

**Investigating the Factors Affecting Rural livelihood: Farm and Non-Farm
Sources in Pakistan**



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Dedicated

To loving parents and family, who are everything to me.

Acknowledgement

“All praises for Almighty Allah, who enables us to know about certain unknown things in the universe and helps us to overcome many difficulties.”

“All respect for Holy Prophet Muhammad (PBUH) who clearly mentioned the difference of right and wrong path, to ensure the success in our lives.”

After almighty ALLAH, I want to acknowledge my parents especially mother for this thesis. She believed and supported me at each phase of education from beginning until now. It was her trust that encouraged me to work hard and complete dissertation.

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Abstract

This study develops and estimates the Rural Livelihood Index of rural communities of Pakistan and investigate the factors affecting the livelihood. The DFID defined livelihood in terms of five major components i.e. human, social, natural, physical and financial capital. Each capital is composed of different number of sub-components. The secondary data of each sub-component is retrieved from the IFPRI. The rural districts of three provinces of Pakistan i.e. Punjab, KPK and Sindh are included in the study. The major components are estimated from indicators, which are used in the estimation of rural livelihood index. The mean values of all five components across each districts have been estimated and compared across provinces and across districts within the province. Our empirical findings show that in Punjab, district Bhakkar performs well in terms of rural livelihood followed by Kasur and Bahawal Nagar. In Sindh, Jaccobabad and Dadu districts have greater rural livelihood index followed by Sanghar and Hyderabad. In KPK, the rural people living in district Mansehra are enjoying better living standards as compared to district Nowshera. Across provinces, Punjab has maximum rural livelihood index followed by KPK while Sindh has lower value of livelihood index. The livelihood can be improved by increasing the educational status of rural communities and it can be done by increasing the number of schools at mouza level. The number of healthcare centers and their quality services can play a significant role in improving health status of rural areas. There is a need to establish a connectivity between rural areas and adjacent cities to develop a growing environment for SMEs. The latest farm equipment significantly affects the farm productivity and farm income. The livestock plays an important role in improving livelihood.

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Chapter 1

Introduction

1.1 Background of the study

Agriculture is one of the major sector that contributes significantly in the economy of Pakistan. Its contribution in gross domestic product (GDP) is about 18.9 percent with 42.3 percent absorption of labor force. It is one of the main source of foreign exchange earning that stimulates growth in other sectors. The country's economic growth largely depends on the performance and growth of agricultural sector as the past experiences show that the years of high or low agricultural growth has generally been associated with the periods of high growth of national economy Ali (2005). The government has focused on supporting small and marginalized farmers through provision of small scale innovative technology (GOP, 2017) because they are large in number and has limited excess to these knowledge based technologies. The agricultural productivity depends on land size along with other determinants like intensity of land use and land fertility Fan and Chan-kang (2005). That's why stress is on agricultural policies to increase productivity, reduce food security threats and improve the livelihood of rural communities.

Agriculture sector not only feed the entire population of Pakistan but also provide the raw material to the industrial sector. In this way, the economic condition of rural people depends on the agricultural growth. The income diversification plays an important role in reducing rural poverty Bryceson (1999). Moreover, the landless farmers mostly rely on the industrial sector i.e. non-farm income. The income of the rural household increases as the land ownership, educational level and age of a household head increases Memon et al. (2019).

The livelihood of the farming community largely depends on the economic status of a rural families. Generally, rural families having own land or access to agricultural land enjoy the

better living and well-being as compared to those who don't or live on monthly income Patel et al. (2015). Most studies link the livelihood and satisfaction level with the job but there are some other factors which determine the livelihood. A study by Mahama and Maharjan (2018) concluded that self-employment, aged and married household head are more satisfied than waged employed and female-headed household heads. Since, the livelihood of rural household depends on agriculture sector so their focus remains on increasing the farm income.

In the National Food Security Policy of 2017, agriculture sector is targeted to attain the growth rate of 4% in agricultural sector. This may also leads to achieve the objective of Zero Hunger, Goal 2 of the Sustainable Development Goal (SDG's). As a continuation, Government has designed the National Framework in 2018 to double the agricultural productivity and incomes of small farmers by 2030.

1.2 Significance of the study

According to the Economic Survey of Pakistan 2017-18, about 60 % of Pakistan's population lives in rural areas. The livelihood of rural population largely depends on income from farm and non-farm sources. According to DFID¹ (2000), "A livelihood of a household includes the capabilities, assets and activities required for a means of living. A livelihood is sustainable when it can utilize and recover from stresses and shocks plus it maintain or enhance its capabilities and assets both now and in the future, while not destroying the natural resource base." The key livelihood framework designed by DFID are human capital, social capital, natural capital and physical capital and financial capital. The human capital is explained by the number of household members in household, their age, and education level. The social capital deals with the social interaction of a household within a community or with other communities. The natural

¹ Department For International Development

capital comprises up of the ownership of natural assets like land and animals. The physical capital contains physical assets like equipment, car, house, etc. The financial capital comprises up of all the earning and expenditure of a household.

The human capital index deals with the number of household members, their educational level and health status. The greater number of productive and working household members can help in better living. The educational status has a direct relation with the health, employment and wellbeing of a member and a household Cutler et al. (2015). The higher education in agricultural sector or any other department can create a new opportunities to earn a better living. One of the factor behind the low income and poverty in rural sectors is that these people have a low trend in education. This results in a huge income gap between educated and uneducated. The child of rich family is 1.36 times sharper and smarter than the child of poor who have completed education. This gap increases as the educational level of a child from poor family decline. The gap reaches the 2.35 times at the end of compulsory education and is approximately 2.89 times at the end of non-compulsory education Yang and Qiu (2016). Moreover, education gives awareness about hygiene and other cleaning standards which may prevent household members from being attacked from diseases.

The social capital deals with the interaction of different members of society with each other. The greater number of meetings can help them to share their common problems and to come up with the suitable solution. Most of the rural communities in Pakistan have similar characteristics which result in gaining greater social capital index value because a study shows that income equality and diversity has a negative relation with social capital Paarlberg et al. (2017). Moreover, the number of healthcare centers, schools and colleges can improve the social standards.

The natural, physical and financial components deal with the economic status of the rural household. The farmer receives two types of earning i.e. income from farm sources that comprises of agriculture and related fields and non-farm sources like shop keeping, teaching or any other non-agricultural profession. The farm income is one of the major sub-component of financial capital and it is affected by farm size, availability of resources to purchase inputs timely, crop intensity, quality of labor employed on farm (education can be used as proxy), cropping pattern, excess to irrigation, excess to credit and extension etc. However, farm income can be increased by using high yielding varieties and through crop diversification. The availability and adaptation of these high yielding varieties depends on government policies, investment on research, efficiency of marketing system, education, extension services and access to seed Ghimire et al. (2015). Janvry (2005), argued that farm income increases with an increase of land area. However, other factors including, agricultural inputs, historical and social factors, public and social service provision trends may also influence the rural livelihood Smith et al. (2001). Majority of the resource constraint farmers need financial support to timely purchase inputs like seeds, fertilizers, pesticide and to rent in agricultural equipment like laser leveling and tractor etc. Such productive use of credit may lead to enhance productivity. However, credit is available from formal and informal sources. The access to informal credit is easy but conditions are tough. Sometime farmers are forced to sell their products to the middleman whom they have acquired the credit Pearce (2003). These conditions enforce them to sell their products even at a low price which results in low income. Under such circumstances credit could have negative impact on farm income.

The population is increasing day by day that leads to deplete natural resources. This increasing population pressure has not only amplified the demand for food but has also taken

away the most productive agriculture land, causing food insecurity and damaging livelihood Tiwari and Joshi (2012). The capacity of agriculture to absorb rural employment is declining along with productivity due to low investment in research and development (R&D). Hence agriculture is failing to provide a decent standard of living to rural community, compelling rural community to involve in non-farm earning activities Hossain (2004). The rural families are now exploring different sources of non-farm income along with the farm income for their survival. Income diversification plays a vital role in improving rural livelihood.

In under-developing countries poorly managed agricultural value chains restrict farmer's income from agriculture sector which motivate farmers to divert their human and financial resources toward non-farm activities. This appears that government did not invest in modernizing the agricultural value chains. Investment in non-farm sectors generate higher benefits that lead to expand non-farm sector. However, during the bad times, non-farm sector helps in coping with risk associated with agriculture sector Canagarajah et al. (2001). Major factors that influence the non-farm income are education, proximity to town, village and neighborhood effects. The expansion of non-farm sector attracts the labor from agriculture sector that may lead to increase in wages in agricultural sector. It is observed that contribution of non-farm income in rural livelihood has become dominant and significant. Major factors that influence the non-farm income are family assets, education (proxy for quality of labor), caste, population size and excess to market Shariff and Lanjouw (2004).

The non-farm sector plays an important role in the lives of landless farmers among the rural communities who are fighting against poverty. The poverty level in rural areas is about 30.7% which could be much higher in the absence of employment provided by non-farm sector. The average income of families involved in non-farm economic activities is higher than those

who participate in farm activities only A. de Janvry (2005). The rural sector economy plays an important role in the provision of better farm and non-farm earning opportunities and lead to poverty alleviation in developing countries Ghimire et al. (2015). The trend of migration in search of employment decreases when the rural community find ways to earn better living both from farm and non-farm sources in their vicinity and rural labor can earn higher than the migrants Zhao et al. (1999).

1.3 Research Gap

A large body of literature has explored the determinants of factors affecting livelihood with farm assets and non-farm income in different areas, implying that further study need to provide empirical evidence to decide the impact of different variable, specifically in the environment of Pakistan. Moreover, there are only a few studies which have estimated both effects simultaneously in single study and present study is attempting to fill this gap. Moreover, the rural livelihood index for Pakistan has never been developed which incorporate all the key framework of livelihood i.e. human capital, social, natural, physical and financial capital. The Ghafoor et al. (2010) only estimated the financial capital in one district of Pakistan but the present study includes other four capitals in estimating the livelihood of rural communities of three provinces of Pakistan i.e. Punjab, Sindh and KPK.

1.4 Policy Relevance

The National Food Security Policy was drafted in 2017 with objectives of achieving agricultural growth at the rate of 4% per annum to improve food security and economic development. It focused on developing innovative food system for producing quality food and bridging the yield gaps to ensure farm profitability for sustainability of agriculture sector. It also encourage to harvest untapped potential of high value agriculture in different areas by using rain water harvesting technologies. One of the goal of NFSP is to provide an energy efficient farm equipment, high yielding seed and quality inputs. The major challenges in achieving these goals are less focus on diversity and healthy food, low quality inputs, lack of infrastructure and technologies. Slow rate of diffusion of technological innovations is another major challenge.

National Education Policy 2017 can affect both farm and non-farm income because a literate person can work better than illiterate person and he can quickly grasp the latest innovations. This policy mainly focused on education, growth and self-purification. The main objective of the policy is to increase access to higher education from 1.4 million students to 5 million in the next five years. It focus to produce highly qualified and technically skilled manpower as per demand and requirement. The major challenges towards achieving above goals are commitment gap, organizational gap, coordination and technical gap.

1.5 Objectives of the Study

In the light of the above discussion, objectives of the Study are to:

- I. Estimate and compare the mean value of the livelihood index across provinces.
- II. Quantify the impact of more than ten years of education, non-farm income, number of schools and healthcare centers, animal and crop sold and total farm assets on livelihood index.

Chapter 2

Literature Review

2.1 Agriculture and Livelihood

Agriculture plays a significant role in the livelihood of rural communities. The farm income plays a major role in the lives of rural people. Those families which do not make enough from their farm sources seek earning opportunities in other sectors. The diversification of livelihood plays a significant role in earning of a household. The livelihood diversification Gautam and Andersen (2016) allow the household members to involve in high salaried jobs or profitable business, which results in better well-being. Since, the poverty remain dominant in rural communities of Pakistan, so the opportunities of farm and non-farm income can help the poor people to improve their livelihood. The non-farm income contribute towards the reduction of poverty level in low income agricultural household Hadijah et al. (2012).

The financial side of rural communities depend on income from both sources i.e. farm and non-farm. To achieve the sustainable livelihood, the farmers rely on different livelihood strategies Scoones (1998). These livelihood strategies include non-farm income sources which are derived from other than unskilled labor. On the other hand, those households who do not have access to non-farm activities have to rely on low farm income Barrett et al. (2001).

Mainly, the rural livelihood depends on the income from the farm sources. Rural households have to grow enough from their landholdings that can not only feed their family but give marketable surplus as well. The farm income largely depends on the agricultural production, which can be increased by using the high yielding crop varieties Ghimire et al. (2015). The adaptation of high yielding crop varieties further depends on education, seed access and

extension services. Most of the studies argue that the farm income increases with land area A. de Janvry (2005). The revenue from Farm sources depend on irrigated area, off-farm income, livestock, hired labor and tractor ownership Qasim and Knerr (2013). Due to increase in population and depletion of natural resources, the agriculture sector became highly stressed and vulnerable. It causes reduction in arable land, production and food production plus it has damaged livelihood Tiwari and Joshi (2012).

The low farm income of the rural people are normally due to several reasons as discussed by Malik (1996). One of the main reason is the low landholdings along with the large family size, low literacy rate and female headed houses. The family have to rely on the income from the low farms and their spending on agricultural inputs provide low profit because the agricultural inputs are not only high in prices but are low in quality Ghafoor et al. (2010). The farm income can be increased by increasing the farmer's access to the output market, market information and ensuring their active participation in extension services from production side to marketing side U. I. Ahmed et al. (2016).

Due to the low income from farm sources, the farmers do not have enough money to purchase inputs for the next crop so they have to rely on credit from formal or non-formal lending institutes. Since the small land holders are greater in numbers so, the small land owners have to face problems in accessing the credit. According to the study of Thapa (2012), the farmers having small land holdings normally have low access to the formal credit lending institutes. He divided the small land holders among three categories i.e. lower (Less than 1 acre), middle small land holders (1.01 to 2.5 acres) and upper small land holders (2.51 – 5 acres). His study found that the upper and middle small land holders are less successful in gaining access to credit from formal institute. This leads them to move towards informal institute. In order to gain

access to informal credit, they have to rely on the strict terms and conditions of informal institute. One of these conditions may be that they have to sell their products to a person whom they acquired the credit.

There is an argument that the large farms are more efficient than the smaller ones Khan and Maki (1979) in terms of output per acre and increasing return to scale Khan (1979). But, the small farm owners do not get enough per acre yield from their land and they have to rely on the non-farm earning. One way to increase the per-acre yield is by producing the high valued crops or horticultural crops. The production and sale of high valued items can give maximum amount of profit C.L. Delgado (1999). The small land owners can gain maximum from their land and they can achieve economies of scale as compare to the large land owners if they efficiently use all the resources and input Cornia (1985).

The agriculture and food industry is transforming day by day. The increase in population causes reduction in arable land. The need of hour is to transform the small and medium land into the production of high valued horticultural crops Reardon et al. (2009). The agriculture production can be increased by improving the land management practices or by growing the high value food crops. The sustainable income can be earned by growing those crops in which the area has a comparative advantage Pender and Gebremedhin (2008).

The low income from the farm sources force rural community to rely on the non-farm opportunities to meet their demands. For some small landholders, share of income from non-farm sources is greater than the income earned from the farm sources. The literate persons have more access to the non-farm income sources as compare to illiterate person while those woman who are located far from the urban areas have to reply on the agricultural labor market A. D. E. Janvry and Sadoulet (2001).

Diversification of livelihood plays an important role in rural survival. The diversification in terms of earning sources enable the farmers to handle and make both hands meet in case of any natural disaster or drought. Diverse system is less vulnerable than undiversified ones and they are sustainable over time Ellis and Freeman (2004). It is well-known argument that there is a strong relationship between environmental variables and fertility. The dependence on natural resources increases as the household loses human and social capital through morbidity and mortality. So, it is important to diversify the livelihood by seeking more non-farm opportunities Sherbinin et al. (2008). This diversification of income will raise the living standards of rural people and plays a vital role in poverty reduction Bryceson (2016). A lot of farmers require financing for input of various on farm activities so they may rely on savings from non-farm earning opportunities. There is a study that a poverty would be much higher in the absence of non-farm sources A. de Janvry (2005). There are several factors that can affect the livelihood activates i.e. varieties of historical, environmental and social factors Smith et al. (2001).

Many countries are focusing on the expansion of non-farm sources, so that the farmers can earn a better living. With an increase in population size, more and more people are living on arable land causing in reduction of agricultural land Hossain (2004). This causes the rural community to participate more and more in non-farm activities. In India, rural community is earning a significant amount of income from non-farm sources. The major factors which affect the non-farm income are wealth, population density, education and other regional effects. Income from non-farm sector plays a vital role in serving the risk reduction effects Canagarajah et al. (2001). This non-farm income can be increased by number of ways like provision of technical training to farmers or financing them in their startups. These off-farm income has a direct link with the rural development process i.e. better the off-farm income opportunities, better

will the off-farm income Pérez et al. (2004). These income opportunities will not only improve the wage rate but it will also increase the agricultural productivity by the financing on high yielding inputs. It will prevent the rural labor from migration because rural labor earn much higher than migrants Haggblade et al. (2010).

2.2 Human Capital and Livelihood

The human capital is one of the basic and essential component of livelihood. Many countries are focusing on strengthening their human power with knowledge and skills. Many studies prove that the investment on the early childhood education benefits a lot. A study by Karoly (2016) proves that the investment in the childhood education gives return up to \$ 4 on every dollar spent. Similarly, the child of a rich family is about 1.36 times smarter and intelligent than the poor one who has completed his education. This gap increases as the education level of poor child starts to decline. So, investment on human especially on brain results in improving livelihood standards.

According to the Psacharopoulos and Patrinos (2018), the global rate of return of one extra year of schooling is approximately 9% a year and it is very stable even over decades. The private returns of higher education have increased due to increase in the opportunities of studding abroad. The social return of schooling is also very high at the secondary and higher education levels. The increase in the education level open the new opportunities to earn a better living. There is a great role of education in improving living standards and reducing the income inequality. The secondary schooling has a stronger impact towards income inequality than the primary schooling Abdullah et al. (2015). Alongside the land holding and agricultural assets, the educational level of household members and total years of agricultural experience significantly affects the livelihood a rural household Khatiwada et al. (2017).

Most of the studies found that investing in the education and skill development of human resources can bring a high growth in an economy. The annual rate of return of a firm that hire high-skilled labor is 8.6 % while the firm which hire low-skilled labor in 0.9 % Belo et al. (2017). Therefore, stress has been made on improving the practical based education of people.

Health plays a significant role in the efficiency and productivity of labor. Those rural areas which do not have safe drinking water, poor sanitation facilities, and no or poorly managed healthcare centers have greater number of diseased person. A study by Chaker et al. (2015) concluded that the non-communicable diseases i.e. heart diseases, kidney disease and diabetes have a negative impact on household income and on overall economy. A good health is a key factor behind the productivity of human resources. Alongside health, happiness plays a significant role in the efficiency and productivity. A study by Oswald et al. (2012) says that happiness increases the productivity of people up to 12%.

2.3 Social Capital and Livelihood

The society plays a key role in the livelihood of its members. It is the society which provides an integrative enrolment for its people to earn a better living. There is a direct relation with the household income and the social capital Yuan (2016). A society offering peaceful environment allow its members to earn a better living while a society with greater crime rate has negative impact on the earning of family. The health and educational status of the society members play an important role in the lives of society members. Indeed, the health, religion and unemployment is one of the key factor in the social well-being on a society Puntscher et al. (2015). Therefore, the number of schools and healthcare centers play a significant role in the lives of society members. The collective effort of members in different business, projects and programs can help a lot in reducing poverty and improving the livelihood of all society members.

According to the Khosla and Jena (2019), the society capital in the form of group membership actively participated in different saving schemes can help in reducing poverty and increase in livelihood.

Chapter 3

Data collection procedure and methodology

3.1 Data Source

This study has employed the secondary data from Pakistan Rural Household Panel Survey (PRHPS). It is a secondary data of cross-sectional at household level, which was collected jointly by International Food Policy Research Institute (IFPRI) and Innovative Development Strategies (IDS) in three different rounds as a part of the Pakistan Strategy Support Program (PSSP). The round 1 and 2 were conducted in 2012 and 2013 respectively. This study has used the round 3 (2014) survey data which was conducted in 76 villages in 3 provinces of Pakistan i.e. Punjab, KPK and Sindh. The 1998 census of Pakistan was kept as a base of sampling frame. The household and population data was available at the mouza level. By using the tehsil-level growth rates, the population and the number of households were projected to 2012.

Those urban areas were removed from the sampling frame and all those areas with the projected population greater than 25,000 in 2012 were also removed the sampling frame as they were classified as urban. This sample frame does not include the rural areas of Baluchistan and FATA due to security issues. Moreover, 13 districts of KPK were not included due to same reason. The rest of 11 districts of KPK were part of the sampling frame.

In the sample selection, the multistage stratified sampling technique was used. The proportion of rural households from each province was used to identify the number of districts that would be chosen from that province. The Probability Proportionate to Size (PPS) was used to select district from each province. It ensures that, within a province, districts with more rural households have the greater probability of being selected in the sample.

At the province level, the total number of rural households were selected and then the districts were arranged in random order. The sampling interval was obtained by dividing the total number of households in the province by the total number of districts that was chosen from that province. At the district level, 4 mouzas were chosen with the help of probability systematic selection. It ensures that the smaller populated mouza had the same chances of being selected as higher ones. The PPS would provide a bias sample by selecting populous mouzas and possibly ignoring the smaller ones. The mouza was divided into different number of blocks with same size on map. Each block contained 200 or less households. If there were fewer than 200 households than the whole mouza was considered as a single block. In each mouza, the blocks were randomly selected for enumeration. From each blocks, only 28 households were randomly selected by employing probability systematic selection from the list of households located in block.

Table 1: Pakistan Rural Household Panel Survey Sample

Provinces	Total number of Districts	Number of Mouza / Districts	Number of households / Mouza	Total number of Households in Province
Punjab	12	4	28	1309
Sindh	5	4	28	557
KPK	2	4	28	224
Total	19	76	2090	2090

The 12 districts of Punjab included in the survey were Khanewal, Kasur, Bhakkar, Vehari, Attock, Jhang, DG Khan, Bahawalnagar, Rahim Yar Khan, Multan, Faisalabad and Sargodha. The 5 districts from Sindh were Dadu, Thatta, Sanghar, Hyderabad and Jaccobabad while only 2 districts from KPK were Mansehra and Nowshera.

The total of 2090 households were supposed to be included in the survey but due to some restrictions by local district administrations and household refusal to respond only 1876 households responded.

As the Secondary Data is employed for the study so that the limitations in the data is that we were unable to get data for other rural districts in three provinces of Pakistan.

3.2 Model Specification

The Rural Livelihood Index included in the study comprises of five major components: Human Capital, Social Capital, Natural Capital, Physical Capital and Financial Capital. Each major component is comprised of several indicators. These major components are developed from the key framework of DFID i.e. livelihood comprises of five components including human capital, social capital, natural capital, physical and financial capital and the detail is given in Appendix 1.

The Rural Livelihood Index used in this study has employed a balanced weighted average approach employed by Sullivan (2002) where each indicator of major component contains equal weight. Although major component is comprised of a different number of indicators and each indicator has different units of measurement. This implies that indicator cannot be used as such and therefore, we need to convert each indicator into an index to make it unit less. The equation used for this conversion is adapted from life expectancy index of Human Development Index employed by (Hahn et al., 2009). It is the ratio of difference of actual and minimum value, and the difference of maximum and minimum value as described below:

$$Index_{Sh} = \frac{S_{izh} - S_{izmin}}{S_{izmax} - S_{izmin}} \quad (1)$$

Where S_{izh} is the actual value of i -th indicator of household “h” in district “z”, and S_{izmin} and S_{izmax} are the minimum and maximum values, respectively in district z of i -th indicator.

Then we developed major components by adding the index of each indicator developed above and then divided by the number of indicators represented by (n) in each component. The number of indicators vary in each major components implying that value of “n” vary across major components. In other words, average of indicator’s index has been taken for each household to get one value of each major component for each household. Mathematically it can be written as below in Equation 2.

$$M_h = \sum_{j=1}^n \frac{index_{shj}}{n} \quad (2)$$

Where “j” stands for index of each indicator included in the major component. For example if there are 5 indicators in major component M_h then the value of “j” will vary from 1.....5 and M_h is major component or major index. By using this methodology we estimated the sub-index for human capital (HC_d), social capital (SC_d), natural capital (NC_d), physical capital (PC_d), and financial capital (FC_d). By employing these major components or sub-indexes, the rural livelihood index is developed as expressed in Equation 3.

Which can also be expressed as

$$RLI_h = \frac{n_1HC_d + n_2SC_d + n_3NC_d + n_4PC_d + n_5FC_d}{n_1 + n_2 + n_3 + n_4 + n_5} \quad (3)$$

Where, RLI_h represents the Rural Livelihood Index for household “h” and n_1 stands for the number of indicators of human capital (HC_d) and similarly n_2 for number of indicators in social capital which are the major components of rural livelihood index. In the Equation 3, n_1, n_2, \dots, n_5 are the weights given to each major component which depends on the number of indicators included in the major component. The range of livelihood index varies between 0.001 to 1 and

low value of rural livelihood index indicates poor status of human capital, social, natural, physical and financial capital and vice versa.

The rural livelihood index is further regressed with the number of variables to find out its determinants which will allow us to investigate future effective policy interventions in the study area. By following the study of Ghaffor et al. (2010), the present study employed the linear regression model to investigate the impact of different policy parameters.

Different studies have estimated the determinants of livelihood in different context. Ghafoor et al. (2010) studied the impact of farm and non-farm income on financial capital. Gordoncillo et al. (2018) checked the factors affecting livelihood diversification in Bangladesh. Ayantoye et al. (2017) estimated the impact of family income on livelihood diversification in Nigeria while Porter et al. (2011) checked the impact of education on livelihood of rural communities of Ghana. However, the current study has examined the major factors effecting the rural livelihood of 3 provinces of Pakistan.

$$Y_1 = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \alpha_5 X_5 + \alpha_6 X_6 + \alpha_7 X_7 + \alpha_8 X_8 + \alpha_9 X_9 + \varepsilon$$

Where;

Y_1 = Rural Livelihood Index

X_1 = Percent of household members with more than ten years of education

X_2 = Percent of employed members in household

X_3 = Total number of healthcare centers in mouza

X_4 = Total number of schools in mouza

X_5 = Percentage of land cultivated by the household member from owned land

X_6 = Total worth of a farm assets (Rs. in Lac)

X_7 = Total non-farm income (Rs. in Lac)

X_8 = Net value of animal sold by the household (Rs in Lac/Year)

X_9 = Net value of the crop sold by the household (Rs in Lac/Year)

The impact of independent variables i.e. percentage of household members with more than ten years of education, percent of employed members, total number of healthcare centers and schools, total land cultivated, total non-farm income, net value of animal and crop sold and net worth of farm assets have been estimated on the rural livelihood index. This rural livelihood index has been developed from five major components and the number of indicators mentioned in the Appendix 1. The five major components are human capital, social capital, physical capital, natural capital and financial capital. These major components are further divided into several indicators.

The family size, their age and characteristics does affects their well-being (Biritwum et al., 2013), therefore variation among the percentage of household adult members is invested in the study. The employment opportunities can help in improving living standards (Haggblade et al., 2010), so the percentage of employed person within household can plays a vital role in improving rural livelihood. The education plays an important role in the life of person and it has a significant impact on income Yang and Qiu (2016) as well so, this study also incorporates the percentage of members ever visited to school. The higher education has a significant impact in one's life and it helps in earning a better living so, the percentage of household members with more than ten years of educations is taken as an independent variable in the study.

The social capital on the other hand gives either a productive or unproductive environment to earn a better living in the lives of people. Previous literature argued that the education really matters a lot in the lives of people in improving income and awareness against diseases Cutler et al. (2015) that's why the number of schools have been taken as an independent variable to examine its impact on rural livelihood. In order to earn more, one has to be physically fit Puntcher et al. (2015). To ensure the good health of people, the number of healthcare centers can play an important role in mouza.

The rural areas are mostly considered as poor or less developed, a study by Bhutto and Bazmi (2007) concluded that the greater production can help in achieving better living and reduction in poverty so, percentage of land being cultivated from the owned land is another variable taken from natural capital. It is obvious that the farm income and non-farm income goes hands in hands in most of the rural families. The non-farm income plays a significant role in overall income of a household Shariff and Lanjouw (2004). The income from non-farm sources is also taken as a variable in our study. The earning from livestock sector and farm sector is also investigated in the study and its impact is checked on rural livelihood index.

Chapter 4

Estimations and Results

4.1 Comparison of mean value across provinces

The mean value of rural livelihood index along with other variables are compared across three provinces of Pakistan (i.e. Punjab, Sindh and KPK) and results are reported in Table 2. This comparison is very helpful in finding those indicators which are performing well and the reason behind their high performance.

Table 2: Comparison of Mean Values across three provinces

Variables	Punjab (a)	Sindh (b)	KPK (c)
Rural Livelihood Index	0.348 ^{ab}	0.305 ^{bc}	0.332
Percentage of employment within household	28.13 ^{ac}	26.99 ^{bc}	16.39
Percentage of households members having more than 10 years of education	1.22 ^{abc}	0.78 ^{bc}	0.89
Total number of healthcare centers in mouza	1.44 ^{ab}	2.16 ^{bc}	1.30
Total number of schools in mouza	5.40 ^{abc}	3.89 ^{bc}	4.38
Percentage of land cultivated by the household member from their own land	43.61 ^{abc}	42.17 ^{bc}	43.21
Farm assets worth kept by household	56.39 ^{abc}	19.86 ^{bc}	21.58
Total non-farm earning per year (Rs. In lakh)	1.37 ^{abc}	1.15 ^{bc}	1.89
Percentage of household having animals	76.78 ^{abc}	71.25 ^{bc}	65.87

Percentage of household selling animal products in market	33.33 ^{abc}	21.32 ^{bc}	27
Percentage of household selling agriculture produce in market	35 ^{abc}	56.46 ^{bc}	28.7
Net value of animal sold by the household per year (Rs. In lakh)	0.55 ^{abc}	0.32	0.34
Percentage of contribution of animal sources by the household	14.75 ^{abc}	25.4 ^{bc}	29
Total value of crop sold by a household per year (Rs. In lakh)	3.18 ^{abc}	0.94 ^{bc}	0.83

Note: abc represents Punjab, Sindh, and KPK respectively. Superscript indicated the difference between groups. For example, “ab” in the superscript indicates that the mean value of Punjab is significantly different from Sindh and so on.

Our data is based only on rural areas implying that comparison is across rural areas of three provinces. It should be further noted that areas (villages) consists of more than 25000 population are not included in the data set. The mean value of rural livelihood index of Punjab (0.348) is highest among the provinces while Sindh has the lowest mean value of 0.305. The rural livelihood comprises of five major components and their respective indicators mentioned in Appendix 1. Two indicators from human capital are included to capture the impact of human capital on rural livelihood. These two indicators are percentage of employed members within household and percentage of household members having more than 10 years’ of education. Our descriptive analysis reveals that Punjab has highest percentage of employed person within household followed by Sindh and KPK. The lowest mean value of employed persons within family in KPK indicates that employment opportunities of paid work in the villages of KPK is lowest compared to Sindh and Punjab. Employment opportunities depend on level of development which further depends on availability of infrastructure and investment. Hence, we

can conclude that the villages of KPK are less vibrant than Sindh and Punjab. Sindh and Punjab are somehow close in terms of employment opportunities which include both farm and non-farm activities. It might be that non-farm employment opportunity in Punjab is higher than Sindh but farm employment opportunities are higher in Sindh than Punjab making the total employment closer to each other. Farm employment in the rural areas of Punjab is less compared to Sindh because of adoption of labor saving technology. This hypothesis can also be supported by farm assets which are higher in Punjab compared to Sindh as reported in 7th row of Table 2. The percentage of persons in family having more than 10 years of education is highest in Punjab compared to Sindh and KPK. This supports our earlier finding of high employment in Punjab. This demonstrate that people in the villages of Sindh are involved more in farm related activities while in the villages of Punjab because of having better education status, people are involved more in non-farm related activities. The percentage of household members having more than 10 years of education is high in KPK as compare to Sindh which employs that rural people have higher literacy rate and skills. They utilizes those skills on the high valued jobs that's why the total non-farm earning is high in KPK but their employed percentage at household level is low as compare to Sindh.

The social capital is captured by taking two variables from this indicator i.e. total number of healthcare centers and total number of schools in mouza. The mean value of total number of heathcare centers are higher in Sindh followed by Punjab and KPK. This is surprising to know that Sindh has higher healthcare centers in each mouza but healthcare situation in Sindh is extremely worse compared to Punjab and KPK. It might be that majority of these healthcare centers are not operative practically, reflecting the poor health facilities in the province. Our mean comparison reveals that total numbers of schools are significantly higher in Punjab

compared to Sindh and KPK. This clearly demonstrates that educational opportunities in rural areas of Punjab are significantly better than KPK and Sindh which can be translate into higher level of employment and income. Hence, we can conclude that education can play a significant role in alleviating rural poverty. The natural capital is captured in the study by using one of its indicator i.e. percentage of land cultivated by household. The Punjab has the highest mean value followed by KPK and Sindh. The physical capital is highlighted with the help of one indicator i.e. farm assets worth. The mean of farm assets net worth is significantly high in Punjab and low in Sindh. It is because of reduction in the GST of agricultural/ farm equipment. The demand for tractors and harvesters has increased in Punjab due to reduction in the prices of farm equipment.

The financial capital is captured by using three indicators i.e. total non-farm income, net value of animal sold and net value of crop sold. The mean value of total non-farm income is higher in KPK while lowest in Sindh. This employs that the people of rural areas of KPK rely more on non-farm earning. The mean value of both animal sold and crop sold is higher in Punjab and lowest in KPK as given in 12th row of Table 2. The Punjab government has worked hard on the agriculture sector by providing credits on easy conditions and farm equipment's on lowest price. The income from the animal sources can be increased, if household participate in the market. The 9th row in the Table 2 indicate the percentage of households that have animals and the 10th row indicates those households which participate in the market. The percentage clearly indicate that greater number of households in Punjab are selling their animal products in the market that's why the income from the animal sources is greater in Punjab. The 11th row indicates the families having enough marketable surplus to sell their agricultural output in market. The greater number of Punjab rural families are selling in market that reflects in 14th row of Table 2. Row 13 in Table 2 indicates the total contribution of income from animal sources in

the total farm income, which clearly indicates that the contribution of income from animal sources are very low in total farm income and it needs to be addressed.

4.2 Comparison of rural livelihood components across provinces

The mean value of five major components of livelihood i.e. human capital, natural capital, physical capital and financial capital is given in Table 3. The mean value of each major component is compared across three provinces to pin point the highest and lowest capital. This comparison of rural livelihood components will highlight those areas in which provinces are performing well and the reason behind the higher mean values. It will provide the direction to take proper actions to increase the low performing capital.

Table 3 shows that Punjab has a highest mean value of human capital i.e.0.61 while Sindh has the lowest mean value of human capital. The indicators of human capital are given in Appendix 1, which shows that Punjab is better in human resource. The government of Punjab has worked hard to improve the literacy rate of rural people. The literate person has a greater number of chances for job as compare to illiterate plus the wage rate increases as the number of years of schooling increases. The government of Punjab is also working on the health sectors to improve the health status as well, so that people can work more number of hours to earn a better living.

Table 3: Mean values of index of five major components across three provinces

Rural Livelihood Components	Punjab	Sindh	KPK
Human Capital	0.61	0.44	0.46
Social Capital	0.48	0.41	0.47

Natural Capital	0.44	0.45	0.46
Physical Capital	0.34	0.29	0.38
Financial Capital	0.13	0.11	0.19

KPK has slightly greater mean value of social capital and physical capital as compare to Punjab. The high mean value of social capital shows that the rural communities of KPK has good social interrelation with each other. They are well aware of each other issues and try to solve those issues at a community level. The number of meetings are significantly greater in KPK as compare to Sindh and Punjab. One reason can be having a lot of leisure time that allows people to start conversation with each other and discuss their daily routine issues. The number of schools and the number of healthcare centers are also high and greater number of people are affected by the community programs. Sindh has slightly greatest mean value of natural capital employs that Sindh rural communities cultivate the greater portion of land from their own land and they own slightly large number of both young and adult animals. The income from the crop sold and animal sold given in Table 1 indicates that the Sindh is lowest in both indicators. This employs that Sindh rural communities keep the low valued animals and sell smaller portion of marketable surplus in market. Greater number of rural people of Sindh lives in their own houses and negligible number of people lives on rented homes.

The mean value of index of physical capital is slightly greater in KPK. The detailed description of indicators are given in Appendix 1. It comprises up of net worth of farm assets, net worth of household assets and net worth of house. The slightly greater mean value of index indicates that rural people of KPK either holds greater worth of farm assets or household asset.

Table 2 shows that the net farm worth of KPK households are smaller than Punjab, so they have greater number of high valued household assets. The net worth of their houses seems to be high as compare to Sindh and Punjab.

Punjab and KPK has high and same mean value of index of financial capital. It employs that in both provinces the rural communities are earning well either in farm sector or in non-farm sector. The 8th, 9th and 10th row of Table 2 supports our hypothesis by showing that the KPK rural families are largely depending on non-farm income and have significantly low farm income but Punjab has significantly greater farm income and low non-farm income as compare to KPK. Sindh is performing low in financial capital although they have greater number of employed person as given in Table 2. This low mean value can be due to the low valued jobs because the education level in Sindh is comparatively low and their crops are not sold on greater prices.

4.3 Comparison of rural livelihood components across districts

The mean value of five major components of livelihood i.e. human capital, natural capital, physical capital and financial capital is given in Table 4. It gives an idea about the high and low capital at district level, so that we may find the reasons that why district is performing well and what policy measurements should be taken to uplift other districts. Table 4 captures of mean value of five capital across 12 districts of Punjab Province.

Table 4: Mean values index of five major components across districts of Punjab

Districts of Punjab	Human Capital	Social Capital	Natural Capital	Physical Capital	Financial Capital
Attock	0.70	0.55	0.23	0.33	0.13
Bahawal Nagar	0.56	0.67	0.44	0.33	0.14
Bhakkar	0.79	0.5	0.6	0.4	0.16
D.G. Khan	0.68	0.23	0.36	0.35	0.13
Faisalabad	0.55	0.63	0.39	0.37	0.15
Jhang	0.61	0.54	0.45	0.32	0.13
Kasur	0.65	0.6	0.58	0.34	0.15
Khanewal	0.71	0.23	0.36	0.31	0.11
Multan	0.51	0.55	0.45	0.4	0.1
Rahim Yar Khan	0.5	0.24	0.44	0.34	0.14
Sargodha	0.47	0.5	0.45	0.31	0.12
Vehari	0.62	0.38	0.51	0.33	0.13

Table 4 shows that Bhakkar district has a higher mean value of human capital index (0.79) among all other rural districts. It indicates that the rural families of Bhakkar district has greater number of adult members and they are very hard worker and spend most part of their daily routine on work. Most of the members were enrolled in school but only few of them passed the ten years of education. The mean value of human capital index of rural areas of Sargodha district is very low which indicates that the rural families consist up of either elder family members or children. One of the reason behind the human capital is due to low time spend on productive activities.

Bahawal Nagar district has higher mean value of social capital Index (0.67) employs that the rural areas have greater number of meetings and community development projects have positively affected their lives. The lower value of human capital supports the hypothesis that the rural communities utilizes less time on earning opportunities and spend more time on social activities. The rural areas of Khanewal and D. G. Khan districts has lower mean value of social capital index, indicates that there is no concept of meeting to discuss mouza issues. This is no healthcare centers in the mouza and a few schools are operating poorly. In terms of natural capital, Bhakkar district has higher mean value. The rural communities cultivates the larger portion of their own land and they own greater number of high value young and adult animals. Since, the rural areas of Bhakkar district have high human capital, so they spent most of their time on farm activities. In physical capital, Bhakkar and Multan have similar and higher mean values of 0.4. The rural communities have expensive farm and household assets. They live in the high valued and big houses. In financial capital, Bhakkar and Kasur remains on top of others with the mean value of 0.16. The perfect utilization of human, natural and physical resources is reflected in the financial capital of Bhakkar district. While Kasur district is located close to one

of the biggest and busiest city of Pakistan i.e. Lahore, so the rural communities of Kasur can have better employment opportunity of non-farm income in Lahore. Moreover, they can sell their farm products in the market of Lahore to earn huge profit. Since, these capitals are estimated by taking average of the index value of their respective indicators mentioned in Appendix 1, so their values lies between 0 and 1.

Table 5 captures of mean value of five major components across 5 districts of Sindh province.

Table 5: Mean values of index of five major components across districts of Sindh

Rural Livelihood Index	Dadu	Hyderabad	Jacobabad	Sanghar	Thatta
Human Capital	0.45	0.44	0.44	0.41	0.48
Social Capital	0.5	0.43	0.51	0.44	0.25
Natural Capital	0.45	0.41	0.61	0.38	0.43
Physical Capital	0.34	0.23	0.34	0.29	0.31
Financial Capital	0.16	0.11	0.1	0.14	0.1

In Sindh, Thatta district has a higher mean value of human capital index (0.48) among all other rural area of Sindh province mentioned in Table 5. It shows that the rural areas of Thutta have greater number of adult members in their family and they spend more time on productive activities. Most of them have enrolled in the school and few of them have more than ten years of education. The human resources are greater in Thatta and it can play an important role in the economy of Pakistan once they gain education or market oriented skills. The rural areas of

Sanghar district has low mean value of human capital employs that the rural households have low education and they have very low employment opportunity which cause them to spent their time on non economical activities. Sanghar district has higher mean value of social capital (0.51) employing that rural people have good social interaction with each other. The low mean value of human capital index supports this argument because the people have more time to spend together and they enjoy greater number of meeting on regular bases. The community development program has positively affected their lives but only to some extent. They have greater number of schools which can be seen in human capital. In terms of natural capital, Jaccobabad district has the higher mean value. It indicate that the rural areas of Jaccobabad district are committed to cultivate maximum part of their land and also have young and adult animals. In physical capital, district Dadu and Jaccobabad has a high mean values indicating that they have high value of both farm and household assets and most of rural families live in their own houses. In financial capital, district Dadu has the high mean value of index. This high value indicates that the rural people of district Dadu are capable to purchase expensive farm equipment. These farm equipment helps in gaining more farm income for rural community of district dadu. Thatta and Jaccobabad districts has a low mean value of financial capital, which employs that they have very low employment opportunities. Although they have relatively good mean value of natural capital and human capital but their animal or crop products are not sold on proper market price causing them low earning. Since, these capitals are calculated by taking average of the indexes of respective indicators mentioned in Appendix 1 and their values lies between 0 and 1.

Table 6 captures of mean value of five major components across 2 districts of KPK province.

Table 6: Mean values of five major components across districts of KPK

Rural Livelihood Index	Mansehra	Nowshera
Human Capital	0.46	0.45
Social Capital	0.47	0.38
Natural Capital	0.46	0.49
Physical Capital	0.37	0.32
Financial Capital	0.14	0.13

Mansehra district has a higher mean values in human capital, social capital, physical capital and financial capital. This reveals that the rural people of Mansehra have greater number of adult household members and they are involved in either farm or non-farm earning. The rural people of Mansehra spend more time on meeting each other. The Nowshera district has higher mean value of natural capital. This employs that the rural people of Nowshera district focuses on cultivating the maximum part of their land. Most of the families may have the young and adult animals as well. These capitals are estimated by taking average of the index values of their respective index given in Appendix 1 and their values lies between 0 and 1.

4.4 Results and discussion

The results of regression analysis by keeping the rural livelihood as dependent variable while percentage of household members with more than ten years of education, percentage of employed member of a household, total number of healthcare centers and schools in mouza, worth of farm assets, non-farm income, income from animal and crop selling as independent variables are given below.

Table 7: Results of OLS

Variables	Co-efficient	Standard Error
Percentage of members with ten years of education	0.0035***	0.0006
Percentage of employed person	0.0004***	0.0001
Total number of healthcare centers in mouza	0.0026***	0.0006
Total number of schools in mouza	0.0029***	0.001
Percentage of land cultivated from the owned land	0.0006***	0.000
Total worth of farm assets	0.0001***	0.0000
Non-farm income	0.0201***	0.0019
Net value to animal sold	0.0394***	0.0103
Net value of crop sold	0.013***	0.002

Note: The stars on the Co-efficient indicates the level of significance of the variable. Three stars indicates the higher level of significance and vice versa.

The coefficient of percentage of family members with more than 10 years of education demonstrates that an increase in one percent of family members with higher education

contributes 0.0035 in rural livelihood index. Our results are in line with the earlier studies exploring the impact of education on income Psacharopoulos et al. (2018). Similarly, our empirical results revealed that one percent increases in the percentage of family employment improves the livelihood by 0.0004. The existing literature also provides empirical evidence that education is important variable that contributes to improve the living standard by creating more employment opportunities Etuk et al. (2018), especially in under developing areas where farm income is limited and not enough to maintain the lifestyle. Therefore, non-farm income plays a significant role in the lives of rural communities A. de Janvry (2005) because it helps to improve their living standard. Strong healthcare system at rural level could significantly contribute to improve the productivity of rural masses Biritwum et al. (2013) which directly contribute to improve income of the people. Our empirical results demonstrate that by increasing one healthcare center in a mouza, the livelihood index increases by 0.0026. The earlier studies also support our empirical findings of Bhutto and Bazmi (2007). The education at both primary and higher level plays an important role Karoly (2016), if the number of school increases by 1, the livelihood will increase by 0.0029. The total worth of farm assets has significantly positive impact on rural livelihood of household members Cornia (1985). If the worth of farm asset increases by 100,000 Rs. the rural livelihood will increase by 0.0001. The non-farm income of a household plays an important role in reducing poverty and income inequality Hadijah et al. (2012). If non-farm income increases by 100,000 Rs, the increase in rural livelihood will be 0.0201. The area under cultivation can provide greater yield and productivity Khan (1979) and hence improve farm income. If the percentage of land cultivated by a household increases by 1, the rural livelihood of the family increases by 0.0006. The families having livestock are enjoying better livelihood than those who do not own livestock Arif et al. (2011). If animal sold and crop

cold increases by 1, the rural livelihood will increase by 0.0394 and 0.013 respectively. In this study, the dependent variable is 46 percent explained by the independent variables.

Chapter 5

Conclusion and Policy Recommendation

5.1 Conclusion

The data for the study has been employed from Pakistan Rural Household Panel Survey (PRHPS) 2014, which is the third round of the survey. The survey was conducted in 76 villages in Punjab, Sindh and KPK. The sampling frame was based on the 1998 Census of Pakistan. The data was available at district, mouza and household level. The population and the number of households were projected to 2012 for each district using district-level population growth rate. Areas with more than 25,000 population were considered as urban and thus not included in the sample. The sample does not include rural areas of Balochistan and FATA and 13 districts of KPK due to security reasons. The sample contains the twelve districts of Punjab i.e. Bhakkar, Attock, Kasur, Khanewal, Vehari, Jhang, Dera Ghazi Khan, Bhawalnagar, Rahim Yar Khan, Multan, Faisalabad and Sargodha. The five districts of Sindh were Thatta, Sanghar, Dadu, Hyderabad and Jaccobabad while only two districts of KPK were included i.e. Mansehra and Nowshera.

One of the objectives of the study was to estimate the efforts of farm and non-farm income and compare the mean value of rural livelihood index across three provinces of Pakistan. Our empirical findings shows that the Punjab is performing better in terms of livelihood index followed by KPK and Sindh. This is because all the indicators performed well in Punjab. The government of Punjab largely focused on education sector especially at primary level. The number of programs and schemes were initiated to develop an interest for education. Moreover, government started number of projects to improve the connectivity between backward and under developed rural areas to adjacent big cities. This connectivity increases an employment

opportunities for rural people and a friendly environment for SMEs as well. The large number of campaigns were initiated by Punjab government to create an awareness related infectious diseases in rural areas. The farm income largely depends on latest farm equipment, which improves efficiency. The government of Punjab has offered farm equipment on easy installment and with minimal GST, which enables small farmers to gain access to farm equipment.

On the other hand, the conditions are worse in Sindh. The education system is very poor due to which the rural people of Sindh can not avail high valued jobs. The condition of healthcare centers are also poor, which leads towards the poor health status of Sindh rural families. The lack of infrastructure cause low connectivity with the big markets which results in low employment opportunities. The low income from non-farm and farm sector causes the rural people of Sindh to fall into poverty.

The second object of the study was to investigate the impact of different variables on rural livelihood and results are statistically significant. The estimated co-efficient of percentage of members with more than ten years of education and percentage of employed person is significant which shows that those households having greater number of members with higher education and employment have greater rural livelihood as compared to those who do not have higher employment percentage and high educational level. This indicates that the education plays a role of backbone in livelihood because higher the educational level of a person lead to higher salary level resulting in better living standard. The non-farm income, income from animal and crop sold and total worth of farm assets have a positive and significant impact on the livelihood of a rural household. So, greater the income from non-farm and farm sources greater will be the livelihood of a household.

The third objective of the study was to investigate the factors affecting non-farm income. As discussed earlier, the non-farm income largely depends on the educational level of a person. There is need to increase the number of universities so that the rural people can also get the higher level of education. Moreover, the health condition of person also plays a vital role in his economic activity. Some families are linked with the non-farm business sector and are not making a good profit then the provision of credit to such SMEs on low conditions can enable them to start their own business. The farm income contributes significantly in the overall income of a household. It comprises of income from crops and livestock sectors. Our results showed that the income from both sources helps on improving living standards. So, the need to focus on both sources so that the farmer can earn a better living. The veterinary hospital and related care centers need to provide their best services to improve the health condition of livestock sector.

5.2 Policy Recommendation

In order to improve the rural livelihood, the following policy recommendation have been suggested by the study

- The rural areas of Punjab has the greater number of schools and members with ten years of education in household as compare to KPK followed by Sindh. So, there is a need to increase the total number of schools and quality education in Sindh and KPK.
- The use of efficient farm equipment increases the farm income. So, the tax on farm equipment needs to be reduced in Sindh and KPK. It will increase the farmer's access to farm equipment resulting in increase in farm income.
- The income from crop sector is very dominate and still there is a need to improve the income from animal to its maximum potential. It can be done by increasing

the number of animal healthcare units and by providing credit to household for animal rearing.

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Appendix 1

Appendix 1: Major components and indicators comprising the Rural Livelihood Index (RLI)

Major Components	Indicators	Explanation of Indicators	Survey Question
Human Capital	Percentage of household adults between 15 - 35 years of age?	Adult members living in household.	How old is (household member)?
	Percentage of employed person?	Employment status of the household members who are contributing in household income.	What is the current employment status of household member?
	Percentage of household members ever visited the school?	Household members with primary education or can write his/her name.	Has the (household member) ever attended school?
	Percentage of household members with more than 10 years of schooling?	Household members having ten years or more education.	What is the highest class (household member) has completed?
	Ability to work	It is the time spent by the household for productive work.	Number of hours/week spent by a member in household agricultural activities (including livestock

			& fishing activities) whether for sale or for household consumption?
Social Capital	The number of meeting held within the mouza.	It explains the interaction between the society members to have a discussion on particular issue.	Total number of meetings held in a mouza in a year?
	Society members being affected by the particular development program.	It indicates the effectiveness of a particular development program on society.	What percentage of household was affected by community program?
	Percent of health facilitation centers in the mouza.	The total number of healthcare centers and health professionals in the mouza.	Total number of healthcare centers (Govt. and Pvt.) in the mouza?
	Percentage of schools present in the mouza.	It will give the general idea about the total number of schools (Govt., Pvt., NGO, Madrassa) in the mouza.	Number of schools in Mouza?

Natural Capital	Land ownership of a household.	It gives the idea about the total number of acres a household own.	How much agricultural land did you own?
	Percentage of agricultural land being cultivated by the household.	It gives the idea about the total number of acres a household cultivated.	How much agricultural land was cultivated?
	Percentage of adult animal owned by the household.	It will provide the idea about the adult animal ownership of a household.	Number of adult animals currently owned by the household?
	Total value of all the adult animals that a household.	Net value of all adult animals i.e. cattle, sheep, goats, poultry and fish.	Net worth of adult animals?
	Percentage of young animal owned by the household.	It will provide the idea about the young animal ownership of a household.	Number of young animals currently owned by the household?
	Total value of all young animals that a household.	Net value of all young animals i.e. cattle, sheep, goats, poultry and fish.	Net worth of young animals?
	Physical Capital	Total value of household assets owned by the household.	Net worth of household assets i.e. car, bike,

		A.C. phone, television etc. owned by the household.	
	Total worth of farm assets owned by a household?	It gives an idea about the current agricultural equipment and related tools owned by a household	What is the total value of (agricultural assets)?
	Net worth of the house.	It gives the house prices of households.	What is the current value of the house?
Financial Capital	Income from crops.	It provides the total amount of crops sold by the household.	What is the total value of crop sold by the household?
	Income from byproducts of agricultural commodities.	It is the income from the byproducts i.e. rice straw, wheat straw, rice husk, cotton sticks etc. of agricultural commodities.	Value of byproducts sold?
	Income from paid livestock activities.	It is the total income of the household earned by during paid livestock activities in a year?	How much have you earned by doing any paid livestock activities in last year.

	Net value of animal sold or slaughtered by a household.	It gives an idea about income of household earned by selling animal or portion of income they saved by consuming their own animal.	Net value of adult animal sold/ slaughtered in last year?
	Income from livestock	It provides income from selling livestock products like eggs, milk etc	How much have you earned by selling livestock products in last year?
	Income from paid farm activities	The income earned by doing paid farm activities like weeding, harvesting etc.	How much have you earned by doing paid farm activities in last year.
	Income from non-farm sources	The income from the primary non-farm job like transportation, construction etc. of the household member.	Total earnings from the primary non-farm job during the last 12 months?
		The income from the secondary non-farm job of the household member.	Total earnings from the secondary non-farm job during the last 12 months?
	Net profit earned from non-agricultural	The total	What was your net

	enterprise.	revenue received from non-agricultural enterprise.	profit from your share in last year?
	Income from other sources	Income from other sources i.e. house rent, agricultural equipment rent and shared business.	Income from other sources?
	Current savings.	It is the total savings of a household...	Total amount currently saved?