. J. (1999). "An Introduction to Basic and Advanced Multilevel Modeling" Sage Publication, London.

Sidani, Y. (2005). "Women's work and Islam in Arab societies", *Women Management Review*, **20**(7), 498-512.

Smith, K. E. (2014). "The Ups and Downs in Women's Employment-Shifting Composition of Behavior from 1970-2010", *Upjohn institute working paper, 14-211*, Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

Sly, Y. H. and Quisi, I. A. (1996). "Determinants of Women labor force participation in Kuwait: A Logit Analysis", *The Middle East Business and Economic Review,* **8**(2), 1-9.

Shah, N. M. (1975), "Work Participation of Currently Married Women in Pakistan. Influence of Socioeconomic and Demographic factors", *The Pakistan Development Review*, **14**(4), 469-492

Schwarz, G. (1978). "Estimating the Dimension of a Model", *The Annals of Statistics,* **6**(2), 461-464.

Tansel, A. and Tasci, H. M. (2004), "Determinants of Unemployment Duration for Men and Women in Turkey", *ERC Working Paper in Economics*, Middle East Technical University Ankara 06531 Turkey.

UN 2007. "The Millennium Development Goal Report 2007" United Nations, New York.

Yasmin, F., Amjad, H. and Ahmed, W. (3013). "Impact of Earnings on Female Labor Participation: A Case Study of Tehsil Vehari Pakistan", *Middle East Journal of Scientific research*, **18**(10), 1396-1401.

Zaho, Z., Chen, J., Shao, X. and Murtaza, G. (2014). "Factors that influence female labor force supply in China", *Economic Modeling*, **37**, 485-491.

APPENDIX

1. Results of logistic regression for Type of Residence

```
. logit  WomWorkStat i. TypRes i.Provinces i.WomEdu i.MigStat i.SexHHH i.Wealth
> Stat i.HusEdu i.PreChild i.Workfeild i.Womenage,or

Iteration 0:   log likelihood = -6802.9911
Iteration 1:   log likelihood = -6047.5039
Iteration 2:   log likelihood = -5985.7463
Iteration 3:   log likelihood =  -5985.451
Iteration 4:   log likelihood =  -5985.451

Logistic regression                                     Number of obs   =      13558
                                                        LR chi2(21)     =    1635.08
                                                        Prob > chi2     =     0.0000
Log likelihood =  -5985.451                             Pseudo R2       =     0.1202
```

WomWorkStat	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
2.TypRes	.8790765	.0526083	-2.15	0.031	.7817837	.9884774
Provinces						
1	.7483177	.073032	-2.97	0.003	.618035	.9060641
2	.8052259	.0483883	-3.60	0.000	.7157587	.9058762
3	.1717489	.0145169	-20.84	0.000	.1455282	.2026939
4	.365855	.028279	-13.01	0.000	.3144234	.4256994
5	.1152428	.0145175	-17.15	0.000	.0900295	.1475171
WomEdu						
1	.8567577	.065742	-2.01	0.044	.7371271	.9958036
2	.7183804	.0618833	-3.84	0.000	.6067776	.85051
3	2.276621	.2166062	8.65	0.000	1.889315	2.743325
1.MigStat	1.427552	.1943843	2.61	0.009	1.093169	1.864219
1.SexHHH	1.230654	.101578	2.51	0.012	1.046834	1.446752
WealthStat						
1	.602723	.0412203	-7.40	0.000	.5271134	.6891781
2	.3197631	.0251284	-14.51	0.000	.2741177	.3730093
HusEdu						
1	.8341191	.059259	-2.55	0.011	.7256972	.9587397
2	.6835403	.0430158	-6.05	0.000	.6042229	.7732697
3	.5804505	.048784	-6.47	0.000	.4922955	.6843912
1.PreChild	.8439157	.0447638	-3.20	0.001	.7605868	.9363741
1.Workfeild	1.599827	.1023282	7.35	0.000	1.41133	1.813501
Womenage						
2	1.553247	.2184782	3.13	0.002	1.178993	2.046302
3	2.278614	.3186835	5.89	0.000	1.7323	2.99722
4	2.125822	.3042625	5.27	0.000	1.60582	2.814211

```
. codebook  TypRes
```

```
TypRes                                                Type of place of residence
```

```
                type:  numeric (double)
               label:  TypRes

               range:  [1,2]                        units:  1
        unique values:  2                       missing .:  0/13558

          tabulation:  Freq.   Numeric  Label
                        6351         1  Urban
                        7207         2  Rural
```

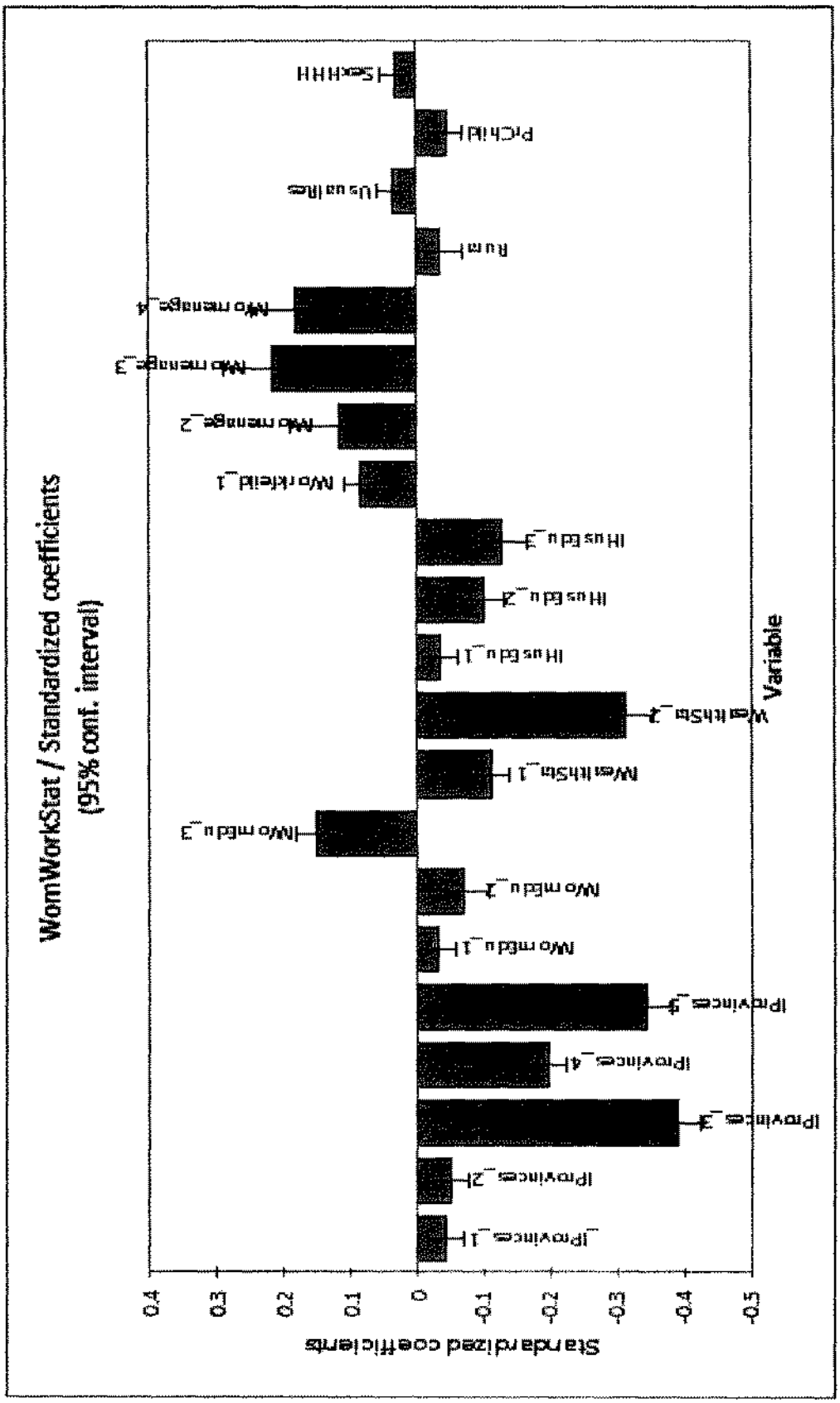
```
.
```

```
. logit  WomWorkStat i. TypRes,or

Iteration 0:   log likelihood = -6802.9911
Iteration 1:   log likelihood = -6757.9377
Iteration 2:   log likelihood = -6757.7636
Iteration 3:   log likelihood = -6757.7636

Logistic regression                                     Number of obs     =      13558
                                                        LR chi2(1)        =      90.45
                                                        Prob > chi2       =     0.0000
Log likelihood = -6757.7636                             Pseudo R2         =     0.0066
```

WomWorkStat	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
2.TypRes	1.511143	.0661383	9.43	0.000	1.386918	1.646494


WomWorkStat / Standardized coefficients
(95% conf. interval)
Standardized coefficients
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
Variable
_IProvInces_1
IProvInces_2
IProvInces_3
IProvInces_4
IProvInces_5
IWo rmEd u_1
IWo rmEd u_2
IWo rmEd u_3
IWeIthSta_1
IWeIthSta_2
IH usEd u_1
IH usEd u_2
IH usEd u_3
IWo rkfield_1
IWo rmenage_2
IWo rmenage_3
IWo rmenage_4
Rurm
Us ualHes
PrCh ild
SexHH

Multicolinearity statistics:

Statistic	Provinces	TypRes	WomEdu	HasTv	MigStat	NoHHMem	PreChild	SexHHH	HasTele	WealthStat	HusEdu	WomWorkStat	Workfeild	Womenage
R^2	0.220	0.353	0.449	0.360	0.151	0.189	0.228	0.034	0.192	0.592	0.364	0.087	0.092	0.171
Tolerance	0.780	0.647	0.551	0.640	0.849	0.811	0.772	0.966	0.808	0.408	0.636	0.913	0.908	0.829
VIF	1.282	1.546	1.815	1.563	1.178	1.232	1.296	1.035	1.238	2.452	1.572	1.095	1.101	1.206

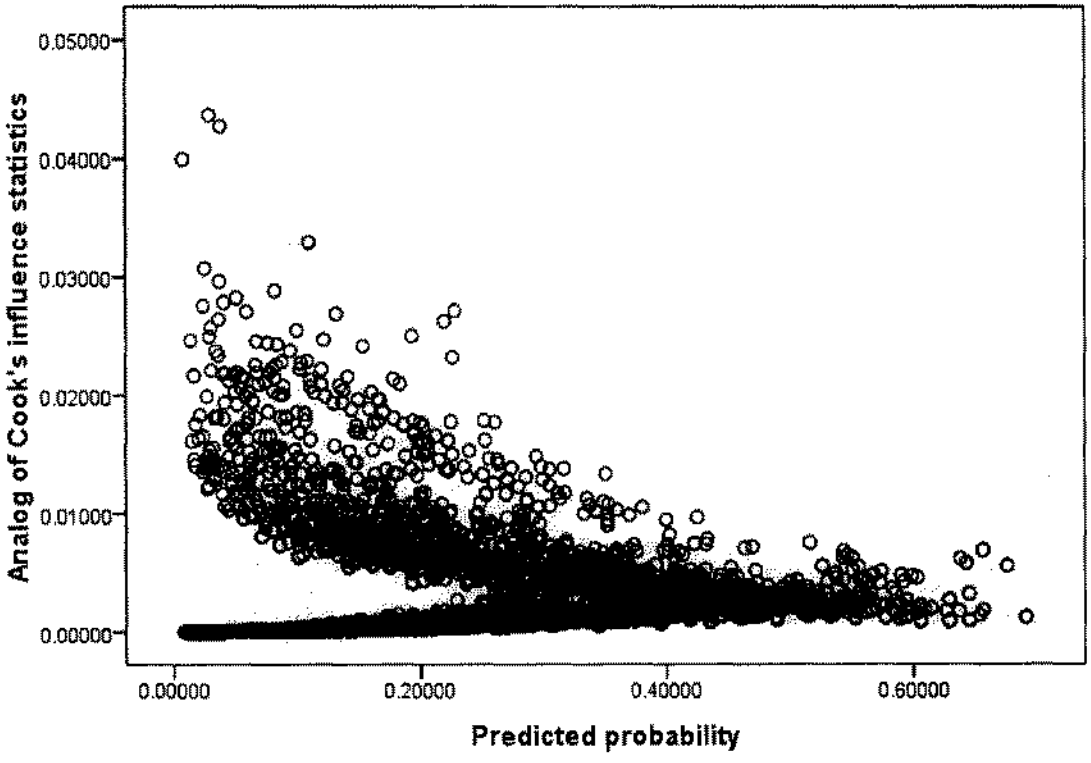
Correlation matrix

Variables	Provinces	TypRes	WomEdu	HasTv	MigStat	NoHHMem	PreChild	SexHHH	HasTele	WealthStat	HusEdu	WomWorkStat	Workfeild	Womenage
Provinces	1.000	-0.026	-0.168	-0.108	0.120	0.167	0.093	-0.066	-0.004	-0.278	-0.039	-0.171	0.001	-0.028
TypRes	-0.026	1.000	-0.359	-0.358	0.019	0.021	0.092	0.028	-0.245	-0.532	-0.269	0.081	0.233	-0.069
WomEdu	-0.168	-0.359	1.000	0.323	-0.063	-0.099	-0.043	-0.007	0.355	0.529	0.539	-0.062	-0.169	-0.116
HasTv	-0.108	-0.358	0.323	1.000	0.232	0.004	-0.074	-0.026	0.231	0.531	0.296	-0.056	-0.126	0.078
MigStat	0.120	0.019	-0.063	0.232	1.000	-0.078	0.082	-0.030	0.069	-0.034	-0.023	0.009	0.013	0.107
NoHHMem	0.167	0.021	-0.099	0.004	-0.078	1.000	0.332	-0.144	0.002	0.008	-0.010	-0.068	0.050	-0.105
PreChild	0.093	0.092	-0.043	-0.074	0.082	0.332	1.000	-0.066	-0.052	-0.114	-0.036	-0.037	0.027	-0.330
SexHHH	-0.066	0.028	-0.007	-0.026	-0.030	-0.144	-0.066	1.000	-0.024	-0.002	0.009	0.012	-0.077	0.039
HasTele	-0.004	-0.245	0.355	0.231	0.069	0.002	-0.052	-0.024	1.000	0.335	0.317	-0.051	-0.092	0.075
WealthStat	-0.278	-0.532	0.529	0.531	-0.034	0.008	-0.114	-0.002	0.335	1.000	0.467	-0.135	-0.209	0.068
HusEdu	-0.039	-0.269	0.539	0.296	-0.023	-0.010	-0.036	0.009	0.317	0.467	1.000	-0.133	-0.177	-0.054
WomWorkStat	-0.171	0.081	-0.062	-0.056	0.009	-0.068	-0.037	0.012	-0.051	-0.135	-0.133	1.000	0.132	0.073
Workfeild	0.001	0.233	-0.169	-0.126	0.013	0.050	0.027	-0.077	-0.092	-0.209	-0.177	0.132	1.000	0.025
Womenage	-0.028	-0.069	-0.116	0.078	0.107	-0.105	-0.330	0.039	0.075	0.068	-0.054	0.073	0.025	1.000

Diagnostic Tests Results for Logistic Regression Analysis

	N	Minimum	Maximum	Mean	Std. Deviation
Predicted probability	13558	.00730	.69105	.2010032	.13934364
Analog of Cook's influence statistics	13558	.00000	.04367	.0016383	.00327336
Leverage value	13558	.00024	.00903	.0016228	.00093539
DFBETA for Provinces(1)	13558	-.01462	.00286	.0000000	.00111285
DFBETA for Provinces(2)	13558	-.01592	.00750	.0000000	.00136461
DFBETA for Provinces(3)	13558	-.01437	.00282	.0000000	.00110825
DFBETA for Provinces(4)	13558	-.01398	.00688	-5.9771951E-10	.00121025
DFBETA for Provinces(5)	13558	-.01385	.00453	.0000000	.00113952
DFBETA for TypRes(1)	13558	-.00391	.00313	-4.2589823E-9	.00050460
DFBETA for WomEdu(1)	13558	-.00735	.00609	.0000000	.00084648
DFBETA for WomEdu(2)	13558	-.00633	.00807	.0000000	.00090088
DFBETA for WomEdu(3)	13558	-.00537	.00660	.0000000	.00085239
DFBETA for MigStat(1)	13558	-.00840	.01744	-3.1360586E-8	.00121809
DFBETA for PreChild(1)	13558	-.00218	.00238	.0000000	.00045427
DFBETA for SexHHH(1)	13558	-.00619	.00425	.0000000	.00071415
DFBETA for WealthStat(1)	13558	-.00640	.00487	-8.0147955E-10	.00067777
DFBETA for WealthStat(2)	13558	-.00440	.00447	.0000000	.00067568
DFBETA for HusEdu(1)	13558	-.00548	.00477	-1.4364042E-8	.00071268
DFBETA for HusEdu(2)	13558	-.00488	.00716	-8.6929339E-9	.00079079
DFBETA for HusEdu(3)	13558	-.00451	.00430	-6.9870662E-9	.00067576
DFBETA for Workfeild(1)	13558	-.00424	.00250	.0000000	.00054131
DFBETA for Womenage(1)	13558	-.00841	.01845	.0000000	.00120539
DFBETA for Womenage(2)	13558	-.00296	.00295	-1.6298231E-9	.00057126
DFBETA for Womenage(3)	13558	-.00271	.00248	-3.5449305E-10	.00052251
Valid N (listwise)	13558				

Scatter Plot for Diagonastic Checking for Logistic Regression Analysis



Scatter Plot for Diagonastic Checking for Logistic Regression Analysis