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The Rural Non-Farm Economy and Poverty Alleviation in Tehsil Sillanwali, District Sargodha

Saima Parveen[1] and Ahmed Raza Cheema[1,2*]
[1]University of Sargodha; [2] University of Wisconsin-Madison, USA
*E-mail: cheemaahmed_raza@yahoo.com

Abstract

Rural non-farm economic activities are getting wide spread recognition in most of the developing countries due to increasing inability of farm sector to provide employment and reasonable livelihood to rural households. These activities are disaggregated into three groups (1) Farm based non-agricultural activities, (2) wage-employment, and (3) self-employment and the study estimates the logit models to know the factors to involve in such activities. The study also investigates the factors influencing income among the rural households in Tehsil Sillanwali, district Sargodha. The results indicate that the poor and households owning more animals have more chances to involve in first category, whereas the dependency ratio is inversely related with it. Education, male to female ratio and household size are the significant determinant of the second type activities. Households owning capital assets have more chances to involve in the third type category. Whereas the results for income model depict that education; land-ownership and involvement in non-farm economic activities are found to be significant factors to affect the household income.

Keywords: arm-based non-agricultural activities, wage employment, self employment, poverty, Sillan Wali, Pakistan

Introduction

Pakistan is an agricultural country, with population of 188.02 million, on the land area of 796095 square kilometres (Economic Survey of Pakistan, 2014). At the time of independence and then over the years, agriculture sector was the dominant sector of the economy, having a substantial share of employment and being the main contributor to GDP. Agriculture sector's share to GDP has shown considerable fluctuations in last 66 years. Agriculture was the largest sector contributing more than 53 percent to GDP in 50's and this share fell down up to 23.6 percent in 2002-03 (Zaidi, 2005). Agriculture sector accounts for 20.9 percent of GDP in 2014-15 and is a source of livelihood of about 43 % of rural population (Economic Survey of Pakistan, 2014-15. But the comparisons of poverty between urban and rural areas show that rural poverty is more severe and deeper than urban poverty in Pakistan (Cheema andSial, 2012). The incidence of rural poverty is more severe among those who own no land, it constitutes 70 percent of total population of rural areas and only 30 percent has access to land (Zaidi, 2005). The highly uneven distribution of land is the main reason for rural poverty. Rural poverty has become the subject of concern and the traditional notion that agriculture is the best way for reducing poverty is discarded.

There is a broad consensus that only agriculture developments cannot by itself overcome the state of deprivation in rural households. The absorptive capacity of agriculture sector has exhausted to provide sustainable livelihood opportunities to growing labour force in rural areas of Pakistan. Pakistan's rural communities are subsisting under poor conditions, due to lack of opportunities and devoid of basic facilities such as road, water supplies, sanitation energy and communication. The above scenario emerges due to negligence of government about rural sector and urban biased strategies.

In recent years, the non-farm sector is getting recognition for employment and income generating activities in rural area of developing countries like Pakistan. The rural sector in Pakistan comprises 61 percent of country's population and has great potential in human and material resources for development. There is need to diversify rural employment and income opportunities in rural areas of Pakistan. Non-farm diversification means seeking business or employment activities other than traditional farming. It is true that rural sector is much more than agriculture in developing countries like Pakistan. So it is important to engage the rural population in non-farm economic activities.

Non-farm activities have an important role to reduce poverty and enhancing the welfare of the rural household. Non-Farm incomes are important element in the livelihood of the rural poor (Timothy, 2011). Non-farm activities can influence the rural economy in different ways. First, non-farm employment can be helpful to reduce the pressure on the demand for land. Second, the involvement in non-farm activities can be helpful to raise the total income level of rural household. The households that diversify their employment activities by involving in non-farm activities are more capable of overcoming the different negative shocks in agriculture production. Third, the non-farm income is often a source of saving that can be helpful to involve in some more profitable or high return non-farm activity. Fourth, the non-farm activities have an important impact on equal distribution of income and poverty alleviation.

This situation indicates that diversification is inevitable. Participation in non-farm economic activities is important because the non-farm income contributes 30 percent to 50 percent in total household income in many developing countries (Awoyemi, 2004; Benjamin andKimhi, 2006; Kaija, 2007). So, the diversification of income sources and employment generating activities from agriculture to non-farm sector can be considered as a critical requirement for rural poverty reduction in rural areas. Many studies of Sub-Sahra Africa (SSA) indicate that rural households can diversify their income sources by combining farm and non-farm activities to sustain their livelihood (Barret et al., 2001; De Janvry et al., 2002; Losh et al., 2011; Winter et al., 2010)

The term non-farm has been defined differently in different studies. The term non-farm defined as all the activities outside agriculture such as wage-employment, manufacturing and services (Reardon et al., 2001). The non-farm activities are also explained as, all the economic activities carried out in the rural areas that are not agriculture (Lanjouw andLanjouw, 2001). The present study disaggregates non-farm activities into farm based non-agricultural activities, Wage-employment activities and self-employment activities.

Rural non-farm activities are important to generate income during the times of year when demand for farm labour is low and it also reduces household income fluctuation to make a sustainable livelihood. It is generally the view that non-farm activities can prove as a measure to break the vicious circle of poverty in developing countries like Pakistan. Rural non-farm activities are a part of solution to overcome the poverty and to enhance the welfare of the rural household.

Rural poverty reduction policies require diversification in employment and income opportunities (Ellis, 2000). It means traditional approach of dependency in single occupation like farming is missing its targets. The importance of rural non-farm economic activity is closely associated to reduce poverty (Ellis, 1998; Lanjouw and Lanjouw, 2001). The poor tries to diversify into non-farm sector in order to smooth their income and consumption patterns. In Pakistan, due to abundance of natural resources and population density, there is needed to enhance the income sources for this fast growing population of rural areas. There is little analytical work on the joint factors which influence the participation in non-farm activities and total income of households in rural Pakistan.

The household s' decision to involve in RNF activities depends on two factors, (1) Pull Factors (2) Push factors. Pull factors offers to the better returns and earnings in the non-farm sector relative to farm sector. When income levels to RNF activities are less risky and higher than farming, then pull factors are in process (FAO, 1998). Pull factors involve the incentive offered such as relative profitability. Push factors refer to those factors which involve the rural household in RNF activities due to inadequate farm output, land scarcity and risk of farming.

Rural households are "pulled" into non-farm activities to get more income and to improve their living conditions. By contrast, factors such as lack of access to credit and risk of farm production tend to "push" households into non-farm activities (Lanjouw and Lanjouw, 2001). Households are involved in non-farm sector due to inadequate farm income and lack of opportunities to sustain their livelihood and crop insurance. Distress-push effects are dominant due to shrinking per capita land in developing countries like Pakistan. Small farm size has pushed the rural households towards low return non-farm activities in rural Pakistan but their participation in these activities are helpful to increase their welfare (Arif et al., 2000). It is also acknowledged that agriculture alone is not sufficient to meet the needs of the rural households. Rural non-farm sector has proved as an important source of employment for small and landless farmers (Anderson and Leiserson, 1980).

Non-farm income sources are more necessary for poor than rich in rural areas of Pakistan (Adam and Richard, 1993). It is generally, the view that rural household can get their income from a diverse portfolio of activities. It is common that policy making authorities aim at increasing net income for the poverty alleviation. Non-farm sector can be helpful to provide better employment opportunities and increasing the income level of the rural household in rural areas.

In spite of so much importance of non-farm activities, there is little focus on non-farm sector. Thus, there is need to focus on the determinants of non-farm activities which can be conducive for rural households to involve in non-farm activities.

Although participation in RNF economic activities can be a good alternative, yet there is little known about those factors which can be helpful for the rural poor to enhance their participation in these activities. This study aims to find the nature of determinants and their importance in non-farm activities, in addition with factors which enhance the total income of rural households. This can be helpful to increase their welfare and to reduce poverty in rural areas of Pakistan. This specific analysis of households attempts to focus on the factors of participation as well as determinants of income which has not been done in the existing literature of non-farm economy in Pakistan.

Rationale of the Study

The concept of rural non-farm economy is a quite recently known and it is getting recognition due to its potential significance for the development of the rural areas and as a way to reduce poverty. This study is prompted due to this fact that agriculture production in the country is uncertain and average farm size is also reducing. This situation clearly shows that agriculture alone cannot sustain the poor rural communities. The subsistence farmer is facing many supply side as well as economic constraints. The incessant rain due to climatic change affects badly the agriculture production. So there is need to emphasize on alternative which is, the rural non-farm economy. There is a little work about the RNF economy in Pakistan, so it is necessary to focus on non-farm sector.

Objective of the Study

The general objectives of this study are to highlight the significance of non-farm employment and to evaluate its effects on the total income and reduction in poverty in the rural areas of Tehsil Sillanwali Dist. Sargodha (Punjab) Pakistan.

The specific objectives are

1. To identify the factors which affect the probability of access to RNF activities
- To measure the determinants of farm-based non- agricultural activities.
- To measure the determinants of wage-employment.
- To measure the determinants of self-employment.

2. To examine the factors that affect income.

After the introduction of the study, the second section presents the review of different studies. The third one describes the data and methodology employed, thereby in this study. Inthe fourth section results are presented. The final section concludes.

Literature Review

The development of non-farm sector as a way to get out of poverty has gained widespread recognition nationally and internationally. The rural non-farm sector has come to be recognized over the past decades, but still agriculture sector is the main income and employment source in the most of the rural areas of developing countries like Pakistan.

In this situation, it is vital to acknowledge the importance of rural non-farm activities in the livelihood of rural household. Many small land holders and landless household earn their income from non-farm activities. So, it is necessary to spotlight on the rural non-farm activities in the rural areas of Pakistan. This strategy is best to reduce the poverty in the rural areas of Pakistan.

An improved understanding of the factors, processes and methodologies of the non-farm economy is a pre requisite to perform a good research. This section reviews theoretical and methodological issues in different non-farm studies and provides practical suggestions regarding field research and solving many issues. Many studies have been taken under consideration in order to find the impact of involvement in non-farm activities and its effects on poverty and inequality in rural household The main purpose of the literature view is to become familiar with the past research work. It is helpful to find the area of study which has not been covered by the earlier studies.

The literature review is distributed in two sections. The section first presents the literature review on factors which may affect the probability of access to RNF activities, whereas the second section highlights the determinants of households' income.

Literature Review on Non-Farm Activities and its Determinants

Arif et al. (2000) focused the linkages between non-farm activities and rural poverty in Pakistan. The primary data was obtained from Household Integrated Economic Survey (HIES) 1996-97. The study explained the three concepts: rural income, non-farm activities and poverty line. The study highlighted the poverty trends in 1990s in rural and urban areas of country. Agriculture was major sector but employment share of this sector had been declined since several years which shifted toward non-agriculture employment. The non-farm sector activities included construction, service and manufacturing. The study also examined the determinants associated with participating in non-farm activities in a multivariate dimension. The logistic Regression technique was applied to analyze the effects of non-farm activities on employment. The study found that there was rise in poverty in rural areas but wage-employment workers in non-farm sector were better than agricultural labour. Service and trade sectors were important to reduce poverty. It was suggested that dynamic and labour intensive agriculture combined with a modern non-agricultural sector could play a key role to eliminate poverty. Non-farm employment was also justified to stop migration toward cities.

Ruben (2001) discussed the effects of non-farm employment on rural household and also highlighted the importance of non-farm wage-employment in Honduras. Non-farm income was

defined as the income obtained from wag-employment and self-employment. The data was collected by Agriculture and Resource office of United States Agency for International Development (USAID) Honduras. The sample was consisted of 2,584 active family members. The sample was divided into four farm household income categories and landless households too, to make a comparative analysis. This study employed the logit regression technique to determine the probability to participate in non-farm employment. The consumption effects of non-farm employment were measured by 2-stage least square method and production effects were estimated by Tobit regression. The overall results indicated that 685 adults were involved in non-farm activities and this sector would enable them to provide food security. As a policy recommendation, it was suggested that education and training programs should be given the top priority which would facilitate the entrance in non-farm activities.

Ferreira and Lanjouw (2001) examined the determinants of Rural Non-Agricultural (RNA) occupations in Brazilian Northeast. This study expressed the distributional profile as well as the impacts of non-farm activities on poverty. The probit model was estimated to measure the involvement in non-farm activity. Non-farm activities were divided into two groups, high-return activities and low-return activities. Low-return activities were essential for landless people while high-return activities were important for both groups. The involvement in non-farm activities was significantly and positively related to education and location. It was also emphasized that rural infrastructure provision was necessary to promote the non-farm sector.

Marcharla (2002) explored the nature of non-farm sector in rural Andhra Pradesh (AP), India. The determinants of Rural Non-Farm Employment(RNFE), its inter-relationship and variations in non-farm employment were examined at district level. This study was conducted for 22 districts, pooling the data for 1981and 1991 for various sub-sectors in AP. The data was collected by secondary sources of census. At primary stage, the means, the standard deviations and the t test for all the variables in all the categories of RNF employment were computed to compare the difference between 1981 and 1991. The regression technique was applied by pooling the data for various subsectors to estimate the determinants and its share of rural non-farm employment. The study found that farm size, literacy, urbanisation, commercialisation, variation in irrigation, infrastructure and poverty were the significant determinants of RNF employment. It was found that distress diversification (i.e., lower development) caused higher RNF share in employment. The traditional RNF employment share was associated with low literacy and distress diversification but modern RNF employment share was associated with high literacy and growth linkages.

Bezmer and Davis (2003) examined the importance of different factors, understanding the process and motivation which enabled the individuals and household to engage in non-farm activities in rural Armenia. The study collected primary data based on large rural household surveys. The survey focused four type of household: involved only in agricultural activities, agricultural activities plus wage-employment, agricultural activities with self-employment and involved only in non-farm activities. The logistic regression for each activity was applied to analyze the data. The Independent variables were household size, dependency ratio, male/ female ratio, average highest level of education, land, the number of animals and dummy variables denoting possession of equipment, and amount of credit (loan). The dependent variables were binary, indicating the involvement in different non-farm activities. The overall results showed that human capital factors affected the wage-employment. The higher levels of education had a significant role in engaging the households in non-farm activities. Distress-push factors appeared dominant in non-agricultural activities. Farm-based non-agricultural activities were associated with less risk of poverty. Many sources of income of a household were significantly linked to reduce poverty. Policy

recommendations suggested that large processing factories and Small and Medium sized Enterprise (SME) should be established to enhance the employment opportunities and to promote the rural non-farm activities.

Sanchez (2005) found the factors affecting the individual s' participation in non-farm activities, the level of labour allocated to different non-farm activities and determinant of household's rural non-farm income in Bolivia. The data was collected by a survey conducted in the three regions of Bolivia in the month of June-July 2002, financed by the United States. Two econometric models, a double hurdle model and Tobit model were applied to estimate the determinants of non-agriculture activities and different income levels. The results indicated that non-agricultural wage-employment income share was the highest in all the sources. In all the three models, education was the significant determinant in highly skilled employment particularly, in wage-employment. Gender was also found significant factor of participation in non-farm activities. Policy interventions suggested that there should be focus on education and training programmes in rural areas of Bolivia.

Correa (2008) investigates the factors which influenced the non-farm activities and income among rural individual's in Paraguay. The data was collected by the Permanent Survey of Household (PSH) of 2003 conducted by Paraguayan department of statistics survey and census. The Probit model was estimated to measure the effects of the demographic characteristics of individuals on the involvement in different non-farm activities. The income level from rural non-farm activities was measured by the Ordinary Least Square (OLS). The result showed that education and social infrastructure were the important factors to enhance the involvement in rural non-farm activities. It was suggested, as policy implications that there should be focus on education, training programmes and social infrastructure to improve the rural non-farm income and employment in rural Paraguay.

Kaija (2007) focused the non-farm activities, its determinants and income level in rural Uganda. The study also explored the effects of non-farm income on inequality. The data was collected from Uganda National Household Survey (UNHS) of 1999-2000. Inequality was decomposed by the Gini index. Income diversification was measured by the ordinary least square method. The determinants of the share of income in total household's income were estimated by the Tobit approach. The results showed that self-employment and wage income were increasing income inequality but farm income and non-labour income reduced inequality. Age, household size, educational level, gender and geographical location influenced income diversification. The policy implication suggested the improvement of rural infrastructure and resource allocation to enhance the overall productivity in rural areas.

Kumar (2009) examined the trends of employment diversification in rural eastern states of India. The employment diversification in non-farm and horticultural sector were taken under consideration to analyse its effects on households. The rural employment diversification was measured during the past two decades, First, for two sub periods 1983-84 to 1993-94 (pre-reform period) and secondly for 1993-94 to 2004-05 (post- reform period). The National Sample Survey Organization (NSSO) conducted different rounds of survey to collect data for this study. The multivariate logistic regression models were applied for estimations in each category. The results indicated that age, household size, education and skill were found significant and positive factors to enhance the probability of working in RNF sector. Landholding had a negative impact on being involved in non-farm activities. It was examined that diversification was distress push. The determinants of employment in horticulture crops were estimated by logit model. The results showed that landholding, monthly per capita income, education and gender showed a significant

impact on employment in horticulture sector. It was suggested that tailor made training programmes, as technological skills and education sector should be promoted in the eastern rural states of India.

Wanyama et al. (2010) examined the factors, which influenced the household s' sources of income diversification as a management strategy to enhance their welfare at micro level in Kenya. A cross sectional survey was conducted in seven agro ecological zones, covering 1850 rural household. The multinomial logit and tobit regressions were applied to analyze the determinants of income diversification. The result showed that majority of famer was engaged in cash cropping and off-farm activities. Lack of capital had made it difficult to diversify from subsistence agriculture to commercial farming. It was found that households with more land were more involved in the non-farm sector. The result indicated that good roads and distance to input and output market had positive and significant impact on the participation in all types of non-farm activities. It was suggested that poverty and food insecurity could be alleviated, only if govt. plays its role in catalyzing assets accumulation by creating jobs in both farm and non-farm sectors.

Atamanov(2011) analysed the factors which effect the involvement in non-farm activities and the determinants of income in the Central Asian Republic of Kyrgyzstan. The data used in this study was obtained from two surveys of representative household budget conducted by National Statistical Committee of the Kyrgyz Republic (NSCK) in 2005/2006. The participation in non-farm activities was measured by multinomial logit regression analysis. Self-employment income was consisting on low-return activities. Education was found as a positive and strong determinant of non-farm income in wage-employment but it was not important in self-employment activities. Access to infrastructure and size of cattle had significant and positive impact on non-farm earnings. Non-farm activities were helpful to contribute 50 percent in total income and it was more important for poor rural households.

Dary and Kunibe (2012) found that rural non-farm economic activities were getting importance in most developing countries due to rising inability of farm sector to support rural livelihoods. This study explained non-farm economic activities, their types and factors of involvement in rural non-farm economic activities in upper west region of Ghana. The study utilized cross sectional data from 172 households. The binary logit model was used to estimate the probability to participate in non-farm economic activities. The results found that 83 percent household were involved in non-farm sector and only 17 percent were not engaged in this sector. The study also found that in a household of seven members, on average three members participated in non-farm activities. The household's were engaged in low-return non-farm economic activities. Participation in non-farm activities was influenced by many factors such as sex, age, marital status, years of schooling and vocational training. The study suggested the promotion of policies to target young rural population to involve them in non-farm sector

Atamanov and Van den Berg (2012) explored the determinants of participation and magnitude of rural non-farm economy in Tajikstan. This study was conducted thoroughly at three levels, individual level, household level and district level. The empirical analysis was based on two national household surveys of Living Standard Measurement Study Project (LSMSP) in 2003 and 2007 by World Bank. The study applied different methods. The OLS regression explained the magnitude of RNF activities at district level in 2003 and 2007. The Tobit model was used to measure the share of time involved in non-farm activities in total time worked at household level. The multivariate probit model indicated the involvement both in farm and non-farm wage-employment and self-employment activities. The results showed that RNF activities expanded from 18 percent in 2003 to 44 percent in 2007. Non-farm income contributed for 33 percent of total household income in 2007. The 75 percent rich households and 25 percent of the poor households

participated in non-farm activities. The involvement in RNF was mostly due to poor and scarce land. It was also found that development of input and output markets affected the involvement in non-farm sector.

Thus the review of literature on the factors affecting the involvement in non-farm sector depicts that most of the studies are cross sectional, based on the primary data collections. The probit and logit models are used to analyse the factors to involve in different non-farm activities. Education and social infrastructure are important factors to enhance the involvement in non-farm activities. It is census that education is the key determinant to get all types of opportunities and diversifications in both, farm and non-farm sectors. As a policy implication, education and technological skills with the provision of basic infrastructure are indispensible to improve the rural non-farm employment.

Literature Review on Determinants of Households' Income

Ibekwe et al. (2010) focused the factors which affect the non-farm income among farm household in South East Nigeria. An interview based survey was conducted in Owerri Agriculture zone in Nigeria. A sample of 200 household was chosen by multi-stage random sampling technique. The information was collected about household's compositions and their participation in different income generating activities. The four regressions were estimated to measure the relation between socio economic factors and level of non-farm income. The results showed that self-employment activities were dominant in non-farm sector. Non-farm income share was positively correlated with overall income. Education and infrastructure were the major determinants to participate in non-farm activities. Policy implication suggested that better crops and live- stock could help the poor to involve in better paying non-farm activities.

Tasie et al. (2010) investigated the determinants of off-farm income in rural households in River State, Nigeria. This study was based on primary data collection through a structured questionnaire. A sample of 90 household was selected through multi-stage random sampling technique. The regression technique was applied to determine the relationship between socio economic factors and non-farm income. The results showed that 70 percent of total household were involved in agriculture. It was also found that 12.2 percent households were engaged in non-farm wage-employment and 17.8 percent households were involved in self-employment. The non-farm self- employment income contributed 42.5 percent. The study also found that farm size, household size, value of farm output and education were the significant determinants of off-farm income. Education was found to be the most significant and positive determinant of off-farm income. It was concluded that non-farm activities could not be ignored by rural households in River State, Nigeria.

Akram et al. (2011) examined the factors of involvement in both farm and non-farm income generating activities and its effects on income inequality in Pakistan.. This study was based on primary data collection in Tehsil Samundri, District Faisalabad, Punjab Province Pakistan. The sample of 104 households was collected through stratified random sampling technique with the representation of both groups (Landlords and landless household). The sampled households were divided into three categories (a) the households that were involved only in farm occupation, (b) the households that adopted only non-farm occupations, and (c) the households that were involved in both occupations. The Gini co-efficient and co-efficient of variation techniques were applied to measure the inequality and numerical indicators. The semi-log multiple regression technique was applied to analyze the effects of different occupations on household s' income. The study found that land ownership and live-stock were significantly and positively associated with income level but only farm occupations were negatively associated with income level. Education was a significant factor in all the three regressions. It was suggested that there should be improvement in the quality

of education and there should be diversification in both farm and non-farm activities to improve the income levels of rural households.

Olugbire et al. (2011) investigated the non-farm income diversification and its impacts on household welfare in rural Nigeria. The data was collected from National Living Standard Survey (NLSS). The survey was conducted in the 36 states of Nigeria. The 2-stage stratified sampling technique was applied by NLSS sample design. The information was collected about key elements which included demographic characteristics, educational skills, social capital, agriculture income, consumption and non-farm employment. A propensity score matching model was estimated to evaluate the differences in out-comes between household who participated in nonfarm employment and those who did not. The propensity score was estimated using probit model in three steps. The results of non-farm income indicated the positive and robust effects on household s' consumption expenditure and welfare. It also reduced the poverty of rural household. The study concluded that RNF income generated higher welfare impacts. It was suggested that policy measures such as financial capital, improved infrastructure and training could help the poor to overcome the barriers to enter in non-farm employment.

Fatima (2012) examined the effects of participation in non-farm activities on absolute incomes in rural Pakistan. The study used the data from Household Integrated Economic Survey (HIES) of 2008. The Heckman procedure was applied to find the effects of non-farm activities on agriculture income and also on counterfactual income scenarios. The probit regression technique was used to analyze the determinants of non-farm activities. The results showed that education, number of workers and land ownership were significantly and positively associated with the participation in non-farm sector. It was also examined that access to non-farm activities enhances the rural income by providing alternatives to rural households. It was recommended that government should focus on education levels through setting up schools and vocational centres. Access to credit and infrastructure should also be focused to promote the non-farm activities.

Sarah (2012) examined the factors of income diversification in rural farm households in Senegal and Kenya. The study was based on quantitative cross-sectional survey in Senegal and Kenya conducted in 2008. The Tobit regression model was employed to measure the determinants of income diversification. The results indicated that education level, access to transport, farm size and access to irrigation were the significant factors to determine the income diversification. Self employment was the most important source of non-farm income. It was found that diversification into non-farm sources contributed 48.8 percent and 58.8 percent to total household income in Senegal and Kenya.

Chawonote and Barett (2013) explored rural non-farm occupational and earning dynamics in rural Thailand. The study was based on panel data which was collected by National Statistical Office (NSO) of Thailand in 2005 and 2010. The data was very comprehensive including all the information regarding villages. The multivairate regression analysis was conducted to measure the changes in earnings associated with farm and non-farm occupations. The results showed that paid non-farm employment generated higher average returns than self-employment. It was also found that income growth depends mostly in the participation of rural non-farm employment.

Thus, the literature review on the determinants of household income and on non-farm income determinants highlights the importance of non-farm sector. The Tobit model and Ordinary Least Square methods are generally, implied to measure the determinants of income diversification. It is the common view that access to non-farm employment enhances the rural income by providing alternative to rural household. Farm size, education and number of adults in a household are the significant determinants of household income.

Data and Methodology

Data

A rational choice of sampling technique and sample size is a requisite for reliable data. Accurate and reliable data is basic condition to carry out a reliable research. In the same way an appropriate methodology is essential for a good research and to make policies for the improvement of the relevant sector.

This study collects the data from Tehsil Sillanwali, district Sargodha, Pakistan to analyze the role of non-farm activities in poverty alleviation. The unit of analysis is household. The survey was conducted in the month of May and June 2013. The sample is selected by multi-stage random sampling technique. As a first stage, five out of sixteen union councils (i.e., the lowest administration unit in Pakistan) in Tehsil were randomly selected. Then, two villages were randomly selected from each of the five local union Councils and then finally, ten household were sampled in each of the ten villages. This sampling procedure obtained a sample of 100 household at the ultimate stage.

In this study, households are disaggregated into four types; households involved only in agricultural activities, households involved in agricultural activities plus wage-employment, households involved in agricultural activities plus self-employment and households not involved in agricultural activities (involved only in non-farm activities).

The survey questionnaire is designed to get information on rural household's composition and about other socio economic activities including details on participation of each household's member in different income generating activities. The survey provides detailed information on farm and non-farm activities, income sources, Income levels, employment status, demographic characteristics as well as other attributes of the households and of the household's members.

This study applies the simplified formula by Yamane (1967) to calculate the sample size. The formula is as under

$$n = \frac{N_0}{1 + N_0(e)^2}$$

n = Sample Size

N_0 = Population Size

e = level of Precision

The study applied the formula mentioned above to find the sample size.

Total population of Tehsil = 254,281

Urban proportion = 9.1%

Total urban = 23140

Total Rural = 231141

Average Hh. Size = 7.3

Total No. of Rural Hh. = 31663

e = 0.05

By putting the values

$$n = \frac{31663}{1 + 31663(0.05)^2}$$

$$n = \frac{31663}{80} = 396 Hh$$

By applying the formula, we get the sample of 396 households but due to lack of funds and shortage of time, the study takes the sample of 100 households. The survey provides detailed information on 100 households. To get detailed information, interview type meetings were arranged.

The study also focuses on the household's Income. This analysis is done to understand those factors which are important in determining the household's total income level. There is a little analytical work, available on the sources of income in rural areas of Pakistan. Past studies (Adam and He, 1995; Malik, 2005) indicate five major sources of income in rural Pakistan: crop income, live-stock income, wage income, rental income and transfer income. Arif et al. (2000) and Akram et al. (2011) distribute the income sources into farm and non-farm sources of income. The income earned from non-farm employments emerged as the most important source of income (Adam & He, 1995).

In this study, the income sources of rural household are also disaggregated into four types

(1) Agricultural income
(2) Wage income
(3) Self-employment income
(4) Transfer income

The survey got the detailed information about the income level of each individual in a household. Total income is defined, as the sum of all earned income from the four sources. The study takes in to account the transfer income in the analysis, to present the more comprehensive composition of total income. Agricultural income is crops net income and net live-stock income. Wage income is also included in the net form of income. Self- employment income is net income and it also includes the income obtained from the entrepreneurial activities in farm based non-agricultural activities e.g. agricultural processing etc. Hence the determinants of the total income level of a household depend on the strength of these factors e.g. education level, age, assets (farm and non-farm equipment), land ownership and No. of adults in a household and involvement of members of a household in different farming and other income generating activities in which they are involved.

Methodology

To determine the extent of relationship between socio economic factors and involvement in non-farm activities, the logistic binary model is estimated in this study. SPSS software is utilized to enter the data with coding scheme and then for estimations. The questionnaires are reviewed and edited before entering the data.

Logistic Regression Model

In econometrics, logistic regression technique is utilized to analyze the relationship between dichotomous dependent variable and different categorical, dichotomous and continuous independent variables. Logistic regression is used for the prediction of the probability of occurrence of an event by fitting data to a logistic curve.

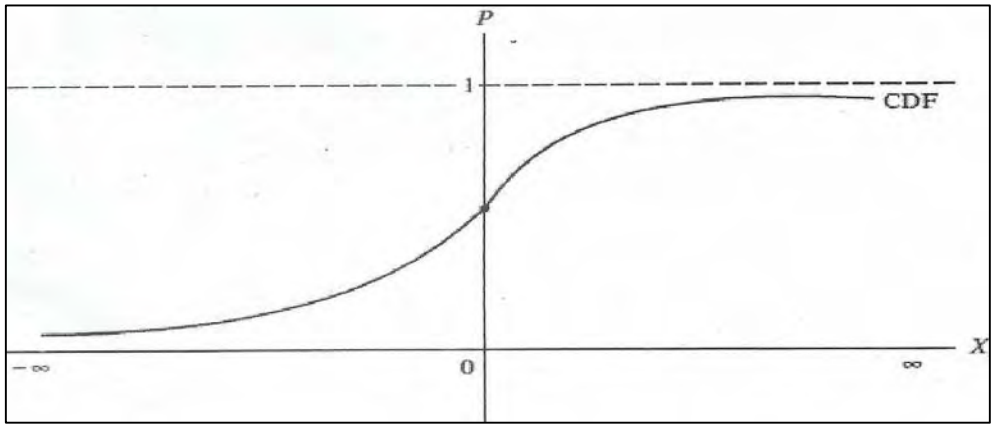

Figure1 A Cumulative Distribution Function

General model specification

In this study, the logistic binary model is chosen for analysing the probability of participation in non-farm economic activities. This model was applied in rural Ghana by Dary and Kuunibe (2012). The logit model specified in this study is stated as

$$L = \log[\frac{p_i}{1-p_i}] = \beta_o + \sum \beta_i x_i + \varepsilon_i$$

Where

p_i = the probability that a household will participate in NFEAs:

B_o = the constant term

B_i = a vector of unknown coefficient of the determinants of participation in NFEAs;

X_i = a vector of independent variables that determine participation in NFEAs

ε_i = the stochastic error term and i =1, 2, 3,.....N observation.

The Likelihood Ratio Test (LRT) is employed to test the fitness of the variable used in the model

Specific model

Model-1: Farm Based Non-Agricultural Activities

Following model is estimated:

$$Q_1 = \alpha + \alpha_1 ANIMALS + \alpha_2 DEPRATIO + \alpha_3 LAND + \alpha_4 PS + \varepsilon \quad (1)$$

In case of participation in farm based non-agricultural activities Q_1=1, otherwise 0.

ANIMALS = No of animals e.g. number of goats, number of cows, buffalos and donkeys.

DEP.RATIO = Dependency ratio=number of children under 15 and persons with age>64 years divided by working age persons (greater than 14 and less than 65 years).

LAND = Land of household in acres.

PS = Poverty status (poor)

(Dummy variable) if Poor then = 1, Otherwise = 0. Poverty line of Rs. 1745 p.m. set by Government of Pakistan was used to decide about the poverty.

Model-2: Wage-Employment Activities

Following model is estimated :

$$Q_2 = \alpha + \alpha_1 EDU + \alpha_2 ANIMAL + \alpha_3 HhSIZE + \alpha_4 DEPRATIO + \alpha_5 MFRATIO + \varepsilon) \quad (2)$$

In case of participation in wage- employment Q_2=1, otherwise 0.

EDU = Education of household head in years.

ANIMALS has been define in the previous model
Hh.SIZE = Household size.
DEP.RATIO has been defined in the previous model.
M.F.RATIO = Male female ratio = number of males/number of females.

Model 3: Non-Farm Self-employment Activities

Following model is estimated:

$$Q_3 = \alpha + \alpha_1 LAND + \alpha_2 ANIMAL + \alpha_3 ASSET + \alpha_4 HhSIZE + \alpha_5 AGE + \alpha_6 EDUE + \alpha_7 EDUHS + \alpha_8 EDUUL + \varepsilon \quad (3)$$

In case of participation in self-employment Q_3=1, otherwise 0.
LAND= farm size of household in acres.
ANIMAS has been defined in the previous model
ASSETS has been defined above
Hh.SIZE= Household size
AGE = Age of household member in years
EDU.E = Elementary education level (Dummy variable).
EDU H.S= Higher secondary education level (Dummy variable).
EDU.UL= University level education (Dummy variable)
Bench Mark Category = those, who never attended the school.

Model 4 Determinants of Household s' Income/Poverty

The study estimates the semi log model of income to estimate the determinants of poverty/income following. The model is given below:

$$LnY = \alpha + \alpha_1 EDUHh.H + \alpha_2 LAND + \alpha_3 ASSET + \alpha_4 AGE + \alpha_5 ADULTSHh + \alpha_6 MS + \varepsilon \quad (4)$$

The dependant variable in the above model is log of total income of household per month
EDU.HhH = Education of household head
LAND = Farm size of household in Acres
Assets = Assets were considered in physical terms (tools, equipments, machinery etc) and introduced as a dummy variable. If a household has assets then = 1, otherwise = 0.
AGE = Age of household head
Adults Hh = No. of individuals more than age of 18
MS= Multiple Sources (Farm + Non-farm) of household
(Dummy variable), if a household is involved more than one sources of income = 1, Otherwise 0.

Results

This section presents the empirical results, based on the estimation of econometric models. The main objectives of the study are to determine the factors which affect the participation in different non-farm activities and to determine the factors affecting the household's income level. This study uses the primary data, collected in Tehsil Sillanwali, district Sargodha Punjab Province Pakistan.

In this section the discussion is divided in to two sub-sections. The first sub-section presents, detailed discussion on the factors which effect the involvement in non-farm activities. The second one discusses the determinants of total income of a household.

i. Determinants of involvement in non-farm activities
ii. Determinants of total income

Determinants of involvement in Non-farm Activities

Logistic Binary Regression models are applied to measure the probability of participation in different non-farm activities. The non-farm activities are divided into three types (1) farm based non-agricultural activities, (2) wage-employment, and (3) self- employment. Three binary logistic models are developed to estimate the determinants of each type of activity. In each model, the dependent variable is binary, indicating the value of one, if a household is involved in non-farm activity, otherwise zero. The choice of independent variable used in each model depends on the nature of non-farm activity. Each type of activity depends on different factors. The change in dependent variable was explained by Odd Ratios. The signs of 'B' values are also taken under consideration in the discussion of results**.**

Table 1.Estimated Results of Participation in Farm Based Non-Agricultural Activities

Variable	B	S.E.	Wald	Sig.	Exp (B).
Animal	.12	.05	4.97	.026	1.12
Dependency	-3.30	1.10	8.87	.003	.04
Land	-.09	.07	1.06	.205	.90
Poverty Status	1.15	.58	3.99	.046	3.16
Constants	1.96	.73	7.22	.007	7.11
No. of	100				
Chi Square	23.79				

Note: Author s' own calculations.

The coefficient of animal is statistically significant and positive. The odds indicate that with the increases in number of animals, the chances of participation enhance by 1.12 for farm based non-agricultural activities. Dependency is significantly and negatively associated with the involvement in farm based non-agricultural activities. It can be interpreted as that household with fewer dependents and more adult have more chances to participate in these activities. The odds indicate 0.04 chances of not participation of the dependents.

The co-efficient of land owned is negatively associated with the involvement in farm based non-agricultural activities. It implies that a decrease in land owned increases the chances to involve in farm based non-agricultural activities. The poverty status (poor) is significantly and positively associated with the farm-based non-agricultural activities. The odds indicate that poor households have 3.16 chances of participation in these activities. This result is line with the findings in rural Armenia (Bezemer and Davis, 2003).

Table 2 Estimated Results for the Participation in Wage-Employment

Variable	B	S.E	Wald	Sig.	Exp (B).
Education Hh. H.	.15	.08	3.52	.061	1.16
Animals	-.29	.11	7.78	.005	.74
Hh. Size	.41	.15	7.11	.008	1.51
Dependency	-2.69	1.14	5.57	.018	.07
M.F. Ratio	.53	.25	4.38	.036	1.70
Constant	-2.96	1.58	3.49	.061	.052
No. Of Observations	100				
Chi Square	33.48				

Note: Authors' own calculations.

Education is a significant and positive determinant of wage employment. It explains that the probability to participate in wage-employment increases with the number of years of schooling. The odds in favour of participation increase about 1.16 for educated household head. This result is in line with the finding in rural south east Nigeria (Ibekwe et al., 2010).The animal size is negatively associated with the participation in wage-employment. It indicates that as the number of animals decrease, it increases the chances to involve in wage-employment. The result is similar with the findings in rural Georgia (Bezemer and Davis, 2003).

The coefficient of household size is significant and positive factor to participate in wage-employment. It implies that families with more members have more chances to involve in wage-employment. The odds show that wage- employment increases 1.51 for large families. The similar result is found by Arif et al. in rural Pakistan (2000).The coefficient of dependency has negative sign. This may be attributed as the number of dependents decrease, the participation level increases. Children and older people stand a 0.07 chance of not participating than their younger counterparts in wage-employment. The M.F ratio is also significantly and positively related to involvement in wage employment it implies that households with more male members have more chances to involve in wage-employment. The odds in favour of participation increase by 1.70 for those families.

Table 3.Estimated Results for the Participation in Self-employment

Variable	B	S.E.	Wald	Sig.	Exp(B)
Land	-.29	.12	6.07	.014	7.45
Animals	.12	.05	6.36	.012	1.13
Assets	1.57	.67	5.49	.019	4.82
Hh. Size	.33	.18	3.49	.062	1.39
Age	-.06	.03	3.04	.081	.94
Edu. E	2.05	1.06	3.71	.054	7.74
Edu. Hs	1.08	1.04	1.08	.300	2.93
Edu_ u	-.43	1.46	.085	.770	.65
Constant	-2.37	2.20	1.15	.282	.09
No. of	100				
Chi Square	36.03				

Note: Authors' own calculation

The coefficient of land owned is negatively associated with the involvement in self-employment activities. It implies that a decrease in land owned increases the chances to involve in self-employment. Non-farm self-employment is significantly and positively associated with animals and assets. The positive coefficient of animal can be interpreted as that an increase in the number of animals enhances the 1.13 chances for the likelihood of participation in self-employment. This result is in line with Lay et al. in rural Kenya (2007). The ownership of assets such as (tools, machines, and equipments) enhances the probability to involve in self-employment in rural areas such as tailor, barber, carpenter, blacks smith, mechanics etc. The odds indicate 4.82 chances for asset owner in self-employment activities. It is consistent to the findings of Escobal (2001) in rural Peru. Household size is also positively related with the involvement in self-employment activities. Having more members in the family have more chances to involve in non-farm self-employment. The odds indicate 1.39 chances for each additional member in a household. However, the probability of participation in self-employment activities decrease with age, older people stand a 0.94 chance of

not participating than their younger counterparts. Thus, the young people are more likely to take up opportunities in self-employment. This finding is similar to Abdulai and Delgado (1999) in Ghana.

The three education levels, middle level, higher secondary level and university level education are included to analyze the effects of different levels of education on self-employment activities. Middle level of education is significantly and positively related with the involvement in self-employment activities. It indicates that the household head having, up to middle level education (as compare to those household head who never attended the school) have 7.74 more chances to involve in self-employment.

Determinants of Household s' Income/poverty

This section presents a detailed discussion on the determinants of total income. A semi-log multiple regression model is estimated to determine the factors which effect the household s' total level of income. The dependent variable is logarithm of the total income of a household per month. The independent variables are education, land, age, assets, No. of adults in household, and multiple sources of income of a household. The results are explained, as per unit change in the size and magnitude of the coefficients.

Table 4. Estimated Results for the Determinants of Household s' income/poverty

Variable	Coefficient	S.E.	t-values	Sig.
Edu.Hh.H.	.04	.96	2.48	.015
Land	.06	.12	5.38	.000
Assets	.20	.12	1.64	.105
Age Hh.H	.01	.01	1.83	.070
Adults Hh.	.06	.03	2.29	.024
Multiple Sources.	.35	.11	3.16	.002
Constant	8.36	2.82	29.61	.000
No. Of	100			
R-Square	0.52			
F - value	16.72			

Note: Authors' own calculation

Education is significantly and positively associated with household`s total income. It can be explained as that education expands the opportunities for educated household heads to improve the income level and reduce their dependency on farming by enhancing the probability to involve in non-farm employment. The result implies that every additional year of schooling is raising the income by four percent. It is consistent with the findings in rural Paraguay (Correa, 2008).

The Land ownership is a key factor to influence the income level. Land ownership contributes positively to income level. Every additional acre of land cultivated leads to rise in income by six percent. This result is in line with Akram et al. (2011) in rural Pakistan. The assets are positively associated with household's income. It can be interpreted as that ownership of assets can be helpful to the owner to involve in both farm and non-farm activities. The coefficient indicates that one unit increase in assets raises the income level by 20 percent. The coefficient of age is positively linked to income level of household. It implies that as a person gets older, he is more likely to have better income from farm and non-farm sources. Age composition is an important factor in the determination of one s' attitude toward work. The coefficient implies that every additional year of age increases the income by one percent. The number of adults in a family is

significantly and positively related to total income level. Every additional adult member in household raises the income by six percent. This is consistence with the findings by Reardon (1997).

The coefficient of multiple sources is positively related to total income. It shows that access to each additional non-farm source lead to an increase in income by 35 percent. This result is similar with the findings by Akram et al. (2001) in rural Pakistan that the households adopted both occupations (Farm plus Non-Farm) were better off than those households who adopted only one occupation. This result is also in line with the findings by Lanjouw and Shriff (2002) in rural India. Participation in non-farm sector has an important contribution toward increasing the total income of the mixed farmers.

Conclusion

High level of rural poverty, under-employment in agricultural sector and rural urban migration has increased the significance of non-farm sector in rural areas of Pakistan. This study is based on primary data collection in Tehsil Sillanwal District Sargodha, Punjab, Pakistan. The results show that the poor households are engaged in farm based non-agricultural activities e.g. cart pulling, sheep rearing etc. Landlessness pushes them toward such activities and possession of animal makes it easier to get involve in farm based non-agricultural activities. Wage-employment activities are mainly determined by human capital factors. Education is the one of the major determinants of wage employment. Self-employment is associated with the availability of capital assets. Landlessness is also a major factor to push the rural household in non-farm sector. As far as the determinants of income is concerned, the land-ownership, education of household head, No. of adults in a family and having multiple sources of income (Farm plus non-farm) are conducive to raise the income level of rural households that will result in reduction in poverty.

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