Determinants of Time Allocation Decision to Labor Market and Non-Market Work in Pakistan

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NATIONAL UNIVERSITY OF MODERN LANGUAGES
ISLAMABAD

September, 2021

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MS., International Islamic University Islamabad, 2015

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF

THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

In **Economics**

To

FACULTY OF MANAGEMENT SCIENCES

NATIONAL UNIVERSITY OF MODERN LANGUAGES, ISLAMABAD

IN THE NAME OF ALLAH

THE MOST MERCIFUL AND GRACIOUS

ALL PRAYERS BE TO ALLAH

NATIONAL UNIVERSITY OF MODERN LANGUAGES FACULTY OF MANAGEMENT SCHCIENCES

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Thesis Title: Determinants of Time Allocation Decision to Labor Market and Non-Market Work in Pakistan

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ABSTRACT

Thesis Title: Determinants of Time Allocation Decision to Labor Market and Non-Market Work in Pakistan

Time allocation to the paid market work and unpaid non-market work has an important impact on the development process of the country. The labor market of Pakistan is quite complex and faces a number of enormous odds. On one side, females in our country face a number of socio-economic and cultural problems that hinders their way to join the paid labor market work. On the other side, participation of males to the labor market has been gradually shrinking in the recent past. As far the non-market is concerned, a large number of females in our country are involved in a number of unpaid household activities. But, their valuable services in the production of household commodities are never recognized at the individual, societal and national level. Therefore, this thesis analyzes the determinants of time allocation to the paid labor market work and unpaid non-market work in Pakistan. The time allocation behavior of males and females is examined with respect to selected social, economic, and demographic variables by using the cross-sectional data from the Pakistan *Labor Force Survey (2017-2018).* Logit, probit, OLS, tobit, and instrumental variable techniques are applied for the sake of analysis. The important findings of the study suggested that age has a positive and age square has a negative relationship with the number of hours allocated per week to both paid labor market work and unpaid non-market work. Both educated males and females allocate relatively lesser time to the labor market work as compared to their uneducated counter parts. In case of non-market work, educated females allocate relatively lesser number of hours per week to housework and household agricultural work but relatively more number of hours per week to the child work. Empirical results of marital status provided evidence that both married males and females allocate more time to the labor market work. Similarly, married females allocate more time to both housework and child work. Presence of small children in the family has a positive relation with time allocation of males to the labor market work but negative relation for females. However, females having small children in the family allocate more time to the non-market activities. The results indicate that males from larger household size and joint families allocate more time per week to the labor market work and negative for females. For non-market work, a negative association exits between joint family system and time allocation to the housework and household

agricultural work. On the other hand, females from joint families allocate more time to the child work. Males and females from all occupational categories allocate relatively lesser time to the labor market work as compared to their counterparts from elementary occupation. Similarly, males and females from Sindh, KPK, and Baluchistan have a lower LFP and time allocation to the paid market work as compared to that of Punjab. However, females from Sindh, KPK, and Baluchistan allocate more time per week to the non-market activities as compared to the Punjab.

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LIST OF ABBREVIATIONS

LFS	Labor Force Survey
IV	Instrumental Variable
FLFP	Female Labor Force Participation
MLFP	Male Labor Force Participation
LFP	Labor Force Participation
OLS	Ordinary Least Square
FBS	Federal Bureau of Statistics
ILO	International Labor Organization
PSUs	Primary Sampling Units
SSUs	Secondary Sampling Units
KPK	Khyber Pakhtunkhwa
HHS	Household Size

ACKNOWLEDGEMENT

At first, all the honor and glory be extended to the ALLAH (SWT), for His help and guidance and encouragement which enabled me to complete my work despite many difficulties. Then I would like to devote a special thanks to my supervisor Dr. Amtul Hafeez, who always felt concerned over the thesis quality. I am thankful for her valuable critiques, helpful comments, and constant encouragement throughout the study. I have the honor to have been under her supervision.

I am also grateful to HOD, Dr. Malik Saqib Ali for providing the facilities, which helped in completion of my thesis. I would like to extend thank you to Dr. Lubna Shahnaz Umer on providing valuable guidance and support during the critical phase of my research work.

I am also thankful to other faculty members for their help and encouragement, Dr. Hidayat Ullah Khan, Dr, Sabahat Subhan, Dr. Saima Shafique, Dr. Zakia Batool, Azra Nasir, Shabna Kauser, Noor Fatima, Saba Bukhari, Naeem Ahmed, Muhammad Sohail, Zahid Mehmood Akhtar, Amir Mustafa, Dr. Muammad Mansoor Ali and Muhammad Akbar.

Further, I would like to appreciate my parents and family for always being there as pillars of support, picking me up when times were rough. My research would not have been possible without the love, prayers, and support of my parents. I will forever be grateful to them.

A special thanks to my friends (Marzia Zaidi, Kalsoom Fatima, Tehmina, Dr. Mahnoor and Nazish) for sharing their experiences and giving valuable suggestions. I will definitely miss them all as they become a part of my pleasant memories forever.

DEDICATION

TO MY MOTHER

CHAPTER 1

INTRODUCTION

The study of time allocation behavior of individual, household, and society has been an important matter of concern in last few decades among economists. Time that household members spend on different activities is divided into two main categories i.e., number of hours allocated in a given week to the labor market work and number of weekly hours allocated to the non-market work. Labor market work includes all those activities for which labor market workers are generally paid. However, non-market work includes all those activities that are done for the purpose of maintaining a home and they are mostly unpaid (Shelton & John, 1996). These unpaid non-market activities are divided into a number of different categories such as housework, child work, care of household members, and household agricultural activities (Kabeer, 2008, Hirway, 2015; Singh & Pattanaik, 2021).

Originally, the subject of allocation of time to market work has received substantial attention resulting into a production of a wide variety of knowledge regarding the time allocation behavior of the household. In contrast, time spent on non-market activities i.e., unpaid housework, childcare, and household agricultural work has largely been ignored, and as a result little is known regarding the time allocation behavior of the adult household members within the home (Poza, Schmid & Widmer, 2001; Malathy, 1994). According to study concluded by Tameen & Desta (2015), little attention is diverted to analyze the time allocation behavior of household members to nonmarket work by researchers.

The approach of “new home economics” is the first mild stone that has enabled economists to understand the non-market part of time allocation. The time which is not used in the market work is allocated to the household production (Becker, 1965). Thus, it is the urgent need of the time to analyze and understand the factors and patterns of both the market as well as non-market allocation of time.

Understanding about the individuals' behavior of allocation of their time to the market and out of the market is thus crucial for increasing our knowledge about the dynamics of economic change and welfare. Time allocation studies are currently being used to evaluate the impact of changes in socioeconomic and demographic variables on the behavior of household members to the market and non-market activities. This helps in understanding the behavior of males and females towards market and non-market work (Khandker, 1987; Juhn and Potter, 2006).

The role of male's and female's participation and time allocation to labor market work is important for the economy because of the significant backward as well as forward linkages. In case of backward linkages, when growth is seen in the labor market it leads to growth of different sectors like education and training that play important role in development of labor force of a country. As a result, these strong backward linkages play an imperative part in creation of labor supply along with generation of employment opportunities for both skilled as well as unskilled individuals. Forward linkages prevail when the labor market development leads to the development of those sectors that employ the labor force resulting into generation of demand for labor force. As a result, significant improvement is seen in the per capita income and standards of living along with raising level of output and production. Thus, raising the overall level of economic development of the country.

According to the report of International Labor Organization, Pakistan has one of the world's ninth largest labor force (ILO, 2019). Males being a bread earner are more involved in labor market. Labor market workers are vital component of production process in a country. It is not possible for employers to undertake production without employing workers and to generate income. Therefore, the time that workers allocate to the labor market can be viewed as an essential economic resource and it should be optimized. The rewards that workers obtain from allocating time to the market work can be used for the individual, household, and national development. According to the World Bank report, males' labor force participation rate is 81.72 percent by 2020. Inspite of being in the list of world's largest labor force, males in labor market of our country are facing a number of difference challenges and issues. These are in the form of lack of employment opportunities, unsafe working conditions, bonded labor, wage inequality, and violation of labor laws to name a few. Therefore, this study identifies and analyzes the

different socioeconomic and demographic factors that influence the male's participation and time allocation to the labor market work (Rashed, Lodhi & Chishti, 1989; Azid, Aslam & Chaudhary, 2001; Hafeez & Ahmed, 2002, Klasen, 2019).

In a developing country like Pakistan where people have a strong social-economic and cultural beliefs, non-market factors also play more significant role in addressing the importance of proper time allocation. Social norms like patriarchy and purdah and economic constraints like unemployment, low wages, lack of proper training and relevant education affect the individual's decision to work inside or outside the home (Sultan, Nazli, Malik & Kazi, 1994; Field & Vyborny, 2014). These social and cultural constraints are the main hindrance towards female's participation and time allocation to activities outside their home (Khan et al., 2020). As a result, a sizable portion of population does not contribute to the development process of the country. As we know that one of the drivers of country growth and development is the FLFP (Verick, 2014). More than fifty percent of the total population of Pakistan is of females, so, it is the demand of time to evaluate their role and contribution not only in the home but also in the market and hence in the development of Pakistan (Ejaz, 2007).

Non-market work like cleaning houses, food preparation, childcare, shopping, construction, management and clothing care etc. are performed by all family members. However, females whether employed or unemployed perform majority of household work as compared to the male members of the family (Tasnim, 2020). The contribution of males in household activities is just a drop in the ocean (Murphy, 1976). A typical behavior prevailing in many developing countries is that females are normally considered inferior to males. They are considered appropriate to look after their children and to perform the household activities without any reward. They are given less chance to allocate some of their time to the productive market work and contribute in household development.

The development of "new home economics" provides an insight towards understanding the behavior regarding allocation of time by household members to activities within the home. Although every one of us know that the unpaid care work is also vital part for the smooth functioning of the economy but still it is treated as the part of non-economic labor by United Nations System of National Accounts of 1993 (UN-SNA). In a developing country like Pakistan where majority of the females are engaged in unpaid household work. Because public

infrastructure fails to provide them basic needs. Besides this, many of the traditional and cultural constraints may confine females to the household domain.

In fact, one of the important sources of support and comfort in daily life of people comes in the form of this unpaid household work performed by some family members. People cannot live comfortable life as an individual and as a society without having provision of these household services (Mazurkiewicz, 2016). No one disputes over the fact that household produces different commodities like healthy meals, well maintained homes, and cleaned clothes that contribute towards the health and well-being of household individuals (Stratton, 2020). According to modern household economics, the time of households is a crucial factor of production. Moreover, it is the dominant resource of production for poor households. Thus, we cannot say that the household services provided by household female member are value free (Gronau, 1977).

There are many personal, social, and economic factors that investigate the time allocation decisions of both males and females. The complexity of these factors varies from the individual to the aggregate level. These factors are mainly age, gender, household size, education, and residential province. Human capital in the form of educated males and females can help to determine the time allocation decision. It is found that education level of males and females is the main determinant at the individual level that determines the time allocation decision to the market and as well as to the non-market production. At the aggregate level, there are many social, cultural, demographic and normative factors responsible for the time allocation decision. These individual, social and economic factors are responsible for the individual and household decision about whether to join the labor force or not and help in allocation of their time for market and non-market activities (Bloemen & Stancanelli, 2010; Gbemisola & Ayo, 2014; Amarante & Rossel, 2018).

1.1. Significance of the Study

Labor market workers are vital component of production process in a country. It is not possible for employers to undertake production without employing workers and to generate income. Therefore, the time that workers allocate to the labor market can be viewed as an essential economic resource and it should be optimized. The rewards that workers obtain from allocating time to the market work can be used for the individual, household, and national development.

Therefore, labor market participation and time allocation by both males and females have an important contribution in the-socio economic development of the country. Labor market behavior is assessed by labor force participation and time allocation of individual workers. Information regarding work force and labor market work is essential for the economy as the efficient operation of labor market depends on the quality labor market intelligence (Che & Sundjo, 2018; Espino et al., 2017; Lee et al., 2008). The labor market in Pakistan is really complex and faces enormous odds (Khadim & Akram, 2013; Andlib & Khan, 2018; Kanwal et al., 2019). To understand work, it is imperative to acknowledge and value both paid market work as well as unpaid non-market work (Kimhi & Rapport, 2004; Hallberg & Klevmarken, 2003).

The approach of New Home Economics is the first mild stone that has enabled economists to understand the non-market part of time allocation. The time which is not used in the market work is allocated to the household production (Becker, 1965). Thus, it is the urgent need of the time to analyze and understand the factors and patterns of both the market as well as non-market allocation of time. Particularly owing to the prevailing socio-cultural norms, women have to be engaged in an array of unpaid domestic chores, besides labor force participation for paid gains. Subsequently, the dual crisis keeps on lurching and a large number of qualified and skilled potential female workers are kept at bay. This doesn't mean that male have an unhindered access to the labor market as the labor force participation of male has been gradually shrinking in the recent past (Kanwal et al., 2019).

The research on unpaid non-market work is conducted because household production is also an important pillar of every economy that must be investigated as an important part of research work. Household production generates valuable services that contributes to the wealth

of the nations along with economic welfare and well-being of the household (Craig, 2017). It is an important component of daily life for most people. It is an important resource for the economic activity and is directly related with the living standards. Although every member of the house participate in unpaid household activities but females bear the brunt of this burden in form of housework, child work and household agricultural work (Hochschild and Machung, 2012). However, unfortunately contributions of females in the household sector are often undervalued and unappreciated that leads to underestimates economic well-being (Stratton, 2012; Febrianty, 2016). Yet because it is conducted outside the market, unpaid non-market work is largely invisible to conventional economic accounting. We cannot say that unpaid domestic work is associated only to family or personal matters. The outcome and advantages of unpaid household activities spread to the whole society for the reason that successful functioning of the society rely not only on the market work but also on the unpaid work and family care (Fineman, 2004). The personal, social, and economic importance of unpaid domestic work is not only what is worth in financial terms, but also in terms of allocated to the activities that brings comfort to the human beings (Craig, 2017).

Therefore, main purpose of this study is to determine the key factors which determine the probability of participation and allocation of time to market and non-market activities in Pakistan.

1.2. Problem Statement

In the last few decades, estimation of the determinants of time that is allocated to market and especially non-market activities performed by males and females has been an important matter of study among the economists. The statistics of labor force participation (LFP) shows that the female's and male's participation rate in the labor force is 22.8% and 81.1% respectively in Pakistan (Pakistan Bureau of Statistics [PBS], 2018). However, with comparison to other South Asian countries, Pakistan FLFP comes under the list of lowest LFP. It is observed that female's labor force participation rate is about 82 percent in Nepal, 61 percent in China, 36 percent in Bangladesh, 21 percent in India, and 22 percent in Afghanistan. Pakistan has second lowest female LFP rate in the region (World Bank, 2019).

Over the last few decades, the overall LFP of Pakistan remains confined between 49 to 51.9 percent from 1971-1972 to 2017-2018. This implies that 48.1 percent of the population of our country is out of labor force. Further, it has been observed that the participation of males in the labor force show a declining behavior from 88.5 percent in 1971-1972 to 81.1 percent in 2017-2018. On the other hand, a rising trend is observed in the labor force involvement of females from 9 percent in 1971-1972 to 22.8 percent in 2017-2018. It means that 19.9 percent males and 78.2 percent females are economically inactive (ILO, 2019). These statistics present a depressed picture of females participating in economic activities as compared to that of males.

The conservative picture of our society adds to this economic activity rate. It is customary practice in our society that after getting marriage, raising children and doing household chores are considered a key role of women. They are relatively less motivated to spend their time to the paid market work. And this lower activity rate of females is considered as main hurdle in the labor force contribution towards the productivity and growth of the economy and a proper attention is required for the improvement of this rate (Ejaz, 2007).

As far the unpaid non-market work is concerned, females are more involved in domestic chores and care work. Unfortunately, we do not see any country in the world where males are more involved in domestic chores and care work in contrary to females. Out of the total unpaid domestic work and care work, around 75 percent is done/performed by females. Worldwide, females are involved nearly 2.5 times more in unpaid domestic and care work as compared to males (United Nations, 2016). At the regional level, the situation of unpaid household work and care work is more equal in developed countries. Females in developed countries allocate up to 4 hours per day on these unpaid household activities as compared to the 2 hours per day by males. However, the worst situation of time allocation to unpaid household activities is recorded for the Northern Africa and Western Asian countries, where females allocate about 4 hours per day in contrast to 54 minutes per day by males (United Nations, 2020). Therefore, we can say that worldwide, females allocate more hours to the unpaid domestic chores and care work as compared to males.

When it comes to Pakistan, according to the report of UN Women's flagship 'Progress of the World's Women (2019-2020), females in our country allocate up to 11 hours per day more on the unpaid domestic work and care as compared for every one hour of male. As compared to

Pakistan, females in Egypt and Oman allocate up to 9 hours and 2.5 hours on unpaid domestic work and care work for each 1 hour of males. According to Arshad, Khanum & Saeed (2008), the estimated economic value of various household chores in a single urban and rural household is US $800 per year and US $430 per year respectively. These statistics represents the economic value of unpaid household tasks and the importance of females' non-market work in daily life. Despite of these valuable contributions, female's participation as well as their time allocation to unpaid non-market work is significantly ignored and undervalued in academic level as well as in national accounts in Pakistan. Therefore, this study will fill this gap in literature by drawing the attention towards the determinants of time allocation to both paid labor market work and unpaid household work in Pakistan.

The statistics of LFS (2017-2018) by employment status show that majority of the females (i.e., 51.9 percent) are working as unpaid family workers as compared to only 12.9 percent males. The total amount of this unpaid household work is excluded from economic accounting, resulting into under estimation of females' contribution towards the economy. There are many socio-economic and demographic factors behind this unequal distribution of burden of household work. Despite their valuable contribution in making the house heaven, their contributions are rarely recognized at the household as well as at national level (Khandker, 1987; Singh & Pattanaik, 2021). The introduction of "new home economics" diverted the attention of the researchers towards the role of females in unpaid household work.

The study of structure and trends in the paid labor market and unpaid non-market work has received significant attention in recent years from policy makers for a number of reasons, which attracted attention towards the factors affecting the decision of participation and time allocation in number of weekly hours to these paid and unpaid activities (Khandker, 1987; Kimmel & Connelly, 2007). An understanding of behavior of males and females towards market work guides planners to understand and forecast the impact of various government policies and changing economic conditions on the level of employment. Determination of time allocation behavior of individual decision makers can help to determine the productivity level and income generation. In addition, the study of time allocation behavior to the labor market work provides essential knowledge on relative economic returns to human capital in different divisions of the economy (Kozel & Alderman, 1990). Household production is playing an imperative part in

household economy and the economy of country. The time of household members allocated to the household care economy also leads to save the household resources. The analysis of time allocation behavior of household members determines the economic value of their time. Moreover, the analysis of the time allocation behavior of females to the unpaid non-market activities may help in estimating the economic values of females' time in the national accounts (Kimhi & Rapport, 2004; Hallberg & Klevmarken, 2003).

A lot of studies have been conducted in respect of market and non-market in many developed and developing countries like USA, Japan, Sweden, India, and china (Kimhi & Rapport, 2004; Hallberg & Klevmarken, 2003; Khandker, 1988; Evenson, 1978; Miller & Mulvey, 2000; Bianchi, Milkie & Sayer, 2000; Aronsson, Daunfeldt & Wikstrom, 2001; Sayer, Bianchi & Robinson, 2004; Anxo & Carlin, 2004; Kimmel & Connelly, 2007; Nadal & Sevilla, 2012). But no remarkable study regarding the subject has been done so far in Pakistan. Most of the studies analyzed the impact of economic reforms and other variables with relation to the time allocation (Siddiqui, 2005). Some studies like Sultana et al. (1994), Harold and Chishti (1991), Kozel and Alderman (1990) studied the determinants of time allocation of females to unpaid household work but in selected districts. The present study will fill this gap by examining the determinants of time allocation for both of males and females to the labor market work. In addition, this study also analyzes the determinants of non-market activities of females in Pakistan.

Therefore, the main objective of this study is to investigate the magnitude and direction of several key factors affecting the participation decision and allocation of time. It is observed that participation or time allocation decision to the labor market work and non-market work is a binary variable. The allocation of time indicates hours of work allocated on a weekly basis to labor market work and non-market activities for males and females. The data used in this study is obtained from Pakistan *Labor Force Survey (LFS) 2017-2018* using the sample of males and females of age between 15-64 years for the market work. The sample for non-market work consists of females of age 10-64 years.

1.3. Research Objectives of the Study

Research questions related to the time allocation to the labor market work and non-market work are given in this section.

1.3.1. Time Allocation to Labor Market Work

This section is divided into two parts. The first section addresses the objectives, research questions and hypothesis related to the determinants of participation or time allocation decision of males and females. The second section addresses the objectives, research questions and hypothesis of time allocation in terms of number of weekly hours to labor market work.

a). Labor Market Participation Decision

Objectives

The objective of this section of the study is:

1. To find out the determinants of gender based i.e., male and female labor market force participation decision.

Research Questions

One of the most important objectives of the study is to examine the main factors that are affecting the labor market participation decision of the males and females. So, the main research question is:

1. What are the main factors that determine the participation decision of males and females in the labor market?

Hypotheses

These research questions lead towards the formulation of following hypotheses.

Hypothesis-1. Individual characteristics have no effect on labor market participation or time allocation decision of the males and female.

Hypothesis-2. Household characteristics have no effect on the labor market participation or time allocation decision of males and females.

Hypothesis-3. Residential characteristics have no effect on the labor market participation or time allocation decision of males and females.

b). Hours of Time Allocation to Labor Market Work

This section addresses the determinants of hours of time allocation of males and females to the labor market work.

Objectives

The objective of this section of study is:

1. To find out the determinants of male's and female's time allocation in terms of number of hours allocated to the labor market work.

Research Questions

The main research question is:

1. What are the important factors that determine the time allocation of males and females in terms of hours allocated to the labor market work?

Hypotheses

These research questions lead towards the formulation of following hypotheses.

Hypothesis-1. Individual characteristics have no effect on the number of hours per week allocated to the labor market work by males and females.

Hypothesis-2. Household characteristics have no effect on the number of hours per week allocated to the labor market work by males and females.

Hypothesis-3. Occupational categories have no effect on the number of hours per week allocated to the labor market work by males and females.

Hypothesis-4. Residential characteristics have no effect on the number of hours per week allocated to the labor market work by males and females.

The explanatory variables include personal characteristics, dummies for the occupation categories, household characteristics, and residential characteristics of males and females.

Personal characteristics like age and age square are one of the important determinants of time allocation of males and females to the labor market work. It is expected that participation and time allocation per week to the labor market increases with the increase in age. This may decline at later years of their lives due to deteriorating health conditions.

Another important personal determinant of participation and time allocation is the education of males and females. By keeping wages constant, it is expected that time allocation to the labor market work tends to increase with the increase in the level of education if the opportunity cost of staying at home increases. This is so because, highly qualified males and females have more attraction to the paid labor market work and thus may allocate more time to the labor market in contrary to those having no formal level of education (Espino, Isabella, Leites & Machado, 2017; Faridi & Rashid, 2014). On the other side in case of females, if the education increases productivity at home production, then they prefer housework to that of paid labor market work (Khandker, 1988).

Marital status also plays a vital role in the determination of time allocation to the labor market work. It is expected that both married males and married females spend more of their time to the labor market work in contrast to their unmarried counterparts in order to meet the financial needs of the growing family (Gitter, 1982; Shaheen, Shabir, Faridi & Yasmin, 2015).

Household characteristics like presence of younger children, household size and joint family system are also important determinants of participation and time allocation of males and females to the labor market work. It is expected that males participate and allocate more amount of their time to the labor market work with each additional small child in the family in order to fulfill the financial needs of the growing family. However, females are expected to participate and allocate lesser amount of their to the labor market work with each additional small child in the family due to increased responsibility of the rearing of children (Gitter, 1982; Meghir et al., 1989; Naqvi, Shahnaz & Arif, 2002; Shapiro & Shaw, 1983; Meghir, Ioannides & Pissarides, 1989).

Time allocation to the labor market work is also expected to be affected by the household size and joint family system. It is expected that males from the larger household size and joint family system are expected to allocate more of their time to the labor market work in order to share the increased financial burden of more members present in the larger household size and

joint family system (Fairidi, Chaudhry & Anwar, 2009; Shaheen, Sial & Awan, 2011). However, females from larger household size and living in joint family system are expected to allocate fewer hours to the labor market work (Knawal, Ahmad, Arshed & Gulzar, 2019). One reason of this may be the presence of helping hands in the form of other working members in the larger household size and joint families. Another reason may be the increased burden of household chores for females in larger families. As far as residential location is concerned, three provincial dummies of Sindh, KPK, and Baluchistan are to be used in this study. Punjab is set as a base category in this case.

1.3.2. Time Allocation to Non-Market Work

This section of the study is also divided into two parts. The first part of this section addresses the objectives, research questions, and hypothesis to explain the participation decision. And, the second part presents the objectives, research questions and hypothesis of the time allocation of females to the non-market work.

a). Participation Decision to Non-Market Work

Objectives

There are following main objectives of this part of study:

1. To find out the factors that affect the participation or time allocation decision of females for housework.
2. To find out the factors that affect the participation decision or time allocation of females for child work.
3. To find out the factors that affect the participation or time allocation decision of females for household agricultural work.

Research Questions

The above objectives lead towards the construction of following research questions of the study.

1. What are the main factors that affect the participation or time allocation decision of females for housework?
2. What are the main factors that affect the participation or time allocation decision of females for child work?

3. What are the main factors that affect the participation or time allocation decision of females for household agricultural work?

Hypothesis

Therefore, following hypotheses are developed on the base of above research questions.

Hypothesis-1. Individual characteristics have no effect on the female's participation or time allocation decision to the housework, child work, and household agricultural work.

Hypothesis-2. Household characteristics have no effect on the female's participation or time allocation decision to the housework, child work, and household agricultural work.

Hypothesis-3. Residential characteristics have no effect on the female's participation or time allocation decision to the housework, child work, and household agricultural work.

b). Hours of Time Allocation to Non-Market Work

Objectives

There are following three main objectives of this part of study:

1. To find out the determinants that affect the number of hours allocated per week to housework by females.
2. To find out the determinants that affect the number of hours allocated per week to child work by females.
3. To find out the determinants that affect the number of hours allocated per week to household agricultural work by females.

Research Questions

The above objectives lead towards the development of following important research questions of the study:

1. What are the important factors that determine the time allocation of females in terms of hours to the housework?
2. What are the important factors that determine the time allocation of females in terms of hours to the child work?

3. What are the important factors that determine the time allocation of females in terms of hours to the household agricultural work?

Hypotheses

Therefore, following hypotheses are developed on the basis of the above research questions:

Hypothesis-1. Individual characteristics have no effect on number of hours per week allocated to the housework, child work, and household agricultural work by females.

Hypothesis-2. Household characteristics have no effect on number of hours per week allocated to the housework, child work, and household agricultural work by females.

Hypothesis-3. Residential characteristics have no effect on number of hours per week allocated to the housework, child work, and household agricultural work by females.

The explanatory variables include personal characteristics, household characteristics, and residential characteristics. An inverted u-shaped pattern is expected between age and age square with that of participation and time allocation of women to the unpaid non-market work. This is so because time allocation of females to the non-market work increases with the increase in age and reduces at later years of their lives due to deteriorating health conditions.

Education is also one of the most significant determinants of participation and time allocation of females to the unpaid non-market work. It is expected that educated females allocate lesser number of hours to the unpaid housework and household agricultural work with the rise in level of education in contrary to females having no formal education. This may be because, an increase in the education level may increase the efficiency of females to home production, resulting into reduction of their time on home production and consequently increases the time for the leisure (Khandker, 1988). However, positive relationship between education and number of hours to the child work is expected in this study, as educated mothers are more conscious about the education and upbringing of their children in perspective of future human capital development of their children as compared to the uneducated mothers.

As far marital status is concerned, married females are expected to participate and allocate more number of hours to the non-market work in contrary to unmarried females. This

may be due to females' traditionally increased burden of household chores and childcare activities after marriage.

Household characteristics like number of small children, household size, and joint family system are important determinants that influence the females' time allocation behavior to the unpaid non-market work. It is expected that females having small children in the family, belonging to larger household size and living in joint family system participate and allocate more time to the unpaid household work. Three provincial residential dummies of Sindh, KPK, and Baluchistan are constructed in this study for the analysis of female's behavior of time allocation to unpaid non-market work. Punjab is set as a base category in this case.

1.4. Contribution to the Literature

The issue of participation and time allocation of males and females to labor market work and non-market activities has not gained much attention of the researchers in Pakistan. In Pakistan, various studies have been conducted to highlight the determinants of participation decision of males and females to labor market work (Faridi & Basit 2010; Khadim & Akram, 2013; Hafeez & Ahmed, 2002). But no remarkable study has been conducted so far on investigating the determinants of hours of time allocation to labor market work. The detailed analysis of the time allocation behavior of males and females to the labor market has not been provided. Some other studies like (Shah, 1975; Kozel & Alderman, 1990; Sultana et al., 1994; Hafeez & Ahmed, 2002; Faridi & Basit 2010; Khadim & Akram, 2013; Andlib & Khan, 2018; Knawal et al., 2019) have investigated the subject. Most of these studies have focused on the participation or non-participation decision of females in labor market.

In case of non-market work, rarely any study is conducted so far in our country that has examined the factors affecting participation decision and time allocation in terms of hours to the unpaid household activities. Rarely any research has done in our country that has diverted the attention of the researchers and policymakers towards the significance of the role of females in home production (Sultana et al., 1994). In case of non-market work, Sultana et al. (1994) has limited her analysis to just three districts of Pakistan.

This study, for the first time, have done combined analysis regarding the determinants of participation decision to the paid market and unpaid non-market work, in detail, in Pakistan. In addition, this study, for the first time, has captured this research gap in literature and has presented an in-depth analysis of the participation as well as time allocation behavior of females to the unpaid household activities by categorizing household activities into housework, child work, and household agricultural work. A thorough analysis of the nature and composition of non-market activities is given in chapter 3. Moreover, this study has also examined the determinants of time allocation to the market and non-market work.

As far the methodology is concerned, previous literature has examined the determinants of participation by using either binary Logit or Probit techniques (Chishti et al., 1989; Hafeez & Ahmed, 2002; Hussain et al., 2016). Previous literature mainly neglected the endogeneity issue which may be present in labor market work models. This study tries to capture and resolve the endogeneity problem in this model. In this respect, this study uses appropriate estimation techniques in form of IV-Probit and IV-Tobit for capturing and resolving the endogeneity issue (Dildar, 2015).

In addition to the above-mentioned discussion, the datasets that are used in previous studies are either cross-sectional in nature or limited for one city or district of Pakistan or obtained through some surveys based on some non-random sample again about any one city or district by the researchers (Chishti et al., 1989; Sultana et al., 1994; Hafeez & Ahmed, 2002). This study is based on the random sample survey of data consisting of approximately 43472 households from all over the country.

In a developing country like Pakistan, government introduces different public policy programs from time to time with the intentions to improve the well-being of people. This study identifies determinants of males and females work patterns that provide help in the formulation of public policy programs (Kozel & Alderman, 1990). Since, more than half of the total population of Pakistan comprises of females. Their participation in the market production is a prerequisite condition for the economic and social development. Consideration of economic, social, and demographic factors that causes variations in the time allocation may lead to more successful policies regarding the development activities in a developing country (Khandker, 1988; Kozel & Alderman, 1990; Lee, Jang & Sarkar, 2008).

1.5. Organization of the Study

This thesis is organized as follows:

Chapter 2 gives a review of some of the important theories related to the labor supply and household work and relevant empirical studies at the national and international level. Chapter 3 provides methodology of the study. A detailed descriptive analysis and characteristics of the data used in the study are presented in chapter 4. The estimation results along with explanation are given in chapter 5 and chapter 6. Conclusion and policy implication of the study is given in chapter 7.

CHAPTER 2

REVIEW OF LITERATURE

2.1. Introduction

The basic purpose of this chapter is to overview the literature regarding the factors affecting and determining the labor force participation decision and the time allocation for various market and non-market activities. The causes and factors responsible for the different behavior of gender especially women towards the personal time allocation have come to be an interesting matter of research for the last few decades. We have seen a great number of studies on the time allocation to market activities, but very little is known on the subject of allocation of time for the non-market activities especially in context of Pakistan.

The analysis of time allocation to market and especially different non-market household activities like childcare reveals the value of time and importance of the activities which remain almost neglected. Time allocation to market and different household activities also provides information about the propensities and needs that tie people in the form of families. These families tie also influence their behavior. This study provides an insight about the different factors affecting and determining male's and female's time allocation along with participation to the different market and non-market activities in a developing country like Pakistan. In modern household economics, household's time is an important factor of production, especially for the poor households. The basic purpose behind time allocation to different household activities is to reduce the cost related to the production of household goods (Evenson, 1978; Alveraz & Miles, 2003; Kimmel & Connelly, 2007; Bruins, 2017). The analysis of labor market behavior play an important role in finding out factors that encourages the participation and allocation of time by individuals to the labor market and consequently raises the development of the labor market and economy (Lee et al., 2008; Ahmed & Hafeez, 2007; Das & Mishra, 2018; Batool. Tabassum & Saghir, 2019).

In this chapter, a review of literature is presented related to the time allocation and its determinants for the market and non-market activities. An overview of the literature is presented in section 2.2. Concluding remarks are given in section 2.3.

2.2. Review of Empirical Studies Related to Determinants of Time Allocation to Labor Market and Non-Market Work

This section presented a review of various international and national studies related to the determinants of participation and time allocation to market and non-market work. There exist a number of empirical studies that investigated the individual's decision of labor supply and the major determinants that are affecting the time allocation decision of individuals to the market and non-market work.

2.2.1. International Empirical Evidence on Labor Market Work

This section provides a review of international empirical literature on the labor market participation decision and time allocation behavior of household. Table 2.1 gives a review of international literature with regard to LFP and time allocation to the market work.

Table 2.1. Survey of the Literature Review Focusing on Labor Force Participation and Time Allocation at International Level

Name of the Study	Data Source	Sample	Methodology	Results
Gitter (1982)	*United States Census of Population*, 1970	394 males	Regression technique	• Wage has a positive and significant association with the LFP. • Married males have higher LFP as compared to the unmarried males. • Education has a negative relation with LFP of males.
Shapiro and Shaw (1983)	*National Longitudinal Surveys of Work Experience*, 1960s, 1970s	781 married females	OLS, probit model, and tobit model	• Variables such as wage, females having no kids, and married more than once have positive effect on the LFP and number of hours of work for the wife. • Husband's earnings, education, children of age 0-5 years have a negative effect on the LFP and number of hours of work of wife.
Behrman and Wolfe (1984)	Field survey data, Nicaragua, 1977-1978	3773 women	Probit model and OLS	• Presence of younger children has a weak effect on the LFP of females due to the presence of childcare alternatives like extended family in developing countries as compared to the developed. • Experience and schooling have a positive relation with the LFP of women. • Other income variable has a negative effect on the LFP of women especially in urban location.

Meghir et al. (1989)	*Greek Labour Force Survey,* 1981	2200 women	OLS, truncated maximum likelihood regression, probit model	• A strong non-linear relationship is found between age and participation and allocation of number of hours of women in labor force. • Education of female has strong positive relation with the participation and number of hours of work. • Young children have negative effect on the participation and number of hours of work. • Husband's occupational groups have a positive effect on the FLFP.
Nam (1991)	*Korean Population Censuses,* 1970 and 1980	1885 females	Logit model	• LFP is found to be higher among those females having middle education as compared to those having no education. • Females from lower economic status exhibited a higher probability of participation to labor market as compared to the females from higher status background.
Herr (1995)	1880 *Manuscript Census of Colorado*	411 women	Logit model	• Widowed women and living with family are negatively correlated with single women LFP. • Single women living in urban have a higher LFP. • Age has a positive relation with the single LFP. However, age square has a negative relation with single LFP. But both are found to be statistically insignificant. • Average wage rate of female has also a positive but insignificant relation with LFP of females. • However, in case of married women, LFP is found to be negative in case of own children and working husband.

				• Wage rate of married women has a positive and significant relation with LFP.
Widarti (1998)	1985 *Intercensal Population Survey*, Indonesia	8505 females	Logit model	• Education is found to be one of the most important determinants of LFP of females and J-shaped pattern is observed between LFP of females and education. • Children under age 5 have a negative relation with the LFP of females belonging to all classes of education. • Husband's education has reduced the FLFP. • Age has a positive relation with the LFP of females.
Sasaki (2002)	*Panel Study on Consumption and Living* 1993, Japan	770 women	Logit model	• Husband's earnings, age, and children of age 0-6 years have a negative influence on married FLFP. • Education, older children, and job experience have a positive and significant relation with married FLFP. • Co-residence with own parents and in-laws has a positive effect on married female's LFP.
Lisaniler and Bhatti (2005)	*Gender Profile in Education and Employment in North Cyprus Survey*, 2001	395 females	Logit model	• Education is found to be one of the important determinants in examining the labor supply decision of female. It resulted into increased labor supply of females. • Females from age groups 25-34 and 35-34 years are more likely to participate in the labor force. • Married females have a lower involvement in the labor force, but the coefficient is found to be insignificant. • Residential location has a negative effect on the LFP of females.

Lee et al. (2008)	*Population and Housing Census, 2000, Census on Basic Characteristics of Establishments, the 2000 Mining and Manufacturing Industry Census*	72283 females	Probit model	• The probability of participation is found to be lower among married females as compared to the single females. • As far the age is concerned, probability of participation is found to be higher among middle aged married females as compared to the young married females.
Yakubu (2008)	*Quarterly Labor Force Survey of Statistics* South Africa, 2008	31617 females	Logit model	• Education has a positive relation with the FLFP. • Labor force participation is found to be highest among single/never married females.
IIkkaracan, 2012	*Household Labor Force Survey (HLFS),* 1995-200, Turkey	530 women	Logit model	• Being married and having young children have a negative relation with FLFP. • Education has a positive relation with FLFP.
Fadayomi et al. (2014)	*Nigerian labor market survey,* 2005, Nigeria	57547 individuals	Logit	• Age has a positive relation with the LFP. However, age square has a negative effect on LFP. • LFP is found to be high among married. • LFP rate is same for those having no formal and primary

				education. • A reduction in LFP is recorded among secondary school graduates and highest level of labor force participation is recorded for the tertiary graduates. • Negative relation exists between household size and labor force participation due to the age structure especially in case of females.
Klasen and Pieters (2015)	*NSS Employment and Unemployment Survey,* 1987-2011, India	27306 married women	Probit model	• Numbers of children of age (0-4) years, age square, husband's education, rising household income and education of females have a negative effect on FLFP. • Age and education of the head of household have a positive effect on FLFP.
Dildar, 2015	*Demographic and Health Survey,* 2008, Turkey	7405 females	Probit and IV-probit	• Age has a positive and age square has a negative relation with FLFP. • Number of children under five years of age has a negative relation with FLFP. • Patriarchy and religion have reduced the FLFP in urban areas as compared to the rural areas.
Hosney (2016)	*Egyptian Labor Market Panel Survey* (ELMPS) and *German Socio-*	134141 females	Probit	• Age and education have a positive relation with the FLFP. • Numbers of children, being married and urban location have a negative effect on the FLFP. • Household size has an insignificant relation with FLFP.

	Economic Panel (SOEP), 2012			
Espino et al. (2017)	*Continuous Household Surveys,* 1986-2010, Uruguay	5000 Individuals	Weighted least square (WLS)	• Education is found to be positively related with the LFP of females. • LFP of women is reported to increase up to the age of 30 and then decreases after age of 50 years. • Younger women allocated fewer hours on work as compared to the older ones. • Women with higher education allocated fewer hours on work as compared to the women having ten to twelve years of education.
Tong and Chiu (2017)	*Hong Kong Population Census,* 1991-2011	101356 females	Logit model	• Education level, being married and domestic help are positively related with FLFP. • Husband's income, young children and younger females have a lower FLFP.
Chatterjee et al. (2018)	*Indian Human Development Survey,* 2016	72620 females	Logit model	• U-shaped relationship exists between FLFP and education. • Number of children 0-5 years, family income, and being a Muslim have reduced the FLFP. • Husband's education is negatively associated with FLFP.
Che and Sundjo (2018)	*Cameroon Demographic Health Survey,* 2011	7041 females	Logit model	• Being a Muslim and presence of children of age 0-5 years have a negative effect on LFP decision of females. • Presence of females in the household, presence of non-working husband, and increases in age has a positive effect on the LFP decision of females.

				• It is found that the FLFP decreases with the increase in the education level. • Marital status of females has a positive relation with the probability of participation of females in labor market.
Das and Mishra (2018)	*National sample survey office data (NSSO),* 1993/94, 2004/05, 2011/12, India	3931 females	Instrumental variable Probit model	• Number of children under age five and household's income have a negative relation with the FLFP. • FLPF is found to be higher among widowed as compared to the unmarried. However, it is insignificant for the married females. • FLFP is found to be higher for the graduated and higher secondary females as compared to the illiterate females and is insignificant for all other levels of education.
Reed (2020)	*Indian Human Development Survey (IHDS)*	3217 women	Fixed effect	• LFP of women is found to be higher during early years of life as compared to the later years of life. • Being head of the household and living with in-laws has a positive relation with widowed participation in labor market.
Majumder and Dey (2020)	*Demographic and Health Surveys (DHS),* 2014, Bangladesh	11695 females	Logit model	• Age and land ownership are positively related with FLFP. • Household size, being married, women's education, and number of children under age 5 years are negatively related with FLFP.

2.2.2. National Empirical Evidence on Labor Market Work

This section gives review of various empirical studies regarding the determinants of time allocation decision and number of hours of males and females at a national level, Pakistan. Table 2.2 provides a survey of literature related to the labor force participation and number of hours of work in Pakistan.

Table 2.2. Survey of the Literature Review Focusing on Labor Force Participation and Time Allocation at National Level

Name of the Study	Data Source	Sample	Methodology	Results
Shah (1975)	*Pakistan National Impact Survey*, 1968-1969	1212 women	Correlation analysis method	• The results provided evidence that the longer marriage duration, increase in the age of wives and number of living children are positively correlated with the FLFP. • LFP is found to be lower for those females that possess higher education, or their husbands are also highly educated. • LFP is also lower for those females that belong to economically well-off families. • Purdah observing women participated less in the labor market in contrast to the non-purdah women.
Chishti et al. (1989)	*Socio-economic survey of Karachi*, 1987-1988	9874 females	Probit model	• Marital status has a negative and significant relation with FLFP. • Being a head of the household and having large number of minors are positively related with the FLFP. • School going children have a negative influence on the FLFP. • The probability of LFP is found to be higher for the females of

				age between 30-45 years. • LFP is found to be higher for more educated women. And earnings of women also increased with the increase in education level. • Women working in teaching and production sectors received lower wages as compared to those working in the service sector.
Kozel and Alderman (1990)	*IFPRI-PIDE Urban Survey*, 1986	2179 women and 2254 men	Probit and tobit models	• The results provided evidence that the labor force participation increases with the increase in wages, education, and work experience. • Presence of other females within the family resulted into increase in the LFP and vice versa in case of presence of males.

Naqvi et al. (2002)	*Pakistan Integrated Household Survey*, 1998-1999	19218 women	Probit and multinomial logit models	• Age, education, rural residential location, and illiterate male headed household have a positive influence on the women's involvement in the labor market. • Married women exhibited a lower probability to join the economic activities. • Economic status of the household, female headed household, and number of children of age 0-4 years have a negative influence on the FLFP. • There is negative but insignificant relation between nuclear family system and LFP of women. • The results of the multinomial logit model provided evidence that the increase in the age and education has positive influence on the decision-making powers to involve in the labor market by her.
Hafeez and Ahmed (2002)	Field survey data from district Mandi Bahaudin, 1998-1999	210 married educated women	Logit and Probit	• Age of the female has a positive influence on the FLFP. With the increase in age, FLFP is expected to increase by 0.8 percent. • Education of females, education of father, household size, family setup, and rural location has significant positive relation with FLFP. • Household income has significant negative relationship with the FLFP.

Gondal (2005)	*Pakistan Integrated Household Survey*, 1998-1999	3421 married women	Probit model	• Women's age is positively correlated with women's participation in the economic activity. • Women's education and per capita income have a negative influence on the women's involvement in the economic activity. • Joint family, number of children of age 0-5 years have a negative but insignificant influence on women's involvement to the economic activity. • Husband's literacy and husband's age are negatively correlated with women's involvement to the economic activity.
Ejaz (2007)	*Pakistan Social and Living Standard Measurement Survey*, 2004-2005	115077 females	Probit and logit models	• Age, education, number of workers in the family, nuclear family system, ownership of vehicle and female as a head of the household are found to be positively correlated with the FLFP. • Marital status, family size, number of children and infants are found to be negatively correlated with the FLFP.
Faridi et al. (2009)	Field survey from Bahawalpur district, 2007-2008	164 females	Logit model	• Participation of females in economic activities having middle class education is lower and significant. However, participation increases with the increase in education up to Ph.D. level. • The results showed that the FLFP varies with the age of the females. Females' having age 15-24 years have lower labor force participation. But, as the age increases from 25 to 64

				years, FLFP increases. • LFP is found to be higher for married females. • Per capita income, urban location and spouse participation in the economic activity are negatively correlated with the FLFP. • Joint family system, number of children and number of dependents are found to be positively correlated with the FLFP.
Khan and Khan (2009)	Primary survey-based data, 2004-2005, Punjab	3911 married females	Probit model	• Age, education, literacy status, household size, and presence of school going girls of age 5-15 years have positive and significant influence on the FLFP. • Household's per capita income, smaller household size, and number of children of age 0-4 years are found to be negatively correlated with FLFP. • LFP of women living in urban areas is found to be less as compared to the rural areas.
Faridi et al. (2009)	Primary data collected through field survey from Bahawalpur district, 2007-2008	330 males	Binomial Logit and Multi-nominal Logit	• The effect of all the education categories on the LFP is found to be positive and statistically significant except that of middle education, which is found to be negative and insignificant. • Age, education of mother, number of dependents, marital status, household size, education of father, and location have a positive and significant influence on the MLFP.

Faridi et al. (2010)	Field survey data, 2008-2009, Bahawalpur	494 workers	Logit model	• The results provided evidence that the experience, worker's education, father's and mother's education, household's size, residential location and number of dependents have a positive and significant influence on the employment of worker. • Spouse's education and marital status have a positive but insignificant relation with the worker's employment. • Family setup has a negative but insignificant relation with the worker's employment.
Shaheen et al. (2011)	*Multiple indicator cluster survey* data, 2007-2008, Punjab	91280 households	Logit model	• The results provided evidence that the education of household head have a negative influence on the decision of females to join the labor market. • Urban residence, being married, higher education, and large family size have a positive influence on the FLFP. • The wages of married females are found to be higher as compared to non-married females. • Earnings of females working as employer are higher as compared to those who are working as employee in labor market and agriculture field.
Khadim and Akram (2013)	*Pakistan Social and Living Standards Measurement Survey*, 2007-2008	6172 females	Logit model	• The education groups have shown a varying influence on the FLFP. • Five years of schooling has a positive and insignificant relation with the FLFP. • Ten years of schooling has a positive and significant influence.

				• Professional and technical education has a positive and significant influence on the FLFP. • Marital status, size of the household, household type and household locality has a positive but insignificant relation with the FLFP.
Faridi and Rashid (2014)	Field survey data, Multan	300 educated women	Logit and probit models	• Results showed that the labor force participation increases with the increase in the age but become negative for age group (55-64 years) because of poorer health conditions. • Education, marital status, and joint family system have a significant and positive influence on the FLFP. • With the increase in the age and education, the number of working hours supplied by the women also increases. • Hours of household work and number of dependents have a negative impact on the labor hours of the females.
Sabir (2015)	*Labor Force Survey*, 2012-2013	12572 females and 54740 males	Logit model	• Education has a positive influence on the LFP of males and females. • The results provided evidence that one of the causes of lower FLFP in Pakistan is the discrimination factor prevailing in our society. • Another reason of lower female labor force participation is the lesser job opportunities for the women. • Age has a negative influence on the MLFP and FLFP. • Number of infants has an inverse and significant influence on the male and female labor force participation.

				• Punjab, Sindh, and urban residence are positively and significantly related with the LFP of males and females. However, KPK has negative influence on the MLFP. • Being married has a positive and significant relation with the FLFP but insignificant in case of MLFP. • The relation of education is negative with the FLFP.
Shaheen et al. (2015)	Field survey data, district Sahiwal, Pakistan	402 females	Binomial and multinomial logit models	• Age and education have a positive and significant relation with the FLFP. • Presence of children above 10 years and marital status are also positively correlated with the FLFP. • There is negative impact of household size and asset presence on the participation of females in labor market. • Number of dependents and total workers present in the family has a positive influence on the decision of female as an active earner and vice versa in case of underemployment and self-employment. • Spouse involvement in economic activity, urban location, and joint family type encouraged the FLFP.
Hussain et al. (2016)	*Labor Force Survey of Pakistan*, 2008-2009	2576 Workers	Logit model	• The results showed that the LFP increases with the increase in the age of workers and starts decreasing and become negative after 45 years. • Education has a negative as well as significant relation with the LFP. • LFP is positive but insignificant for Punjab. Sindh and KPK

				have significant but negative coefficients for LFP. • Job training and being a married have a positive and significant influence on the LFP.
Khan and Hafeez (2017)	*Labor Force Survey of Pakistan*, 2012	6914 unmarried labourers	Probit model	• Age has a positive influence on the LFP of unmarried laborer. • Education has negative impact on the LFP of unmarried laborer. • The impact of household size on the unmarried laborer is found to be negative but insignificant. • LFP is found to be positively as well as significantly related with the residential location in Punjab. • LFP of unmarried male laborer is higher as compared to the females.
Andlib and Khan (2018)	*Labor Force Survey of Pakistan*, 2014-15	65649 females	Probit model	• FLFP is found to be lower in urban location in contrast to the rural location. • Intermediate and higher level of education is positively related with FLFP at the national and regional level. • Females from the joint family system and having technical and vocational trainings exhibited a higher LFP. • Age has a positive relation with the FLFP. However, age square has a negative relation with the FLFP. • Number of children of age 0-5 years has a negative but insignificant influence on FLFP.
Kanwal et al.	*Labor Force*	69347	OLS model	• Age and education level have a positive impact on labor

(2019)	*Survey of Pakistan*, (2010–2011)	workers		supply. • Gender has also a positive impact which means that the males supply 14 hours more in labor market as compared to females. • Household size, province, and head of the household variables are inversely related with the hours of work in the labor market. • Number of siblings is also positively related with the labor supply. • Married workers allocate more hours to the labor market, but the coefficient is statistically insignificant.
Batool et al. (2019)	*Pakistan Labor Force Survey (2014-2015)*	20246 females	Logit model	• Age has a positive association with the FLFP. However, age square has a negative effect on FLFP. • Education has a positive influence on the FLFP. • Number of younger children has a negative influence on FLFP. • Household income has also a negative influence on FLFP.
Faridi et al. (2019)	Field survey data, Multan, Pakistan	300 females	OLS model	• Age, number of children and level of education have positively affected the working hours of females. • Years of schooling of husband and working days also positively affected the working hours of females.
Cheema et al. (2021)	*Pakistan Social and Living Standard Measurement*	2617357 females	Logit model	• Age, wages and urban location are positively related with FLFP. • Household size is negatively related with FLFP.

	(PSLM) Survey data (2013-14)			• U-shaped relationship is observed between education and FLFP.
Iqbal et al. (2021)	Primary data collected from district Multan, Pakistan	834 females	Logit model	• Age, presence of children, marital status, and joint family setup have a positive impact on female's participation in paid work. • Educated females have a higher probability of participation in paid work as compared to uneducated females.

Summary of Findings: Labor market participation and time allocation has been a widely discussed topic in the last three decades. The international studies suggest a multitude of factors that contribute to labor market participation and time allocation such as age, urbanization, extended family system, marital status, education, wage, number of younger children, and cultural norms. Studies found that labor market participation and time allocation increases with higher education, being married and more liberal cultural norms. Age is linked in a U relationship with labor market participation and time allocation. Household size and presence of younger children decreases the participation and time allocation to the labor market work for females and vice versa in case of males.

This study makes two important contributions regarding labor market work. First, it addresses the potential problem of endogeneity with an instrumental variable estimation strategy in analyzing the effects of potential endogenous variables on the participation and time allocation to labor market. Secondly, our study examined the determinants of time allocation to labor market work which is ignored by previous studies at the national level by using LFS (2017-2018) data.

2.2.3. International Empirical Evidence on Non-Market Work

In this section, some studies that deal with the determinants of participation and time allocation to the non-market work i.e. housework, child work, and household agricultural work at the international level are reviewed.

Table 2.3. Survey of the Literature Review Focusing on the Participation and Time Allocation to the Non-Market Work at the International Level

Name of the Study	Data Source	Sample	Methodology	Results
Evenson (1978)	Laguna project collected data, 1977	225 rural households	OLS model	• This study gave the evidence that the non-wage income has a negative relation with the time allocation by a husband belonging to the non-farming house on the market work. • The results also supported the positive influence of the wife's wage on the wife's market time and a reduction in the farms and home's time. • Education has also a favorable influence on the market time. • The results also supported that presence of younger children results in more amount of time spend at home than in the market and vice versa in case of older children.

Mueller (1982)	*Rural Income Distribution Survey*,1975, Botswana	4600 individuals	Regression technique	• Human and non-human capital has a positive influence on the amount of time allocated to the economic activities. • Education has a negative association with the time allocated on housework both for the males and females. • Women up to age 42 years, allocated more time on economic activity. • And, after 42 years of age, women spent more time on leisure and decrease her time on market and housework. • Presence of small children increased the amount of time to housework by women aged 20-64 years; however, number of hours assigned to market work and leisure are reduced.
Nock and Kingston (1988)	1981, *Study of Time Use (STU)*	216 married couples	OLS model	• The results showed that the dual earner couples gave less time for the childcare as compared to the single earner couples. • Unemployed mothers with preschool and without preschool children spent 525 and 355 more minutes respectively on childcare as compared to the employed mothers. • The larger size of the family and presence of younger children resulted into more time for the childcare from both the single earner and double earner couples.

Khandker (1987)	Data collected through survey in rural Bangladesh	500 households	Probit, OLS, and Tobit model	• The results showed that the women involvement in the market is enhanced by the rise in the wage rate of women, husband's education, and location of the school. • The results of the censored regression technique discovered that the constraints related to the individual, market, household, and community play an important role towards explaining the time allocation by women to market production.
Glick (1999)	*Multi-Purpose Survey*, 1990, Guinea	2555 women	Tobit model	• Female's time to home activities raises by about 3.5 number of hours in a week with each additional child in the family under age 6. • Years of schooling has linear but insignificant effect at time allocation to homework. • Time allocation to homework is more for the married females as compared to the unmarried females. • Years of vocational schooling has a positive effect on market labor supply. • Female labor supply is found to be first increases with the rise in age and then declines with the decrease in age. • Own children have a significant positive effect on female labor supply. • Married females allocated more amount of their time to the market work in contrary to unmarried females.

Miller and Mulvey (2000)	*Time Use Survey* data, 1992, Australia	1612 married females	OLS technique and tobit model	• The results of the study showed that well educated women allocated more time towards the childcare as compared to the less educated women. Those women who have done tertiary studies allocated 21 minutes more than those who are less educated. • Presence of disabled child resulted in a rise of time towards domestic work and childcare.
Bianchi et al. (2000)	*Time Diary* and *National Surveys of Families and Households*, U.S, 1965-1995	6740 households	OLS model	• This study concluded that from 1965 to 1995, women hours of housework have decreased while men hours of housework have increased. • The presence of children in the home has increased the time both for men and women. More time spent on housework if there are younger children and reduction in time if there are older children. • Aging factor shows that older members spent more time on housework as compared to the younger ones. • Marital status of females has a positive influence on the amount of their time allocated to housework but not for men. • This study gives the evidence that the more the women educated the less time they devote to the housework. • Income has a negative correlation with the time of the housework.
Hallberg and Klevmarken	*Swedish Household Panel*	1983 sample consist of 2500	Bivariate probit and	• This study supported that there exists interdependence between market work and time for the children.

(2003)	data from HUS, 1983 and 1993	and 1993 consist of 3500 respondents.	Three stage least square (3SLS)	• Out of home care services for the child is not a good substitute. Presence of infants in the family negatively affects the female's working hours. • Wage rate and income differences have no effect on the time allocated for the children.
Alvarez and Miles (2003)	*Work Situation and Time Use Survey*, 1991, Spain	789 couples	Bivariate binomial model	• The wage of the spouse is negatively related with the housework time. • University graduated women have reduced their time for the housework by at least one hour. But, the housework time of the men is not altered by the education level of males and females. • With the increase in age of the wives, time for the housework has increased and age has opposite effect on housework time allocated by men. • Presence of children caused an increase of housework time for the women but has no effect on the time of men. • Labor earnings of the wife have a negative influence on her housework time. However, labor earnings of the husband have no significant impact on the time for the housework. • Presence of the domestic help has reduced the time of housework both for men and women. • Residential location in south of the Spain has no effect on the housework time of the men but it resulted into reduction for the women's time. Overall, the results showed that the influence of explanatory variables is more on the women's time for

				housework as compared to men.
Sayer et al. (2004)	Time diary data, Canada, Germany, Italy, and Norway	1333, 4666, 5571 and 1081 individual married mothers from Canada, Germany, Italy, and Norway respectively	OLS, tobit models	• The results showed that the more educated mothers spent more time on the childcare opposite to the less educated mothers in all the countries. • No relation is found between education of father and care of the children for Norway; however, week relation is found in case of Germany. The reason for this difference among fathers is the time constraints.
Anxo and Carlin (2004)	*Time Diary Survey* data, 1991, France	3033 married or cohabiting couples	Tobit model	• An employed woman spent less time on housework resulting into increase in the time of her husband for the housework. • More educated women spent less time on the housework, but more educated men devote more time to the housework. • Aged couples devoted more time to the housework as compared to the younger couples. • Residential location in a big city resulted into drop of time to housework by wives but no significant impact was found in case of husbands. • A rise in the household income resulted into decline of the wives' time for the housework.

Deding and Lausten (2006)	2001 *Danish Time Use Survey* data	718 Couple households	Tobit model	• Increased flexibility in working schedule has a positive correlation with the paid work of male and female. • Males living in rural areas spent more of their time on paid work as compared to the urban males. • Males living in single family house, spent more time on paid work and it is insignificant for the females. • Unpaid work time has increased for those women who have large number of children but not for the men.
Kimmel and Connelly (2007)	*American Time Use Survey*, 2003 and 2004	4552 mothers	Tobit model	• This study found that the increased wages have a positive association with the care giving time and a negative association with the time for leisure and home production. • The price of childcare and number of children has a positive relation with the care giving time of mothers. • As the increase in age of child is recorded it resulted into decline of mother's time for the care giving.
Bloemen et al. (2010)	*Italian National Time Use Survey* data, 2002-2003	21,075 households	Simulated maximum likelihood using GHK algorithm, Regression technique	• This study pointed out that more educated woman allocated more amount of their time on the childcare and paid work and lesser amount of their time on the housework activities. However, more educated fathers spent more time on the childcare in weekends as compared to the primary pass fathers who paid less time on the child caring activities during weekdays. • Presence of younger children has a positive relation with the females' time spent on the childcare work and negative relation

				with the paid market work and housework both for the weekends and weekdays. It also affected the father's time but the influence of younger children on the mother's time is stronger. • Those men who are residing in the north of Italy spent more time on the childcare and housework while women spent less time on housework. • Thus, the most important factors that determine the time allocation are age, education, and age of the youngest child.
Craig and Mullan (2010)	*Australian Time Use Survey* (AUSTUS) data 2006, American *Time Use Survey* (ATUS) data 2003, *Danish Time Use Survey* (DTUS) data 2002, Italian Time Use Survey (ITUS) data 2002-2003, *French Time Use Survey* (FTUS) data 1999	3057, 954, 4644, 1554 and 532 individuals from US, Australia, Italy, France, and Denmark.	Multivariate OLS	• This study analyzed the relationship between time allocation of mothers and parenthood. The study concluded that those households who have children demands more total time as compared to those who have no children. Households having children spent more of their time on paid, unpaid and, childcare activities as compared to the childless households in different countries. • Households without having children allocated more time on unpaid work on weekends as compared to weekdays because they preferred paid work over unpaid work on weekdays. • In case of parenthood, results showed that the father's paid work time was slightly more than the non-fathers and opposite in case of mothers and non-mothers.

Fox et al. (2013)	*Current Population Survey* (CPS),1967-2009, America	5120 Parents	Regression-adjusted technique	• This study concluded that employed mothers paid less time towards the primary childcare as compared to the non-employed mothers. • The time spent on the primary childcare has shown a decline with the age of the child. Overall, there is rise in the parent's time for the childcare irrespective of working or not working in 2000-2008 as compared to the 1975 counterparts.
Nadal and Molina (2013)	*Multinational Time Use Survey* data, Spain (2002), and UK (2000)	1527 couples from UK and 4499 couples from Spain	Seemingly unrelated regression Tobit model, OLS model	• This study categorized the childcare activities into basic, educational, and supervisory activities and analyzed how educated parents invest time on the childcare. • This study explored that education of the mothers has a more positive influence on the amount of their time allocated for the educational care of the children as compared to the fathers both in UK and Spain. • With respect to the supervisory childcare activities, the number of household members, younger children, and disability are the main factors affecting time allocation process while parent's education and wage rate have no effect on time allocated to these activities.
Masigwa et al. (2013)	*Integrated Labor Force Survey* data, 2006	11226 males, 1257 females, 2466 boys and 1833 girls	Regression method	• Education has a more favorable impact on the time spent for the wage work and a negative impact on the time spent for the non-wage work both for the males and females. • In case of landholdings, males spent less time as compared to females because farming is the activity of females in rural

				Tanzania. • With the increase in age, economic activity of the children has increased and time for the leisure decreased. • Women of female' headed house, spent time on economic activity because of lower level of income as compared to the male's headed house where women spent more time on the housework.
Bloemen and Stancanelli (2014)	*French Time Use Survey* data, 1998-1999	1080 married or cohabiting partners	Simultaneous equation model, Reduced form methodology	• Own wage rate positively affected the own market hours and negatively affected the time for the housework and childcare for both the parents. • When there is increase in wage rate offered to the wife then it resulted into rise in the amount of time allocated to the housework and childcare by father.
Gbemisola and Ayo (2014)	*Time Use Survey* data, 2009, Nigeria	200 households and 400 respondents	Tobit model	• The results showed that the larger household size has a more favorable effect on the paid work time of males and housework time of the women. Consequently, a reduction of time for the leisure for both the sexes. • Age is negatively correlated with the farm and non-farm work time both for the women and men. And the age has a stronger influence especially in case of women. • Married men allocated more time on farm work and married women allocated lesser time on the farm work. • Income and size of the farm are positively associated with farm work time for both sexes.

				• The use of the technology has reduced the amount of their time spent on the farm work as well as for the housework both for males and females. • As the education level of women increases, it resulted into increase in the time spent for the non-farm work. • Household's size has a favorable influence on the non-farm's time of the males and vice versa in case of women in both the seasons. • Presence of the younger children and women's non-farm's time are negatively related with each other and opposite in case of older children. • Age and distance from the water resources has a positive relation with the housework time. • Household's size, income, and technology negatively influence the time allocated for the housework of the women.
Bernardo et al. (2015)	*American Time Use Survey* data, 2010	1527 respondents.	Multiple Discrete Continuous Nested Extreme Value Model (MDCNEV)	• The presence of children has a negative association with both in and out of home non-work activities. • This study also supported the evidence that the presence of younger children means more time spend on the housework as compared to the non-housework and vice versa in case of older children.

Tamene and Desta (2015)	Cross sectional survey data, 2013, Ethiopia	384 households	Multiple Regression model	• This study concluded that females have more burden of housework as compared to the males. • The results supported that the participation in domestic work has increased for the married ones. • In case of the unmarried ones, males have less involvement in the housework because females prefer to work by themselves. • Time for housework has declined with the increase in the amount of level of education, • Age has an inverse association with the housework.
Rathnayaka and Weerahewa (2015)	Baseline survey data from Udukumbura village, Sri lanka	80 husbands and wives.	Two stage least square technique	• Husbands paid more time on the nonpaid work i.e. crop field, home gardening, and extraction from forests. Women spent more time on care giving activities like childcare, cooking, and housework. • Education has a negative association with the time allocation of nonpaid work both for husbands and wives. • Presence of the older adults in the family has a negative and significant association with the nonpaid work of the wife • Those who have a large land in the form of crops, garden etc., spent more time on the nonpaid work as compared to the paid work.
Bruins (2017)	*American time use survey* data, 1975, 1985,1995, and 2005	7809 mothers and 5333 fathers	OLS technique	• The increase in wages of both men and women has positive effect on parent's time for children. When there was an increase of 5% in the wage ratio of male and female, it would raise one-hour amount of time for the childcare.

				• As the parents spent more time on the education of their children their time for the secondary child related activities decreased when there is a rise in their wage rates.
Kedir and Rogers (2018)	*Ethiopian Urban Household Survey (EUHS, 1994-2004*	12000 individuals	Probit model	• Participation of females in domestic work is found to be higher as compared to males. • Age and domestic work participation are found to be positively and significantly related with each other. • Educated females showed a lower probability of participation in domestic work in contrary to those with no formal level of education. • The results also revealed that most of the domestic work is done by singles as compared to the married.
Singh and Pattanaik (2019)	*National Sample Survey, 1993-1994 to 2011-2012*	66000 females	Logit model	• It has been found that married females participated more in unpaid work and unmarried females participated more in paid work. • It has been noticed that female participation in paid work has been decreased. • However, overall, participation of females in unpaid work has been significantly increased and the major determinants behind are low education and belongs to poor household background.

Singh and Pattanaik (2020)	*National Sample Survey Office (NSSO)* , 1993-94, 1999-00, 2004-05, 2011-12, India	51260 females	Logit model	• Less educated females are more involved in domestic work as compared to more educated females. • Females belonging to age groups, 15-24 and above 60 are more involved in domestic work as compared to other groups. • Household income is positively related with female's participation in unpaid domestic work. • Urban location has also a positive relation with participation of females in unpaid domestic work.
Nazier and Ezzat (2021)	*Labor Market Panel Surveys (LMPS)*, 2012, Egypt and Tunisia	38107 and 12879 individuals	Tobit model	• Age has a positive association and age square has a negative association with female's time allocation to housework. • Educated females allocated lesser number of hours to housework as compared to uneducated females. • Married females spent more number of hours to housework as compared to unmarried females. • Household size has a negative relation with female's time allocation to housework.

2.2.4. National Empirical Evidence on Non-Market Work

This section gives review of empirical evidence about the determinants of participation and allocation of time to the non-market work in Pakistan.

Table 2.4. Survey of the Literature Review Focusing on the Participation and Time Allocation to the Non-Market Work at National Level

Name of the Study	Data Source	Sample	Methodology	Results
Sultana et al. (1994)	*International Food Policy Research Institute* panel survey data, 1993, Pakistan	2454 women	OLS and tobit models	• Poorer women are more engaged in different activities as compared to those who only work at home. • Women's age, women's education, number of dependents, and men's anticipated wages have an important negative influence on the amount of time assigned to domestic work by the participated women. • However, women's age and her predicted wages have an important positive influence on the amount of time allotted to household work by non-participating women. • Women's age and education have no significant relation with their amount of time allotted to market work. • Predicted wage rate of females and males increased the women's time in market activities.

Summary of Findings: Non-market participation and time allocation has been a widely discussed topic in the last few decades. The international studies suggest a multitude of factors that contribute to participation and time allocation to non-market work such as age, urbanization, extended family system, marital status, education, and wage, number of younger children, residential location and cultural norms. Studies found that participation and time allocation to the house work and farm work decreases with increase in level of education. However, educated females allocate more time to the child work as compared uneducated counterparts. Age is linked in a U relationship with participation and time allocation to non-market work. Household size and presence of younger children increases the participation and time allocation to the non-market work. At the national level, no significant work is seen that has examined the determinants of participation and time allocation to the housework, child work, and household agricultural work.

Therefore, this study makes important contribution by investigating the determinants of participation and time allocation to the non-market work. For this purpose, our study categorized the non-market work into three important categories i.e. housework, child work and household agricultural work for analyzing the contribution of females in making home heaven by providing these valuable services without any reward level by using LFS (2017-2018) data.

2.3. Conclusion

This chapter gives knowledge about the theoretical framework and reviews of empirical studies on the determinants of participation decision and time allocation to the market and non-market activities both at the national and international level. The main focus of most of these studies is on how males and females allocate their time on paid market work, and unpaid non-market. These studies also discovered that there are many socio-economic and demographic factors that affect the participation decision and time allocation regarding various market and non-market activities for males and females.

The demographic factors that are likely to influence the time allocation to various market and non-market activities include age of males and females, number and age of children, number of dependents, and size of the family etc. Socio-economic elements include income, age, and education level. Most of the literature provided evidence that level of education and wage rate increases the time for the paid work and decreases the time for the unpaid housework and leisure (Bianchi et al., 2000; Deding & Lausten, 2006; Bloemen at al., 2010; Masigwa et al., 2013). However, number of children reduces the amount of time for the paid work and increases the time for that of unpaid housework especially in case of women (Hallberg & Kleymarken, 2003; Wittenberg, 2009; Tamene & Desta, 2015).

Thus, we have seen that there is a lot of literature and studies on the determinants of the participation decision and time allocation problem of the market and non-market work at the international level (Meiners & Olson, 1987; Hallberg & Klevmarken, 2003; Pino, 2004; Kalenkoski et al., 2009). But in case of Pakistan, most of the work is on the determinants of the wage rate and labor force participation and these studies are just like the drop-in oceans. Most of these studies are restricted to just some specific districts or provinces (Sajid et al., 2011; Shaheen et al., 2011; Faridi & Rashid, 2014; Awan et al., 2015) to name a few. And, in case of non-market, we have seen no remarkable work except only the work of Sultana et al. (1994) which is on the just three districts. So, this study fills this gap by determining the important socio-economic and demographic factors that are affecting the participation decision and time allocation towards the market and non-market activities for the males and females at the national level in Pakistan by using the data from *LFS (2017-2018)*.

CHAPTER 3

THEORETICAL FRAMEWORK AND METHODOLOGY

3.1. Introduction

This chapter comprises of two main sections. The first section includes the model regarding the determinants of labor market participation decision of males and females and determinants of the hours of labor market work supplied by both males and females. The next section comprises of the model to determine the factors affecting the participation decision in the non-market work and the time allocation to the non-market work by females. The analysis is built on the cross-sectional data that is obtained from the *LFS (2017-2018).* Therefore, regression models considering the determinants of participation decision of labor market and non-market work and number of working hours assigned to market and non-market are estimated in this chapter. The study employs probit and logit estimation techniques for the analysis of the participation decision. However, OLS and Tobit models are used for the examination of the determinants of weekly hours of labor market work and non-market work.

The chapter is organized as follows: Theoretical framework is given in section 3.2. In section 3.3, theoretical model related to the labor market work and non-market work is presented. In section 3.4, market work is discussed along with determinants of labor force participation decision and number of weekly hours of labor market work. Nature of the non-market work with reference to the participation decision and time allocation is given in section 3.5. Estimation techniques are discussed in section 3.6. The chapter's conclusion is given in section 3.7.

3.2. Theoretical Framework

The question related to the causes and determinants of time allocation has become the subject matter of research for the last few decades. From time-to-time different approaches have been developed for analyzing the determinants of time allocation. These approaches are categorized into three main categories i.e., economic approach, household approach, and the sociological approach. The explanation of all these approaches in the context of time allocation is given below.

3.2.1. Economic Theory of Allocation of Time

Economic approaches of time allocation are based on the basic assumptions of neo-classical. And the base of most labor supply models is the Neo-classical economic theory. The regard to represent the theory of Neo-classical labor supply goes to the Mincer (1962). The concept on which the Mincer theory based was traditional utility maximization. According to his theory, the maximization of individual utility depends on the rational division of time between leisure and wage employment (Cain, 1966; Bowen & Finegan, 1969). The supply of individual labor depends on the wage rate and this is constrained by time and leisure (Standing, 1978; Killingsworth, 1983). Thus, according to the labor supply model, labor supply is expected to increase with the growth of the wages or emergence of income opportunities. When there is rise in the real wage rate, it has two effects. The first effect is that the positive substitution effect which resulted into increase in the number of hours supplied by the individual. The second effect is the negative income effect which resulted into increase in the number of hours of leisure. However, the trade-off relationship between work and leisure is determined by individual preferences and relative value of leisure and additional income. Non-market activities are another factor that affects the married women labor force participation decisions (Mincer, 1962).

The major drawback of this theory is that it ignores the household related production. So, this does not work well for the non-industrial societies (Steel & Campbell, 1982; Tovo, 1984; Folbre, 1986). The problem of not incorporating the non-market work of women is recognized by Mincer (1962), Becker (1965), and Cain (1966). Becker (1965) solved this problem by presenting the time allocation theory in which he introduced the non-market concept into the labor supply theory. His model consists of market work, home production and leisure. Due to

this contribution, Becker (1965) is called the founder of New Home Economics. He for the first time used the instruments of neo-classical in gender issues. According to this approach, private households act like an economic institution, which produce beneficial commodities by using time utility and market commodities. A household mutually takes decision about the paid and unpaid work and leisure and this depends on the relative productivity of the individual members of the household. And, the different household members can gain the comparative production advantages through specialization. The main variables of this approach are family income and labor market productivity. In this theory, it is assumed that the individual preferences for the personal benefits are constant for all members of the household (Becker & Stigler, 1977). This theory was subsequently extended taking other individual characteristics like age, education, and number of children etc.

There, can be general perception about using theory of wages and labor economics to address the issue of time allocation. However, our study is based on the time allocation theory of Becker (1965), which suits our data (Evenson, 1978; Bloemen et al., 2010; Nadal and Molina, 2013; Khandker, 1987). Our study has nothing to do with the theory of wages which focus on the relationship between wage rate and level of productivity of workers (Harris & Holmstrom, 1982; Weitzman, 1989; Razzak, 2015).

The Becker's theory of household time allocation, which assumed complete information, utility maximization and defined preferences, is subjected to considerable criticism because of its assumptions. The assumption that all the household members maximize the household utility is not true because every member within the household maximizes her or his own preferences (Bergmann, 1995). A household is not considered as a unit because it is place of conflicts and cooperation (Couprie, 2002). Chiappori (1998) and Browning and Chiapppori (1998) developed the new collective model in response to the unitarist approach of Becker.

3.2.2. Household Economic Theory of Allocation of Time

Household economic theory has a strong resemblance to the theory of Becker. The main topic of this theory is housework. The basic focus of this theory is to describe the economic contributions made by housewives towards dealing financial matters of a household and society. The work of Nickolas and Metzen (1978) was pioneer work among the household economists.

According to their theory, three principal factors affect the performance of the housework. These three principal factors are categorized into pressure factors, constraints factors, and facilitator factors. Pressure factors are size of the family, number of children and property etc. which cause an increase in the time expenditures on housework. Constraint factors are comprised of personal characteristics of individual which determine the time allocation. Facilitators include education, family income, and home help etc. which help in efficient working and which reduce the share of a person for housework.

When we talk about the household economic research, we come to know that it focuses on the time and resources allocated to the different tasks done for the household production and divide the household production into different components like cleaning, cooking etc. which distinguish it from neo-classical theory (Godwin, 1991).

3.2.3. Sociological Theory of Allocation of Time

There are different sociological theories of time allocation which explains the process of gender differences and discrimination towards time allocation. Blood and Wolfe (1960) gave the relative resource theory and Rodman (1967) gave the theory of relative resources in cultural context. According to both of these theories, the power of decision making depends on how much resources are possessed by the household members in terms of monetary and non-monetary items. Women are considered inferior to men due to smaller income offered to them in market. Cultural norms and accessibility to relative resources determine the household division of labor. Godwin (1991) gave the relative productivity hypothesis. This hypothesis assessed the relation between individual characteristics and relative resources.

Condran and Bode (1982) presented the socialization ideology theory. This theory studies the role of socialization and attitudes and expectations of the individuals on gender division of labor and time allocation process. Division of labor depends on the orientation of normative gender role of partner. The traditional and non-traditional attitudes are also affected by the socioeconomic status and it is assumed that with the non-traditional attitude, men perform more of housework as compared to the women. Wheeler and Arvey (1981) gave the time available hypothesis and Coverman (1985) introduced the demand response capability theory. Both theories link the labor supply to the labor demand for doing housework. Demand side are those which force household members to change the traditional way of the division of labor on the

base of number of children and size of the family etc. Covermann (1985) measured the resource capability terms of wage and the time devoted by man to the paid work. It is assumed that every member performs his or her fix task. And the paid work of men and women affect the gender differences in the performance of housework. Thus, the major focus of sociological approaches is on the relative contributions and balance of power and gender discrimination.

3.3. Theoretical Model

According to the Becker (1965), the utility that each person derives depends on allocating their time to different market and non-market work. Utility maximization is the basic criteria of this study (Khandker, 1987; Malathy, 1994; Glick, 1999; Evenson, 1978). A household unit is assumed to comprise of male (M) and female (F) members. Both male and female derives utility from three things i.e., market goods (MG), home produced goods (HG), and from leisure (L_i, where i = H and W). And resources are required for the production of home-produced goods (HG). The household faces different constraints like time constraints, market constraints, and community constraints during the process of maximization of utility (Gronau, 1973; Khandker, 1988; Gronau, 1977; Aguiar & Hurst, 2009). The main effect of these constraints is on the transaction costs of the goods and services produced at home that a household mainly produces as an alternative for the goods and services that are available in the market.[1] In this study, it is assumed that individuals drive utility from market goods as well as from the home-produced goods (Cain, 1966; Khandker, 1987; Malathy, 1994; Glick, 1999). The household utility function is given below:

$$U = U\,(MG, HG) \qquad 3.1$$

Here, it is assumed that the home made good (HG) is produced by using combinations of inputs bought from the market (IN) and the time input of female (TA_{HWF}) only (Khandker, 1988; Gronau, 1977). The non-market production relationship of the household is given as:

$$HG = HG\,(IN, TA_{HWF}) \qquad 3.2$$

[1] Equations from 3.1 to 3.10 of our theoretical model are based on the research work of Khandker (1988).

Where TA_{HWF} is the amount of time of females that is allocated to non-market work (Bianchi et al., 2000; Gronau, 1973). There are basically two types of time constraints (i.e., 3.3a and 3.3b). These constraints tell us that the total time spends by each member of the family on market work as well as to the non-market work cannot exceed the total time available ($TT_i, i = M, F$).

$$TT_M = TA_{MWM} + L_M \quad 3.3a$$

$$TT_F = TA_{MWF} + TA_{HWF} + L_F \quad 3.3b$$

Where TT_M is the total amount of time of males. TT_F is total amount of available time of females. TA_{MWM} is the time of males that is allocated to market work out of the total time available. L_M represents the leisure of males. The time assigned by females to home produced goods (TA_{HWF}) and leisure (L_F) is positive (Aguiar & Hurst, 2009). It is observed that most of the female population of Pakistan is not participating to the labor market work, so, the time assigned to labor market work by majority of females TA_{MWF} in this case may not be positive (Khandker, 1988).

Another constraint faced by the household is budget constraint ((Khandker, 1988). According to the budget constraint, the expenditures made by the household on the purchase of market goods which are used as an input in the production of non-market goods of the household must be equal to or less than the income of the family (FI):

$$P_{MG}MG + P_{IN}IN \leq W_M TA_{MWM} + W_F TA_{MWF} + X = FI, TA_{MWF} \geq 0 \quad 3.4$$

Where P_{MG} and P_{IN} are the prices of market goods (MG) and market purchased inputs (IN) respectively. W_M and W_F are the market wages of males and females. X is the amount of non-earned income of a household.

It is also assumed for simplicity that the proportion of home produced good (HG) is fixed which means that the inputs used in the non-market production depends on the quantity of home-produced goods and vary proportionately (Khandker, 1988).

$$IN_{HG} = \alpha HG \quad 3.5a$$

$$TA_{HWF} = \beta HG \quad 3.5b$$

Where α is the marginal productivity of the inputs purchased from the market (IN) and β is the marginal productivity of the time devoted by female in the production of home good (TA_{HWF}). By putting the values of equations 3.2, 3.3, and 3.5 into 3.4, we can find budget constraint as:

$$P_{MG}MG + W_M L_M + W_F L_F \leq W_M TT_M + W_F TT_F + X = FI^*, TA_{MWF} \geq 0 \qquad 3.6$$

Where FI^* represents the "total amount of income" of a household.[2] The following optimal conditions are the result of the maximization of the utility function FI subject to the budget constraint of equation (4.6):

$$U_{MG} = \delta P_{HG} \qquad 3.7a$$

$$FI^* - P_{MG} \geq 0 \qquad 3.7b$$

In the above equations δ is the marginal utility derived from the income, which is positive. Since, the data is not available on the leisure activities of males and females in *Labor Force Survey (2017-2018)*, therefore, the focus of our study is on the time allocation to market and non-market work only. Thus, the reduced form equation for the females allocating time to home production is given below:

$$TA_{HWW} = TA_{HWW}\,(W_H, W_W, \alpha, \beta, X, P_{IN}, P_{MG}, TT_H, TT_W\,) \qquad 3.8a$$

Where TA_{HWW} is the optimal time that a female spends on home production. W_H are the market wages obtained by males, W_W are the market wages obtained by females (Khandker, 1988). The equation for the optimal time allocated by females to market work is given below:

$$TA_{MWW} = TA_{MWW}\,(W_H, W_W, \alpha, \beta, X, P_{IN}, P_{MG}, TT_H, TT_W\,) \qquad 3.8b$$

Where TA_{MWW} is the value of optimal time allocated by a female to market work (Khandker, 1988; Evenson, 1978). The equation for the optimal time assigned to household production and market work for a non-participating female is as follows:

$$TA_{HWW} = TA_{HWW}\,(W_H,, \alpha, \beta, X, P_{IN}, P_{MG}, TT_H, TT_W\,) \qquad 3.9a$$

[2] Total income is defined as the amount of income earned by a household by devoting available household time to the market work.

Where TA_{HWW} is the time allocated by the non-participating female to the household production. For a non-participating female:

$$TA_{MWW} = 0 \qquad 3.9b$$

According to traditions and norms prevailing in Pakistan, it is observed that males mainly join the labor market and are reluctant to participate to the non-market activities (Sultana et al., 1994). Therefore, we analyze here the participation of males in the market work only. The model regarding labor market work of males is given here.

$$TA_{MWH} = TA_{MWH}\ (W_H, W_W, \alpha, \beta, X, P_{IN}, P_{MG}, TT_H, TT_W\ ) \qquad 3.10$$

Since, in the local context as far as time allocation of males is concerned, it has been streamlined. However, in case of female's time allocation, there exists a huge gap (Sultana et al., 1994; Khandker, 1988 and Gronau, 1977). Therefore, keeping in view, the focus of study in case of optimal time allocation to non-market work is only females. However, optimal time allocation is calculated for both males and females in case of labor market work (Hussain et al., 2016; Espino et al., 2017). In this study, it has been assumed that individuals drive utility from market goods as well as from the home-produced goods (Cain, 1966; Khandker, 1987; Glick, 1999). This study does not incorporate the time allocated to the leisure activities. The main reason for this is the non-availability of data for leisure time for the specified households.

3.4. Specification of Model for Time Allocation to Labor Market Work

This section provides the details of the conceptual framework for labor market work by males and females in Pakistan.

3.4.1. Determinants of Labor Market Time Allocation Decision of Males and Females

The main goal of this section of study is to determine the probability of males' and females' participation to the labor market. There are numerous socio-economic and demographic factors that are expected to influence the participation of males and females in the labor force. The description of dependent and explanatory variables used in the study is available in Table 3.1.

The dependent variables, labor force participation decision of male (MWork_m) and female (MWork_f) are qualitative variables containing two possible states that is, it takes the value of 1 if male and female decide to participate in labor market and 0 otherwise. The explanatory variables are divided into four main categories. These categories include characteristics of males and females, household characteristics, and residential characteristics.

The first set of independent variables comprises of the characteristics of males. It includes dummy variables of primary, middle, matric, intermediate, graduate, and higher education level for males, male's age, male's age square and marital status. The second set of independent variables comprises of the characteristics of females. This set includes dummy variables of primary, middle, matric, intermediate, graduate, and higher education level for females, female's age, female's age square and marital status. The third set of independent variables comprise of the characteristics of household like household size, number of small children, and joint family system.

Age as well as age square is important determinants of labor market time allocation decision. The influence of age on the LFP is expected to be positive. However, age square is likely to be negatively related with the labor market time allocation decision. The association between age and labor market participation decision is found to be quite trending. At younger age, the probability to assign time to the labor market is expected to be lower for both males and females because of lack of required qualification, experience level, and skills. They are required to groom their personality by improving their required qualification and acquiring better skills before joining the labor market. However, the likelihood to join the labor market is higher at middle age or peak productive age. This is so because both males and females may have acquired all necessary qualification, skills, and experience at this age. The probability to allocate time to the labor market is again expected to decrease at the older years of age. This explains that males and females become less energetic and therefore, possesses less working potential over time. That is why the age-participation relationship appears in the form of inverted u-shaped curve (Lee at al., 2008; Fadayomi et al., 2014).

In case of education, the base category is no formal education which is 0-4 years of education. Education reflects a range of factors. First and foremost, thing is that education is the indicator of human capital which is reflection or signal of earning potential of workers. Second,

education creates awareness and increases the ability of individuals for better forecast and decision making of females. Third important thing is that education reflects the social status of individuals. Society gives much respect to the highly educated people. These factors indicate that educated people can take efficient time allocation decision (Hosney, 2016; Espino et al., 2017; Evenson, 1978).

The probability to join the labor market is expected to be higher for both married males and females because of the increased household duties and responsibilities of household male and female members after being married. Since, unmarried males and females are relatively free from the responsibilities of married life, their likelihood to participate to the labor market is relatively lower (Che & Sundjo, 2018).

The third set of independent variables is comprised of the characteristics of household like household size, number of small children, and joint family system. Household is basically defined as all those members that usually live together and share their meals and it may consist of one or more persons who may or may not be related to each other (*Labor Force Survey, 2017-2018*). Literature review provided evidence that if males and females belong to a relatively large household size then the chances to join the labor market is expected to increase as compared to those belonging to a small household size. The reason of higher labor force participation for the lager household size results from the higher economic needs of the more family members. The additional reason may be the availability of the other family members to perform the household tasks in the larger family, so the more productive family members may decide to allocate time to the labor market (Shaheen et al., 2011; Faridi et al., 2009).

Another important determinant of the decision of labor market participation is the presence of small children of age between 0-5 years. Small children present in the family raises pressure on the family assets and may require males to decide to assign time to the labor market. Labor force participation of males is expected to be higher as compared to the females for each additional younger child in the family (Chishti et al., 1989). Similarly, males belonging to joint families are more oriented to join the labor market in contrary to males from the nuclear family system. However, females from joint families are less likely to join the labor market in contrary to their counterparts from the nuclear families. This is so because the other working members

present in the joint family system contribute to the household income and reduces the probability of females to work in the labor market (Gondal, 2005).

The fourth set of explanatory variables comprises of characteristics of residential location. Residential location is used to capture the numerous features of the residential province. It includes three provincial dummies such as Sindh, KPK and Baluchistan using Punjab as the base category. The reason of selecting Punjab as a base category is that literacy rate is relatively high in Punjab as compared to that in other provinces. This is economically stronger province. Economic activity is higher in this province as compared to that in other provinces (Hussain et al., 2016). Higher level of job opportunities are available to both males and females (Faridi and Rashid, 2014). Punjab is one of the largest province which accounts for more than 50 percent of the Pakistani population. One of the qualities of selecting the base category is that it should be larger in sample size (Bortolotti, 2018). Therefore, indicators in Punjab can play a role for the sake of comparison. Table 3.1 provides the description of underlying variables of the study.

Table 3.1. Description of Variables for Time Allocation Decision to Labor Market Work

Variables	Description	Measurement of variables
Dependent Variables		
MWork_m	Labor market participation decision of males	= 1, if individual male participates in labor market during reference week; =0, otherwise
MWork_f	Labor market participation decision of females	= 1, if individual female participates in labor market during reference week; =0, otherwise
Explanatory Variables: Characteristics of Males		
Age_m	Age of male	Completed years
Age ^{2}_m	square of age of male	Completed years square
Edup_m	Education category of male	=1, if the highest level of education of male is primary, = 0 otherwise
Edumi_m	Education category of male	= 1, if the highest level of education of male is middle, and = 0 otherwise
Edum_m	Education category of male	= 1, if the highest level of education of male is matric, and = 0 otherwise
Edui_m	Education category of male	=1, if the highest level of education of male is intermediate, and = 0 otherwise
Eduh_m	Education category of male	= 1, if the highest level of education of male is

		higher than intermediate that is B.A/B.Sc., M.A/M.Sc. and M.Phil./Ph.D., and = 0 otherwise
Married_m	Marital status	= 1, if male is married, and =0 for unmarried
Explanatory variables: Characteristics of Females		
Age_f	Age of female	Completed years
Age^2_f	Square of age of female	Completed years square
Edup_f	Education category of female	= 1, if the highest level of education completed by female is primary, and = 0 otherwise
Edumi_f	Education category of female	= 1, if the highest level of education of female is middle, and = 0 otherwise
Edum_f	Education category of female	= 1 if the highest level of education of female is matric, and = 0 otherwise
Edui_f	Education category of female	= 1, if the highest level of education of female is intermediate, and = 0 otherwise
Eduh_f	Education category of female	= 1, if the highest level of education of female is higher than intermediate that is B.A/B.Sc., M.A/M.Sc. and M.Phil./Ph.D., and = 0 otherwise
Married_f	Marital status	= 1, if female is married, and =0 for unmarried
Explanatory Variables: Characteristics of Household		
SC	Number of small children	Total number of small children of age less than equal to five years in the family
HHS	Size of the household	Total number of members of the family
JOINT	Type of the family	= 1, if individual is living in the joint family, and = 0 for the nuclear family
Explanatory Variables: Residential Characteristics		
Sindh	Residential province of Sindh	= 1, if individual is currently living in the province of Sindh, and = 0 otherwise
KPK	Residential province of Khyber Pakhtunkhwa	= 1, if individual is currently living in the province of KPK, and = 0 otherwise
Baluchistan	Residential province of Baluchistan	= 1, if individual is currently living in the province of Baluchistan, and = 0 otherwise
Punjab	Residential province of Punjab	= 1, if individual is currently living in the province of Punjab, and = 0 otherwise It is used as a base category

The equations for estimating the participation decision to the labor market work by employing probit and logit estimation techniques are given below:

Equation (3.11) given below shows the relationship between independent variables and the decision of the males to join the labor market or not.

$$\text{MWork}_{\_m} = \begin{bmatrix} \text{Age}_{\_m}, \text{Age}^2_{\_m}, \text{Edup}_{\_m}, \text{Edumi}_{\_m}, \text{Edum}_{\_m}, \text{Edui}_{\_m}, \text{Eduh}_{\_m}, \\ \text{Married}_{\_m}, \text{SC}, \text{HHS}, \text{JOINT}, \text{Sindh}, \text{KPK}, \text{Balushistan} \end{bmatrix} \quad 3.11$$

The decision of the females whether to allocate time to the labor market or not and influence of the independent variables is given in equation form as follows:

$$\text{MWork}_{\_f} = \begin{bmatrix} \text{Age}_{\_f}, \text{Age}^2_{\_f}, \text{Edup}_{\_f}, \text{Edumi}_{\_f}, \text{Edum}_{\_f}, \text{Edui}_{\_f}, \text{Eduh}_{\_f}, \\ \text{Married}_{\_f}, \text{SC}, \text{HHS}, \text{JOINT}, \text{Sindh}, \text{KPK}, \text{Baluchistan} \end{bmatrix} \quad 3.12$$

3.4.2. Determinants of Number of Hours Allocated to the Labor Market Work by Males and Females

Labor market time allocation decision is related to the decision of whether to work and how long to work in the labor market. It is observed that when an individual seeks work actively, then by definition that individual is the part of the labor force. The decision to work is actually related to how to allocate time. One can spend time on a number of non-market activities like raising children, cleaning house, fetching water, and shopping etc. or alternatively, one can spend time on some paid market work (Kimmel & Connelly, 2007; Aguiar & Hurst, 2009). So, the main purpose of this section of the study is to examine the relation between number of hours of work that males and females spend in the labor market relative to the numerous socio-economic and demographic determinants. For this purpose, a regression model is estimated in which number of hours of labor market work is a function of different independent variables.

The time allocation model of our study uses number of hours allocated in a week for working males and females as the dependent variable. There are two main dependent variables, one is weekly number of hours assigned to market work per week by the males (TAMW_m) and the second is the weekly number of hours allocated to market work by the females (TAMW_f).

Ordinary linear regression estimation technique is used to estimate the models as the hours of work are a continuous variable.

The exogenous or independent variables are categorized into six main categories. These are 1) characteristics of males, 2) characteristics of females, 3) male's occupation 4) female's occupation 5) characteristics of household, and 6) residential characteristics. The list of all these dependent and exogenous variables of the study is given in Table 3.2.

Table 3.2. Description of Variables for Number of Hours Allocated to Labor Market Work

Variables	Description	Measurement of variables
Dependent Variables		
TAMW_m	Time allocated to market work by males	Number of hours allocated to market work in a week by males
TAMW_f	Time allocated to market work by females	Number of hours allocated to market work in a week by females
Explanatory Variables: characteristics of Males		
Age_m	Age of male	Completed years
Age ^{2}_m	square of age of male	Square of completed years
Edup_m	Education category of male	=1, if the highest level of education of male is primary, = 0 otherwise
Edumi_m	Education category of male	=1, if the highest level of education of male is middle, and = 0 otherwise
Edum_m	Education category of male	=1, if the highest level of education of male is matric, and = 0 otherwise
Edui_m	Education category of male	= 1, if the highest level of education of male is intermediate, and = 0 otherwise
Eduh_m	Education category of male	=1, if the highest level of education of male is higher than intermediate that is B.A/B.Sc., M.A/M.Sc. and M.Phil./Ph.D., and = 0 otherwise
Married_m	Marital status	=1, if individual male is married, and =0 for unmarried
LMW	Males' wage rate	Wage rate in log form of working males
Explanatory variables: characteristics of females		
Age_f	Age of female	Completed years
Age^2_f	Square of age of female	Square of completed years

Edup_f	Education category of female	=1, if the highest level of education completed by female is primary, and = 0 otherwise
Edumi_f	Education category of female	=1, if the highest level of education of female is middle, and = 0 otherwise
Edum_f	Education category of female	=1, if the highest level of education of female is matric, and = 0 otherwise
Edui_f	Education category of male	=1, if the highest level of education of female is intermediate, and = 0 otherwise
Eduh_f	Education category of female	=1, if the highest level of education of female is higher than intermediate that is B.A/B.Sc., M.A/M.Sc. and M.Phil./Ph.D., and = 0 otherwise
Married_f	Marital status	=1, if individual female is married, and =0 for unmarried
LFW	Females' wage rate	Wage rate in log form of working females
Explanatory Variables: Male's Occupations		
Occmp_m	Occupation category of male	=1, if male is manager and professional, =0 otherwise
Occtacs_m	Occupation category of male	=1, if male is technician, associate professional, clerical and support worker, and =0 otherwise
Occaffcp_m	Occupation category of male	=1, if male is skilled agricultural workers, forestry & fishery, craft & related trades workers, plant/ machine operators & assemblers, and =0 otherwise
Occele_m	Occupation category of males	=1, if male is working as an elementary worker, and =0 otherwise. It is used as a base category
Explanatory Variables: Female's Occupations		
Occmp_f	Occupation category of female	=1, if female is manager and professional, =0 otherwise
Occtacs_f	Occupation category of female	=1, if female is technician, associate professional, clerical and support

		worker, and =0 otherwise
Occaffcp_f	Occupation category of female	=1, if female is skilled agricultural workers, forestry & fishery, craft & related trades workers, plant/ machine operators & assemblers, and =0 otherwise
Occele_f	Occupation category of female	=1, if female is working as an elementary worker, and =0 otherwise. It is used as a base category
Explanatory Variables: Characteristics of Household		
SC	Number of small children	Total number of small children of age less than equal to five years in the family
HHS	Size of the household	Total number of members of the family
JOINT	Type of the family	= 1, if individual is living in the joint family, and = 0 for nuclear family
Explanatory Variables: Residential Characteristics		
Sindh	Residential province of Sindh	= 1, if individual is currently living in the province of Sindh, and = 0 otherwise
KPK	Residential province of Khyber Pakhtunkhwa	= 1, if individual is currently living in the province of KPK, and = 0 otherwise
Baluchistan	Residential province of Baluchistan	= 1, if individual is currently living in the province of Baluchistan, and = 0 otherwise
Punjab	Residential province of Punjab	= 1, if individual is currently living in the province of Punjab, and = 0 otherwise It is used as a base category

All the underlying independent variables have an important relation with the dependent variables. Characteristics of both males and females include log of market wages both for males and females, dummy variables for primary, middle, matric, intermediate, and higher education levels for males and females, age of males and females, age square of males and females, females and marital status.

Age as well as age square is considered to be the important determinants of time allocation to the labor market. Age is likely to be positively related with the market work while age square is expected to be inversely associated with the market work. Younger males and females are expected to spend lesser time on market work. This may be because of lack of relevant qualification and experience of individuals. To earn higher wages, they should equip themselves with all necessary human capital, experience and skills. In addition females may prefer to complete their family size first before joining the labor market. They are expected to allocate lesser hours to the market work because of additional responsibility of household work along with market work. With age, both males and females allocate a greater amount of time to the labor market work because they have acquired higher qualification, experience, and hence higher expected wage rates may be earned over time. However, number of hours allocated to market work starts to decline during older age both for males and females because they both may suffer from health issues and consequently have low working potential over time. Therefore, the age-labor supply relationship is likely to be concave in shape.

As we know that one of the key indicators of human capital is education. Education creates awareness among individuals, increases the forecasting ability and help in making vital decisions. In fact, it shows the earning potential of an individual and also improves the social status (Lisaniler & Bhatti, 2005; Ahmed & Hafeez, 2007). In our study, no formal education is used as a base category for the education level. There should be positive effect of the potential hourly wages of the male and female on his and her time spend in the market work. It is observed that higher wages increases the opportunity cost of males and females to do the non-market work outside the domain of paid labor market. Therefore, the tendency to work longer hours by scarifying the leisure increases under the substitution effect (Evenson, 1978; Khandker, 1987). However, under the income effect, males and females either allocate fewer hours of work or continue to supply similar hours of work to the labor market.

Occupation categories of males and females have also sound relation with the labor supply behavior of males and females. For this purpose, four dummy variables for professionals, associate professionals and agricultural occupation are constructed for the occupations. Unskilled workers are set as the base category.

The fifth set of explanatory variables comprises of household characteristics. These characteristics comprise of household size, family setup, and presence of small number of children. Presence of small children may increase the amount of their time assigned to market work by males to fulfill the financial needs of the children. And opposite is the case for females, especially for the mothers. The burden of household work may increase for females due to presence of small children in the family (Evenson, 1978; Mueller, 1982). Therefore, the number of hours of time allocated to the market work by females may decrease with small children in the family. It is hypothesized that there is considerable contribution of household size towards determining the time allocation behavior of males and females. Males living in larger household bear more financial burden and thus, allocate more hours of work to the market as compared to those living in smaller sized households (Gbemisola & Ayo, 2014). Similarly, males from joint family system allocate more hours to the market work. The joint families are expected to be larger in size. The presence of other members in the household increases the financial burden on resources of the household. We can say that the joint families through the division of labor can more efficiently achieved the economies of scale. However, the load of household chores is higher on females belonging to joint family system in contrary to those living in nuclear family system. Therefore, females allocate lesser hours to the labor market work. Residential characteristics are the last set of independent variables where Punjab is set as the base category.

The functional relationship between the numbers of weekly hours of market in relation to various independent variables of the study is given below.

Weekly hours of market work function for males

Equation (3.13) shows the relationship between number of weekly hours allocated to the labor market work by males and a variety of independent variables.

$$\begin{aligned}\text{TAMW\_m} = {} & \alpha_0 + \alpha_1\text{Age\_m} + \alpha_2\text{Age}^2\text{\_m} + \alpha_3\,\text{Edup\_m} + \alpha_4\,\text{Edumi\_m} + \alpha_5\,\text{Edum\_m} + \alpha_6\,\text{Edui\_m} + \\ & \alpha_7\,\text{Eduh\_m} + \alpha_8\text{Married\_m} + \alpha_9\text{LMW} + \alpha_{10}\text{Occmp\_m} + \alpha_{11}\text{Occtacs\_m} + \alpha_{12}\text{Occaffcp\_m} + \\ & \alpha_{13}\text{SC} + \alpha_{14}\text{HHS} + \alpha_{15}\text{JOINT} + \alpha_{16}\text{Sindh} + \alpha_{17}\text{KPK} + \alpha_{18}\text{Baluchistan} + e_i \end{aligned} \quad 3.13$$

Weekly hours of market work function for females

Equation (3.14) shows the relationship between number of weekly hours allocated to the labor market work by females and a set of independent variables.

$$\text{TAMW\_f} = \beta_0 + \beta_1 \text{Age\_f} + \beta_2 \text{Age}^2\text{\_f} + \beta_3 \text{Edup\_f} + \beta_4 \text{Edumi\_f} + \beta_5 \text{Edum\_f} + \beta_6 \text{Edui\_f} + \beta_7 \text{Eduh\_f} + \beta_8 \text{Married\_f} + \beta_9 \text{LFW} + \beta_{10} \text{Occmp\_f} + \beta_{11} \text{Occtacs\_f} + \beta_{12} \text{Occaffcp\_f} + \beta_{13} \text{SC} + \beta_{14} \text{HHS} + \beta_{15} \text{JOINT} + + \beta_{16} \text{Sindh} + \beta_{17} \text{KPK} + \beta_{18} \text{Baluchistan} + e_i \quad 3.14$$

3.5. Specification of Model for Time Allocation to Non-Market Work

According to Shechtman (1984), household work is defined as "an unpaid activity that has an opportunity cost and also benefits another household member who could potentially compensate the individual that produce work in household."

The non-market work includes activities like housework, agriculture work and care of children. The detail of all these non-market activities is given in Table 3.3. Housework includes activities like making clothes, knitting embroidery, sewing pieces of clothes or leather, mat making, rope making, spinning, ginning, and waving. It also includes activities such as shopping, marketing, washing clothes, mending clothes, cleaning and arranging the house, carrying water from outside to the home, taking food from outside to the farm, collection of firewood and construction work like mud plaster of roofs and walls (Gwozdz & Poza, 2010; Miranda, 2011; Bloemen & Stancancelli, 2014; Rathnayaka & Weerahewa, 2015).

Agricultural operations include sowing, ploughing, transplanting rice, picking cotton, collection of fruits and vegetables, weeding field, and harvesting crops (Rathnayaka & Weerahewa, 2015). Food processing activities are also added into agriculture operations. Food processing activities comprised of milling, grinding, drying maize, seeds, or rice husking. Livestock operations and poultry raising are also part of agriculture operations. It includes activities like meat processing, feeding animals, milking animals, whipping milk, grassing, gathering of cow dung, making dung cakes, feeding poultry birds, eggs collection and packing, medication to birds and feeds preparation (Canoves et al., 1988).

Childcare work includes activities like caring for children or health care of ill children and helping children in their education and homework. These non-market activities are performed by females without any sort of wages or reward for improving the utility of the family.

Table 3.3. Description of Non-Market Activities

Sr. no	Classification of Activities	Main Activities
1	Housework	It includes making clothes, sewing clothes or pieces of leather, interweaving embroidery, mat making, rope making, spinning, waving, ginning, shopping, marketing, washing clothes, mending clothes, cleaning and arranging the house, carrying water from outdoor to the home, taking food from outside to the farm, collection of firewood and construction work like mud plaster of roofs and walls.
2	Child Work	Caring for children or health care of ill children, helping children in their education and homework.
3	Household Agricultural Work	Agricultural operations include sowing, ploughing, transplanting rice, picking cotton, collection of fruits and vegetables, weeding field, and harvesting crops. Food processing activities comprise of milling animals, grinding, drying maize, seeds or rice husking. Livestock operations and poultry raising includes meat processing, feeding animals, milking animals, churning milk, grassing animals, gathering of cow dung, making dung cakes, feeding poultry birds, eggs collection and packing, medication to birds and feeds preparation.

reference: *Pakistan Labor Force Survey (2017-2018)*

3.5.1. Time Allocation Decision of Females to Non-Market Work

This section analyzes the time allocation decision behavior of the females towards non-market activities. The data for the non-market work participation is obtained from the *Pakistan LFS (2017-2018).* The sample consists of females of age 10-64 years and their participation to the household work is examined with respect to the various social, economic and demographic factors. A standard approach from the literature is adopted by keeping in view of the prevailing socio-economic circumstances of Pakistan and availability of data during the process of selection of determinants. Decision of females to allocate time to the household activities has hardly been examined in the context of Pakistan. For the analysis of determinants of household work time allocation decision of females, a regression model considering the household time allocation

decision as a function of several independent variables is considered. Probit and logit estimation techniques are used for the purpose of analysis (Sultana et al., 1994; Khandker, 1987; Short et al, 2002; Alvarezz & Miles, 2003).

The dependent variable, time allocation decision of females to the non-market work or household work is a qualitative variable which is equal to 1 if female is involved in the non-market work and zero otherwise.

The explanatory variables are divided into three main categories. These are: 1) Characteristics of females 2) Characteristics of household and 3) Residential characteristics. The detail of dependent along with independent variables is given in Table 3.4.

Table 3.4. Description of Variables for Time Allocation Decision to Non-Market Work

Variables	Description	Measurement of variables
Dependent Variables		
NMWork_hwf	Housework decision	= 1, if individual female is involved in housework during a reference week; = 0, otherwise
NMWork_cwf	Child work decision	= 1, if individual female is involved in child work during a reference week; = 0, otherwise
NMWork_awf	Household agricultural work decision	= 1, if individual female is involved in household agricultural work during a reference week; = 0, otherwise
Explanatory variables: characteristics of females		
Age_f	Age	Completed years
Age^2_f	Square of age	Completed years square
Edup_f	Education category	= 1, if the highest level of education completed by female is primary, and = 0 otherwise
Edumi_f	Education category	= 1, if the highest level of education of female is middle, and = 0 otherwise
Edum_f	Education category	= 1, if the highest level of education of female is matric, and = 0 otherwise
Edui_f	Education category	= 1, if the highest level of education of female is intermediate, and = 0 otherwise
Eduh_f	Education category	= 1, if the highest level of education of female is higher than intermediate that is B.A/B.Sc., M.A/M.Sc. and M.Phil./Ph.D., and = 0 otherwise
Married_f	Marital status	= 1, if female is married, and = 0 for unmarried females
Explanatory variables: Characteristics of household		
SC	Number of small children	Total number of small children of age less than equal to five years in the family
HHS	Size of the household	Total number of members of the family
JOINT	Type of the family	= 1, if individual is living in the joint family, and = 0 for nuclear family
Explanatory Variables: Residential Characteristics		
Sindh	Residential province of Sindh	= 1, if individual is currently living in the province of Sindh, and = 0 otherwise
KPK	Residential province of Khyber	= 1, if individual is currently living in the province of

	Pakhtunkhwa	KPK, and = 0 otherwise
Baluchistan	Residential province of Baluchistan	= 1, if individual is currently living in the province of Baluchistan, and = 0 otherwise
Punjab	Residential province of Punjab	= 1, if individual is currently living in the province of Punjab, and = 0 otherwise It is used as a base category

The first set of independent variables comprises of characteristics of females. It includes female's age, female's age square, dummy variables for primary, middle, matric, intermediate, and higher education level of females, and marital status of females. The second set of independent variables comprises of characteristics of household like household size, number of small children, and joint family system. And the third set of independent variables comprises of provincial residential location.

The first set of explanatory variables, age and age square of female play an imperative role in the non-market work time allocation decision of females. Age is expected to have positive relation with the females' participation to the non-market work while age square is expected to have opposite relation. That is females' participation to the non-market work or sharing the burden of household chores increases with the increase in the age. At younger age, the burden of household chores is relatively lesser for females. However, with the increase in the age of females, the burden of household chores and child work is expected to increase. At the older age, females' participation in the non-market work is expected to decline. This may be due to emergence of health issues at later years of life. However, they are considered relatively free from the childcare duties during older years as their children may already have grown up (Mueller, 1982; Kedir & Rogers, 2018).

The second important determinant that influences the decision of the females to participate in the non-market is the education level of females. Education is categorized into six main categories and no formal education is chosen as the base category in our study. Education may specify the earning potential of the individual and can measure the value of her time in the form of human capital endowment. The effect of education on the non-market work participation may work in two unusual ways. First, it is expected that the females' participation in the non-market work decreases with the increase in education. Females prefer to join labor market if the

opportunity cost of being at home is higher. Educated females can more efficiently perform the market work and thus decrease their allocation of time to the home production. Consequently, they increase their time to the market work. Education may also represent the taste factor in the sense that if more educated females possess lower taste for the household work, they can reduce their time allocated to the household work and join the labor market work consequently (Rathnayaka & Weeraheawa, 2015; Anxo & Carlin, 2004; Kedir & Rogers, 2018). On the other side, the education is expected to raise the productivity of females in the household production. Therefore, they may prefer to stay at home and perform household chores.

The third important characteristic of females that may influence the household time allocation decision is the marital status. As far as the non-market work is concerned, it is evident that the married females perform more household work in contrary to their non-married counterparts. This is because the burden of child work and household chores is more likely the responsibility of the mothers as compared to the unmarried female members of the family. So, married females' participation is likely to be positively associated with the household non-market work (Bianchi et al., 2000; Singh & Pattanaik, 2019).

The household size can impact female participation in the non-market work either positively through higher needs for the household care or negatively by participating in the labor market work through household need of more income. Females belonging to a large household size are expected to spend more amount of their time to the non-market work in contrast to those belonging to a small household size. This is so because larger household size involves more burden of household chores.

The number of younger children (0-5) years present in the family is known to be highly affiliated with the time allocation decision of the females. Children are considered to be more time consuming. Therefore, child work services by females may be expected to increase with each additional younger child in the family (Nock & Kingston, 1988).

Family system comprises of nuclear and joint family systems. Nuclear family system comprises of married couples only or married couples with unmarried children, or one parent with unmarried children. And joint family system comprises of married couples with parents or married couples with their parents along with children (United Nations, 1998). These family

types have vital implications for the non-market work. The joint families are expected to be larger. On one side in joint family system more burden may be exerted on females household member in the form of care of old/ill family members and other relatives. On the other side, presence of parents and other relatives may serve as helping hands and may spare the time of females from doing household activities and childcare. The last category of independent variables includes residential characteristics. It includes three provincial dummies for Sindh, KPK and Baluchistan keeping Punjab as the base category.

Equation (3.15) represents the functional relationship between decision of the females to do the housework and a set of independent variables.

$$\text{NMWork}_{\text{\_hwf}} = \begin{bmatrix} \text{Age}_{\text{\_f}}, \text{Age}^2_{\text{\_f}}, \text{Edup}_{\text{\_f}}, \text{Edumi}_{\text{\_f}}, \text{Edum}_{\text{\_f}}, \text{Edui}_{\text{\_f}}, \text{Eduh}_{\text{\_f}}, \\ \text{Married}_{\text{\_f}}, \text{SC}, \text{HHS}, \text{JOINT}, \text{Sindh}, \text{KPK}, \text{Baluchistan} \end{bmatrix} \quad 3.15$$

Equation (3.16) represents the functional relationship between decision of the females to do the child work and a set of independent variables.

$$\text{NMWork}_{\text{\_cwf}} = \begin{bmatrix} \text{Age}_{\text{\_f}}, \text{Age}^2_{\text{\_f}}, \text{Edup}_{\text{\_f}}, \text{Edumi}_{\text{\_f}}, \text{Edum}_{\text{\_f}}, \text{Edui}_{\text{\_f}}, \text{Eduh}_{\text{\_f}}, \\ \text{Married}_{\text{\_f}}, \text{SC}, \text{HHS}, \text{JOINT}, \text{Sindh}, \text{KPK}, \text{Baluchistan} \end{bmatrix} \quad 3.16$$

Equation (3.17) represents the functional relationship between decision of the females to do the household agricultural work and a set of independent variables.

$$\text{NMWork}_{\text{\_awf}} = \begin{bmatrix} \text{Age}_{\text{\_f}}, \text{Age}^2_{\text{\_f}}, \text{Edup}_{\text{\_f}}, \text{Edumi}_{\text{\_f}}, \text{Edum}_{\text{\_f}}, \text{Edui}_{\text{\_f}}, \text{Eduh}_{\text{\_f}}, \\ \text{Married}_{\text{\_f}}, \text{SC}, \text{HHS}, \text{JOINT}, \text{Sindh}, \text{KPK}, \text{Baluchistan} \end{bmatrix} \quad 3.17$$

3.5.2. Determinants of Hours of Work Allocated to Non-Market Work

After analyzing the determinants of non-market time allocation decision of the females, the very next question is that how many hours, females may allocate to the non-market or household work. It is usually observed that females perform number of different household activities. The unpaid non-market activities such as housework, child work, and household agricultural work play an important role in making home heaven. These unpaid non-market activities save the amount of cost of purchasing these goods and services from the market. Thus, it directly affects the well-being of household members and their standard of living (Sayer et al.,

2004; Kimmel & Connelly, 2007; Bloemen et al., 2010). Therefore, the study of time allocated to the household work by females with respect to the various socio-economic and demographic factors is the need of the time.

There are three dependent variables in case of non-market work. They are the number of hours allocated to housework per week by the females (TANMW_hwf), the number of hours allocated to child work per week by the females (TAMNW_cwf), and the number of hours allocated to the household agricultural work per week by the females (TAMNW_cwf). Since, the number of hours of non-market work is a continuous variable. Ordinary linear regression technique is used for the purpose of analysis.

The exogenous or independent variables are categorized into three main categories. These are 1) characteristics of females, 2) characteristics of household and 3) residential characteristics. The list of all these dependent and exogenous variables is given in Table 3.5.

Table 3.5. Description of Variables for Number of Hours Allocated to Non-Market Work

Variables	Description	Measurement of variables
Dependent Variable		
TAMNW_hwf	Time allocation to housework i.e. number of hours allocated per week to housework	If individual female allocates at least one hour to the housework during a reference week
TAMNW_cwf	Time allocation to child work i.e. number of hours allocated per week to child work	If individual female allocates at least one hour to the child work during a reference week
TAMNW_awf	Time allocation to household agricultural work i.e. number of hours allocated per week to household agricultural work	If individual female allocates at least one hour to the household agricultural work during a reference week
Explanatory variables: Characteristics of Females		
Age_f	Age	Completed years
Age^2_f	Square of age	Completed years square
Edup_f	Education category	= 1, if the highest level of education completed by female is primary, and = 0 otherwise
Edumi_f	Education category	= 1, if the highest level of education of female is middle, and = 0 otherwise
Edum_f	Education category	= 1, if the highest level of education of female is matric, and = 0 otherwise
Edui_f	Education category	= 1, if the highest level of education of female is intermediate, and = 0 otherwise
Eduh_f	Education category	= 1, if the highest level of education of female is higher than intermediate that is B.A/B.Sc., M.A/M.Sc. and M.Phil./Ph.D., and = 0 otherwise
Married_f	Marital status	= 1, if female is married, and =0 for unmarried
Explanatory Variables: Characteristics of Household		
SC	Number of small children	Total number of small children of age less than equal to five years in the family
HHS	Size of the household	Total number of members of the family
JOINT	Type of the family	= 1, if individual is living in the joint family, and = 0 for nuclear family
Explanatory Variables: Residential Characteristics		

Sindh	Residential province of Sindh	= 1, if individual is currently living in the province of Sindh, and = 0 otherwise
KPK	Residential province of Khyber Pakhtunkhwa	= 1, if individual is currently living in the province of KPK, and = 0 otherwise
Baluchistan	Residential province of Baluchistan	= 1, if individual is currently living in the province of Baluchistan, and = 0 otherwise
Punjab	Residential province of Punjab	= 1, if individual is currently living in the province of Punjab, and = 0 otherwise It is used as a base category

It is observed that age and age square are important determinants of time allocation of females to the non-market work. Age is likely to be positively related with the time allocation to the non-market activities while age square is negatively related with time allocation to the non-market work. Younger females allocate relatively lesser time to the non-market work because of lack of household work experience. As the age of female increases, it is expected that they allocate more time to the household chores, child work and agricultural activities. This may be because adult females are energetic and healthy. They can perform different household work easily and in proper manners. At older age, females are likely to spend less time on the non-market work because of less working potential and deteriorating health condition. And another reason is that older females may have previously fulfilled their responsibilities regarding upbringing small children and other household chores. It is now the turn of their grown-up children to perform these household responsibilities (Kedir & Rogers, 2018). However, it is quite possible that some older females may bear the responsibility of household work particularly in the absence of other females to perform household work. Thus, females may have to work even during older age, especially when they are still energetic enough to perform these duties.

With the increase in the education level, it is common practice that individuals allocate more hours to the paid work in labor market and reduces their amount of number of hours for the unpaid non-market activities like housework and household agricultural activities. So, we can say that the education is negatively related with the amount of time allocated to the non-market work. However, less educated females are expected to allocate more amount of their time to household work and household agriculture work (Kedir & Rogers, 2018). Pertaining to childcare

activities, a positive association is expected between time allocation to childcare activities and education of females (Miller & Mulvey, 2000; Nadal & Molina, 2013).

As far as marital status is concerned, it is expected that married females allocate more hours per week to the housework and child work as compared to the unmarried females. This is so because married females traditionally bear more burden of these responsibilities as compared to the unmarried ones (Singh & Pattanaik, 2018; Bianchi et al., 2000).

Household characteristics comprise of presence of number of small children, household size, and joint family system. Presence of younger children in the household is expected to increase the females' burden of housework and childcare services and thus increase their time allocation to the non-market activities (Bloemen et al., 2010; Alvarez & Miles, 2003; Mueller, 1982).

Larger household is expected to have a negative relation with the females' number of hours allocated to the housework. This may be because of presence of helping hands in the form of other members of the family who shares the burden of housework. However, it is expected to have positive relation with the childcare activities. Larger household size involves more of housework burden and more need of caring services for the children and old family members. This may increase the number of hours allocated to the childcare activities by females (Nock & Kingston, 1988).

The last category of independent variables indicates residential location of the females. This group includes dummies for provinces like Sindh, KPK, and Baluchistan. Punjab is taken as base category.

The functional relationship between numbers of weekly hours of non-market work in relation to various independent variables is given below.

Weekly hours of housework function for females

Equation (3.18) shows the relationship between weekly number of hours allocated to the housework by females and a set of independent variables.

$$\begin{aligned}\text{TANMW\_hwf} = {} & \gamma_0 + \gamma_1 \text{Age\_f} + \gamma_2 \text{Age}^2\text{\_f} + \gamma_3 \text{ Edup\_f} + \gamma_4 \text{ Edumi\_f} + \gamma_5 \text{ Edum\_f} + \gamma_6 \text{ Edui\_f} + \\ & \gamma_7 \text{ Eduh\_f} + \gamma_8 \text{Married\_f} + \gamma_9 \text{SC} + \gamma_{10} \text{HHS} + \gamma_{11} \text{JOINT} + \gamma_{12} \text{Sindh} + \\ & \gamma_{13} \text{KPK} + \gamma_{14} \text{Baluchistan} + e_i \end{aligned} \quad 3.18$$

Weekly hours of child work function for females

Equation (3.19) shows the relationship between number of weekly hours allocated to the child work by females and a set of independent variables.

$$\begin{aligned}\text{TANMW\_cwf} = {} & \gamma_0 + \gamma_1 \text{Age\_f} + \gamma_2 \text{Age}^2\text{\_f} + \gamma_3 \text{ Edup\_f} + \gamma_4 \text{ Edumi\_f} + \gamma_5 \text{ Edum\_f} + \gamma_6 \text{ Edui\_f} + \\ & \gamma_7 \text{ Eduh\_f} + \gamma_8 \text{Married\_f} + \gamma_{11} \text{SC} + \gamma_{12} \text{HHS} + \gamma_{13} \text{JOINT} + \gamma_{14} \text{Sindh} + \\ & \gamma_{15} \text{KPK} + \gamma_{16} \text{Baluchistan} + e_i \end{aligned} \quad 3.19$$

Weekly hours of household agricultural work function for females

Equation (3.20) shows the relationship between number of weekly hours allocated to the household agricultural work by females and a set of independent variables.

$$\begin{aligned}\text{TANMW\_awf} = {} & \gamma_0 + \gamma_1 \text{Age\_f} + \gamma_2 \text{Age}^2\text{\_f} + \gamma_3 \text{ Edup\_f} + \gamma_4 \text{ Edumi\_f} + \gamma_5 \text{ Edum\_f} + \gamma_6 \text{ Edui\_f} + \\ & \gamma_7 \text{ Eduh\_f} + \gamma_8 \text{Married\_f} + \gamma_9 \text{SC} + \gamma_{10} \text{HHS} + \gamma_{11} \text{JOINT} + \gamma_{12} \text{Sindh} + \\ & \gamma_{13} \text{KPK} + \gamma_{14} \text{Baluchistan} + e_i \end{aligned} \quad 3.20$$

3.6. Estimation Techniques

The general form of the market and non-market participation or time allocation decision is given by:

$$Y = f\ (X_1, \dots, X_n) \qquad 3.21$$

Where *Y* represents the decision regarding market and non-market time allocation. Y=1, if males and females decide to allocate their time to market and non-market work and zero otherwise.

There are a lot of socio-economic and demographic factors that affect the males' and females' participation decisions in the labor market and non-market work. In the above equation, $X_1, \dots, X_n$ represents the numerous socio-economic and demographic factors of the study. These socio-economic and demographic factors include age of males and females, education of males and females, marital status of males and females, household size, family type, number of younger children of age between 0-5 years, and residential location. Education of the males and females is categorized into categories namely primary, middle, matric, intermediate, and higher with keeping non-formal education as the base category. In family type, a dummy for joint family is used keeping nuclear family as the base category. Linear along with non-linear probability models are used to determine the function given in equation (4.21) above.

Linear Probability Model

The regression of the linear probability model is given below:

$$Y_i = \beta_o + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki} + e_i \qquad 3.22$$

Where Y_i is a binary dummy variable which is equal to 0 for non-workers and is equal to 1 for the workers. X_{ki} explains the set of exogeneous variables such as age, age square, education level, marital status, number of children, household size, family type, and residential location. e_i is the error term. This is the linear version of probability model. However, linear probability model is unreliable due to several reasons. The first problem is that the error term in linear probability model is heteroskedastic and the distribution is not normal. And, the second problem is the assumption that the marginal effects remain constant or we can say that the probability

increases in a linear way with X, resulting into fall of predicted probability outside the range of 0-1. To avoid these problems, a model is needed which confine the probability within the range, so, that it remains constant (Gujarati, 2009).

3.6.1. Probit Model

Non-linear specification is more appropriate in view of the inadequacy of the linear probability model (Faridi et al., 2010; Gujarati, 2009). So, probit model is used to explain the behavior of dichotomous dependent variables. And, it assumes that the cumulative distribution of error term is normal. The probit model in equation form is given below:

$$Y_i^* = \beta_O + \beta_1 X_i + e_i \qquad 3.23$$

Where Y_i^* denotes the decision of whether to participate in labor market and non-market work or not. Since, Y_i^* is unobservable, so, it depends on the observed factors represented as X_i. β_1 is a row vector of parameters and X_i is the column vector of the variables that affect the Y_i^*. e_i is the error term which is normally distributed with zero mean (Gujarati, 2009; Hare, 2016). The observable dichotomous dependent variable Y is associated with the unobservable variable Y_i^* in the following way:

Y_i=1 if $Y_i^* > 0$

Y_i=0 if $Y_i^* < 0$

The probability that Y_i^* is less than or equal to Y_i, under the normality assumption can be calculated from the standardized normal cumulative distribution function as follows:

$$P_i = P_r(Y_i = 1) = (Y_i^* \leq Y_i) = F(Y_i) = \int_{-\infty}^{BX_i} e^{-t^{2/2}} dt \qquad 3.24$$

Where P_i is the probability of whether to participate in labor market work and non-market work or not. And, *t* is the standardized normal variable with zero mean and unit variance. The major advantage of using probit model is that with the increase in X, probability of occurrence also increases but never falls outside the 0-1 range. Probit model is used for knowing whether males and females are participating in the market and non-market work or not (Kalenkoshi et al., 2009; Pino, 2004).

3.6.2. Logit model

Another equally important non-linear model that deals with the problem of limited dependent or dichotomous variable is the logistic or logit model. There are number of reasons that make the logit model fit in case of binary variables. One reason is that it eliminates the probability of falling the market and non-market participation outside the limit of 0-1 (Faridi et al., 2010; Gujarati, 2009; Fraidi and Rashid, 2014; Hussain et al., 2016). Another reason is that it is easier to correct the bias in case of outliers as it is not sensitive in comparison to the probit technique. In addition to this, it has less restrictive requirements as it does not assume homoscedasticity in contrast to the simple linear regression model (Batool et al., 2019). The logistic transformation of market and non-market participation p is Log $\frac{p}{1-p}$ and it is written in the form of logit (p). Where the odds of participation are $\frac{p}{1-p}$ and it converts the log p from the limit of (0-1) to -∞ to ∞. If the probability of market and non-market participation is p then the odds of participation are $\frac{p}{1-p}$. And, the odds in this case are shown as:

$$\frac{P(Y=1|X)}{P(Y=0|X)} = \frac{P(Y=1|X)}{1-P(Y=1|X)}$$

Where Y=1 represents the odds of participation and Y=0 represents the odds of non-participation to the labor market and non-market work (Gujarati, 2009). Thus, the relationship between dependent and independent variables in the form of linear logistic model is represented as:

$$\text{Logit } P_i = \frac{exp(\beta_o+\beta_1 X_1+\cdots+\beta_k X_k)}{1+exp(\beta_o+\beta_1 X_1+\cdots+\beta_k X_k)} \qquad 3.25$$

Maximum likelihood estimation is used for the estimation of unknown parameters, which is given as:

$$L(\beta) = \sum_{i=1}^{n} P_i^{yi}(1-P_i)^{1-y_i}$$

3.6.3. The Ordinary Least Square (OLS) Model

Ordinary least squares (OLS) is a method that is used to estimate the relation between dependent and independent variables by minimizing the sum of squares of differences between the observed dependent and predicted values of independent variables (Gujarati, 2009). Since the numbers of hours assigned to labor market work and non-market work are continuous variables, employing OLS is found suitable estimation technique for analyzing the time allocation behavior of males and females.

The linear regression model in general form is given below:

$$Y_i = \beta_o + \beta_1 X_{i1} + \beta_2 X_{i2} + \cdots + \beta_k X_{ik} + e_i \qquad (i = 1,2, \ldots \ldots \ldots, N) \qquad 3.26$$

Number of weekly hours of market work and non-market work for males and females are estimated by using OLS estimation technique.

3.6.4. Heckman's Two Step Estimation Approach

The decision to participate and allocate time in the labor market is not based on some controlled process in which a random sample of individuals are allowed to participate and allocate time in the labor market and controlled group of individuals should have to stay at home (Heckman, 1976; Craig & Brown, 2014). In fact, this decision is based on the individual's maximization behavior. Since, we cannot observe the number of hours of work of non-participants and if we use the truncated sample of participant workers only then we encounter with the issue of sample selection bias (Sultana et al., 1994). Therefore employing OLS produces biased results (Heckman, 1979; Antonakis et al., 2014). Thus, Heckman's two step procedure is needed to partially correct the sample selection bias in predicting hours of labor market work for females (Connelly & Kimmel, 2009; Irfan, 2015). First stage deals with the decision making of females in labor market work. In this regard, probit equation on full sample of participating and non-participating females is performed because of the availability of full data on the participation decision of females in labor market work and Inverse Mill's ratio, a sample selection correction term, is generated in this process. At the second stage, OLS is applied on the hours of work function for females and data is available on participating female workers, using Inverse Mill's

ratio as an additional regressor (Vaara & Matero, 2011; Vella, 1998). Consequently, we can obtain consistent estimates (Bascle, 2008; Wooldridge, 2002).

3.6.5. Tobit Model

Tobit model also called censored regression model is a form of linear regression. Specifically, the tobit model is used if a continuous dependent variable needs to be regressed, but is skewed to one direction. The tobit model allows regression of such a variable while censoring it so that regression of a continuous dependent variable can happen (Sayer et al., 2004; Kimmel & Connelly, 2007; Shen et al., 2016).

It allows the researcher to specify a lower (or upper) threshold to censor the regression at while maintaining the linear assumptions needed for linear regression. The tobit technique uses all observations i.e., both at and above the limit in order to estimate the regression line (McDonald Moffitt, 1980). The data which has been used for the analysis has censoring issue. Therefore, the best variable option is tobit model (Glick, 1999; Anxo & Carlin, 2004; Kimmel & Connelly, 2007). Hence, the same has been employed for analysis in this thesis.

The use of tobit model is justified on the base of following steps:

1. Since, a remarkable number of males and females do not participate in at least one of the two types of work, i.e. market work and non-market work (Sultana et al., 1994; Bloemen et al., 2014). Also, a sizeable number of females do not spend time on childcare activities (Malathy, 1994).
2. Consequently, the dependent variable contains many zero values and the problem of censored data arises in these cases, which is solved by applying tobit technique in this study (Shen et al., 2016).
3. Therefore we have estimated the decision to participate model by applying the logit estimation technique. This problem of censored data is solved by using the maximum likelihood (ML) Tobit method (Addabbo et al., 2012; Kalenkoshi et al., 2009; Khandker, 1987; Kozel and Alderman, 1990). At second step we have applied tobit model to estimate time allocation equation. The model in equation form is as follows:

$$Y_i^* = \beta_O + \beta_1 X_i + e_i \qquad 3.27$$

$$Y_i = \begin{cases} \beta_o + \beta_1 X_i + e_i & \text{if } Y_i^* > 0 \\ 0 & \text{if } Y_i^* \leq 0 \end{cases}$$

Where Y_i is an observed continuous variable that is equal to Y_i^* which is latent variable. X_i is a set of exogeneous variables. $Y_i = Y_i^*$ if $Y_i^* > 0$, that is if males and females allocate time to market and non-market activities. $Y_i^* = 0$, if males and females do not spend time on either activity. e_i is the error term (Gujarati, 2009; Ateriou & Hall 2015; Stewart, 2005).

3.6.6. Instrumental Variable Approach

The problem of endogeneity arises from the correlation between independent variables and error term (Bascle, 2008). It leads to biased estimation results. There are many potential sources of endogeneity. One of the causes of endogeneity is the measurement errors. It arises due to errors in variables when the true value of the explanatory variable is unobservable. Second cause of endogeneity may be the omitted variables. The omitted variable bias arises when a variable that affects the regressand variable is correlated with the other explanatory variables of the sturdy. As a result, the condition of exogeneity is violated in case of omitted variable bias. Another cause of endogeneity is the simultaneous causality. It happens because the causality runs in both ways (Bascle, 2008; Wooldridge, 2002). Instrumental variable approach is used to address the problem of endogeneity (Bascle, 2008; Stefanski & Buzas, 1995). The reason of using instrumental variable approach to that of Heckman is that later requires a strong assumption related to the joint normal distribution. However, IV approach is more robust in dealing with misspecification in distribution (Xu, 2017).

The identification of this particular IV is based on studies of Riddell and Sung, 2011 and Totouom et al., 2018. Relevancy and exogeneity tests are used to check the validity of instruments. The same has been adopted in this study. Moreover, to justify the problem of endogeneity, Durbin Wu Hausman test is used to check endogeneity of instrumented variables (Heitmueller, 2007; Mendola & Carletto, 2012). Following instrumental variable approaches are to be used in this research to address the problem of endogeneity.

3.6.6.1. IV Probit Model

The problem of potential endogeneity arises in education variable for the male's hours of work in the labor market. In other words, we can say that there exists correlation between explanatory variables and error terms. Applying OLS would lead to bias estimation results. Therefore, instrumental variable approach is applied to tackle the problem of likely endogeneity in the variable of education. As far the education is concerned, we know that there are number of factors that correlates education with the probability of time allocation to the labor market work. For instance, individuals belonging to well off background and well-connected social network may obtain higher educational level and therefore, may obtain better employment opportunities in the labor market (Riddell & Sung, 2011). Furthermore, the chances of reverse causality between education and labor market participation can create endogeneity problem as well. For example, the labor market work can provide individuals availing better chance to enhance their educational level, by investing their current earnings to fulfill their educational expenses. And, the last reason of endogeneity between education and labor market participation may be the measurement error that is common in survey data. Collectively, the problem of endogeneity can result into biased estimates.

In order to resolve the issue of endogeneity, we need valid instrumental variables that influence the education without directly interrupting the male's involvement in the labor market. Thus, we identify two instrumental variables for the endogenous education variable. The first instrumental variable for the education is the level of education of head of the household, and the second instrumental variable is the educational level of the parents. The educational level of both the head of the household and parents affect access of the individuals to the labor market through their influence on the attainment of education of individuals. The more the head of a household as well as parents of the individuals are educated, the more they will invest on the education of their children. This would result into positive impact of the education of children on their labor market outcomes (Totouom et al., 2018).

Since, the number of instruments is greater than the number of endogenous variables, the model is said to be over identified. The validity of instrumental variables is checked by relevancy test and exogeneity test. An instrument is relevant, if it is correlated with the endogenous

variable. According to the exogeneity test, all instruments must be uncorrelated with the error term. The relevance of instrumental variables is checked through the first stage F-statistics that is developed by Stock and his colleagues (Stock, 2001; Stock et al., 2002; Stock and Yogo, 2004). The null hypothesis of which is that all underlying coefficients of instruments are equal to zero. The results of our relevancy test i.e., first stage F-statistics reveals that: F = 77.26 (P = 0.000). Since, the value of F statistics is greater than 10 which mean that our instruments are strong and confirms the relevancy of our instrumental variables (Stock et al., 2002). The result of relevancy test is reported in Table 12A (appendix). However, Sargan and Basmann statistics is used to check the exogeneity of the underlying instrumental variables. The exogeneity condition requires that instrumental variables are not correlated with the error term present in the structural part of equation. The result of our exogeneity test reveals that: Sargan (score) chi2(3) = 5.232 (p = 0.7325) and Basmann chi2(3) = 5.220 (p = 0.7338). Since, the p values of both Sargan and Basmann tests are large which confirm that instrumental variables are uncorrelated with the error term. The result of exogeneity test is reported in Table 11A (appendix). The test of over identification restrictions: chi2(3) = 5.851 (p = 0.328). Because the value of p is greater than 5%, the null hypothesis is not rejected and thus confirms the validity of over identification restrictions. All of these validity tests confirm the validity of our instrumental variables i.e. education of parents and education of the head of the household and model is correctly specified.

Since, decision of participation of males to the labor market is a dichotomous variable, instrumental variable probit model (IV-Porbit) is used in this study.

$$C = \pi_i Z_i + \sum \lambda_i X_i + \mu \qquad 3.28$$

$$Y = \varphi_1 C^* + \sum \beta_i X_i + \varepsilon \qquad 3.29$$

4.28 is the first stage equation. Where, C is the endogenous variable of education. Z_i are the instrumental variables. X_i represents the series of exogeneous covariates. In the first stage equations, predicted values of education (C^*) are obtained through OLS regression. Equation 3.29 is the second stage equation. In the second stage, IV estimates φ_1 are obtained by regressing dependent variable (Y) on $C^*$and X_i (Ateriou and Hall, 2015; Stewart, 2005).

3.6.6.2. Two-Stage Least Squares (2SLS)

It is observed that OLS do not give consistent estimates in presence of endogeneity. That is OLS estimates may be biased either upward or downward due to the presence of correlation between error term and endogenous variables. Another model used to resolve the issue of endogeneity between suspected endogenous variables like education and hours of labor supply, is the two-stage least square 2SLS model. This model reduces the biasness in estimates created as a result of endogeneity by using instrumental variables. The estimates can be robust as a result (Wooldridge, 2002; Gujarati, 2009, Ateriou & Hall, 2015). There are basically two main stages of 2SLS model. At first stage, predicted probabilities are obtained from equation 3.28 by applying OLS estimation technique. At the second stage, predicted probability of each individual endogenous covariate is incorporated in labor supply equation as a separate regressor. This final equation (3.29) is estimated by applying OLS model.

Durbin-Wu Hausman (DWH) test is widely used to check whether OLS or IV methods are more appropriate. In other words, it is used to detect the potential endogenous variables. The null hypothesis of DWH test is that variables are exogenous. If the p-value is less than 5 percent, then we reject the null hypothesis and accept the alternative hypothesis.

3.6.6.3. IV-Tobit Model

Standard Tobit model gives biased results in presence of endogenous variables (Smith and Blundell (1986). Moreover, the multinomial logit model cannot be used for in the case of continuous dependent variable (Schwab, 2002; Shaheen et al., 2015). Multinomial logit model can be applied in the presence of a categorical dependent variable with two or more unordered levels (Kwak & Mattthew, 2002). Since, the numbers of hours allocated to the market and non-market work is a continuous variable, Tobit estimation technique is appropriate (Deding & Lausten, 2006; Kimmel & Connelly, 2007; Nazier & Ezzat, 2021). Instrumental variable Tobit (IV-Tobit) estimation technique is appropriate in the presence of endogenous regressors (Finlay & Magnusson, 2009; Shen et al., 2016). In other words, when there exist a correlation between one or more regressors and error term, IV-Tobit is employed. There are two main stages of the IV-Tobit model. At first stage, all endogenous variables are one by one regressed on the instrumental variables and exogeneous variables in order to obtain the respective predictive

probabilities by using OLS estimation technique. At the second stage, dependent variable is regressed on exogenous covariates and predicted probabilities obtained from the first stage (Shen et al., 2016). Therefore, in the context of above discussion regarding the Tobit and IV-Tobit estimation techniques, these techniques have been found appropriate to be applied in this study instead of multinomial logit model.

3.7. Conclusion

Since, the main purpose of this study is to estimate and analyze factors that are affecting time allocation decision and the magnitude of time that is to be allocated to labor market and non-market activities, it required to use the nonlinear probability and linear probability models. For this purpose, this study employs the probit and logit to analyze the labor market and non-market participation behavior of individuals. Tobit and OLS are employed to examine the determinants of number of weekly hours allocated to the labor market work and non-market activities. The problem of endogeneity is resolved by employing instrumental variable approach. There is no study so far done in Pakistan which has examined the market and non-market work behavior of males and females by different aspect and employing different estimation techniques.

CHAPTER 4

DATA AND DESCRIPTIVE ANALYSIS

4.1. Introduction

This chapter presents an analysis of the data regarding the participation and time allocation to labor market work and non-market work in Pakistan. The data is based on Pakistan *Labor Force Survey* (LFS) 2017-2018. The chapter also provides the descriptive analysis of time allocation in terms of number of hours per week of males and females to the market work and specifically for females only in case of non-market work. This chapter is structured as follows. Analytical framework is presented in section 4.2. Source of the data along with the background is given in section 4.3. Section 4.4 presents information about sample framework and stratification. Section 4.5 gives the descriptive analysis of the data on the determinants of participation and allocation of time in the labor market. Descriptive analysis of the data about the determinants of participation and allocation of time regarding the non-market work is provided in Section 4.5. Conclusion of this chapter is given in Section 4.6.

4.2. Analytical Framework

The study uses this data for the analysis of males and females LFP and their working hours. Another set of data is used to analyze the females' participation decision and allocation of time for the non-market work. LFS provides a detailed information regarding history of participation in labor market and non-market work by all sampled households of age 10 years or above. Cross tabulation technique is adopted in this chapter for the meaningful analysis of the topic. Characteristics of both participating as well as non-participating males and females in Pakistan are to be examined in this study. Furthermore, males' and females' characteristics that are affecting their time allocation per week in the labor market work are also examined. In addition, characteristics of females affecting their participation decision and hours of work allocated per week to non-market work are also analyzed in this study. These characteristics include age, education level, number of children, family setup, and residential province.

In this study, we assume that each adult household has two main options i.e., to participate or not to participate in labor market and non-market work.

4.3. Data Source and Background

The study is based on the *LFS, 2017-2018* data. This survey is conducted by the Federal Bureau of Statistics. It provides wide range of knowledge about the different aspects of the civilian labor force of the country. It also provides information about the different non-market activities performed by household members. In LFS, multipurpose household questionnaire is adopted for the collection of data at the individual and household level. It provides information about different measures of household composition. It also gives demographic evidence for all the individuals that are of age 10 years and above.

Federal Bureau of Statistics (FBS) started the process of data collection regarding different characteristics of civilian labor force in 1963. FBS has continuously updated the questionnaire and methodology of LFS in order to keep pace with the requirement of the changing social and economic situation. In 1990, questionnaire was revised, and questions related to the marginal economic activities especially related to the females were included. In 1995, portion of the LFS related to the migration and informal sector was improved. A further

extension in the form of occupational safety and health of employed persons was made in 2001-02. This practice of updating LFS has been continuing [FBS (2018)].

The major objective of conducting survey is to gather comprehensive statistics of different dimensions related to the civilian labor force of the country. These different dimensions include, age, education, gender, marital status and relationship to head of the household etc. This will help in development of skills, generation of employment opportunities, planning, evaluating the role and significance of the informal segment of the economy, and examining the volume, attributes, and outline of employment [FBS (2018)].

4.4. Sampling Framework and Stratification

Households living in all rural and urban areas in the four provinces of Pakistan form the universe of LFS. Islamabad is also included in this universe; however, FATA and military restricted areas are excluded from this universe. The sample design adopted for this survey is the stratified two-stage sample design. As far the sample framework is concerned, Federal Bureau of Statistics (FBS) has formed its own sampling framework for the urban and rural territories. According to this sampling framework, enumeration blocks are formed in each city. On average, 200 to 250 households are included in each enumeration block according to the clearly defined boundaries and maps. The LFS (2017-2018) is based on the most recent frame, updated by the Population and Housing Census 2017.

Total Primary Sampling Units (PSUs) are 3032. Out of this, 1260 are urban and 1772 are rural. The whole sample of households in Secondary Sampling Units (SSUs) is drawn from these PSUs and is distributed evenly over four quarters. As far the sample size allocation is concerned, a greater portion of the sample is allocated to the rural areas. The sample allocated to Punjab and Sindh is higher as compared to the other two provinces.

LFS (2017-2018) data is collected from 43472 households in the country. The sample of this study in case of labor market work consists of males and females of age 15-64 years currently residing in the four provinces of Pakistan (ILO, 2021). The age bracket of 15-64 years used in this study is based on ILO definition of working age. The sample size of our study for the labor market work for males and females is 73524 and 74457 respectively. However, the

sample of this study for the non-market work comprises of females of age 10-64 years. In case of non-market work, the sample size of our study comprises of 52748 females.

4.5. Description of Data

This section describes the characteristics of participating along with non-participating males and females in the labor market work in Pakistan. Characteristics of males and females that influence their hours of time allocation per week are also described in this section. In addition, characteristics of females that affect females' participation decision and their allocation of hours of work in a week to the non-market work are described in this section.

4.5.1. Description of Time Allocation of Males and Females to Labor Market Work

This section is divided into four main parts. The first section presents the description of the characteristics of participating as well as non-participating males. The third section explains the characteristics of participating along with non-participating females. The second and fourth sections present an analysis of the characteristics of males and females influencing their time allocation behavior in forms of weekly hours of work respectively.

4.5.1.1. Characteristics of Participating and Non-Participating Males

The distribution of males by their years of age is given in Table 4.1. The pattern of male's labor force participation (MLFP) reveals an inverted u-shaped pattern. MLFP is lower for the younger age group due to lack of experience, required skills, and education. This increases with the increase in the male's years of age due to increase in experience level, better skills and improved education level. MLFP is relatively lower for the age of 50 years or older due to deteriorating health conditions. Males of 21-30 years have shown 92 percent probability of participation into labor market work. And males from age group 31-40 years have shown about 98 percent probability of participation into labor market work. It is observed that males are more likely to decide about labor market work during 21 to 40 years of age because of increased family responsibilities on the shoulders of males. As the age increases beyond 50 years, probability of males to join the labor market work decreases. This may be due to deteriorating health condition and early retirement.

Table 4.1. Distribution of MLFP by Males' Age

Male's Age	Participation	Non-participation	Total
Up to 20	53.21	46.79	24.99
21-30	92.01	7.99	26.46
31-40	98.40	1.60	20.88
41-50	97.64	2.36	15.28
51-60	93.43	6.57	8.51
60-64	70.08	29.92	3.88
Total	83.78	16.22	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The total sample size is 73524.

Distribution of MLFP by education of males is given in Table 4.2. The table shows that 94.67 percent of the males who participate in the labor market work relatively have no formal education. Since, the males with no formal education are mainly related to weak economic background, they have to participate in the labor market at large. Among other educational categories, it has been observed that as the education level increases, participation of males to the labor market also increases. However, the probability of educated males' participation to the labor market is relatively lower with comparison to the base category of no formal education. This may be because educated males may not have access to better job opportunities that match with their level of education. In addition, educated males may not be satisfied with the wage rate offered by job market.

Table 4.2. Distribution of MLFP by Males' Education

Education Level	Participation	Non-participation	Total
No formal	94.67	5.33	30.01
Primary	89.11	10.89	19.77
Middle	69.72	30.28	16.66
Matric	75.18	24.82	17.29
intermediate	73.24	26.76	8.15
Higher	88.51	11.49	7.64
Total	83.78	16.22	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The total sample size is 73524.

Distribution of MLFP by males' marital status is given in Table 4.3. The distribution shows that the married males participate more to the labor market work as compared to unmarried males. This is because married males have higher burden of financial needs of growing families as compared to unmarried males. According to the data, married males have about 96 percent higher probability of participation to the labor market work as compared to unmarried males.

Table 4.3. Distribution of MLFP by Males' Marital Status

Marital Status	Participation	Non-participation	Total
Unmarried	64.27	35.73	38.72
Married	96.10	3.90	62.28
Total	83.7	16.22	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The total sample size is 73524.

According to Table 4.4, MLFP is found to be higher in joint families in contrary to the nuclear families. Among the joint families, about 85 percent of males participate in the labor market in contrary to about 15 percent of males who do not participate in the labor. This could be because joint families are assumed to be larger than nuclear families. They need more finances in order to fulfill financial expenses of their families.

Table 4.4. Distribution of MLFP by Type of Family System

Family Type	Participation	Non-participation	Total
Joint	85.11	14.89	40.27
Nuclear	82.88	17.12	59.73
Total	83.78	16.22	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The total sample size is 73524.

Table 4.5 shows the distribution of males in four provinces of Pakistan. The highest MLFP is recorded for the province of Punjab. For example, males from Punjab have more than 87 percent probability to join the labor market as compared to males in other provinces. This may be because, labor market of Punjab is more active and provides better job opportunities to workers as compared to that in the other provinces.

Table 4.5. Distribution of MLFP by Residential Province

Residential Province	Participation	Non-participation	Total
Punjab	87.20	15.26	46.66
Sindh	83.84	16.16	22.24
KPK	78.61	21.39	14.32
Baluchistan	83.29	16.71	12.40
Total	83.78	16.22	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The total sample size is 73524.

4.5.1.2. Characteristics of Males Influencing their Time Allocation to the Labor Market Work

Table 4.6 shows the distribution of males' time allocation to the labor market work by their age. According to the distribution, the number of hours allocated per week to the labor market work increases with age. It is observed that younger males of 20 years of age supply fewer hours to the labor market work. This may be due to lack of required education, experience level, and skills. However, males belonging to 21 to 40 years of age group allocate more hours per week in contrary to males belonging to other age groups. This is so because males during peak potential age are better equipped with education, experience and skills. Thus, they allocate more hours to the labor market work and earn handsome wage rate. For example males have, on average, about 21 percent probability to work 51-60 hours per week at the age of 21-40 years. And at the older age of life, a reduction in working hours is observed for males which may be due to deteriorating health conditions.

Table 4.6. Distribution of Males' Time Allocation to Labor Market Work by their Age

Variables	**Weekly Hours of Work**					
Males' Age	Up to 30	31-40	41-50	51-60	Above 60	Total
Up to 20 years	7.52	18.01	36.82	18.70	18.95	14.98
21-30	2.57	11.29	40.62	21.20	24.32	28.77
31-40	2.28	10.45	39.60	21.62	26.05	25.27
41-50	3.08	12.28	38.44	20.95	25.25	18.21
51-60	4.28	16.02	41.28	18.19	20.23	9.57
60-64	7.10	20.30	36.57	18.92	18.92	3.20
Total	3.64	13.01	39.33	20.47	23.56	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The total sample size is 58903.

Table 4.7 shows the distribution of males' time allocation to their labor market work by their education level. Time allocation of males to the labor market is likely to be negatively associated with their education level. The distribution shows that as the level of education increases, males allocate relatively lesser time to the labor market in contrary to males with no

formal level of education. This may be because less educated males have to work extended hours in the labor market in order to earn the decent livelihoods for their families. In addition, being more expert and skillful and thus, educated males allocate relatively lesser number of hours in a week to labor market work.

Table 4.7. Distribution of Males' Time Allocation to Labor Market Work by their Education Level

Variables	**Weekly Hours of Work**					
Education Level	Up to 30	31-40	41-50	51-60	Above 60	Total
No formal	3.46	14.58	39.31	21.29	21.36	34.56
Primary	3.41	15.61	37.42	20.00	19.56	21.26
Middle	7.31	12.65	40.47	21.00	18.75	13.81
Matric	6.61	13.22	41.92	18.21	18.05	15.34
Intermediate	6.23	15.32	40.10	19.36	19.00	6.79
Higher	3.60	17.92	49.23	14.63	14.63	8.25
Total	3.64	13.01	39.33	20.47	23.56	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The total sample size is 58903.

Table 4.8 reveals the distribution of males' time allocation to the labor market by marital status. Married males allocate more amount of their time to the labor market in contrast to unmarried males. For example, married males have about 39.40 percent more probability to allocate 41-50 hours in a week to the labor market. Similarly, they exhibit about 25 percent higher probability to allocate more than 60 hours in a week to the labor market. This is due to the fact that married males have more financial responsibilities of the family as compared to the unmarried males. Therefore, they have to spend longer hours in the labor market in order to accomplish the financial needs of the family.

Table 4.8. Distribution of Males' Time Allocation to Labor Market Work by Marital Status

Variables	**Weekly Hours of Work**					
Marital Status	Up to 30	31-40	41-50	51-60	Above 60	Total
Unmarried	5.65	15.15	39.13	19.38	20.69	28.02
Married	2.86	12.18	39.40	20.89	24.67	71.98
Total	3.64	13.01	39.33	20.47	23.56	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The total sample size is 58903.

The distribution of males' time allocation to the labor market by family type is given in Table 4.9. It has been observed that males' number of working hours for the week is relatively higher in joint families in contrast to males from the nuclear family system. One of the reasons may be that joint families are expected to be larger in terms of family members and thus, have higher financial needs than the nuclear families. Another reason may be the gain of economies of scale through the division of labor by the presence of other family members in the joint family system. It means that more productive labor market workers may allocate more hours to the labor market and less productive workers may stay at home in order to bear the responsibilities of the household work.

Table 4.9. Distribution of Males' Time Allocation to Labor Market Work by Family Type

Variables	**Weekly Hours of Work**					
Family Type	Up to 30	31-40	41-50	51-60	Above 60	Total
Joint	4.24	13.43	39.87	22.33	26.46	40.56
Nuclear	3.23	12.72	38.96	19.18	20.82	59.42
Total	3.64	13.01	39.33	20.47	23.56	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The total sample size is 58903.

The distribution of males' time allocation to the labor market by residential province is given in Table 4.10. It has been observed that males from Punjab tends to be more oriented to work longer hours per week in labor market as compared to the three other provinces of Pakistan. This is due to the fact that the labor market of Punjab is relatively more stable and expanded. That is, the labor market of Punjab provides more job opportunities as compared to the labor market in other provinces.

Table 4.10. Distribution of Males' Time Allocation to Labor Market Work by Residential Province

Variables	**Weekly Hours of Work**					
Residential Province	Up to 30	31-40	41-50	51-60	Above 60	Total
Punjab	2.64	10.30	38.34	20.16	31.56	46.48
Sindh	2.96	17.40	36.97	22.69	19.98	23.91
KPK	8.28	12.21	40.68	18.70	20.13	17.07
Baluchistan	2.29	15.77	46.03	19.79	16.12	12.54
Total	3.64	13.01	39.33	20.47	23.56	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The total sample size is 58903.

4.5.1.3. Characteristics of Participating and Non-Participating Females

Table 4.11 shows the distribution of females by their age. The pattern of female labor force participation (FLFP) reveals an inverted u-shaped pattern. FLFP is lower during early years of life and then starts to increase with age. This shows highest trend in females' participation during the peak productive age (31-60) years and again declines at older age. There are a number of reasons for this lower LFP of females in Pakistan. A few of these reasons are early age marriage system, presence of social and cultural restrictions on the free movement of females, and the absence of proper and safe working environment for the females. Apart from this, other factors that may be responsible for this lower FLFP may be lower education and experience level during early years of their life. They have not completed their family size at yet and thus participate less in labor market work. For example, there is about 15 percent probability that the females of age up to 20 years participate to the labor market work. Females' labor market

participation is higher during the peak productive age because they have acquired the better education and experience level. They may also bear the required family size. At older age, females have less energy and potential to work and therefore, their labor market participation declines. For example, females from age group 60-64 years have shown a probability of 15 percent of participation into labor market work.

Table 4.11. Distribution of FLFP by Females' Age

Females' Age	Participation	Non-participation	Total
Up to 20 years	15.13	84.87	22.05
21-30	22.23	77.77	30.78
31-40	25.06	74.94	22.18
41-50	25.71	74.29	14.61
51-60	23.19	76.81	7.20
60-64	15.00	85.00	3.17
Total	21.64	78.36	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 74457.

According to the Table 4.12, educated females exhibit lower FLFP as compared to the females having no formal level of education. This may be due to the reason that environment of labor market of our country is not very promising in providing suitable employment opportunities to females. Another reason may be the lower wage rate offered to educated females in labor market. This generates a discouraging effect on educated females to join the labor market.

Table 4.12. Distribution of FLFP by Females' Education Level

Education Level	Participation	Non-participation	Total
No formal	28.55	74.93	56.10
Primary	18.60	81.40	13.85
Middle	9.70	90.30	9.19
Matric	10.69	89.31	10.48
Intermediate	14.66	85.34	5.45
Higher	22.91	77.09	4.03
Total	21.64	78.36	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 74457.

Table 4.13 shows the distribution of FLFP by the marital status. The comparison of married and unmarried working females shows that FLFP rate is higher for married females. For example, there is 22.27 percent probability that the married females participate to the labor market work. The reason is that married females have more financial burden of increased family size. Thus, they work relatively more in labor market for the purpose of fulfilling the growing financial needs of the family.

Table 4.13. Distribution of FLFP by Females' Marital Status

Marital Status	Participation	Non-participation	Total
Unmarried	20.15	79.85	29.60
Married	22.27	77.73	70.40
Total	21.64	78.36	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 74457.

Table 4.14 shows the distribution of FLFP by type of family system. The pattern of FLFP shows that the FLFP is higher for the nuclear family system as compared to that in the joint family system. One reason of this is that other members may be present in the joint family system who takes the responsibility of the labor market work. Another reason may be the increased burden of household chores in joint families which result into less participation of

female member in labor market work. In addition, the concept of division of labor may be applied here. That is, following the theory of comparative advantage, household members who are more productive in the paid market work participate in labor market. Those who are more productive in household activities are more likely to stay at home and do household chores.

Table 4.14. Distribution of FLFP by Type of Family System

Family Type	Participation	Non-participation	Total
Joint	21.04	78.96	43.47
Nuclear	22.11	77.89	56.53
Total	21.64	78.36	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 74457.

Table 4.15 shows the distribution of females' participation into labor market work by residential province. According to the data, FLFP is found to be higher in Punjab as compared to the other provinces of Pakistan. This is because of the fact that more job opportunities are available in the job market of Punjab as compared to the other provinces. The lowest probability of 9 percent regarding female's participation is observed for the province of Baluchistan. That is, the highest non-participation behavior is observed in this province by females. This may be due to the lack of job opportunities available and conservative market environment regarding the employment of females in Baluchistan. Moreover, traditional setup of the province may not allow women to participate in the market.

Table 4.15. Distribution of FLFP by Residential Province

Residential Province	Participation	Non-participation	Total
Punjab	29.88	70.12	48.62
Sindh	16.81	83.19	20.18
KPK	13.43	86.57	20.68
Baluchistan	8.99	91.01	10.52
Total	21.64	78.36	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 74457.

4.5.1.4. Characteristics of Females Influencing their Time Allocation to the Labor Market Work

Table 4.16 show the distribution of females' time allocation to the labor market work by their age. Data shows that time allocation of females to the labor market work increases with age. It has been observed that younger females display lower level of labor market activity as compared to females from the middle age group. This may be due to the fact that younger females have lower level of education and experience. They have not yet reached the peak productive age. Another reason may be that at the childbearing age, females have to remain at home and look after the children. For example, females belonging to 31-50 years of age group have about 22 percent probability to supply about 41-50 hours to the labor market in a week. However, females up to 20 years of age have only 15 percent probability to supply similar hours of work to the labor market.

Table 4.16. Distribution of Females' Time Allocation to Labor Market Work by their Age

Variables	**Weekly Hours of Work**					
Females' Age	Up to 30	31-40	41-50	51-60	Above 60	Total
Up to 20 Years	39.16	38.13	15.97	4.09	2.67	15.13
21-30	31.11	41.22	21.27	3.96	2.44	29.87
31-40	28.35	42.45	21.98	4.56	2.68	26.71
41-50	29.32	41.98	21.87	4.22	2.61	18.32
51-60	33.71	42.44	18.24	3.28	2.33	7.78
60-64	42.77	38.15	14.15	3.69	1.23	2.19
Total	31.72	41.25	20.38	4.13	2.53	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 14871.

The distribution of females' time allocation to the labor market by education level is given in Table 4.17. The table shows that the educated females generally allocate lesser hours during a week to the labor market in contrary to the females having no formal education. This may be because labor market of a developing country like Pakistan is not so strong and stable to provide secure and suitable working environment as required and demanded by educated

females. In addition educated females may be able to earn a reasonable amount of earnings by allocating lesser number of hours to the market. However, females having no formal education are usually offered lower wage rate. They mostly belong to financially unstable families. Thus, they may have to work longer hours in order to fulfill the basic needs of their families.

Table 4.17. Distribution of Females' Time Allocation to Labor Market Work by Education Level

Variables	**Weekly Hours of Work**					
Education Level	Up to 30	31-40	41-50	51-60	Above 60	Total
No formal	34.07	31.37	22.79	7.19	4.58	67.76
Primary	36.24	38.97	17.42	4.48	2.89	12.32
Middle	35.50	37.62	19.71	4.89	2.28	4.13
Matric	38.98	37.37	15.73	5.11	2.28	5.00
Intermediate	30.72	46.86	18.16	2.02	2.24	3.00
Higher	30.90	46.86	18.55	2.67	1.47	7.79
Total	31.72	41.25	20.38	4.13	2.53	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 14871.

Table 4.18 shows the distribution of females' time allocation to the labor market by marital status. The distribution shows that married females allocate a greater number of hours on a weekly basis to the labor market in contrary to the unmarried females. This may be because married females bear more responsibilities of families and thus, they work longer hours in order to fulfill the financial needs of the growing families.

Table 4.18. Distribution of Females' Time Allocation to Labor Market Work by Marital Status

Variables	**Weekly Hours of Work**					
Marital Status	Up to 30	31-40	41-50	51-60	Above 60	Total
Unmarried	30.72	40.03	15.38	2.95	2.22	23.00
Married	32.07	41.67	21.81	4.48	2.62	79.10
Total	31.72	41.25	20.38	4.13	2.53	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 14871.

Table 4.19 shows the distribution of females' time allocation to the labor market work by family type. The table shows that the females from joint family system allocate lesser amount of hours each week to labor market as compared to their counterpart from the nuclear family system. This is so because other working members are absent in the nuclear families. And, thus these females have to work more hours in labor market for the purpose of fulfilling the growing financial needs of families.

Table 4.19. Distribution of Females' Time Allocation to Labor Market Work by Family Type

Variables	**Weekly Hours of Work**					
Family Type	Up to 30	31-40	41-50	51-60	Above 60	Total
Joint	37.14	38.24	18.35	3.72	2.55	41.08
Nuclear	25.93	43.35	21.79	4.42	4.51	58.92
Total	31.72	41.25	20.38	4.13	2.53	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 14871.

The distribution of females' time allocation to the labor market by residential province is given in Table 4.20. According to the data, females from Sind, KPK, and Baluchistan are more expected to work lesser number of hours to labor market as compared to females from Punjab. This may be due to the fact that labor market in Punjab is relatively stronger and provide larger number of employment opportunities to females as compared to the labor market in other provinces of Pakistan. That is why females in Punjab work longer hours in contrary to the other provinces of the country.

Table 4.20. Distribution of Females' Time Allocation to Labor Market Work by Residential Province

Variables	**Weekly Hours of Work**					
Residential Province	Up to 30	31-40	41-50	51-60	Above 60	Total
Punjab	32.26	38.64	21.16	4.96	2.98	69.91
Sindh	27.01	52.41	16.95	2.37	1.26	15.91
KPK	42.04	37.48	17.59	1.50	1.39	12.54
Baluchistan	24.83	53.32	17.66	2.45	1.74	3.85
Total	31.72	41.25	20.38	4.13	2.53	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 14871.

4.5.2. Description of Time Allocation of Females to Non-Market Work

This section describes the unpaid non-market activities of household members. These unpaid activities are mainly categorized as housework, child work, and, household agricultural activities. This section is divided into two parts. The first part of this section describes the participation characteristics of working and non-working females into the unpaid housework, child work, and household agricultural work. The second part of this section examines the characteristics of females influencing female's time allocation in the form of number of hours assigned per week to housework, child work, and household agricultural work.

a) Time Allocation to Housework

This section comprise of two parts. In first part, females' characteristics influencing their participation decision are explained. Second part describes the females' time allocation to the housework.

Females' Participation in Housework

The distribution of participation decisions of females to housework by age is given in Table 4.21. The distribution shows that females, irrespective of any age group, show higher probability to participate in housework. It is observed that females belonging to the peak productive age indicate even higher probability to participate in the housework. This may be due to the fact that females at the peak productive age bear more burden of household chores as compared to the younger and older age females. Females become mature with age and are more likely to take higher responsibility of household activities. However, females' participation slightly declines during older years of age due to deteriorating health condition.

Table 4.21. Distribution of Females' Housework Participation Decision by their Age

Females' Age	Participation	Non-participation	Total
Up to 20 years	99.41	0.59	19.88
21-30	99.55	0.45	31.94
31-40	99.89	0.11	23.38
41-50	99.65	0.35	15.24
51-60	99.15	0.85	7.10
60-64	99.31	0.69	2.47
Total	99.58	0.42	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 52748.

Table 4.22 shows the distribution of females' housework participation decision by education level. Generally, it can be seen from the table that both educated as well as uneducated females participate more in performing household work. This may be due to the reason that performing household activities is traditionally considered as the primary responsibility of household females. However, it is observed that educated females participate slightly less to perform household work. This could be because educated females may be more expert in performing household chores and can use different household appliances more efficiently as compared to uneducated counter parts.

Table 4.22. Distribution of Females' Housework Participation Decision by Educational Level

Education Level	Participation	Non-participation	Total
No formal	99.61	0.39	59.53
Primary	99.57	0.43	15.41
Middle	99.52	0.48	7.48
Matric	99.53	0.47	958
Intermediate	99.52	0.48	4.38
Higher	99.48	0.52	3.62
Total	99.58	0.42	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 52748.

Table 4.23 shows the distribution of females' housework participation decision by marital status. According to the table, female's participation in housework is slightly recorded to be higher for married in contrary to the unmarried females. This is because married females bear more burden of household chores as compared to unmarried females. On the whole, the data show that a larger percentage of both married and unmarried females participate in housework. And only a small percentage of females, who do not participate in housework, are recorded. This indicates that females both married as well as unmarried feel responsibility of performing household activities.

Table 4.23. Distribution of Females' Housework Participation Decision by Marital Status

Marital Status	Participation	Non-participation	Total
Unmarried	99.39	0.61	24.20
Married	99.64	0.36	75.80
Total	99.58	0.42	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 52748.

Table 4.24 shows the distribution of females' participation in housework with respect to the family type. Generally, it is found that a greater percentage of females belong to both joint and nuclear families are likely to perform household activities. The distribution shows that females from the nuclear family system have a slightly higher probability of participation in household work as compared to the females from the joint family system. This may be due to the fact that helping hands are available in the form of the other members or other relatives who share the burden of household chores in the joint families. However, females from nuclear families may have to do the household chores by themselves since other relatives are not present in nuclear family system.

Table 4.24. Distribution of Females' Housework Participation Decision by Family Type

Family Type	Participation	Non-participation	Total
Joint	99.37	0.63	44.21
Nuclear	99.75	0.25	55.79
Total	99.58	0.42	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 52748.

Table 4.25 shows the distribution of females' housework participation decision by residential province. It is observed that females belonging to all provinces show more or less similar responsibility to perform household work. According to the table, females residing in all provinces have higher probability to participate in the housework. This may be because performance of household work is considered as the primary responsibility of all females belonging to all provinces. It is found that females belonging to the province of Sindh show highest probability to perform household work. This behavior is followed by females in Baluchistan and KPK. However, females belonging to Punjab are relatively less likely to participate in housework.

Table 4.25. Distribution of Females' Housework Participation Decision by Residential Province

Residential Province	Participation	Non-participation	Total
Punjab	99.43	0.57	40.42
Sindh	99.84	0.16	23.45
KPK	99.58	0.42	23.30
Baluchistan	99.62	0.38	12.83
Total	99.58	0.42	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 52748.

Females' Hours of Time Allocation to Housework

Table 4.26 shows the distribution of females' hours of housework by their age. According to the table, females perform household work for longer hours per week during the peak productive age as compared to during young or old age. This may be due to the fact that females bear more responsibilities of household chores during the peak productive age as compared to the early and older years of age. It is observed that females are likely to spend significant amount of their time to perform household activities during 21 to 50 years of age. The intensity of performing household activities is found to be lower before 20 years and after 50 years of age.

Table 4.26. Distribution of Females' Time Allocation to Housework by their Age

Variables	**Weekly Hours of Work**					
Females' Age	Up to 30	31-40	41-50	51-60	Above 60	Total
Up to 20 years	61.12	26.48	8.87	2.43	1.10	19.84
21-30	37.56	38.08	16.88	5.26	2.22	31.93
31-40	27.82	37.93	22.13	8.34	3.78	23.45
41-50	37.75	34.59	18.12	6.44	3.10	15.25
51-60	54.41	27.65	12.56	3.69	1.69	7.06
60-64	69.27	20.90	7.12	2.01	0.70	2.46
Total	41.95	34.05	16.16	5.41	2.42	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 52528.

Table 4.27 shows the distribution of females' hours of housework by their education level. It is found that both educated as well as less educated females allocate more or less similar hours to the household work. However, it can be seen from the table that educated females spend relatively lesser number of hours on the housework as compared to uneducated females. This may be due to the fact that educated females have become more expert and skillful in performing household chores. They have developed the factor of efficiency and effectiveness in their household work in contrary to females having no formal education. This would result into

reduction of their time allocated to household chores. Another reason may be that educated females can hire the services of maid to perform their housework.

Table 4.27. Distribution of Females' Time Allocation to Housework by their Education Level

Variables	**Weekly Hours of Work**					
Education Level	Up to 30	31-40	41-50	51-60	Above 60	Total
No formal	40.51	34.16	16.58	5.82	3.26	63.38
Primary	46.91	32.91	15.02	3.92	1.25	15.41
Middle	47.80	33.28	14.51	3.85	0.56	7.48
Matric	46.25	34.78	14.22	3.82	0.93	9.57
Intermediate	45.17	35.55	13.79	4.40	1.09	4.37
Higher	48.08	34.90	12.70	3.85	0.47	3.61
Total	41.95	34.05	16.16	5.41]	2.42	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 52528.

The distribution of females' hours of housework by marital status is given in Table 4.28. According to the table, married females allocate more weekly hours to the housework in contrast to the unmarried females. This may be because married females bear more burden of household chores as compared to unmarried females. This shows that married females show relatively mature behavior towards household work as compared to their unmarried counterparts.

Table 4.28. Distribution of Females' Time Allocation to Housework by Marital Status

Variables	**Weekly Hours of Work**					
Marital Status	Up to 30	31-40	41-50	51-60	Above 60	Total
Unmarried	61.15	26.01	9.28	2.46	1.11	24.16
Married	35.84	36.61	18.36	6.35	2.84	75.84
Total	41.95	34.05	16.16	5.41	2.42	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 52528.

Table 4.29 shows the distribution of females' hours of housework by the family type. According to the table, females from the nuclear family system exhibit about more than 06 percent probability to allocate 51-60 hours per week to the household production. The females belonging to joint families allocated lesser hours to the household work in contrary to females in nuclear families. This is because the burden of household chores may be considered higher on the females belonging to nuclear family system due to absence of helping hands in the form of other members as in the joint families.

Table 4.29. Distribution of Females' Time Allocation to Housework by Family Type

Variables	**Weekly Hours of Work**					
Family Type	Up to 30	31-40	41-50	51-60	Above 60	Total
Joint	49.00	33.81	12.12	3.61	1.46	44.12
Nuclear	36.39	34.24	19.36	6.83	3.18	55.88
Total	41.95	34.05	16.16	5.41	2.42	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 52528.

Distribution of females' time allocation in form of number of hours in a week to the housework by residential province is given in Table 4.30. According to the data, females from Sindh, KPK, and Baluchistan have a higher probability to allocate longer hours per week to the housework. This may be because Punjab is relatively more advanced and developed as compared to the other provinces of Pakistan. As a result, females in Punjab are more likely to use efficient household appliances which results into reduction of their time allocated to the housework.

Table 4.30. Distribution of Females' Time Allocation to Housework by Residential Province

Variables	**Weekly Hours of Work**					
Residential Province	Up to 30	31-40	41-50	51-60	Above 60	Total
Punjab	32.46	33.42	11.83	0.96	0.57	40.35
Sindh	53.43	28.89	18.37	7.10	3.76	27.70
KPK	45.25	42.70	14.44	7.40	3.61	27.48
Baluchistan	44.79	29.78	18.18	6.04	1.22	12.84
Total	41.95	34.05	16.16	5.41	2.42	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 52528.

b) Time Allocation to Child Work

This section describes the women participation decision including work and number of hours allocated to child work.

Females' Participation in Child Work

The distribution of females' participation in child work with respect to the age is given in Table 4.31. According to the data, younger females participate relatively less in the child work as compared to the females from peak productive age. That is females' participation in child work increases with age. Females at the peak productive age show higher probability of participation in child work as compared to those belonging to the younger and older years of life. This is due to the fact that mature females take more responsibilities of the childcare and child training as compared to the younger less mature females. However, probability of participation in child work slightly declines after 50 years of age, which may be due to decline in females' potential of work during older years of life.

Table 4.31. Distribution of Females' Child Work Participation Decision by their Age

Female's Age	Participation	Non- participation	Total
Up to 20 years	38.99	61.01	19.88
21-30	76.58	23.42	31.94
31-40	79.39	20.61	23.38
41-50	56.05	43.95	15.24
51-60	46.70	53.30	7.10
60-64	51.19	48.81	2.47
Total	63.89	36.11	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample is 52748.

Table 4.32 shows the distribution of females' child work participation decision with respect to their education level. According to the table, educated females participate more in child work in contrary to females having no formal education. Female's participation in child work rises with the increase in the level of education. For instance, females with higher education have 74 percent probability to participate in the childcare and educational activities of the children. This is so because educated females are more conscious about the healthy upbringing and educational activities of family children in contrary to the females that have no formal education.

Table 4.32. Distribution of Females' Child Work Participation Decision by their Education Level

Education Level	Participation	Non-participation	Total
No formal	62.53	37.47	58.76
Primary	64.19	35.81	15.99
Middle	64.83	35.17	7.67
Matric	65.19	34.81	9.58
Intermediate	68.90	31.10	4.38
Higher	73.78	26.22	3.62
Total	63.89	36.11	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample is 52748.

Table 4.33 shows the distribution of females' participation to the child work with respect to the marital status. It has been observed from the table that married females have a higher probability of participation in the child work as compared to unmarried females. Married females have 72.63 percent probability to participate in child work. This is so because, childcare is mainly considered as the duty of married females whereas unmarried females are relatively free from this responsibility. It is found that a larger proportion of unmarried females are not participating in childcare activities.

Table 4.33. Distribution of Females' Child Work Participation Decision by Marital Status

Marital Status	Participation	Non-participation	Total
Unmarried	36.52	63.48	24.20
Married	72.63	27.37	75.80
Total	63.89	36.11	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample is 52748.

Table 4.34 shows the distribution of females' child work participation decision by family type. According to the data, females from joint families participate more in child work in contrary to females belonging to the nuclear families. Females from nuclear family system show about 63 percent probability to participate in childcare activities, whereas females from the joint family system exhibit about 65 percent of probability to participate in child work. This may be due to the fact that helping hands are available in the form of other members and relatives who reduce the burden of household other than childcare in joint families and as a result, females participate more in child work.

Table 4.34. Distribution of Females' Child Work Participation Decision by Family Type

Family Type	Participation	Non-participation	Total
Joint	64.63	35.37	44.21
Nuclear	63.21	36.69	55.79
Total	63.89	37.06	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample is 52748.

Table 4.35 shows the distribution of participation of females into the child work by residential province. According to the table, females from Baluchistan show highest probability of participation into childcare activities as compared to females from other provinces. The similar females' behavior regarding childcare activities is observed in KPK. It is found that females in Punjab are relatively less likely to perform child work. This may be because females from Punjab can hire the services of others for childcare activities. It is observed that household environment is relatively broad and advance in Punjab as compared to that in other provinces.

Table 4.35. Distribution of Females' Child Work Participation Decision by Residential Province

Residential Province	Participation	Non-participation	Total
Punjab	58.88	41.12	40.42
Sindh	60.58	39.42	23.45
KPK	65.29	34.71	23.30
Baluchistan	83.19	16.81	12.83
Total	63.89	36.11	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample is 52748.

Females' Hours of Time Allocation to the Child Work

The distribution of females' time allocation to child work by their age is given in Table 4.36. According to the table, there is above 90 percent probability that females of all age groups allocate up to 30 hours per week on childcare activities. It is observed that percentage of females belonging to age group of 21 to 40 years allocate similar hours to child work in a week as compared to females of other age groups. However, these females show higher probability to allocate longer hours to child care work among all age groups. This may be because females have more burden of childcare activities at the peak productive age and thus, they allocate longer hours.

Table 4.36. Distribution of Females' Time Allocation to Child Work by their Age

Variables	**Weekly Hours of Work**					
Females' Age	Up to 30	31-40	41-50	51-60	Above 60	Total
Up to 20 years	97.43	1.88	0.29	0.29	0.10	12.13
21-30	92.83	4.94	1.49	0.40	0.34	38.29
31-40	94.74	3.63	1.12	0.33	0.18	29.05
41-50	97.98	1.55	0.36	0.09	0.02	13.37
51-60	98.63	0.97	0.17	0.23	0.00	5.19
60-64	98.65	0.75	0.30	0.15	0.15	1.98
Total	95.05	3.45	0.99	0.31	0.20	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample is 33701.

Table 4.37 shows the distribution of females' time allocation to child work by their education level. According to the distribution, there is about 97 percent probability that the females from no formal education allocate up to 30 hours in a week to childcare work. The data shows that more educated females spend more amount of their time to the childcare activities as compared to less educated females. It is observed that highly educated females work longer hours per week to perform the childcare activities as compared to the less educated females. This may be due to the fact that educated females are more concerned about the childcare activities for healthy brought up of their children. That is, they spend more time for development of human

capital of children. And better brought up children means better future for children as well as for their parents. That is why educated females allocate more time on childcare activities.

Table 4.37. Distribution of Females' Time Allocation to Child Work by Education Level

Variables	**Weekly Hours of Work**					
Education Level	Up to 30	31-40	41-50	51-60	Above 60	Total
No formal	97.28	1.97	0.47	0.17	0.11	59.45
Primary	94.00	4.10	1.12	0.43	0.35	14.58
Middle	92.03	4.96	1.99	0.65	0.37	7.29
Matric	90.74	6.56	2.00	0.52	0.18	9.77
Intermediate	89.88	7.23	1.88	0.57	0.44	4.72
Higher	88.06	8.03	2.84	0.50	0.57	4.17
Total	95.05	3.45	0.99	0.31	0.20	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample is 33701.

According to Table 4.38, married females relatively spend longer hours per week on childcare activities as compared to the unmarried females. This may be due to the fact that childcare activities are mainly considered the duty of the married females, whereas unmarried females are likely to take lesser burden of childcare responsibilities.

Table 4.38. Distribution of Females' Time Allocation to Child Work by Marital Status

Variables	**Weekly Hours of Work**					
Marital Status	Up to 30	31-40	41-50	51-60	Above 60	Total
Unmarried	99.23	0.62	0.09	0.04	0.02	13.83
Married	94.38	3.90	1.14	0.35	0.23	86.17
Total	95.05	3.45	0.99	0.31	0.20	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample is 33701.

Table 4.39 shows the distribution of females' hours of child work by type of family system. The distribution results show that the females from the joint family system exhibit higher probability to allocate more time per week to the childcare activities. However, females from nuclear families exhibit relatively lower time allocation per week to the childcare activities. This may be because other members and relatives present in joint families may share the females' burden of the other household activities. Thus, females may allocate more time to the childcare activities.

Table 4.39. Distribution of Females' Time Allocation to Child Work by Family Type

Variables	**Weekly Hours of Work**					
Family Type	Up to 30	31-40	41-50	51-60	Above 60	Total
Joint	94.66	3.69	1.05	0.38	0.22	44.72
Nuclear	95.36	3.25	0.94	0.26	0.19	55.28
Total	95.05	3.45	0.99	0.31	0.20	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample is 33701.

Table 4.40 shows the distribution of females' hours of childcare activities with respect to the residential province. It is observed that females mainly allocate, on average, up to 30 hours per week on the caring and educational activities of the children in four provinces of Pakistan. Females belonging to Sindh, KPK, and Baluchistan have relatively higher probability to allocate more time in a week to the child work as compared to Punjab. This may be because Punjab is more developed as compared to the other provinces of Pakistan. Females in Punjab are more likely to use hired help in caring and educational activities of the children and consequently spend relatively lesser time per week on the childcare activities. However, females from Sindh, KPK, and Baluchistan have to perform all these childcare activities by themselves and as a result they work longer hours per week to fulfill their childcare duties.

Table 4.40. Distribution of Females' Time Allocation to Child Work by Residential Province

Variables	**Weekly Hours of Work**					
Residential Province	Up to 30	31-40	41-50	51-60	Above 60	Total
Punjab	89.42	7.23	2.14	0.66	0.55	37.25
Sindh	81.85	9.87	4.54	1.07	2.67	22.24
KPK	85.89	7.52	3.98	0.84	1.80	23.81
Baluchistan	85.49	7.30	3.57	2.31	1.33	16.71
Total	95.05	3.45	0.99	0.31	0.20	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample is 33701.

c) Time Allocation to Household Agricultural Work

The first part of this section explains the characteristics of females affecting their decision to participate in household agricultural work. The second section describes the characteristics of females that affect the number of hours allocated to the household agricultural work by females in a week.

Females' Participation in Household Agricultural Work

The distribution of females' participation into household agricultural work with respect to the age is given in Table 4.41. The data distribution show that females participate more in household agricultural activities during middle years of life as compared to the early and later years of life. Higher probability of participation to household agricultural activities is seen during 31 to 60 years of age for women. This may be due to the fact that females bear more burden of household agricultural activities during middle years of life. This is so because females are more experienced and energetic during these years of life. They can save their household income by actively participating in household agricultural activities. However, they are relatively less experienced and cannot bear more household responsibilities during early years of life. Whereas, they become less energetic and physically weaker during later years of life particularly after 60 years of age.

Table 4.41. Distribution of Females' Household Agricultural Work Participation Decision by their Age

Female's Age	Participation	Non-participation	Total
Up to 20 years	20.19	79.81	19.88
21-30	20.46	79.54	31.94
31-40	22.35	77.65	23.38
41-50	22.45	77.55	15.24
51-60	23.38	76.62	7.10
60-64	21.45	78.55	2.47
Total	22.50	77.50	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 52748.

Table 4.42 shows the distribution of females' participation into agricultural work with respect to their level of education. According to the table, females with no formal education participate more in the agricultural work as compared to educated females. This shows that participation into household agricultural work decreases with the increase in the level of education. This may be due to the fact that educated females may be more productive in labor market work. Therefore, they may prefer to join the formal labor market for paid work instead of performing unpaid household agricultural work. This may be due to application of principal of comparative advantage at the household. According to this principal, the educated females can perform better in the labor market work whereas those having no formal education can better perform agricultural activities at home.

Table 4.42. Distribution of Females' Household Agricultural Work Participation Decision by their Education Level

Education Level	Participation	Non-participation	Total
No formal	30.49	69.51	59.53
Primary	17.34	82.66	15.41
Middle	9.45	90.55	7.48
Matric	7.08	92.92	9.58
Intermediate	4.11	95.89	4.38
Higher	2.83	97.17	3.62
Total	22.50	77.50	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 52748.

Table 4.43 shows the distribution of females' participation into household agricultural work with respect to marital status. It has been observed that the percentage of unmarried participation is slightly higher as compared to that of married females in the agricultural work. This may be because married females bear more burden of other household duties like childcare and household chores. Therefore, their participation in agricultural work may be lower as compared to the unmarried females present in the household.

Table 4.43. Distribution of Females' Household Agricultural Work Participation Decision by Marital Status

Marital Status	Participation	Non-participation	Total
Unmarried	23.13	78.08	24.58
Married	22.29	77.32	75.42
Total	22.50	77.50	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 52748.

Table 4.44 shows the distribution of females' participation into household agricultural work with respect to the family type. According to the distribution, females from the nuclear family system are more involved in performing household agricultural work in contrary to the females belonging to the joint families. This may be because helping hands in the form of other family members and relatives may be available in joint families, who share the females' burden of household agricultural work. However, in nuclear family system, females have to perform agricultural activities by themselves.

Table 4.44. Distribution of Females' Household Agricultural Work Participation Decision by Family Type

Family Type	Participation	Non-participation	Total
Joint	21.70	78.30	55.79
Nuclear	23.13	76.87	44.21
Total	22.50	77.50	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 52748.

Table 4.45 shows the distribution of females' participation into household agricultural work by residential province. It has been observed from the table that females from Sindh and KPK show a higher probability of participation in doing household agricultural work like poultry raising, processing food, livestock and agricultural operations as compared to the women belonging to other two provinces. And the least probability of female participation in household agricultural activities is observed from Punjab. This may be because working environment is more favorable for paid work in Punjab than in other provinces. Since, economic activities are higher in Punjab, females have higher access to paid market work here. Therefore, females from Punjab may prefer to perform paid labor market activities as compared to do unpaid household agricultural work.

Table 4.45. Distribution of Females' Household Agricultural Work Participation Decision by Residential Province

Residential Province	Participation	Non-participation	Total
Punjab	8.35	91.65	40.42
Sindh	36.70	63.30	23.45
KPK	33.75	66.25	23.30
Baluchistan	20.64	79.36	12.83
Total	22.50	77.50	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 52748.

Females' Hours of Household Agricultural Work

This section describes the characteristics of females influencing their allocation of hours to household agricultural work. Table 4.46 shows the distribution of hours allocated to household agricultural work by females with respect to their age. The data reveals that females are more likely to spend relatively more amount of their time per week to the household agricultural work with the increase in years of age. This may be because those females become more experienced and expert over time and therefore, they become more productive in performing household agricultural work. However, the younger females are less mature and less experienced. They allocate less number of hours to agricultural activities in a week. Similarly, the older females have less potential to perform household agricultural work extensively.

Table 4.46. Distribution of Females' Time Allocation to Household Agricultural Work by their Age

Variables	**Weekly Hours of Work**					
Females' Age	Up to 30	31-40	41-50	51-60	Above 60	Total
Up to 20 years	99.85	0.07	0.00	0.04	0.04	22.78
21-30	99.30	0.67	0.03	0.00	0.00	29.06
31-40	99.12	0.80	0.04	0.11	0.00	23.89
41-50	98.95	0.89	0.11	0.00	0.06	15.20
51-60	98.63	1.37	0.00	0.00	0.00	7.37
60-64	71.68	0.00	0.00	0.00	0.00	2.35
Total	99.29	0.63	0.03	0.03	0.02	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 11866.

Table 4.47 shows the distribution of females' hours of household agricultural work with respect to their education level. According to the table, majority of the females allocate up to 30 hours per week to the agricultural work. It has also been observed that the longest numbers of hours per week are allocated to these activities by females having no formal education. The reason may be that less educated females allocate more hours to the agricultural work in order to produce agricultural commodities at home for household consumption instead of purchasing these products from market. In this way, they can work to save the household budget. The educated females find themselves more productive in labor market work. Therefore, they may allocate greater amount of their time to the paid labor market work rather than performing unpaid non-market work.

Table 4.47. Distribution of Females' Time Allocation to Household Agricultural Work by Education Level

Variables	**Weekly Hours of Work**					
Education Level	Up to 30	31-40	41-50	51-60	Above 60	Total
No formal	97.31	0.65	0.01	2.02	0.02	80.70
Primary	99.50	0.29	0.14	0.07	0.00	11.88
Middle	98.66	1.34	0.00	0.00	0.00	3.14
Matric	98.88	0.56	0.28	0.28	0.00	3.02
Intermediate	98.95	1.05	0.00	0.00	0.00	0.80
Higher	100	0.00	0.00	0.00	0.00	0.46
Total	99.29	0.63	0.03	0.03	0.02	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 11866.

Table 4.48 shows the distribution of females' hours of agricultural work with respect to the marital status. According to the table, the unmarried females are likely to allocate relatively longer time to the household agricultural work. This may be mainly because the unmarried females relatively allocate less time to the other household activities like housework and childcare. However, married females may be more involved in these activities.

Table 4.48. Distribution of Females' Time Allocation to Household Agricultural Work by Marital Status

Variables	**Weekly Hours of Work**					
Marital Status	Up to 30	31-40	41-50	51-60	Above 60	Total
Unmarried	97.56	2.3	0.04	0.08	0.04	21.69
Married	99.86	0.76	0.03	0.02	0.01	78.31
Total	99.29	0.63	0.03	0.03	0.02	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 11866.

Table 4.49 shows the distribution of females' time in terms of weekly hours of agricultural work with respect to the family type. According to the table, females from the nuclear family system allocate relatively longer hour on the household agricultural work as compared to the females from the joint family system. One reason of this may be that females in nuclear families have no helping hands in the form of relatives and other members in the family who can share their burden of household agricultural activities. That is why they have to work longer on agricultural activities as compared to the females from the joint families.

Table 4.49. Distribution of Females' Time Allocation to Household Agricultural Work by Family Type

Variables	**Weekly Hours of Work**					
Family Type	Up to 30	31-40	41-50	51-60	Above 60	Total
Joint	99.66	0.32	0.02	0.02	0.00	42.64
Nuclear	98.03	0.87	1.06	0.03	0.01	57.36
Total	99.29	0.63	0.03	0.03	0.02	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 11866.

The distribution of females' time in form of weekly hours of their household agricultural work by residential provinces is given in Table 4.50. It has been observed that the females from Sindh, KPK, and Baluchistan work longer hours per week to the household agricultural production as compared to the females from the Punjab. This may be because Sindh, KPK, and Baluchistan are comparatively less developed as compared to those of Punjab. That is why females belonging to these provinces are relatively more involved in unpaid non-market activities like agricultural production. They work longer hours to perform these activities as compared to those of Punjab.

Table 4.50. Distribution of Females' Time Allocation to Household Agricultural Work by Residential Province

Variables	**Weekly Hours of Work**					
Residential Province	Up to 30	31-40	41-50	51-60	Above 60	Total
Punjab	97.42	2.58	0.00	0.00	0.00	15.01
Sindh	97.45	0.48	2.04	0.04	0.00	38.26
KPK	98.90	0.02	1.02	0.00	0.05	34.95
Baluchistan	98.50	0.43	1.07	0.00	0.00	11.77
Total	99.29	0.63	0.03	0.02	0.02	100

Note: All percentages are given in form of row total. The table is based on statistics taken from *LFS (2017-2018).* The sample size is 11866.

4.6. Conclusion

The data analysis reveals that the age of the males and females is important in determining participation into labor market and non-market work. It also plays important role in determining number of weekly hours of labor market and non-market work. Both the participation and hours of market and non-market work tend to increase with the increase in the age and decrease with the decrease in age.

Education is also one of the important determinants in labor market as well as in non-market work. In case of labor market work, educated males and females exhibit a lower probability of LFP and time allocation. However, in case of non-market work, education decreases the participation and the amount of time allocated to the housework and household agricultural work for females. On the contrary, education is positively related with the participation and number of hours allocated on the child work.

Both married males and females exhibit a higher probability of participation and time allocation to the labor market work as compared to their unmarried counterparts. In case of non-market activities, married females allocate more weekly hours to the housework and child work in contrary to the unmarried females. The participation and number of hours of household agricultural work is relatively higher for the unmarried in contrary to the married females.

Males and females residing in the Punjab province exhibit a higher probability of participation and number of hours allocated to the labor market work as compared to other provinces of the country. In case of non-market activities, females from Sindh, KPK, and Baluchistan seems to exhibit a higher probability of participation and time allocation in contrary to the females from Punjab.

All of the above mentioned descriptive analysis gives a sound base to do formal econometric analysis on the determinants of participation and number of hours of labor market as well as non-market work. And the reason of applying the formal econometric analysis is that it controls all other factors and keeps focus on the particular factors for the analysis of the behavioral variable.

CHAPTER 5

EMPIRICAL RESULTS OF TIME ALLOCATION TO LABOR MARKET WORK

5.1. Introduction

This chapter presents the analysis of the time allocation decision and magnitude of time allocated to the labor market for males and females. The data for the purpose of analysis is obtained from the Pakistan *Labor Force Survey (LFS) 2017-2018*. The study analysis the socio-economic and demographic factors of decision of participation and time allocation of males and females to the paid labor market work. In first model, labor market participation decision is a function of numerous explanatory variables. This study assumes that a household has two choices regarding the participation decision of males and females, i.e., to participate or not to participate in the labor market. Therefore, binomial probit and logit estimation techniques are used for the examination of labor force participation decision in this study. In second model, the dependent variable is the magnitude of time allocated to the labor market work, which is a continuous variable. OLS and Tobit estimation techniques are used to analyze the determinants of time allocation to the labor market. The major objectives of this part of study are following:

i. To find out the probability that males and females participate in the labor market.

ii. To find out the determinants of male's and female's allocation in number of hours a week to the labor market.

This chapter is categorized into three main sections. Empirical results and description of probability of participation decision and time allocation in terms of number of weekly hours allocated to the labor market work for males are given in section 5.2. Empirical results and description about probability of participation decision and time allocation in form of number weekly hours to the labor market work for females are given in section 5.3. The conclusion of this chapter is given in section 5.4.

5.2. Empirical Results of Model of Time Allocation to Labor Market Work for Males

In this section, empirical results of males' time allocation models to the labor market work are presented.

5.2.1. Results of Male's Labor Market Participation Decision Function

Table 5.1 shows the results of male's decision to participate or allocate time to the labor market. The signs and significance of all explanatory variables are found appropriate. In addition, the value of R^2 is quite reasonable. This shows that the overall explanatory power of this model is correct. The magnitude of coefficient of intercept is higher and significant. This reveals that there may be other variables which are not present in the model but they may affect the labor market participation decision of males.

Hausman endogeneity test is applied to check the presence of endogeneity, if any, between participation decision of males to the labor market work and potential endogenous variables of education, household size, family type, and small children (0-5 years). Education is found to be endogenous while other suspected endogenous variables are found to be exogenous. Wald test of exogeneity statistic shows that endogeneity is present between suspected endogenous variables of education and males' labor force participation. Therefore, IV-Probit model is applied to examine the determinants of male's participation decision to the labor market work. Education of head of the household and parents' education are used as instruments to correct the endogeneity issue. This is so because education level of the household head and parent's education affects the human capital investment of child and hence his access to the labor market. That is, the higher the level of education of the household head and parents, the greater the chances of investment on the education of his/her child (Totouom, Mboutchounang, and Fotio, 2018).

According to the IV-Probit model estimates, age is positively, however, age square is negatively correlated with the males' participation decision in the labor market. This could be due to the fact that the probability to participate to the labor market increases with the increase in age. This may be due to the strong health, acquiring of required skills and education and greater mobility over time. The pattern of male's labor force participation (MLFP) reveals an inverted u-

shaped pattern (Faridi et al., 2009; Sabir, 2015; Gillani & Zulfiqar, 2018). MLFP is lower for the younger age group due to lack of experience, required skills, and education. This increases with the increase in the male's years of age due to increase in experience level, better skills and improved education level. As given in Table 3.1 in chapter 3, males of 21-30 years have shown 92 percent probability of participation into labor market work. And males from age group 31-40 years have shown about 98 percent probability of participation into labor market work. It is observed that males are more likely to decide about labor market work during 21 to 40 years of age because of increased family responsibilities on the shoulders of males. As the age increases beyond 50 years, probability of males to join the labor market work decreases. This may be due to deteriorating health condition, decline in working potential and early retirement during older years.

Regression coefficients of all the five dummies of education are negative and statistically significant. This indicates that the probability to join the labor market among educated males is relatively lower as compared to those males who possess no formal education. It is observed that less educated workers mainly belong to the relatively weaker financial background. They are also likely to be offered lower wage rate. Thus, they work more in order to fulfill the financial needs and raise the standard of living. The important reason of this lower labor market participation of educated males may be the result of mismatch between the skills offered by the educated participants and skills required by the job opportunities available for educated workers in the job market of Pakistan. This situation could result into lesser involvement of educated males to the labor market work in contrary to males with no formal amount of education (Hou, 2010). Moreover, the educated males may not be satisfied with the wage rate offered by the job market. This reveals the relatively weaker labor market situation for the educated workers in a developing economy.

The coefficient of marital status illustrates that married males are more likely to participate in the labor market as compared to unmarried males for the purpose of fulfilling the household requirements of their families (Gitter, 1982; Faridi et al., 2009; Stella et al., 2017; Fadayomi, 2014; Gillani & Zulfiqar, 2018). The results reveal that one more married male worker is expected to increase the participation of married males in labor force by about 1 percentage points.

Number of children of age less than equal to 5 years has a positive and significant relation with the participation of males to the labor market. This is so because presence of younger children in the family exerts more financial burden on the economic resources of the family.

As far household size is concerned, it is found that males from a lager household size have a higher probability of participation to labor market work (Faridi et al., 2007; Stella et al., 2017). It may be because when family size increases, males have to work more to meet the economic needs of growing family (Faridi et al., 2009). The coefficient of joint family system is also found to be positive but statistically insignificant. There may be two effects. One effect may be that joint families are likely to be larger and bear more financial burden due to its size as compared to the nuclear families. This results into increased probability of participation of males to the labor market work. Another effect may be that helping hands in the form of other working members are present in joint families. This would reduce the financial burden of males and as a result, reduction is seen in males' participation to the labor market work. These two effects may cancel out each other and the resulting influence may be positive but insignificant.

The coefficients of provincial dummies of KPK and Baluchistan are negative and statistically significant. This means that the probability to join the labor market is relatively less in these provinces as compared to that in Punjab. This is due to the fact that economic activity of Punjab is found to be relatively higher and better job opportunities are offered here in contrast to the other three provinces of Pakistan (Hussain et al., 2016). However, the estimate for Sindh is negative but statistically insignificant, which shows that labor market participation decision of males is more or less similar in Punjab and Sindh.

Table 5.1. Results of Males' Labor Market Participation Decision Function

IV-Probit Model			
Explanatory Variables	**Coefficients**	**Z-values**	**Marginal Effects At means**
Intercept	-3.777***	-30.91	
Age	0.303***	22.36	0.044***
Age^2_m	-0.004***	-22.79	-0.001***
Edup_m	-0.233***	-4.72	-0.033***
Edumi_m	-0.881***	-15.32	-0.157***
Edum_m	-0.935***	-15.45	-0.202***
Edui_m	-1.058***	-14.93	-0.323***
Eduh_m	-0.916***	-11.50	-0.227***
Married_m	0.713***	15.14	0.098***
SC	0.164***	2.65	0.006***
HHS	0.092***	2.96	0.002***
JOINT	0.057	1.14	0.008
Sindh	-0.010	-0.25	0.004
KPK	-0.374***	-8.13	-0.036***
Baluchistan	-0.328***	-8.19	-0.049***
Wald chi2	4915.94***		
Loglikelihood	-6186.974		
Wald test of exogeneity	15.65 ***	0.016	
Sample	73524		

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

5.2.2. Results of Hours of Time Allocation of Males to Labor Market Work Function

The results about the determinants of market hours of work for males are given in Table 5.2. The signs and significance of all explanatory variables are found appropriate. In addition, the value of R^2 is quite reasonable that shows that the overall explanatory power of the model is correct. The magnitude of coefficient of intercept is larger and is statistically significant. This shows that there may be other variables that are not present in the model but they may reasonably affect the dependent variable. Hausman endogeneity test is applied to check the presence of endogeneity between number of hours of males' work and potential endogenous variables of education, household size, family type, and small children (0-5 years). Education is found to be endogenous while other suspected endogenous variables are found to be exogenous. Therefore, IV-Tobit and 2SLS estimation techniques are employed for estimating the time allocation function of males due to presence of endogenous variable of education. Education of the head of the household is used as an instrument to correct the potential endogeneity in education (Totouom et al., 2018). Both of these estimation techniques give almost similar results for the model of number of hours of male's time allocated to the labor market. Therefore, results of only IV-Tobit model are discussed here in this section.

It has been observed that coefficient of age is found to be positive and statistically significant (Hou, 2010). This implies that males allocate more hours in a week to labor market with the increase in years of age. It has been observed from Table 3.1 and Table 3.6 given in chapter 3 that males participate and allocate greater hours during their peak productive age. This may be because workers have acquired all the necessary educational skills and experience over time. They become more energetic, mature and prepared to take the financial responsibilities of large families with the increase in age. However, the coefficient of age square is found to be negative. This means that number of weekly hours allocated to the market work decreases with more and more increase in years of age. This may be due to reduction in working potential and increase in health problems with age. These results are confirmed by Hou (2010).

The role of education is also very important in determining the number of hours allocated to the labor market by males. The coefficients of primary, middle, matric, intermediate, and higher education are found negative. This means that educated males allocate relatively lesser number of hours to the labor market work in contrary to those having no formal level of

education. The reason of this may be that as the education level increases, males become more expert and skillful in their work. This result in reduction in number of weekly hours allocated to labor market in a week. Another reason may be that less educated males or males working in the informal sector of the market may be more likely to earn lower level of wages particularly in the labor market of a developing country. Therefore, they have to work longer hours per week in labor market in order to earn the livings for their families. However, more educated male workers are supposed to be more productive and therefore they are likely to earn higher wage rate. Thus, they are required to work lesser hours per week in the labor market. These results are conformed by Hou (2010).

The coefficient of wage rate of males is found to be positive and statistically significant. This indicates that increase in wage rate have positive effect on the time allocation to the labor market work by males in a week. That is, the substitution effect of wage rate increase prevails here. It means that, with the increase in wages, male workers allocate about 0.856 hours per week more to the labor market. The similar results are found by Hou (2010).

The coefficient of marital status is positive and statistically significant (Hou, 2010). It means that married males allocate weekly more than one additional hour to the labor market work as compared to the unmarried counterparts. This may be because married males have to bear more financial responsibilities of their family as compared to their unmarried males.

The coefficient of number of small children is positive and statistically significant at 5 percent level of significance. This is due to the fact that presence of small children exerts more financial pressure on the economic resources of the family. As a result, males have to work more hours in the labor market in order to meet financial needs of the growing families.

The coefficient of household size is positive and statistically insignificant. There may be two effects resulting from larger household size. On effect may be that males from larger household size have to allocate more hours per week to the labor market to meet the financial needs of the family. Another effect may be that helping hands in the form of other working members are present in joint families. This would reduce the financial burden of males and as a result, reduction is seen in males' participation to the labor market work. These two effects may cancel out each other and the resulting effect may be positive but insignificant. It is observed that positive effect may dominate the negative effect.

As far the role of joint family system is concerned, the estimate is also positive and statistically significant at 1 percent level of significance. It is found that males belonging to joint family system allocate about 0.884 more hours per week to the labor market in contrary to those living in the nuclear family system. The joint families are expected to be larger than nuclear families. One important reason of males from joint families to work longer hours in the labor market is to meet the growing financial needs of joint families.

The effect of occupational categories (Professionals and associate professionals) of males on allocation of hours to the labor market is quite prominent. The effect of all occupational categories on hours of labor market work of males is found to be negative, which means that males from these occupational categories allocate lesser number of hours per week as compared to those who belong to elementary occupation (base category). The reason may be that workers associated with professional and associate professional categories are more productive and can perform labor market work more efficiently. Therefore, they complete their task in less amount of time as compared to the unskilled workers. Moreover, they are paid at reasonable rates. These results can be confirmed from the inverse effect of different educational categories on the time allocation of males to the labor market work. However, the males belonging to the elementary occupation are usually paid at lower rates. They have to work longer hours to earn their livings.

The coefficients of all the residential categories are negative and statistically significant. Males from Sindh allocate about 2 hours per week lesser to the labor market work as compared to the males from the Punjab. Males belonging to KPK and Baluchistan spend about 4 hours and 3 hours per week lesser to the labor market activities respectively as compared to those belonging to Punjab. It means that males from Punjab allocate more time to the labor market work as compared to males from other provinces of the Pakistan. This is so because the labor market of Punjab is more promising towards providing employment opportunities and decent wage rates. Therefore, males in Punjab are encouraged to allocate more time to paid work in order to earn decent standards of livings.

Table 5.2. Results of Weekly Hours of Time Allocation to Labor Market Work for Males

	IV-Tobit Model		**2SLS Model**	
Explanatory Variables	**Coefficients**	**Z-values**	**Coefficients**	**Z-values**
Intercept	38.891***	29.00	30.066***	12.87
Age_m	0.678***	11.28	0.680***	11.34
Age ^{2}_m	-0.010***	-12.65	-0.010***	-12.72
Edup_m	-0.780***	-2.46	-0.776***	-2.45
Edumi_m	-0.217	-0.57	-0.211	-0.55
Edum_m	-0.311	-0.78	-0.300	-0.76
Edui_m	-2.362***	-4.41	-2.371***	-4.44
Eduh_m	-3.825***	-5.97	-3.844***	-6.01
LMW	0.856***	4.47	0.854***	4.46
Married_m	1.389***	3.66	1.373***	3.64
SC	0.555**	2.06	0.520**	2.05
HHS	0.364	1.57	0.345	1.52
JOINT	0.884***	2.64	0.800***	2.71
Occmp_m	-1.521***	-2.65	-1.500***	-2.63
Occtacs_m	-5.246***	-15.04	-5.255***	-15.10
Occaffcp_m	-1.642***	-5.87	-1.638***	-5.86
Sindh	-2.159***	-7.85	-2.153***	-7.84
KPK	-3.846***	-9.47	-3.820***	-9.53
Baluchistan	-3.068***	-9.45	-3.064***	-9.44
Wald chi2	1641.48***	0.000		
Loglikelihood	-67154.228			
Wald test of exogeneity	18.14 ***	0.006		
R-squared			0.186	
Sample	58903			

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

5.3. Empirical Results of Model of Time Allocation to Labor Market Work for Females

This section presents the empirical results of the determinants of participation and time allocation to the labor market work for females.

5.3.1. Results of Female Labor Market Participation Decision Function

The results of the probability of female's time allocation decision to the labor market are shown in Table 5.3. The logit model is applied here to find out the probability of labor market participation decision of females. Since, the logit model is non-linear, we calculate the marginal effects to describe the magnitude of effect of each independent variable on dependent variable. Almost all the explanatory variables show appropriate signs and quite significant. The value of pseudo R^2 shows that explanatory variables play an important part in explaining the behavior of dependent variable. In order to check the robustness of our results, we have also applied the linear probability (LPM) model on the LFP decision of females. Since, the results of both of these models are almost similar, we have given the results of LPM model in appendix in Table 2A. Only the results of logit model are explained in this section of the study.

The coefficients of age and age square shows that age is positively related whereas age square is negatively related to the labor market participation decision of the females (Widarti, 1998; Naqvi et al., 2002; Khan & Khan, 2009; Hosney, 2016; Batool et al., 2019). The coefficient of age shows that 1-year increase in the age of female is expected to increase the probability of females to join the labor market by about 0.088 percentage points. It has been observed from the Table 3.11 given in chapter 3 that the maximum FLFP is observed for the age groups 31-50 years. This may be because females become mature with the increase in years of age. They equip themselves with better education and skills with time as compared to the younger females. However, marginal productivity declines during later years of age resulting from deteriorating health, lower working potential, and early retirement. Consequently, probability of participation become lower (Shaheen et al., 2015).

Another vital factor in determining the labor market participation decision of females is education. In present study, it has been observed that the coefficients of primary, middle, matric

and intermediate and higher level of education are negative and statistically significant. These results are confirmed by Shapiro and Shaw (1983) and Hussain et al. (2016). The results are an indication of the fact that educated females may be less likely to join labor market. This may be because of lack of employment opportunities available in the market to the educated labor force (Faridi et al., 2009). Another reason can be lower wage rate offered to the educated labor force in the market. This can lead to discouraging effect on the educated females as compared to the less educated females. It is observed that women without having any formal education may be willing to accept lower wage rate as compared to educated females. Another important factor responsible for lower LFP of educated females is the cultural factors i.e. norms that restrict the mobility of females. In addition, it has been observed in our society that educated females tend to marry educated males with greater incomes. So, this higher income of the family would further exert discouraging effect on the LFP of educated females in our country (Chatterjee et al., 2018).

The coefficient of marital status is found to be positive and statistically significant. This means that married females are more likely to join the labor market in contrary to unmarried females because of the increased financial burden of family. That is, the married females are more likely to participate in the labor market in order to share the financial burden of the growing families. These findings are confirmed by Che and Sundjo, (2018) and Faridi and Basit (2011).

A reduction in females' probability of participation is observed, when there is one unit increase in the number of young children (0-5 years) in the family. This shows that there exist negative relationship between presence of small children within the family and female's labor market participation decision. Similar results are found by Meghir et al. (1989); Naqvi et al. (2003); Dildar (2015); Gondal (2005); Faridi et al. (2015); Andlib and Khan (2018); Batool et al. (2019). However, the result is found to be statistically insignificant. There may be two types of effects resulting from the presence of small children at home. The first effect may be that an increase in the reproductive responsibilities of the females causes a reduction in the probability of FLFP. This may be that caring and raising of children need more attention of the mothers, and this may refrain females from joining the labor market (Dildar, 2015). The second effect may be that the presence of small children exerts more burden on the finances of the family, such females may require more labor market participation of female members of the family in order to

financially support increased household expenses. Therefore, these two effects may cancel out each other, and the resulting effect may be negative but insignificant.

As far the household size is concerned, it has been observed that females from a larger household size have a lower probability of participation to the labor market work (Kanwal et al., 2019; Khan & Hafeez, 2017; Cheema et al., 2021). The result is found to be insignificant. There may be again two effects for this result. One effect of this may be that larger household size means increased financial burden resulting from the presence of more members in the family which forces females to join the labor market. In other words, we can say that females have to join the labor market through need for more income. Another effect is that larger households may follow the principle of comparative advantage. More productive workers participate in the labor market work. Those who are more productive in the household work may stay at home to perform household responsibilities (Dildar, 2015). This results into lower labor market participation of females because of higher need of care for household. These two effects may cancel out each other. The overall effect may be negative but insignificant.

It has been found that females belonging to joint family system possess a lower probability of participation in labor market work (Awan et al., 2015; Gondal, 2005). This implies that one more female belonging to the joint family system reduces the probability of females to join the labor market by about 2.3 percentage points. The reason of this may be that of increased burden of household chores that force females to stay at home and pay more attention to the household activities. Moreover, the joint families are expected to be larger where other families members may work in the labor market are present. They lower the probability of females to participate in the labor market.

The results of residential categories also seem to be very interesting. The coefficients of all the residential provinces are found to be negative and statistically significant. This indicates that females living in Sindh, KPK, and Baluchistan have lower probability of participation to the labor market work as compared to females from Punjab. This is because better employment opportunities for females are available in Punjab as compared to the other provinces of Pakistan. The similar results are found by Ahmad and Hussain (2012) and Hussain et al. (2016).

In addition, a separate logit model is estimated for young females of age 10 to 18 years. The results of this model are reported in Table 10A given in appendix. It has been observed that

female's participation in labor market and age has a u-shaped relationship. As far educational dummies are concerned, educated females have a lower labor force participation as compared to females with no formal education due to lack of required education, skills and experience (Shapiro & Shaw, 1983; Hussain et al., 2016). Further, it has been observed that females that are married, living in larger household size, and belonging to Sindh, KPK, and Baluchistan has a lower participation in labor market work (Ahmad & Hussain, 2012; Hussain et al., 2016).

Table 5.3. Results of Female Labor Force Participation Decision Function

	Logit Model		
Explanatory Variables	**Coefficients**	**Z-values**	**Marginal effects**
Intercept	-1.472***	-11.55	
Age	0.088***	11.07	0.013***
Age^2_f	-0.001***	-10.60	-0.000***
Edup_f	-0.737***	-18.14	-0.091***
Edumi_f	-1.484***	-23.54	-0.145***
Edum_f	-1.470***	-24.59	-0.146***
Edui_f	-1.126***	-15.15	-0.118***
Eduh_f	-0.400***	-7.64	-0.066***
Married_f	0.440***	9.21	0.071***
SC	-0.005	-0.41	-0.001
HHS	-0.002	-0.51	-0.000
JOINT	-0.155***	-4.88	-0.023***
Sindh	-1.006***	-28.35	-0.122***
KPK	-1.280***	-35.30	-0.154***
Baluchistan	-2.003***	-35.33	-0.183***
Loglikelihood	-19039.706		
Pseudo-R-squared	0.179		
Sample	74457		

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

The sign and significance of the explanatory variables are found appropriate. The coefficients of age and age square shows that age is found to be positively related whereas age square is negatively related to the labor market participation decision of the females. It has been observed that the coefficients of primary, middle, matric and intermediate and higher level of education are negative and statistically significant. The coefficient of marital status is found to be positive and statistically significant. It has been observed that females from a larger household size have a lower probability of participation to the labor market work.

5.3.2. Results of Hours of Time Allocation of Females to Labor Market Work Function

The estimates of females' time allocation function are given in Table 5.4. Almost all the explanatory variables show appropriate relationship with the time allocation of females to the labor market work. The value of R^2 is found to be quite reasonable which shows that explanatory variables play an imperative part in explaining the behavior of dependent variable. The magnitude of coefficient of intercept is larger and significant. This shows that there may be other variables that are not present in our model but they may reasonably affect the dependent variable. Number of hours of work allocated by females in a week is the dependent variable. Heckman two stage procedure is applied to analyze the determinants of females' time allocation function.

The coefficient of age is positive and significant. However, the coefficient of age square is negative and found to be statistically significant. Similar results are found by Azid et al. (2001); Espino et al. (2017); Kanwal (2019); Faridi et al. (2019). The sign of both of these coefficients shows that the females' time allocation to the labor market tends to have an inverted u-shaped relation with the age of the females (Faridi & Rashid, 2014). It means that females allocate lesser number of hours in labor market during early years of life. This may be because younger females would not be able to receive decent wage because of lack of required level of education, experience and training. Moreover, they have not completed their family size at such a younger age (Hafeez & Ahmad, 2002). Females' time allocation to the labor market work is found to be higher at the peak productive age i.e., 31-50 years as indicated by Table 3.16 in chapter 3. This may be due to increased financial burden of large families which forced the females to join the labor market in order to provide better life standard to their families. After 50 years, reduction in females' time allocation to labor market observed due to deteriorating health conditions. Another reason may be the fulfillment of majority of their family responsibilities.

Another important determinant of time allocation of female to the labor market work is the level of education that may reflect her productive potential in the market work as well as at home. By taking this into account, five educational dummies are used to find out the role of education in determining the time allocation of females to the market work. The effect of different educational categories on time allocation of females is found insignificant. There may emerge two effects due to increase in the education level of females. On one hand, if the opportunity cost in terms of increase in wage rate of staying at home increases with the increase in level of education, females prefer to allocate more number of weekly hours to the paid labor market work and vice versa. On the other hand, in case of increase in the opportunity cost of labor market work, females are expected to work longer hours at home rather than in the paid labor market. That is, the time of educated females is more demanded at home to efficiently perform household activities and to fulfill the child rearing responsibilities. This is so because educated females can better perform different child care activities (like training and education of children) at home. The similar argument was also presented by Sultana et al. (1994). As a result, the ultimate effect of rise in education level becomes indeterminate. It has been found that time allocation behavior of primary pass females is similar to that of females having no formal education. This may be due to almost similar nature of jobs offered to them. The coefficient of middle education is found to be negative but statistically insignificant. The similar relationship was found by Hou (2010). The coefficient of matric level of education is found to be negative and significant. This indicates that females with matric level of education allocate lesser number of hours in a week to the labor market work in contrary to females having no formal level of education. Females with intermediate and higher level of education show relatively weak negative association with time allocation to the labor market work.

Log of wage rate of females have a positive and significant association with the time allocation behavior of females to the labor market work. This implies that as the wage rate increases, number of weekly hours of females allocated to the labor market also increases. This association was also confirmed by results analyzed by Azid et al. (2001).

It is observed that the married females allocate larger number of hours in a week to the labor market work as compared to the unmarried females (Che & Sundjo, 2018). This can be due

to the fact that married females bear more financial burden of large families as compared to unmarried females.

The coefficient of small children of age less than equal to 5 years is found to be negative but statistically insignificant. The similar association between presence of small children in a household and time allocation of females to the labor market work was found by Batool et al. (2019). This negative and insignificant association may result from the similar reasons that we have already described while explaining the result of this variable in female participation decision function (Table 5.3).

As far the household size is concerned, it is found to be negatively and significantly related with the number of weekly hours allocated to the labor market work by females. This implies that females living in larger household size, allocate lesser hours to the labor market work. One reason of this may be that increased burden of household chores on the shoulders of females members in the larger families (Fadayomi et al., 2014). Another reason of this may be the presence of helping hands in the form of other working members in the larger families who join the labor market and share the financial burden of the family. As a result time allocation of females to the labor market work is reduced (Khan & Khan, 2009).

Similarly, females from the joint family system allocate lesser hours in a week to the labor market work as compared to females from the nuclear family system. Since, the joint families are usually considered to be larger in size, the burden of household chores become higher in joint family system and therefore cause the females to perform the household duties. This may lead to lower the time allocation of females to labor market.

Another important determinant of time allocation of females to the labor market is their occupational choice. The coefficients of all the occupational categories (for example, professional, manager, associate professional and agricultural workers) are negative and statistically significant. Elementary occupation is used as a base category. This implies that females from these occupational categories allocate fewer numbers of hours per week to the labor market work in contrary to females belonging to the elementary occupation. This may be because that females belonging to these occupational categories are educated and therefore, more productive. They can better perform their labor market duties in shorter time than elementary workers. Moreover, they are paid at decent wage rates. These results can be confirmed from the

negative effect of different educational categories on the labor market time allocation of females. However, it has been generally observed that being less/uneducated, females belonging to the elementary occupations are paid at lower rates. Therefore, they have to work longer hours to earn their livings.

The coefficients of residential category of Sindh, KPK and, Baluchistan are found to be negative and statistically significant. It indicates that females from these provinces allocate lesser number of weekly hours to the labor market work as compared to females from the Punjab. The reason may that labor market in Punjab provides better job opportunities and also offer better working environment to the females as compared to other provinces of Pakistan. Thus, females in Punjab are found to work longer hours in order to be more productive and to earn decent standards of living.

On the whole, it has been observed that almost all the explanatory variables show appropriate relationship with the time allocation of females to the labor market work. The value of R^2 is found to be quite reasonable which shows that explanatory variables play an imperative part in explaining the behavior of dependent variable. The magnitude of coefficient of intercept is larger and significant. This shows that there may be other variables that are not present in our model but they may reasonably affect the dependent variable. Number of hours of work allocated by females in a week is the dependent variable. Women belonging to different educational categories supply lesser number of hours to the market as compared to the women having no formal education for the similar reasons explained in other models. Married women are likely to work more number of hours than unmarried women. Women belonging to larger families also allocate smaller number of hours. Moreover, women living in Punjab are likely to work for longer hours (Fadayomi et al., 2014; Khan & Khan, 2009; Batool et al., 2019; Sultana et al., 1994).

Table 5.4. Results of Weekly Hours of Time Allocation to Labor Market Work for Females

	Heckman's Two Step Procedure	
Explanatory Variables	**Coefficients**	**t-values**
Intercept	33.811***	12.25
Age_f	0.302***	2.55
Age ^{2}_f	-0.004***	-2.43
Edup_f	-0.486	-0.07
Edumi_f	-0.784	-0.35
Edum_f	-4.403***	-3.94
Edui_f	-0.052	-0.12
Eduh_f	-0.085	-0.05
Married_f	1.462***	2.44
LFW	1.059***	4.31
SC	-0.209	-1.32
HHS	-0.295***	-5.46
JOINT	-0.217**	-2.15
Occmp_f	-1.952**	-2.10
Occtacs_f	-1.278***	-2.13
Occaffcp_f	-7.211***	-14.84
Sindh	- 9.811***	-6.99
KPK	-2.262***	-3.75
Baluchistan	-1.854***	-3.54
R-squared	0.137	
Mill's Ratio	-17.039**	-2.12
Sample	14871	

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

5.4. Conclusion

According to the analysis of the labor market work, there are numerous demographic and economic factors that affect the LFP decision and number hours of the labor market work of males and females. One of the most important determinants of LFP decision and the number of weekly hours allocated to the labor market work is the age of males and females. Age of both males and females is found to increase their LFP and number of weekly hours on the labor market work but at diminishing rate.

As far education is concerned it is observed that both educated males and females have lower probability of participation as well as time allocation to the labor market work as compared to their uneducated counterparts. Married males and females exhibit a higher probability of participation to the labor market along with time allocation as compared to the unmarried males and females due to increased financial responsibilities of the families. Both males and females show a higher probability of participation and time allocation to the labor market with the increase in wage rate offered.

Younger children present in the family increased the participation and allocation of time to the labor market work for males but negative impact is recorded for that of females. Males from joint families work longer hours per week in labor market, however, females belonging to the joint families exhibit a lesser probability of participation to the labor market work.

Males and females from a larger household size and joint families allocated more hours to the labor market work. However, females from larger household size and joint families allocate lesser number of weekly hours to the labor market work as compared to the females from nuclear families.

Males and females from managerial (Occmp_m), technicians, associate professional (Occtacs_m), and skilled agricultural (Occaffcp_m) occupational category allocate fewer number of hours in a week to the labor market as compared to their counterparts from elementary occupation. As far the residential categories are concerned both males and females from Sindh, KPK, and Baluchistan have a lower LFP and time allocation as compared to that from the Punjab.

CHAPTER 6

EMPIRICAL RESULTS OF TIME ALLOCATION TO NON-MARKET WORK

6.1. Introduction

This chapter discusses the time allocation decision and number of weekly hours to non-market work for females in Pakistan with respect to the various socio-economic and demographic variables. The data for the analysis is obtained from the *LFS (2017-2018),* concentrating on a sample of females of age 10-64 years.

There are following major objectives of this part of study.

i. To find out the determinants of females' participation decision for the housework, child work, and household agricultural work.

ii. To find out the determinants of females' time allocation to housework, child work, and household agricultural work.

The probability of participation of females to the housework, child work, and household agricultural work is a dichotomous variable, thus, binomial Probit and Logit estimation techniques are used for the purpose of estimation in this section. However, the time allocation of females to housework, child work, and household agricultural work is measured in hours of work per week. To analyze this, we apply the Ordinary Least Square (OLS) and Tobit estimation techniques using number of weekly hours of their work as a function of numerous independent variables.

The plan of this chapter of study is as follows. Section 6.2 analyzes the results of determinants of participation decision and time allocation to the non-market work. The chapter is concluded in section 6.3.

6.2. Empirical Results of Time Allocation to Non-Market Work Model

In this section, empirical results of the determinants of participation and allocation of time to non-market activities are given along with explanation.

6.2.1. Empirical Results of Time Allocation to Housework

This section is divided into two parts. Empirical results of housework participation decision are given in first part. Second part presents the empirical results of time allocation to housework.

6.2.1.1. Results of Housework Participation Decision Function

The results of the logit estimates of female participation into the housework are given in Table 6.1. The signs of all explanatory variables appear to be correct. The value of R^2 is found quite reasonable which shows that explanatory variables play an important role in determining the dependent variable. The magnitude and significance of intercept term is quite prominent. This reveals that there are other variables that are not present in the model but they may significantly affect the dependent variable. In order to check the robustness of our results, we have also applied the linear probability (LPM) model on the participation decision of females to the housework. Since, the results of both of these models are almost similar, we have given the results of LPM model in appendix in Table 5A. Only the results of logit model are explained in this section of the study.

The coefficient of age is positive and statistically significant at 1 percent level of significance (Mueller, 1982; Kedir & Rogers, 2018). This implies that the probability of females to participate in the housework increases with the age of the females. However, the coefficient of age square is found negative and statistically significant. This implies that the ability of females to do the household chores decreases at the later years of life due to deteriorating health conditions, decline in energy, and work potential. Moreover, they have already accomplished most of their core household responsibilities.

The coefficients of all the educational categories are found to be negative but insignificant. This implies that educated females have lower probability of participation into the housework as compared to the uneducated females (Kedir & Rogers, 2018). There may be two

main reasons for this insignificant result. Firstly, education is considered as an indicator of potential productivity in market production. The increase in opportunity cost of staying at home leads to increase in females' participation in labor market work rather than to stay at home. Secondly, an increase in the level of education of female means an increase in her efficiency in doing home production. It is observed that educated females can better perform the household activities. Therefore, they decide to perform household work. This result into reduction of her time that is being allocated to home production and consequently raises the level of her consumption of market and leisure time (Khandker, 1988; Malathy, 1994). Both of these effects cancel out each other and the resulting effect would be negative but insignificant.

The coefficient of marital status is found positive but statistically insignificant. This shows that this variable has a weak relation to determine the decision of females to perform household chores (Singh & Pattanaik, 2019). That is both married as well as unmarried females show more or less similar behavior in performing household responsibilities. Moreover, it is found that marital status of being married can affect the probability to perform housework in different ways. First is that married females are likely to take intensive part in household chores. This is so because the housework is considered as the primary responsibility of married females rather than unmarried females. That is married females are traditionally known as responsible for performing household chores as compared to their unmarried counterparts. Secondly, married females are mature and show serious concern towards fulfilling financial requirements of the family in order to meet at least the minimum standards of life. Therefore, they may decide to step in the market in order to earn money. These two effects may cancel out one another and the resulting effect may be positive but insignificant.

The coefficient of presence of younger children in the family is found to be positive but insignificant. This implies that the probability of females to do the housework increase in case of presence of small children in a family (Alvarez & Miles, 2003). There may be again two effects resulting from presence of small children in the family. One effect is that the presence of small children may increase the work burden on female members in the family. Therefore, they decide to perform housework. Secondly, the presence of small children may increase pressure on household budget of the family and women may decide to enter the labor market in order to

financially support the family. These two effects may cancel out each other. The overall effect may be positive but insignificant.

The coefficient of household size is found to be negative but statistically insignificant. This indicates that females from the bigger household size have a lower probability of participation to the housework. There may be two effects for this insignificant relationship between household size and females' participation decision to home work. One effect is that helping hands in the form of more members may be present in the family. They share the burden of females to perform household chores and thus, reduce their participation to the housework. Second effect may be that larger household size increases the females' burden of household chores and as a result, they have to do more housework. Thus, the overall effect of household size on women' participation to housework is found to be neutral.

It is found that females from a joint family system exhibit a lower probability of participation to the housework than females belonging to a nuclear family system. This may be because presence of other members as well as relatives in joint families shares the female burden of housework. However, these helping hands are not present in the nuclear family system to share the burden of females for housework. Therefore, they have to perform household work by themselves here.

The analysis of residential categories shows that the females from Sindh, KPK, and Baluchistan have a higher probability of participation to the household work as compared to the females from Punjab. This may be because Punjab is relatively more advanced and developed province than other provinces of the country. It has been observed that females belonging to Punjab are more oriented to paid labor market work. They are also oriented to hire services to perform different household activities. Moreover, they are more likely to utilize different household appliances to perform household chores. This result can be further confirmed by the signs of coefficients of residential provinces in Table 5.3. These results show that females from other provinces are less likely to join to labor market work in contrary to females belonging to Punjab. Therefore, they decide to stay at home to fulfill household responsibilities.

Table 6.1. Results of Females' Participation Decision to Housework Function

	Logit Model		
Explanatory Variables	**Coefficients**	**Z-values**	**Marginal Effects**
Intercept	3.055***	4.38	
Age	0.187***	4.25	0.001***
Age^2_f	-0.003***	-4.72	-7.53e-06***
Edup_f	-0.025	-0.10	-0.000
Edumi_f	-0.024	-0.07	-0.000
Edum_f	-0.137	-0.46	-0.000
Edui_f	-0.493	-1.39	-0.002
Eduh_f	-0.530	-1.36	-0.002
Married_f	0.075	0.25	0.000
SC	0.093	1.11	0.000
HHS	-0.040	-1.29	-0.000
JOINT	-1.297***	-4.97	-0.004**
Sindh	0.940***	3.11	0.002***
KPK	0.599***	2.74	0.002***
Baluchistan	0.855***	2.35	0.002***
Loglikelihood	-830.706		
Pseudo-R-squared	0.162		
Sample	52748		

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

6.2.1.2. Results of Hours of Time allocation to Housework Function

The results of the Tobit and OLS estimates of time allocation to housework are shown in Table 6.2. The signs and significance of all underlying explanatory variables are appropriate. In addition, the value of R^2 is found to be quite reasonable which support that independent variables play an essential part in explaining the behavior of the dependent variable. The results of both of these models are almost similar. We discuss the estimates of Tobit model here.

The coefficient of age is positively and significantly related with time allocation to domestic chores. However, age square is negatively and significantly associated with time allocation to housework. This means that female allocate more hours of housework during early years of life as compared to the later years of life. This may be due to deteriorating health conditions of females over time. Results found by Anxo and Carlin (2004), Sultana et al. (1994), South and Spitze (1994), Tamene and Desta (2015) support these estimates.

The results indicate that coefficients of all the categories of education are negative. It shows that educated females devote relatively lesser number of hours to housework (Mueller, 1982; South & Spitze, 1994; Craig, 2006; Anxo & Carlin, 2004; Bianchi et al., 2000; Bloemen et al., 2010; Tamene & Desta, 2015). Altuzarra et al. (2020) found that females with intermediate and higher education allocate relatively lesser number of hours to the household activities. One reason of this may be that the educated females may be more productive in paid market as well as unpaid non-market work. Therefore, they allocate relatively less time for the home production. A study by Sultana et al. (1994) found similar results. Another reason may be that the educated females tend to be more oriented to join the labor market and consequently reduce the number of hours allocated to the housework.

The coefficient of marital status is to be found positively and significantly related with the female's time allocation to unpaid housework. The similar results for marital status and females' time allocation to unpaid housework are found by Glick (1999); Bianchi et al. (2000); Dong & An (2012); Tamene & Desta (2015). This shows that married females allocate 2.166 more hours in a week to the housework in contrary to the unmarried ones. This indicates that married females are likely to take more responsibilities of household chores than the unmarried ones.

The coefficient of number of small children is found to be positive. But it is statistically insignificant. This implies that presence of additional number of small children in a household increases the time spend by females on household chores per week. This may be so because the presence of small children increases the intensity of housework for females.

The value of coefficient of household size shows a negative and statistically significant relation with time allocation of females to the housework. This may be due to availability of helping hands in the form of other family members in the larger families. These other members may share the burden of females in performing household chores (Dong & An, 2012; Tamene & Desta, 2015).

Similarly, females from joint family system also allocate relatively lesser number of hours per week to the housework as compared to the females from the nuclear family system. This may be because joint families are probably to be larger in size where other relatives may be present in the family. These other relatives share the females' burden of household chores. As a result, females have to allocate relatively lesser number of hours to household work in joint families as compared to the nuclear families.

The coefficients of all the residential categories of provinces are found to be positive and statistically significant. Females from Sindh spend more than 6 hours per week on the housework as compared to females from Punjab. Similarly, females from KPK and Baluchistan allocate relatively 4 hours per week more on the housework. This may be because Punjab is relatively more advanced and developed province of the country. Females in Punjab are more likely to utilize different household appliances in performing household chores. This would result into reduction of their time to household chores. Moreover, it has also been observed that females belonging to Punjab are more oriented to paid labor market work that is confirmed by the signs of residential provinces in Table 5.3 and Table 5.4. Females from other provinces are more likely to spend less amount of their time to the labor market work and more of their time to the housework.

Table 6.2. Results of Weekly Hours of Time Allocation to Housework for Females

	Tobit Model		**OLS Model**	
Explanatory Variables	**Coefficients**	**t-values**	**Coefficients**	**t-values**
Intercept	17.016***	31.67	17.019***	31.67
Age_f	1.349***	37.42	1.349***	37.41
Age ^{2}_f	-0.020***	-40.31	-0.020***	-40.30
Edup_f	-0.367	-1.05	-0.366	-1.07
Edumi_f	-0.367	-1.49	-0.368	-1.50
Edum_f	-0.320	-1.43	-0.320	-1.43
Edui_f	-0.466	-1.49	-0.466	-1.48
Eduh_f	-0.593*	-1.73	-0.595*	-1.73
Married_f	2.166***	9.13	2.166***	9.13
SC	0.004	0.07	0.004	0.07
HHS	-0.068***	-3.12	-0.068***	-3.12
JOINT	-3.538***	-23.64	-3.538***	-23.63
Sindh	6.683***	38.85	6.683***	38.84
KPK	4.088***	24.95	4.088***	24.95
Baluchistan	4.254***	21.64	4.254***	21.63
loglikelihood	-117589.75			
R-squared	0.156		0.179	
Sample	52528			

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

6.2.2. Empirical Results of Time Allocation to Child Work

This section is divided into two main parts. The first part represents the empirical results of child work participation decision equation. The second part contains the empirical results of time allocation to the child work.

6.2.2.1. Results of Child Work Participation Decision Function

The results of the female participation decision to the child work are presented in Table 6.3. Almost all the explanatory variables show positive relationship with females' participation in child care activities. In addition, value of pseudo R^2 is quite reasonable for cross sectional data. This shows that explanatory variables play an essential role in explaining the behavior of dependent variables. The magnitude of coefficient of intercept is larger and z-value is significant at 1 percent level of significance. This reveals that there may be other variables which are not present in the model but they may significantly affect the dependent variable. In order to check the robustness of our results, we have also applied the linear probability (LPM) model on the participation decision of females to the child work. Since, the results of both of these models are almost similar, we have given the results of LPM in appendix in Table 7A. Only the results of logit model are explained in this section of the study.

The coefficient of age is positive and that of age square is negative. Both of these variables are statistically significant at 1 percent level of significance. This implies that female's participation to the child work activities is likely to increase with the increase in the years of age but at a diminishing rate. Females are relatively less likely to bear responsibilities of child work during later years of their lives. This indicates concave age and child work profile.

The coefficients of all the educational dummies are positive and statistically significant. This indicates that educated females have a higher probability of participation in childcare activities in contrary to females with no formal level of education. This may be due to the fact that better educated females have greater taste in educating and caring children and are consequently more efficient in performing this task in contrary to females having no formal education (Malathy, 1994; Bloemen et al., 2013). This explains that educated females are fully aware of the fact that better education and better care of children foster the acquisition of human capital development in their children (Craig, 2006). In addition, educated females can easily

afford to use the services of hired help for household work and consequently participated more in the child work activities.

Coming towards the marital status, the coefficient is also found to be positive and statistically significant. This indicates that probability of married females to do the child work is higher as compared to the unmarried females.

The coefficient of younger children (0-5) years is found to be positive and statistically significant. This shows that probability of females' participation to the child work increase with each unit increase in the number of small children in the family. This is so because the childcare and developing the educational activities of the children is more responsibility of married females as compared to their unmarried counterparts. This implies that childcare activities of the females increase with the presence of number of minor children in the family (Bloemen et al., 2010).

However, females belonging to a large household size and joint family setup exert positive effect on the probability of females to do child work. This may be due to the reason that larger and joint families may bear more small children. So, the work burden of child care activities may be higher in such families. Therefore, females have to work more for child care. Moreover, this may be due to the presence of helping hands in the form of other family members and relatives in the relatively larger families and joint families who share the females' burden of other household chores. So that potential females can spare time for child care. As a result, females are more oriented to involve in childcare activities.

As far the residential provinces are concerned, females from Sindh, KPK, and Baluchistan participate more in child work as compared to females from Punjab. This may be because Punjab is relatively advanced province, females in Punjab can hire services for caring and educational activities of their children. Therefore, females in Punjab exhibit a relatively lower probability of participation towards child work as compared to the other provinces of the country. However, the coefficient for Sindh is statistically insignificant which shows that females' behavior regarding child care work is more or less similar in Sindh and Punjab.

Table 6.3. Results of Females' Participation Decision to Child Work

Logit Model			
Explanatory variables	**Coefficients**	**Z-values**	**Marginal effects**
Intercept	-1.663***	-13.54	
Age	0.129***	15.85	0.017***
Age^2_f	-0.002***	-18.92	-0.000***
Edup_f	0.263***	5.63	0.033***
Edumi_f	0.190**	2.95	0.024**
Edum_f	0.342***	5.57	0.041***
Edui_f	0.438***	4.90	0.051***
Eduh_f	0.688***	6.29	0.073***
Married_f	1.804***	34.65	0.339***
SC	0.304***	18.28	0.041***
HHS	0.078***	14.75	0.010***
JOINT	0.387***	10.01	0.051***
Sindh	0.104	1.05	0.014
KPK	0.115***	2.47	0.015***
Baluchistan	0.825***	13.44	0.090***
Loglikelihood	-12771.201		
Pseudo- R-squared	0.179		
Sample	52748		

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

6.2.2.2. Results of Hours of Females' Time allocation to Child Work Function

The results of the determinants of time allocation to child work for both Tobit and OLS estimation techniques are given in Table 6.4. The signs and significance of all explanatory variables are found appropriate. The value of R^2 is found quite reasonable which shows that independent variables play an imperative part in explaining the behavior of dependent variable. The magnitude of coefficient of intercept is larger and t-value is statistically significant at significance level of 1 percent. This shows that there may be other variables which are not present in the model but they may reasonable impact the dependent variable. The results of both of these techniques are almost similar, that's why only results of Tobit model are discussed in this section.

According to the estimates, the coefficient of age is positive whereas that of age square is found negative. Thus, the results capture the quadratic relationship of age with the time allocation of females to child work. This indicates that females allocate more time during middle years of life as compared to the early and later years of their lives.

The coefficients of all the educational dummies are found to be positive and statistically significant. Similar results are found by Kalenkoski et al. (2009); Bloemen et al. (2010); Kimmel and Connelly (2007); Altuzarra et al. (2020). All the educational dummies show monotonic increase in the females' time allocation to childcare activities (Miller & Mulvey, 2000; Sayer et al., 2004). This shows that education creates the element of more childcare among females. That is, the educated females become more aware of the fact that more is the time that educated females allocate to the child care activities, the better is the development of human capital in children during the future period (Craig, 2006; Nadal & Molina, 2013; Altuzarra et al., 2020). In addition, educated females belong to wealthy families and can afford the services of hired help for household maintenance, resulting into allocation of more of their time in child work activities.

Coming now towards marital status, married females spend about 6.833 hours per week more on the child work as compared to the unmarried females. This is so because childcare activities are traditionally assumed to be the duty of married females as compared to their unmarried counterparts (Pepin, 2018).

The coefficient of our variable of number of small children is positive as well as statistically significant at 1 percent level of significance. This implies that presence of younger

children of age less than equal to 5 years increases the amount of time of females allocated to childcare activities (Kimmel & Connelly, 2007; Bloemen et al., 2010; Altuzarra et al., 2020). This is so because younger children are considered as time intensive commodity. That is, they need more time and attention of household females than the grown up children present in the family (Kalenkoski et al., 2009).

Females from a larger household size and joint family system allocate greater number of hours per week on childcare activities. The coefficients of both these variables are statistically significant. This may be because of availability of helping hands in the form of other family members and relatives who share the burden of other household chores of mothers. As a result, females belonging to larger households and joint families can spare a greater number of hours to allocate to childcare as compared to their counterparts belonging to small household size and nuclear families.

Females from Sindh, KPK, and Baluchistan allocate more hours to the child work as compared to those in Punjab. This is so because Punjab is more advanced and developed province of the country. Females in Punjab can use the facilities of hired help for education and caring activities of their children. Therefore, they allocate fewer hours per week to the childcare activities in contrary to those females belonging to other provinces of the country. On the other hand, females are relatively less involved in paid market work in Sindh, KPK, and Baluchistan. Therefore, they allocate greater number of hours per week to the child work.

Table 6.4. Results of Weekly Hours of Time Allocation to Child Work for Females

	Tobit Model		**OLS Model**	
Explanatory Variables	**Coefficients**	**t-values**	**Coefficients**	**t-values**
Intercept	11.704***	20.89	11.767***	21.04
Age_f	0.021	0.57	0.019	0.51
Age ^{2}_f	-0.002***	-4.23	-0.002***	-4.18
Edup_f	1.204***	7.17	1.196***	7.14
Edumi_f	1.753***	7.70	1.753***	7.72
Edum_f	2.441***	11.97	2.434***	11.95
Edui_f	3.290***	11.63	3.291***	11.65
Eduh_f	4.438***	14.70	4.431***	14.69
Married_f	6.833***	26.36	6.817***	26.33
SC	0.681***	11.66	0.679***	11.64
HHS	0.054***	2.61	0.055***	2.63
JOINT	0.928***	6.55	0.926***	6.54
Sindh	6.034***	37.56	6.012***	37.48
KPK	5.364***	34.96	5.361***	34.98
Baluchistan	8.112***	46.18	8.113***	46.24
Loglikelihood	-89564.748			
R-squared	0.149		0.193	
Sample	33701			

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

6.2.3. Empirical Results of Time Allocation to Household Agricultural Work

The first part of this section presents the results of participation decision equation of household agricultural work. The second part shows the results of equation of time allocation to household agricultural work.

6.2.3.1. Results of Household Agricultural Work Participation Decision Function

The results of logit estimates for the determinants of household agricultural work by females are given in Table 6.5. The signs and significance of all explanatory variables are found appropriate. The value of pseudo R^2 is found appropriate. This shows that explanatory variables play a significant role in explaining the behavior of dependent variable. In addition, the intercept term is significant. This demonstrates that there may be other variables that are omitted from the model but may reasonably impact the household agricultural work participation decision of females. In order to check the robustness of our results, we have also applied the linear probability (LPM) model on the participation decision of females to the household agricultural work. Since, the results of both of these models are almost similar, we have given the results of LPM in appendix in Table 9A. Only the results of logit model are explained in this section of the study.

The coefficient of age is found positive. This means that the probability of participation of females in the household agricultural work increases with the increase in females' age. It is found that each additional year of age is expected to increase the females' involvement in household agricultural work by 0.2 percentage points. This is so because females become more energetic and experienced with the increase in age. Therefore, they are likely to participate better in performing the household agriculture work. In this way, they are helpful to save the household finances that the household would have to otherwise spend in order to hire the external services to perform these activities for the family. However, the coefficient of our variable, age square is negative and significant. This indicates that females are less likely to participate in household agricultural work during later years of their age. This may be due to the deteriorating health conditions of females during older years (Canoves et al., 1988).

As far the education level is concerned, the coefficients of all the five educational categories are negative and statistically significant. This indicates that educated females are less involved in household agricultural work as compared to those females who have no formal

education. This may be because educated females are more productive in child care activities as compared to the less educated females. That is educated females can well perform in better upbringing of children. Therefore, they may be less likely to perform household agriculture work. The law of comparative advantage is applicable here. The results show that females having higher education level are less likely to participate in household agricultural work by 18 percentage points. In addition, educated females may be more productive in labor market work due to higher human capital investment. Therefore, they may decide to join the formal labor market where they may be rewarded at higher rates.

The coefficient of marital status indicates that probability of married females to do the household agricultural work is lower as compared to those of unmarried females. The study by Gbemisola and Ayo (2014) also provide similar results. The result is found statistically insignificant. It has been found that married females bear more responsibilities of housework and child work, which restraint them from bearing additional work burden in form of doing household agricultural work. However, unmarried females may bear relatively lower burden of other household and child chores and may be involved more in household agricultural work. The other effect may be that married females participate more in household agricultural work. Agricultural activities are mainly performed outside the household domain. Since, married females have prestigious social status and are therefore, more likely to participate in agricultural work outside the household domain. So, the second effect may be positive. However, the overall effect may be neutral but negative.

The estimation results indicate that the value of coefficient of number of small children is positive as well as statistically significant. This means that presence of younger children in the family raises the probability of participation of females in the household agricultural work. This may be because presence of small children increases the household consumption expenditures. Therefore, the females have to participate more in the agricultural activities performed by household members to fulfill the household demand for agricultural products.

It has been observed that females belonging to the larger household size and joint family setup participate less in the household agricultural work. This may be due to the fact that the presence of other family members in larger household size and joint families share the females'

burden of household agricultural activities in contrary to females belonging to the small and nuclear families.

As far as the residential characteristics are concerned, the coefficients of all the categories are positive as well as statistically significant at 1 percent level of significance. This reveals that females from Sindh, KPK, and Baluchistan are more likely to get involved in the informal unpaid household agricultural work in contrary to females from the Punjab. This may be because working environment of Punjab is more favorable for formal paid work than in other provinces. Since, economic activities are larger in Punjab, females have higher access to formal paid market work here. Therefore females from Punjab may prefer to perform more paid labor market activities as compared to do unpaid household agricultural work.

Table 6.5. Results of Females' Participation Decision to Household Agricultural Work

Logit Model			
Explanatory Variables	**Coefficients**	**Z-values**	**Marginal Effects**
Intercept	-2.242***	-18.24	
Age	0.012*	1.75	0.002**
Age^2_f	-0.000**	-2.04	-0.000**
Edup_f	-0.446***	-10.42	-0.064***
Edumi_f	-1.021***	-13.74	-0.122***
Edum_f	-1.367***	-18.64	-0.151***
Edui_f	-1.959***	-14.66	-0.174***
Eduh_f	-2.229***	-13.41	-0.182***
Married_f	-0.047	-0.84	-0.008
SC	0.038***	2.71	0.006***
HHS	-0.014**	-3.00	-0.002***
JOINT	-0.078**	-2.21	-0.012**
Sindh	1.665***	38.00	0.328***
KPK	1.507***	35.04	0.285***
Baluchistan	0.842***	16.74	0.157***
Loglikelihood	-15244.151		
Pseudo-R-square	0.128		
Sample	52748		

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

6.2.3.2. Results of Hours of Time allocation to Household Agricultural Work Function

The estimates of the Tobit and OLS for time allocation to household agricultural work are presented in Table 6.6. Almost all the explanatory variables show appropriate signs and level of significance. In addition, the value of R^2 is quite reasonable. This shows that explanatory variables play an essential part in explaining the behavior of dependent variable. The magnitude of coefficient of intercept is larger and significant. This shows that there may be other variables that are omitted from the model but may reasonably impact the dependent variable.

According to the estimates, age is positively and age square is negatively related with female's time allocation to household agricultural activities. Both of these variables are found to be statistically significant. This shows that a quadratic relationship exists between allocation of time to the household agricultural work and age of the females.

As far education is concerned, the coefficients of all educational dummies are negative. This indicates that educated females allocate lesser number of hours per week to the informal unpaid household agricultural work (Gbemisola & Ayo, 2014; Rathnayaka & Weerahewa, 2015). It is found that educated females allocate more time to childcare activities as compared to uneducated females. However, they are less likely to contribute to informal household agriculture activities. This may be because educated females consider these activities as inferior. Therefore, they are reluctant to perform these activities. Instead, they may prefer to allocate more of their time to the formal labor market work, where they can be hired at better wage rates.

Empirical result for marital status indicates that married females allocate less number of hours per week to the household agricultural work as compared to the unmarried females. A study by Gbemisola and Ayo (2014) found similar results for the relation of marital status to the allocation of time to household agricultural activities by females. But the result is found to be statistically insignificant. There may be two effects resulting from this. One effect may be that married females allocate lesser time to the household agricultural activities as they bear more burden of other household chores like housework and child work. Housework and child work are more time intensive commodities as compared to the household agricultural work. The other effect may be that agricultural activities are mainly performed outside the household domain. Since, married females have stable social status, they are more likely to allocate greater number of hours per week to these activities outside the household domain as compared to the unmarried females.

These two effects may cancel out each other and can result into neutral behavior of this variable. Thus, the overall effect may be negative but insignificant.

The coefficient of number of small children is found to be positive and statistically significant (Rathnayaka & Weerahewa, 2015). This implies that presence of small children in the family raises the household demand for agricultural products. This may be because small children increase the household consumption expenditures. Therefore, females have to allocate more time to the agricultural activities in order to fulfill the household demand for agricultural products.

Females from larger household allocate lesser number of hours per week to the household agricultural work as compared to those belonging to nuclear family system. However, the result is found to be statistically insignificant. One effect of this may be that females allocate lesser number of hours per week to the household agricultural work because other family members present in larger families share the females' burden of agricultural activities. The other effect of this may be that females belonging to larger families may bear more burden of household agricultural work to fulfill larger household need of agricultural products. The overall effect may be negative but insignificant.

Similarly, the coefficient of joint families is found negative and significant. This shows that females from joint household size allocate less time to the household agricultural work due to presence of other members in the family who share household agricultural burden of females.

The coefficients of all the residential categories are positive as well as statistically significant at 1 percent level of significance. Females from Sindh and Baluchistan allocate about more than 1 hour per week on the household agricultural work as compared to females from Punjab. Females from KPK spend about 2 hours in a week more on the household agricultural work in contrary to females from Punjab. This may be because working environment of Punjab is more favorable for paid labor market work than in other provinces. Since, economic activities are larger in Punjab, females have higher access to paid market work here. They are also rewarded at higher rates for their work. Therefore, females from Punjab may prefer to allocate more of their time to paid market work in contrary to the informal unpaid household agricultural activities.

Table 6.6. Results of Weekly Hours of Time Allocation to Household Agricultural Work for Females

	Tobit Model		**OLS Model**	
Explanatory variables	**Coefficients**	**t-values**	**Coefficients**	**t-values**
Intercept	7.281***	14.56	7.296***	14.61
Age_f	0.145***	4.38	0.145***	4.40
Age ^{2}_f	-0.001***	-2.83	-0.001***	-2.86
Edup_f	-0.511	-1.20	-0.513	-1.21
Edumi_f	-0.321	-0.95	-0.322	-0.95
Edum_f	-0.689**	-2.02	-0.672**	-1.98
Edui_f	-1.617***	-2.53	-1.580***	-2.48
Eduh_f	-1.219**	-2.10	-1.228**	-2.09
Married_f	-0.370	-1.64	-0.373	-1.63
SC	0.091**	2.04	0.091**	2.01
HHS	-0.026	-1.40	-0.027	-1.43
JOINT	-0.238*	-1.68	-0.240*	-1.67
Sindh	1.476***	7.61	1.494***	7.72
KPK	2.224***	11.66	2.236***	11.74
Baluchistan	1.554***	6.79	1.576***	6.90
Loglikelihood	-23316.095			
R-squared	0.180		0.195	
Sample	11866			

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

6.3. Conclusion

The analysis of determinants of the non-market work shows that there are number of socioeconomic and demographic factors that are responsible for determining the participation decision and time allocation to the non-market work. Age of females is found to increase the probability of participation decision and time allocation to housework, child work, and household agricultural work but at a diminishing rate. This confirms the fact that females participate and allocate more hours on non-market activities during middle years of life as compared to the early and older years of their lives.

A striking difference can be seen in case of education variable. Whereas, on one side, this variable has negative effect on housework and household agricultural work, on the other side, it turns to have a positive relation with the child work equation. It may be due to the fact that females, especially mothers cannot substitute their time on child work with that of any other non-market activity. The result of education suggests that highly educated females possess a higher taste for educating, learning, and caring activities of their children and are perhaps efficient in childcare activities as compared to the no or less educated females.

The effect of marital status reveals that married females allocate greater number of hours to both the housework and child work as compared to the unmarried females. Because responsibilities of childcare and housework is more on the shoulders of married females as compared to the unmarried counterparts. Presence of younger children (0-5) years increases the amount of time of females allocated to the non-market activities.

Coming towards the joint family system, it is observed that it has negative effect with time allocation to the housework and household agricultural activities. It may be inferred that other members in the larger household size shares and take responsibility of these non-market activities and consequently females allocate fewer hours per week. However, it has positive impact on the time allocation to the child work.

As far the provincial dummies are concerned, females from Sindh, KPK, and Baluchistan allocate greater number of hours to the housework, child work and household agricultural work compared to the Punjab.

CHAPTER 7

CONCLUSION

7.1. Conclusion

This study presents the analysis of the determinants of time allocation decision and number of hours allocated to labor market both by males and females in Pakistan. Another important contribution of this study is the analysis of the determinants of time allocation decision and number of weekly hours allocated to unpaid non-market work by females. The unpaid non-market work is divided into three main categories. That is, housework, child work and household agricultural work. The sample of labor market and non-market work is obtained from Pakistan *Labor Force Survey (2017-2018).* In case of labor market work, our sample consists of males and females living in the four provinces of Pakistan. However, our sample consists of only females in case of non-market work due to unavailability of required data on males. Probit and logit estimation techniques are used to estimate the time allocation decision functions. OLS and tobit estimation techniques are used for the estimation of number of hours in a week assigned to the labor market and non-market work.

This study finds out that there are many significant socio-economic and demographic factors that influence the time allocation decision and number of weekly hours allocated to the labor market work. According to the study, age has a positive and age square has a negative influence on the participation decision and time allocation to the labor market work both for males and females.

It is observed that both the educated males and females allocate lesser number of hours in a week to the labor market in contrary to their counterparts with no formal level of education. Time allocation to the labor market work increases with each unit increase in the wage rate of both males and females.

Married males as well as females have a higher probability of participation in the labor market work. They work longer hours per week in the labor market in contrary to their unmarried counterparts.

The nature of occupation also influences time allocation behavior of males and females. It has been observed that both males and females belonging to different occupational categories (professional, associate professional and agricultural and operational categories) allocate relatively fewer numbers of hours in a week to the labor market work in contrary to those belonging to elementary occupation.

Due to the increased financial burden, males from a joint family system tend to allocate a greater amount of hours in a week to the labor market. However, females from the joint family setup tend to allocate relatively lesser number of hours in a week to the labor market. Both males and females from Sindh, KPK, and Baluchistan mainly exhibit relatively lower probability of participation and allocate lesser number of hours in a given week to the labor market as compared to males and females from Punjab.

As far non-market working behavior is concerned, females' participation and allocation of number of hours to these non-market activities have an inverted U-shaped relation with the years of age. Educated females work relatively fewer hours per week on the housework and household agricultural work in contrary to females with no formal level of education. However, educated females work longer hours for the child care as compared to the females with no formal education. Married females allocate more hours per week to the housework and child work as compared to their unmarried counterparts.

Presence of younger children in a family raises the amount of time of females allocated to the unpaid non-market work. Females belonging to joint family system allocate relatively lesser hours in a week to the housework and household agricultural work due to presence of helping hands in the family. However, potential females in joint families show positive relation with time allocation to child work.

It is observed that females from Sindh, KPK, and Baluchistan allocate greater number of hours per week to the housework, child work, and household agricultural work as compared to the females from Punjab.

7.2. Policy Implications and Recommendations

The response of males and females labor force to changes in the socioeconomic and demographic factors is of particular importance to the policy makers. Following policy implications are suggested on the base of findings of the thesis.

1. It has been observed that the rate of males' and females' labor market participation is lower during the younger and older years of life. The major reasons are the lack of required education, experience, and skills at the younger years of life. Therefore, such programs that give proper training and develop the skills of the young males and females should be formulated and established at the large scale in our country. The labor market participation of older males and females can be encouraged by providing benefits such as annual increments, social security, and pensions.
2. It has been observed in our study that the educated males and females have lower labor market participation in contrary to those having no informal education. This is so because most of the males and females are either working as a low paid jobs or unpaid helpers. Generally, major factors that are responsible for this low rate of participation in economic activities are lack of competitiveness and low level of human capital. Therefore, skill development programs such as skilled education and vocational training play an important role in compensating the lack of skills and raise the marginal returns for both males and females. Moreover, there is a need to address the issues of relevance and practical application of education in Pakistan. For this purpose, proper association should be established between education institutions and the needs and requirements of the job industry. Along with this, the government should formulate policies and programs to promote and provide attractive employment opportunities in order to encourage the participation of educated males and females to the labor market.
3. Since, the major portion of our labor force possesses the informal education so there is a need from the government side to pay special attention on the development of this sector. This can be done by ensuring the availability of better advanced technical and vocational institutions that will further enhance the efficiency and productivity of males and females.

4. Willingness of females to work or seek employment is considerably affected by the policies that help them in reconciling work inside or outside the domain of household. This can be done through establishment and provision of public child care centers, child care allowances, longer maternity leaves, and greater flexibility in work arrangements. All such steps will results into increased participation of females to the labor market.
5. The government should have to enforce the legal rights and provide protection to females against the discriminatory practices in the labor market. General practice that is observed in Pakistan is that employment laws are not applied on the informal workers. Thus, depriving the informal workers from any protection that is provided by the legal framework of our country. Therefore, it is recommended that informal workers especially females because of their vulnerability must be given the required legal protection by the employers that are enforced by the country.
6. The amount of time that the females spend on home production i.e., housework, child work, and household agricultural work is a significant resource at household and societal level. It is the time to recognize the value of the time that females spend in making home heaven not only at the household, societal, but also at the socio-economic levels. At household level, the efforts of females must be appreciated and accepted by all members of the family. A common behavior prevalent in our society is that only females are assumed to be responsible to do the household chores. Whereas male members are considered as dominating part of the society who are always reluctant to perform in household economy. At the societal level, media, different civil society organizations and most importantly educational institutions can create awareness and educate males to recognize the worth of females work as well as to participate equally in doing the unpaid household chores (Bose & Panda, 2020). There is a need to device efficient educational programs to create awareness among male members of the society regarding recognition of importance of their participation in performing household work. This could also increase the efficiency of time allocation of both males and females both for market and home production.

7.3. Relationship with Community Development

Males' and females' labor market work is an important driver of community development of our country. Since, higher economic growth and development cannot be sustained without the presence of a competitive labor force. That is why, one of the important goals of Sustainable Development Goals (SDGs) is to encourage constant economic growth through provision of full and productive employment opportunities. Access of potential labor force towards employment opportunities lead towards the sustainable development and growth of the country. Higher involvement and allocation of their time to the labor market work not only raise the level of national production, but also increase the level of family income and consumption, ensuring the self-esteem and decreasing income inequalities. Consequently, the overall level of well-being of the society can be improved (Ustababs et al., 2020).

It is the immediate need of the time for Pakistan to take important steps to increase the participation and allocation of their time to the economic activities for males and especially for females. The empirical results illustrates that educated females have a relatively lower level of participation and time allocation to the labor market work as compared to uneducated females. One reason of this may be the lack of appropriate employment opportunities and secure working environment for the educated females. Therefore, the government of our country has to provide secure working environment and a number of employment opportunities according to the needs and requirements of educated labor force.

As far the non-market work is concerned, it also plays an imperative part in the community development of our country as it plays a critical role in the production of household goods and services. Consequently, it raises the well-being of household members. At the macro level, these unpaid household activities raise the well-being of the people in the country by saving financial resources. Recognizing the value of unpaid non-market work, sustainable development goal 5.4 (SDG 5.4) is recently included in the list of SDGs through provision of public services and social security, development of infrastructure, and sharing of responsibility of unpaid domestic work within the household.

Unpaid non-market work is a source of provision of number of different services such as family care and basic public services. For example, females in our households take care of sick,

disabled, and old people and also provide nutrition, education and healthcare to the children. All of these unpaid household services contribute to a well-functioning and healthy society in the form of human capital formation and tend to reduce the burden of our government (Singh & Pattanailk, 2021). These non-market activities also fill the infrastructural gaps. For instance, number of household agricultural activities such as fetching of drinking water and collecting fire woods especially from distant places. Thus, we can say that it subsidizes our government through provisioning households. It also plays important role in taking care of the depreciation of working members of the household through provision of basic comfort at home. Thus, enabling them to go back to work every day. Therefore, we can say that females' involvement in unpaid domestic chores subsidizes the market and also plays imperative role in reducing the burden of the state (Hirway, 2015).

7.4. Study Limitations and Future Research

1. One limitation of our study is that it does not take into account of the effect of cultural factors on the market work and as well as on the non-market work. It is recommended that the effect of culture related variables on the males' and females' participation and time allocation to the labor market and non-market work should also be investigated along with other socioeconomic and demographic variables.
2. Second, major limitation of our study is that it does not scrutinize the determinants of male's participation and allocation of their time to the non-market work. That is data related to non-market work for males is not available. *LFS (2017-2018)* lacks data on the male's participation and time allocation to the non-market work. This study focus on female's time allocation behavior to unpaid non-market work. However, male's time allocation to unpaid non-market activities is required to be focused. This will allow estimation of determinants of male's participation decision and time allocation to home production in future.
3. In addition, behavior of both males as well as females regarding the choices of different occupation should be analyzed. That is, the subsequent studies can focus the reasons of choosing among different occupation by males as well as females.
4. Last but not the least limitation of our study is that it does not examine the determinants of paid non-market work. Regarding this, future research should be done addressing the

determinants of paid and unpaid non-market work, which provides valuable comparative analysis of the determinants of paid and unpaid non-market work, depending on the availability of data.

References

Addabbo, T., Caiumi, A., & Maccagnan, A. (2012). The Allocation of Time within Italian Couples: Exploring its Unequal Gender Distribution and the Effect of Childcare Services. *Annals of Economics and Statistics*(105/106), 209-227. doi:10.2307/23646462

Adeyonu, A., & Oni, O. (2014). Determinants of rural farming households' time allocation: A gender perspective. *Journal of Agricultural Economics and Development Vol, 3*(7), 107-119.

Aguiar, M., & Hurst, E. (2009). A summary of trends in American time allocation: 1965–2005. *Social Indicators Research, 93*(1), 57-64.

Alderman, H., & Chishti, S. (1991). Simultaneous determination of household and market-oriented activities of women in rural Pakistan. *Research in population economics, 7*, 245.

Altuzarra, A., Gálvez-Gálvez, C., & González-Flores, A. (2020). Do Spanish Dual-Earner Couples Share Unpaid Work Equally? *Social Indicators Research*, 1-33.

Álvarez, B., & Miles, D. (2003). Gender effect on housework allocation: Evidence from Spanish two-earner couples. *Journal of Population Economics, 16*(2), 227-242.

Aly, H. Y., & Al-Quisi, I. (1996). Determinants of Women's Labour Force Participation in Kuwait: A Logit Analysis. *Middle East Business and Economic Review, 8*, 1-9.

Amarante, V., & Rossel, C. (2018). Unfolding patterns of unpaid household work in Latin America. *Feminist Economics, 24*(1), 1-34.

Andlib, Z., & Khan, A. H. (2018). Low Female Labor Force Participation in Pakistan: Causes and Factors. *Global Social Sciences Review, 3*(3), 237-264.

Antonakis, J., Bendahan, S., Jacquart, P., & Lalive, R. (2014). Causality and endogeneity: Problems and solutions. *The Oxford handbook of leadership and organizations*, *1*, 93-117.

Anxo, D., & Carlin, P. S. (2004). Intra-family time allocation to housework: French evidence.

Aronsson, T., Daunfeldt, S.-O., & Wikström, M. (2001). Estimating intrahousehold allocation in a collective model with household production. *Journal of Population Economics, 14*(4), 569-584.

Arshad, Z., Khanum, A., Ali, A., Saeed, T. J. S. f. A. M., Research, & Health Bridge: Islamabad, P. (2008). The economic contribution of Pakistani women through their unpaid labour.

Asteriou, D., & Hall, S. G. (2015). *Applied econometrics*: Macmillan International Higher Education.

Awan, M. (2011). Female Labour Force Participation in Pakistan: A case of Punjab. *Journal of Social and Development Sciences, 2*(30), 104-110.

Azid, T., Aslam, M., & Chaudhary, M. O. (2001). Poverty, female labour force participation, and cottage industry: a case study of cloth embroidery in rural Multan. *The Pakistan Development Review, 40*(4), 1105-1118.

Bank, W. (2019). World Bank Indicators.

Bascle, G. J. S. o. (2008). Controlling for endogeneity with instrumental variables in strategic management research. *6*(3), 285-327.

Basmann, R. L. J. J. o. t. A. S. A. (1960). On finite sample distributions of generalized classical linear identifiability test statistics. *55*(292), 650-659.

Batool, S. A., Tabassum, A., & Saghir, S. (2019). Dynamics of Female Labor Force Participation in Pakistan. *Pakistan Journal of Social Sciences (PJSS), 39*(3), 751-762.

Becker, G. S. (1965). A Theory of the Allocation of Time. *The Economic Journal, 75*(299), 493-517.

Behrman, J. R., & Wolfe, B. L. (1984). Labor force participation and earnings determinants for women in the special conditions of developing countries. *Journal of development Economics, 15*(1-3), 259-288.

Bergmann, B. (1995). Becker's theory of the family: Preposterous conclusions. *Feminist Economics, 1*(1), 141-150.

Bernardo, C., Paleti, R., Hoklas, M., & Bhat, C. (2015). An empirical investigation into the time-use and activity patterns of dual-earner couples with and without young children. *Transportation Research Part A: Policy and Practice, 76*, 71-91.

Bianchi, S. M., Milkie, M. A., Sayer, L. C., & Robinson, J. P. (2000). Is anyone doing the housework? Trends in the gender division of household labor. *Social Forces, 79*(1), 191-228.

Bianchi, S. M., Sayer, L. C., Milkie, M. A., & Robinson, J. P. (2012). Housework: Who did, does or will do it, and how much does it matter? *Social Forces, 91*(1), 55-63.

Bloemen, H. G., & Stancanelli, E. G. (2010). How do partners allocate time: an empirical analysis of wages and time uses.

Blood Jr, R. O., & Wolfe, D. M. (1960). Husbands and wives: the dynamics of married living.

Bonke, J., & McIntosh, J. (2005). Household time allocation–Theoretical and empirical results from Denmark. *Electronic International Journal of Time Use Research, 2*(1), 1-12.

Bose, M., & Panda, S. M. Women's Unpaid Work Through the Eyes of Men in Odisha, India.

Bose, M., & Panda, S. M. (2020). Women's Unpaid Work Through the Eyes of Men in Odisha, India. *GEDRAG & OGANISATIE REVIEW, 33*(02), 595-610.

Bowen, W. G., & Finegan, A. T. (1969). economics of labor force participation.

Bortolotti, R. (2018). Tutorial K-data prep 2-2: dummy coding category variables A2-Nisbet, Robert. *Handbook of statistical analysis and adata mining applications, 2nd edn. Academic press, Boston*, 497-514.

Bruins, M. (2017). Women's economic opportunities and the intra-household production of child human capital. *Labour Economics, 44*, 122-132. doi:https://doi.org/10.1016/j.labeco.2016.12.007

Cain, G. G. (1966). Married Women in the Labor Force: An Economic Analysis: University of Chicago Press.

Chatterjee, E., Desai, S., & Vanneman, R. J. D. R. (2018). Indian Paradox: Rising Education, Declining Womens'employment. *38*, 855.

Che, G. N., & Sundjo, F. (2018). Determinants of female labour force participation in Cameroon. *International Journal of Applied Economics, Finance and Accounting, 3*(2), 88-103.

Cheema, A. R., Firdous, S., & Ahmad, T. (2021). Estimating the Determinants of Female Labor Force Participation in Pakistan.

Chen, J., Shao, X., Murtaza, G., & Zhao, Z. (2014). Factors that influence female labor force supply in China. *Economic Modelling, 37*(4), 485-491.

Chiappori, P.-A. (1988). Rational household labor supply. *Econometrica: Journal of the Econometric Society*, 63-90.

Chishti, S., Lodhi, A., & Rashid, S. (1989). Female Labour Participation Behaviour: A Case Study of Karachi. *Pakistan Journal of Applied Economics, 8*(2), 157-165.

Condran, J. G., & Bode, J. G. (1982). Rashomon, working wives, and family division of labor: Middletown, 1980. *Journal of Marriage and the Family*, 421-426.

Connelly, R., & Kimmel, J. (2009). Spousal influences on parents' non-market time choices. *Review of Economics of the Household, 7*(4), 361-394.

Contreras, D., & Plaza, G. (2010). Cultural factors in women's labor force participation in Chile. *Feminist Economics, 16*(2), 27-46.

Couprie, H. (2002). Intra-household decision-making and labour supply: An estimation on the British Household Panel Survey. Paper presented at the EPIC Workshop, Florence (17 th-21 st of May 2002).

Coverman, S. (1985). Explaining husbands' participation in domestic labor. *The sociological quarterly, 26*(1), 81-97.

Cragg, J. G. (1971). Some statistical models for limited dependent variables with application to the demand for durable goods. *Econometrica (pre-1986), 39*(5), 829.

Craig, L. (2006). Parental education, time in paid work and time with children: an Australian time-diary analysis. *The British journal of sociology, 57*(4), 553-575.

Craig, L. (2017). Gender, Economics, and Unpaid Work.

Craig, L., & Brown, J. E. (2014). Weekend work and leisure time with family and friends: Who misses out?. *Journal of Marriage and Family*, *76*(4), 710-727.

Craig, L., & Mullan, K. (2010). Parenthood, gender and work-family time in the United States, Australia, Italy, France, and Denmark. *Journal of Marriage and Family*, *72*(5), 1344-1361.

Das, K. S., & Mishra, D. K. (2018). Woman and work in rural Assam: pattern and determinants. *Journal of Social and Economic Development*, *20*(2), 213-239.

Daunfeldt, S. O., & Hellström, J. (2007). Intra-household Allocation of Time to Household Production Activities: Evidence from Swedish Household Data. *Labour*, *21*(2), 189-207.

Deding, M., & Lausten, M. (2006). Choosing between his time and her time? Paid and unpaid work of Danish couples. *Electronic International Journal of Time Use Research*, *3*(1), 28-48.

Dildar, Y. J. W. D. (2015). Patriarchal norms, religion, and female labor supply: Evidence from Turkey. *76*, 40-61.

Dong, X.-y., & An, X. (2012). Gender Patterns and Value of Unpaid Work: Findings from China's First Large-scale Time Use Survey: UNRISD Geneva.

Ejaz, M. (2007). Determinants of female labor force participation in Pakistan an empirical analysis of PSLM (2004-05) micro data. *The Lahore Journal of Economics*, *12*(S), 203-235.

Elhorst, J. P. (1998). A note on the linear, logit and probit functional form of the labour force participation rate equation.

Espino, A., Isabella, F., Leites, M., & Machado, A. (2017). Do women have different labor supply behaviors? Evidence based on educational groups in Uruguay. *Feminist Economics*, *23*(4), 143-169.

Evenson, R. E. (1978). Time allocation in rural Philippine households. *American Journal of Agricultural Economics*, *60*(2), 322-330.

Fadayomi, T. O., & Olurinola, I. (2014). Determinants of labour force participation in Nigeria: The influence of household structure. *Journal of Economics and Development Studies*, *2*(2), 169-190.

Faridi, M. Z., & Basit, A. (2010). How do Workers Decide to Work? Evidence from District Bahawalpur. *Pakistan Journal of Social Sciences (PJSS)*, *30*(2).

Faridi, M. Z., & Basit, A. (2011). Factors determining rural labour supply: A micro analysis. *Pakistan Economic and Social Review*, 91-108.

Faridi, M. Z., Chaudhry, I. S., & 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.

Faridi, M. Z., Chaudhry, I. S., & Basit, A. (2009). An Analysis of the Determinants of Male Labor Force Participation and Employment Status in Pakistan: The Case of Bahawalpur District. *Pakistan Journal of Social Sciences (PJSS), 29*(2).

Faridi, M. Z., Malik, S., Ahmad, R. I. J. E. J. o. E., Finance, & Sciences, A. (2010). Impact of Education and Health on Employment in Pakistan: A Case Study. (18).

Faridi, M. Z., Mehmood, K. A., Azam, A., & Bibi, S. (2019). Does Education Affect Women's Employment in Society? Cross Sectional Study in Pakistan. *Pakistan Journal of Social Sciences (PJSS), 39*(1).

Faridi, M. Z., & Rashid, A. (2014). The correlates of educated women's labor force participation in Pakistan: A micro-study. *The Lahore Journal of Economics, 19*(2), 155-184.

Febrianty, F., Nurlina, T., AM, S. T. J. R. J. o. A., & Sciences, S.-E. (2016). The economic value of housework and its contribution to household income. *60*(12).

Field, E., & Vyborny, K. J. M. A. D. B. (2016). Female labor force participation in asia: Pakistan country study.

Fineman, M. (2004). The autonomy myth a theory of dependency.

Finlay, K., & Magnusson, L. M. (2009). Implementing weak-instrument robust tests for a general class of instrumental-variables models. *The Stata Journal*, *9*(3), 398-421.

Folbre, N. (1986). Cleaning house: New perspectives on households and economic development. *Journal of development Economics, 22*(1), 5-40.

Fox, L., Han, W.-J., Ruhm, C., & Waldfogel, J. (2013). Time for children: Trends in the employment patterns of parents, 1967–2009. *Demography, 50*(1), 25-49.

Garcia-Ramon, M. D., & Canoves, G. (1988). The role of women on the family farm: the case of Catalonia. *Sociologia Ruralis, 28*(4), 263-270.

Gillani, D. Q., & Zulfiqar, K. (2018a). An Empirical Analysis of Male Labour Force Participation in District Lahore. *Pakistan Perspectives, 23*(2), 95-107.

Gillani, D. Q., & Zulfiqar, K. (2018b). An Empirical Analysis of Male Labour Force Participation in District Lahore. *Pakistan Perspectives, 23*(2).

Gimenez-Nadal, J. I., & Molina, J. A. (2013). Parents' education as a determinant of educational childcare time. *Journal of Population Economics, 26*(2), 719-749.

Gimenez-Nadal, J. I., & Sevilla, A. (2012). Trends in time allocation: A cross-country analysis. *European Economic Review, 56*(6), 1338-1359. doi:https://doi.org/10.1016/j.euroecorev.2012.02.011

Gitter, R. J. (1982). The determinants of the labor force participation rate of prime age males: A study across communities. *The American Economist, 26*(2), 11-16.

Glick, P. (1999). Simultaneous determination of home work and market work of women in urban West Africa. *Oxford Bulletin of Economics and Statistics, 61*(1), 57-84.

Godwin, D. D. (1991). Spouses' time allocation to household work: A review and critique. *Lifestyles, 12*(3), 253-294.

Gondal, A. H. (2005). Participation Of Married Women In Economic Activities In Rural Punjab. *Bangladesh Journal of Agricultural Economics, 28*(454-2016-36542), 61-71.

Gronau, R. (1976). The allocation of time of Israeli women. *Journal of political economy, 84*(4, Part 2), S201-S220.

Gronau, R. (1977). Leisure, home production, and work--the theory of the allocation of time revisited. *Journal of political economy, 85*(6), 1099-1123.

Grossbard-Shechtman, A. (1984). A theory of allocation of time in markets for labour and marriage. *The Economic Journal, 94*(376), 863-882.

Gujarati, D. N., & Porter, D. C. J. N. Y. M.-H. I. (2009). Basic econometrics (international edition).

Hafeez, A., & Ahmad, E. (2002). Factors determining the labour force participation decision of educated married women in a district of Punjab. *Pakistan Economic and Social Review*, 75-88.

Hallberg, D., & Klevmarken, A. (2003). Time for children: A study of parent's time allocation. *Journal of Population Economics, 16*(2), 205-226.

Hare, D. J. C. E. R. (2016). What accounts for the decline in labor force participation among married women in urban China, 1991–2011? , *38*, 251-266.

Heckman, J. J. (1976). The common structure of statistical models of truncation, sample selection and limited dependent variables and a simple estimator for such models. In *Annals of economic and social measurement, volume 5, number 4* (pp. 475-492).

Heckman, J. J. (1979). Sample Selection Bias as a Specification Error. *Econometrica*, 47(1), 153–61.

Heitmueller, A. (2007). The chicken or the egg?: Endogeneity in labor amrket participation of informal carers in England. *Journal Of Health Economics*, 26(3), 536-559.

Herr, E. (1995). Women, marital status, and work opportunities in 1880 Colorado. *The Journal of Economic History, 55*(2), 339-366.

Hirway, I. J. I. J. o. L. E. (2015). Unpaid work and the economy: linkages and their implications. *58*(1), 1-21.

Hochschild, A., & Machung, A. (2012). The second shift: Working families and the revolution at home: Penguin.

Hosney, S. H. (2016). Factors influencing female labor force participation in Egypt and Germany: A comparative study.

Hou, X. (2010). Challenges for youth employment in Pakistan: are they youth-specific? *The Pakistan Development Review*, 193-212.

Hussain, M., Anwar, S., & Huang, S. (2016). Socioeconomic and demographic factors affecting labor force participation in Pakistan. *Journal of Sustainable Development, 9*(4), 70-79.

Irfan, S. (2011). Modeling wages of females in the UK. *International Journal of Business and Social Science*, *2*(11).

İlkkaracan, İ. J. F. E. (2012). Why so few women in the labor market in Turkey? , *18*(1), 1-37.

Iqbal, S., Ali, H., Yasmin, F., Bint e Ajaz, M. J. R. o. E., Administration, & LAW. (2021). Role of Educational attainment in Married Women's Entry into and Escape from Labor Force in Pakistan. *4*(2), 381-392.

Juhn, C., & Potter, S. J. J. o. E. P. (2006). Changes in labor force participation in the United States. *20*(3), 27-46.

Kabeer, N. (2008). Mainstreaming gender in social protection for the informal economy: Commonwealth Secretariat.

Kalenkoski, C. M., Ribar, D. C., & Stratton, L. S. (2009). The influence of wages on parents' allocations of time to child care and market work in the United Kingdom. *Journal of Population Economics, 22*(2), 399-419.

Kanwal, W., Rizwan Ahmad, H., Arshed, N., & Gulzar, M. (2019). Labor supply and demographics: A case of Pakistan. *Journal of Labor and Society, 22*(2), 491-508.

Kedir, A. M., & Rodgers, P. (2018). Household survey evidence on domestic workers in Ethiopia. *The Service Industries Journal, 38*(11-12), 824-840.

Khadim, Z., & Akram, W. (2013). Female labor force participation in formal sector: An empirical evidence from PSLM (2007-08). *Middle-East Journal of Scientific Research, 14*(11), 1480-1488.

Khan, P. D. H. U., Jan, M. A., & Wajid, A. (2020). Burden of being a Working Woman; An Empirical Investigation into Satisfaction and Happiness of Working Women in a Patriarchal Society. *6*, 18-35. doi:10.5281/zenodo.4395942

Khan, R. E. A., & Khan, T. (2009). Labor force participation of married women in Punjab (Pakistan). *Journal of Economic and Social research, 11*(2), 77.

Khandker, S. R. (1987). Women's time allocation and household nonmarket production in rural Bangladesh. *The Journal of Developing Areas, 22*(1), 85-102.

Khandker, S. R. (1988). Determinants of women's time allocation in rural Bangladesh. *Economic Development and Cultural Change, 37*(1), 111-126.

Kiani, A. Q. (2013). Determinants of Female Labor Force Participation. *ASEAN Marketing Journal*.

Killingsworth, M. R. (1983). *Labor supply*: Cambridge university press Cambridge.

Kimhi, A., & Rapaport, E. (2004). Time allocation between farm and off-farm activities in Israeli farm households. *American Journal of Agricultural Economics*, *86*(3), 716-721.

Klasen, S., & Pieters, J. J. T. W. B. E. R. (2015). What explains the stagnation of female labor force participation in urban India? , *29*(3), 449-478.

Klasen, S. J. T. W. B. R. O. (2019). What explains uneven female labor force participation levels and trends in developing countries? , *34*(2), 161-197.

Kozel, V., & Alderman, H. (1990). Factors determining work participation and labour supply decisions in Pakistan's urban areas. *The Pakistan Development Review*, 1-17.

Kwak, C., & Clayton-Matthews, A. (2002). Multinomial logistic regression. *Nursing research*, *51*(6), 404-410.

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

Lisaniler, F. G., & Bhatti, F. (2005). Determinants of female labour force participation: a study of North Cyprus. *Review of Social, Economic and Business Studies*, *5*(6), 209-226.

Majumder, S., & Dey, S. J. J. o. t. A. S. o. B., Science. (2020). Socio-Economic and Demographic Determinants of Women Participation in Labor Force in Rural Bangladesh. *46*(1), 103-115.

Malathy, R. (1994). Education and women's time allocation to nonmarket work in an urban setting in India. *Economic Development and Cultural Change*, *42*(4), 743-760.

McDonald, J. F., Moffitt, R. A. J. T. r. o. e., & statistics. (1980). The uses of Tobit analysis. 318-321.

Meghir, C., Ioannides, Y., & Pissarides, C. (1989). Female participation and male unemployment duration in Greece: Evidence from the labour force survey. *European Economic Review*, *33*(2-3), 395-406.

Mendola, M., & Carletto, C. (2012). Migration and gender differences in the home labor market: Evidence from Albania. *Labour Economics*, 19(6), 870-880.

Miller, P., & Mulvey, C. (2000). Women's time allocation to child care: Determinants and consequences. *Australian Economic Papers*, *39*(1), 1-24.

Mincer, J. (1962). Labor force participation of married women: A study of labor supply. In *Aspects of labor economics* (pp. 63-105): Princeton University Press.

Miranda, V. (2011). Cooking, caring and volunteering: Unpaid work around the world.

Mueller, E. (1984). The value and allocation of time in rural Botswana. *Journal of development Economics*, *15*(1-3), 329-360.

Nam, S. (1991). Determinants of female labor force participation: A study of Seoul, South Korea, 1970–1980. Paper presented at the Sociological Forum.

Naqvi, Z. F., Shahnaz, L., & Arif, G. (2002). How do women decide to work in Pakistan?[with comments]. *The Pakistan Development Review*, 495-513.

Nazier, H., Ezzat, A. J. T. Q. R. o. E., & Finance. (2021). Gender differences and time allocation: A comparative analysis of Egypt and Tunisia.

Nickols, S. Y., & Metzen, E. J. (1978). Housework time of husband and wife. *Family and Consumer Sciences Research Journal*, *7*(2), 85-97.

Nock, S. L., & Kingston, P. W. (1988). Time with children: The impact of couples' work-time commitments. *Social Forces*, *67*(1), 59-85.

Nwokoye, E., Dimnwobi, S. K., & Ibe, E. J. (2017a). Socio-Economic Determinants of Labour Force Participation Rate in an Era of Gender Mainstreaming in Nigeria: Responses from Afikpo North, Nigeria.

Nwokoye, E., Dimnwobi, S. K., & Ibe, E. J. (2017b). Socio-Economic Determinants of Labour Force Participation Rate in an Era of Gender Mainstreaming in Nigeria: Responses from Afikpo North, Nigeria. *Journal of Economics and Finance*, *2*(9), 31-38.

Pepin, J. R., Sayer, L. C., & Casper, L. M. (2018). Marital status and mothers' time use: Childcare, housework, leisure, and sleep. *Demography*, *55*(1), 107-133.

Rathnayaka, R., & Weerahewa, J. (2015). An analysis of gender differences in intra-household time allocation of rural farm families in Sri Lanka. *Tropical Agricultural Research, 26* (4), 677-683.

Razzak, W. A. (2015). Wage, productivity and unemployment: microeconomics theory and macroeconomics data. *Applied Economics*, *47*(58), 6284-6300.

Reed, M. N. J. D. R. (2020). The labor force participation of Indian women before and after widowhood. *43*, 673-706.

Riddell, W. C., & Song, X. (2011). The impact of education on unemployment incidence and re-employment success: Evidence from the US labour market. *Labour Economics*, *18*(4), 453-463.

Rodman, H. (1967). Marital power in France, Greece, Yugoslavia, and the United States: A cross-national discussion. *Journal of Marriage and the Family*, 320-324.

Sabir, M. (2015). Gender inequality in labour force participation: An empirical investigation. *The Pakistan Development Review*, *54*(4), 551-564.

Sajid, M. R., Maqsood, S., Maqsood, F., & Afzal, I. (2011). Determinants of labor force participation of married women: A case study of district Gujrat. *Academic Research International, 1*(3), 254-264.

Sargan, J. D. J. E. J. o. t. E. S. (1958). The estimation of economic relationships using instrumental variables. 393-415.

Sayer, L. C., Bianchi, S. M., & Robinson, J. P. (2004). Are parents investing less in children? Trends in mothers' and fathers' time with children. *American journal of sociology, 110* (1), 1-43.

Schwab, J. A. (2002). Multinomial logistic regression: Basic relationships and complete problems.

Shah, N. M. (1975). Work Participation of currently married women in Pakistan: Influence of socio-economic and demographic factors. *The Pakistan Development Review, 14* (4), 469-492.

Shaheen, R., Shabir, G., Faridi, M. Z., & Yasmin, F. (2015). Determinants of female employment status in Pakistan: A case of Sahiwal District. *Pakistan Journal of Commerce and Social Sciences (PJCSS), 9*(2), 418-437.

Shaheen, S., Sial, M. H., Awan, M. S. J. J. o. S., & Sciences, D. (2011). Female labor force participation in pakistan: a case of Punjab. *2*(3), 104-110.

Shapiro, D., & Shaw, L. B. (1983). Growth in the labor force attachment of married women: Accounting for changes in the 1970s. *Southern Economic Journal, 50*, 461-473.

Shelton, B. A., & John, D. J. A. r. o. s. (1996). The division of household labor. *22*(1), 299-322.

Shen, K., Yan, P., & Zeng, Y. (2016). Coresidence with elderly parents and female labor supply in China. *Demographic Research, 35*, 645-670.

Short, S. E., Chen, F., Entwisle, B., & Fengying, Z. (2002). Maternal work and child care in China: a multi-method analysis. *Population and Development Review, 28*(1), 31-57.

Siddiquii, R. (2005). Modelling gender dimensions of the impact of economic reforms on time allocation among market, household, and leisure activities in Pakistan. *The Pakistan Development Review, 44*(4II), 615-639.

Singh, P., & Pattanaik, F. (2019). Economic status of women in India: paradox of paid–unpaid work and poverty. *International Journal of Social Economics, 46*(3), 410-428.

Singh, P., & Pattanaik, F. J. P. C. (2020). Unfolding unpaid domestic work in India: women's constraints, choices, and career. *6*(1), 1-13.

Smith R, Blundell R. (1986). An exogeneity test for a simultaneous equation tobit model with an application to labor supply. *Econometrica* , 54, 679-68.

Sousa-Poza, A., Schmid, H., & Widmer, R. (2001). The allocation and value of time assigned to housework and child-care: An analysis for Switzerland. *Journal of Population Economics, 14*(4), 599-618.

South, S. J., & Spitze, G. (1994). Housework in marital and nonmarital households. *American Sociological Review*, 327-347.

Standing, G. (1978). Labor force participation and development.

Statistics, P. B. o. (2018). Labor Force Survey (2017-2018).

Steel, W. F., & Campbell, C. (1982). 11. Women's Employment and Development: A Conceptual Framework Applied to Ghana. *Westview Special Studies on Africa*, 225.

Stefanski, L., & Buzas, J. J. J. o. t. A. S. A. (1995). Instrumental variable estimation in binary regression measurement error models. *90*(430), 541-550.

Stewart, K. G. (2005). *Introduction to applied econometrics*: Thomson Brooks/Cole Belmont, CA.

Stigler, G. J., & Becker, G. S. (1977). De gustibus non est disputandum. *The american economic review, 67*(2), 76-90.

Stock, J. H. (2001). Instrumental Variables in Statistics and Economics. *International Encyclopedia of the Social and Behavioral Sciences*, 7577–7582.

Stock, J. H., Wright, J. H., Yogo, M. J. J. o. B., & Statistics, E. (2002). A survey of weak instruments and weak identification in generalized method of moments. *20*(4), 518-529.

Stock, J. H., & Yogo, M. (2002). Testing for weak instruments in linear IV regression. In: National Bureau of Economic Research Cambridge, Mass., USA.

Stratton, L. S. J. I. W. o. L. (2020). The determinants of housework time.

Sultana, N., Nazli, H., Malik, S. J., & Kazi, S. (1994). Determinants of Female Time Allocation in Selected Districts of Rural Pakistan [with Comments]. *The Pakistan Development Review, 33*(4), 1141-1153.

Tamene, A. H., & Desta, C. G. (2019). Demographic and socioeconomic determinants of time use for household activities: A study in Kolfe Keranyo Sub city, Addis Ababa, Ethiopia. *Ethiopian e-Journal for Research and Innovation Foresight (Ee-JRIF), 7*(1).

Tong, Y., & Chiu, S. W.-k. J. C. S. R. (2017). Women's labor force participation in Hong Kong: 1991–2011. *49*(1), 35-64.

Totouom, A., Mboutchouang, V. D. P., & Kaffo Fotio, H. (2018). The Effects of Education on Labour Force Participation in Cameroon: A Gender Perspective. *African Development Review, 30*(1), 45-55.

Tovo, M. C. (1984). The determinants of female labor force participation: a new model.

Ustabaş, A., & Gülsoy, T. Y. (2020). The relationships between the female labor force participation rate and economic development: a correlation analysis for Turkey. Paper presented at the Proceeding International Conference on Eurasian Economies.

Vaara, M., & Matero, J. (2011). Modeling daily outdoor recreation participation and time-use as a two-stage choice process: a Finnish example. *Leisure sciences*, *33*(4), 269-289.

Verick, S. J. I. W. o. L. (2014). Female labor force participation in developing countries.

Warman, A., Idris, I., & Sentosa, S. U. (2018). Analysis Determinants of Labor Supply for Married Woman in West Sumatra. Paper presented at the First Padang International Conference On

Economics Education, Economics, Business and Management, Accounting and Entrepreneurship (PICEEBA 2018).

Wheeler, C. L., & Arvey, R. D. (1981). Division of household labor in the family. *Family and Consumer Sciences Research Journal, 10*(1), 10-20.

Widarti, D. (1998). Determinants of labour force participation by married women: the case of Jakarta. *Bulletin of Indonesian Economic Studies, 34*(2), 93-120.

Wittenberg, M. (2009). The Intra-Household Allocation of Work and Leisure in South Africa. *Social Indicators Research, 93*(1), 159-164.

Weitzman, M. L. (1989). A theory of wage dispersion and job market segmentation. *The Quarterly Journal of Economics*, *104*(1), 121-137.

Women, U. (2016). Discussion Paper:Unpaid Care And Domestic Work: Issues And Suggestions For Viet Nam. doi:www://vietnam.unwomen.org

Women, U. (2019). Progress of the World's Women 2019-2020: Families in a Changing World.

Wooldridge, J. M. (2002a). Econometric analysis of cross section and panel data (0262232197). Retrieved from Wooldridge, J. M. (2002b). Inverse probability weighted M-estimators for sample selection, attrition, and stratification. *Portuguese Economic Journal, 1*(2), 117-139.

Xu, H. J. C. e. r. (2017). The time use pattern and labour supply of the left behind spouse and children in rural China. *46*, S77-S101.

Yakubu, Y. A. (2010). Factors influencing female labor force participation in South Africa in 2008. *The African Statistical Journal, 11*, 85-104.

Zachorowska-Mazurkiewicz, A. (2016). Gender, unpaid labour and economics. *Folia Oeconomica, 6*(326), 121-131.

Zaheer Khan, M., & Hafeez, A. (2017). Economic activities and unmarried labour. *Economic research-Ekonomska istraživanja, 30*(1), 985-991.

Appendix

Table 1A. Results of Female Labor Force Participation Decision

	Probit Model		
Explanatory Variables	**Coefficients**	**Z-values**	**Marginal Effects**
Intercept	-0.888***	-12.25	
Age	0.051***	11.15	0.014***
Age^2_f	-0.001***	-10.65	-0.000***
Edup_f	-0.416***	-18.04	-0.097***
Edumi_f	-0.814***	-24.56	-0.154***
Edum_f	-0.781***	-25.22	-0.151***
Edui_f	-0.586***	-14.86	-0.120***
Eduh_f	-0.271***	-8.68	-0.080***
Married_f	0.244***	9.01	0.070***
SC	-0.005	-0.60	-0.001
HHS	-0.001	-0.25	-0.000
JOINT	-0.084***	-4.60	-0.023***
Sindh	-0.575***	-28.27	-0.131***
KPK	-0.720***	-35.92	-0.162***
Baluchistan	-1.087***	-38.05	-0.192***
Loglikelihood	-19080.34		
R-squared	0.198		
Sample	74457		

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

Table 2A: Results of Female Labor Force Participation Decision

	LPM Model	
Explanatory Variables	**Coefficients**	**Z-values**
Intercept	-1.201***	-10.12
Age	0.012***	10.52
Age^2_f	-0.000***	-10.09
Edup_f	-0.112***	-15.19
Edumi_f	-0.200***	-22.12
Edum_f	-0.197***	-21.75
Edui_f	-0.165***	-11.69
Eduh_f	-0.099***	-8.82
Married_f	0.064***	9..04
SC	-0.001	-0.22
HHS	-0.001	-0.50
JOINT	-0.024***	-3.91
Sindh	-0.169***	-21.33
KPK	-0.199***	-30.04
Baluchistan	-0.275***	-20.12
R-squared	0.168	
Sample	74457	

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

Table 3A. Results of Weekly Hours of Time Allocation to Labor Market Work for Females

	Tobit Model		**OLS Model**	
Explanatory Variables	**Coefficients**	**t-values**	**Coefficients**	**t-values**
Intercept	33.96***	28.12	33.959***	28.09
Age_f	0.535***	7.33	0.535***	7.32
Age ^{2}_f	-0.007***	-6.76	-0.007***	-6.76
Edup_f	-0.007	-0.05	-0.018	-0.05
Edumi_f	-0.304	-0.49	-0.303	-0.49
Edum_f	-2.349***	-3.67	-2.349***	-3.67
Edui_f	-0.044	1.05	-0.044	0.05
Eduh_f	-0.763	-0.95	-0.767	-0.95
Married_f	1.253***	2.90	1.252***	2.90
LFW	1.382***	5.70	1.383***	5.69
SC	-0.065	-1.03	-0.065	-0.53
HHS	-0.177***	-3.76	-0.177***	-3.76
JOINT	-0.191	-0.67	-0.192	-0.67
Occmp_f	-4.160***	-5.19	-4.15***	-5.19
Occtacs_f	-2.324***	-2.66	-2.324***	-2.65
Occaffcp_f	-9.048***	-24.44	-9.047***	-24.42
Sindh	-4.154***	-12.70	-4.156***	-12.69
KPK	-2.821***	-8.21	-2.821***	-8.21
Baluchistan	-1.738***	-2.89	-1.738***	-2.88
Loglikelihood	-30212.528			
R-squared	0.131		0.150	
Sample	14871			

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

Table 4A. Results of Female Participation Decision to Housework

Probit Model			
Explanatory Variables	**Coefficients**	**Z-values**	**Marginal Effects**
Intercept	1.694***	6.93	
Age	0.071***	4.48	0.001***
Age^2_f	-0.001***	-4.95	-0.000***
Edup_f	-0.08	-0.000	-0.000
Edumi_f	-0.16	-0.001	-0.001
Edum_f	-0.054	-0.50	-0.50
Edui_f	-0.181	-1.39	-1.39
Eduh_f	-0.199	-1.40	-1.40
Married_f	0.011	0.11	0.001
SC	0.034	1.13	0.000
HHS	-0.014	-1.27	-0.000
JOINT	-0.435***	-5.09	-0.001***
Sindh	0.325***	3.21	0.003***
KPK	0.223***	2.88	0.002***
Baluchistan	0.304***	2.50	0.002***
Loglikelihood	-828.98559		
R-squared	0.164		
Sample	52748		

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

Table 5A. Results of Female Participation Decision to Housework

LPM Model		
Explanatory Variables	**Coefficients**	**Z-values**
Intercept	1.163***	5.80
Age	0.001***	5.02
Age^2_f	-0.000***	-5.58
Edup_f	-0.001	-0.14
Edumi_f	-0.001	-0.01
Edum_f	-0.001	-0.46
Edui_f	-0.003	-1.53
Eduh_f	-0.003	-1.38
Married_f	0.001	0.68
SC	0.001	1.23
HHS	-0.002	-1.48
JOINT	-0.004***	-4.61
Sindh	0.040***	3.55
KPK	0.003***	3.12
Baluchistan	0.034***	2.69
R-squared	0.152	
Sample	52748	

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

Table 6A. Results of Female Participation Decision to Child Work

	Probit Model		
Explanatory Variables	**Coefficients**	**Z-values**	**Marginal Effects**
Intercept	-0.991***	-13.90	
Age	0.076***	16.11	0.019***
Age^2_f	-0.001***	-19.07	-0.000***
Edup_f	0.148***	5.62	0.035***
Edumi_f	0.107**	2.97	0.025**
Edum_f	0.186***	5.53	0.043***
Edui_f	0.249***	5.09	0.054***
Eduh_f	0.368***	6.42	0.076***
Married_f	1.071***	35.24	0.344***
SC	0.172***	18.68	0.043***
HHS	0.045***	14.78	0.011***
JOINT	0.212***	9.73	0.052***
Sindh	0.058***	2.35	0.015**
KPK	0.072***	3.04	0.017***
Baluchistan	0.458***	13.86	0.096***
Loglikelihood	-12840.694		
R-squared	0.183		
Sample	52748		

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

Table 7A. Results of Female Participation Decision to Child Work

LPM Model		
Explanatory Variables	**Coefficients**	**Z-values**
Intercept	-0.856***	-10.23
Age	0.022***	18.27
Age^2_f	-0.000***	-21.21
Edup_f	0.034***	5.56
Edumi_f	0.025**	3.04
Edum_f	0.112***	4.23
Edui_f	0.053***	5.03
Eduh_f	0.074***	6.42
Married_f	0.355***	25.68
SC	0.037***	17.86
HHS	0.010***	13.63
JOINT	0.040***	7.98
Sindh	0.013***	2.20
KPK	0.015***	2.74
Baluchistan	0.084***	12.63
R-squared	0.112	
Sample	52748	

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

Table 8A. Results of Female Participation Decision to Household Agricultural Work

	Probit Model		
Explanatory Variables	**Coefficients**	**Z-values**	**Marginal Effects**
Intercept	-1.296***	-17.96	
Age	0.007	1.39	0.002
Age^2_f	-0.000	-1.06	-0.000
Edup_f	-0.265***	-10.75	-0.070***
Edumi_f	-0.576***	-14.48	-0.130***
Edum_f	-0.759***	-19.92	-0.161***
Edui_f	-1.060***	-16.43	-0.186***
Eduh_f	-1.193***	-15.34	-0.194***
Married_f	-0.035***	-1.07	-0.010***
SC	-0.024***	-2.87	-0.007***
HHS	-0.009***	-3.13	-0.003***
JOINT	-0.045**	-2.18	-0.013**
Sindh	0.943**	38.78	0.134***
KPK	0.848***	35.94	0.274***
Baluchistan	0.449**	16.08	0.144***
Loglikelihood	-15245.079		
R-squared	0.128		
Sample	52748		

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

Table 9A. Results of Female Participation Decision to Household Agricultural Work

	LPM Model	
Explanatory Variables	**Coefficients**	**Z-values**
Intercept	-0.105***	-5.16
Age	0.002	1.45
Age^2_f	-0.000	-1.47
Edup_f	-0.085***	-9.45
Edumi_f	-0.146***	-15.60
Edum_f	-0.177***	-20.17
Edui_f	-0.212***	-12.75
Eduh_f	-0.220***	-14.91
Married_f	-0.011***	-1.20
SC	-0.007***	-2.02
HHS	-0.003***	-3.09
JOINT	-0.015**	-2.57
Sindh	0.253**	38.68
KPK	0.214***	34.42
Baluchistan	0.087**	11.57
R-squared	0.123	
Sample	52748	

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

Table 10A. Results of Female Labor Force Participation (10-18 Years) Decision

	Logit Model		
Explanatory Variables	**Coefficients**	**Z-values**	**Marginal Effects**
Intercept	-12.382***	-10.10	
Age	1.507***	8.59	0.061***
Age^2_f	-0.044***	-7.09	-0.002***
Edup_f	-1.860***	-22.80	-0.085***
Edumi_f	-2.813***	-18.48	-0.051***
Edum_f	-2.718***	-14.14	-0.044***
Edui_f	-2.449***	-6.36	-0.039***
Eduh_f	0.205	0.897	0.009
Married_f	-0.347***	-2.46	-0.012***
SC	0.182	4.84	0.007
HHS	-0.053***	-3.74	-0.002***
JOINT	0.025	0.31	0.001
Sindh	-1.765***	-19.00	-0.050***
KPK	-2.047***	-20.24	-0.060***
Baluchistan	-2.482***	-15.52	-0.052***
Loglikelihood	-3173.816		
Pseudo R-squared	0.245		
Sample	27416		

Note: ***, **, * indicates the significance at 1%, 5%, and 10% respectively.

Table 11A: Results of Exogeneity Test

Sargan (score) chi2 (3) = 5.23226 (p = 0.7325)

Basmann chi2 (3) = 5.21977 (p = 0.7338)

Table 12A: Results of Relevancy Test

First-stage regression summary statistics

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	F(2,17744)	Prob > F
edu	0.5095	0.5081	0.4985	77.2160	0.0000

Minimum eigenvalue statistic = 77.2160

Critical Values	# of endogenous regressors:	1
Ho: Instruments are weak	# of excluded instruments:	2

	5%	10%	20%	30%
2SLS relative bias	15.05	11.56	8.57	4.43
	10%	15%	20%	25%
2SLS Size of nominal 5% Wald test	22.88	10.92	9.55	7.22
LIML Size of nominal 5% Wald test	8.72	6.39	4.89	4.66