

The Impact of Non-farm household Enterprises on Rural Household Income: A Case of Pakistan

Sohail JAVED* and Fouzia SOHAIL**

Abstract

Given the employment trends (slow growth) in the agriculture sector, researchers and policy-makers have started evaluating the role of the non-farm sector in sustaining employment in the rural economy. Apart from participation in non-farm activities, in Pakistan, as reported in the Household Income and Expenditure Survey (HIES) 2018-19, around 21.7 per cent of households exclusively reported operating non-farm enterprises (NFEs). NFEs support farm income, smooth seasonal fluctuation in income, and mitigate labour market uncertainties by absorbing surplus labour. In this connection, the paper aims to explore the opportunities available to the rural labour force within the non-farm sector as the growth in the agriculture sector remains stagnant and fails to absorb the growing labour force. The research in the area mainly remains focused on exploring the effect of non-farm activities while neglecting the role of non-farm enterprises that not only generate substantial income for poor households but also create employment opportunities in the rural areas of Pakistan. The paper investigates the role of NFEs in generating employment and income by employing nationally representative data of HIES conducted in 2018-19, and by employing the Heckman Selection model. The results suggest that rural NFEs make positive contributions in rural areas by generating employment and income. Explicitly, NFE on average, generate employment for 59 per cent of the working people in households located in rural areas of Pakistan and generates a monthly net income of around Rs. 140,264 at all Pakistan level and Rs. 98,828 for the rural areas. Considering the NFEs operating in the rural areas only, results reveal that net income and gross profit generated by the NFEs operating in Khyber Pakhtunkhwa and Punjab are higher than those operating in the rural areas of Sindh and Balochistan. Further, results based on the Heckman Selection approach confirm that after controlling for non-random self-selection bias into entrepreneurship, socio-economic characteristics function as significant determinants of total income among households engaged in non-farm enterprise ownership.

Keywords: Non-Farm Enterprises, Household Income, Employment Opportunities, Heckman Selection Model.

JEL Classification: C34, Q10, Q19, J21, J46, O17, R2.

I. Introduction

It is evident from the current situation that Pakistan's economy is undergoing a period of transformation, generating labour market mismatch and higher unemployment-

* Lecturer, ** Assistant Professor, Applied Economics Research Centre AERC, University of Karachi, Karachi, Pakistan.

ment. The last few decades have shown that the labour market is continuously facing disequilibrium. During the period 2017-18 to 2020-21, though the growth rate of the economy has improved, the employment growth (9 per cent, from 61.71 to 67.25 million) remains slower than the increase in the labour supply (65.5 to 71.76 million – around 10 per cent), further adding a rough number of about 4.51 million in the unemployed labour force (Economic Survey of Pakistan – various issues). As stated in the United Nations Development Program (UNDP-2018) report along with the Labour Force Survey (2014-15), Pakistan requires generating 1.3 million new job prospects annually to facilitate the influx of new entrants. The rapid population growth, along with a rising number of new entrants into the labour force, creates a distressing situation, as the required employment generating rate to absorb the unemployed is slow. The worst-hit areas are the rural areas, where employment in agriculture, forestry, live-stock, and fishing shows a negative employment trend. Employment in this sector declined from 39.2 per cent in 2018-19 to 37.4 per cent in 2020-21, while the rural civilian labour force increased from 45.86 million to 48.5 million during the same period (Labour Force Survey – various issues). The data confirms the need to generate employment opportunities for the increasing labour force on an immediate basis. If the issue at hand is not tackled on an immediate basis, the chances are that the situation will get worse with the escalation in poverty levels, as unemployment will eventually create poverty and inequalities in the country, especially in rural regions of the country where most of the population is dependent on agricultural activities. Though comprehensive sectoral policy reforms are needed to generate employment, however, the study remains focused on sectoral reforms needed for rural development, given the worst employment situation in rural areas. The study aims to explore the opportunities available to the rural labour force within the non-farm sector as the growth in the agriculture sector remains stagnant and fails to absorb the growing labour force.

Policies aiming at rural development have neglected the role of rural non-farm activities (such as value chain activities – processing, marketing, and distribution). According to Farooq and Younais (2018), in the presence of skewed land distribution and fluctuating agricultural growth, the rural non-farm sector is an important pathway for poverty reduction and employment generation.

Rural households often face the challenges of coping with low incomes and negative crop shocks, making it difficult to smooth consumption. Owning and operating a non-farm enterprise can be a solution as it derives from both push (necessity) and pull (opportunity) factors. Pull aspects, such as the chances to produce earnings in the lean season, and push aspects, such as low earnings and undesirable shocks, motivate households to minimise their exposure to shocks by operating such an enterprise. This type of enterprise is generally referred to as a ‘family firm’, because if a member of the household loses a job, this person’s labour supply is normally absorbed into the family business. Therefore, owning and operating a non-farm enterprise can be a viable solution for rural households facing economic challenges.

Further, the influence of household enterprise on household income or the performance of the enterprise is principally grounded on the evidence from advanced economies; the issue gains less importance in emerging economies—more specifically, in Pakistan. Nevertheless, about 70 per cent of the economy is informal. Policymakers in Pakistan, though, recognise that the growth in the informal sector is providing employment to many but fail to recognise the role that Household Enterprises (HEs) are playing in creating employment opportunities.

Globally, it is evident that NFEs are among the significant players that have generated socioeconomic growth for several nations. The majority of NFEs are informal and are the foremost foundation for creating income and employment. For example, Adeyonu, et al. (2024) for Nigeria explore the effect of NFEs on Poverty; Pritchard et al. (2019) for Myanmar explore its effect on household food security; Seng (2015) for Cambodia explores its effect on food consumption. Further, Barrett et al. (2001) and Reardon et al. (2000) found that its income contributes about 40 per cent to 45 per cent of Latin America and Sub-Saharan Africa's rural household income while constituting 30 per cent to 40 per cent of South Asia's household income. Moreover, for Sub-Saharan African countries, the share of enterprise in employment and income-generating activities has seen considerable upsurges (Lanjouw & Lanjouw, 2001; Start, 2001; Haggblade et al., 2010). However, in the case of Pakistan limited studies are available on the topic; for example, Rashidin et al. (2020); Farooq and Younais (2018); (Saqib et al., 2018) Sur and Jian (2006), World Bank (2007) and Malik (2008); Arif et al. (2000); and Nasir (1999) indicating the positive role, these enterprises are playing in case of Pakistan. The research in the area mainly remains focused on exploring the effect of non-farm activities while neglecting the role of non-farm enterprises that not only generate substantial income for poor households but also create employment opportunities in the rural areas of Pakistan, except for the study conducted by Farooq and Younais (2018). According to Farooq and Younais (2018), the literature available in Pakistan remains focused on issues related to agriculture and poverty, ignoring the role of the rural non-farm economy in poverty alleviation and resource diversification. Their study is based on the two rounds of the Pakistan Panel Household Survey (PPHS), 2001 and 2010; much has changed since then and hence needs re-assessment. The potential of NFEs to absorb the unemployed labour force and generate income for poor rural households is crucial and needs assessment. In this study, we will look at the important role that non-farm household enterprises (NFE) play in income generation and employment creation in Pakistan, mainly covered in the data under the umbrella of non-farm income-generating activities (NFA) by employing the Household Income and Expenditure Survey of Pakistan conducted in 2018-19.

The study is divided into five sections: after the introduction, the Section II discusses the literature that provides the basis for the model formation, Section III discusses the model to empirically test the objectives, Section IV discusses the results, and the final Section V concludes the study by giving some policy implications.

II. Literature Review

The literature section is divided into three parts; the first part evaluates the studies that have examined the household decision to own and operate NFE, while the second part of the literature summarises the findings of those papers exploring the effect of NFE on household income, while the third part summarises the literature on Pakistan.

1. *The Decision to Operate an NFE*

Herrington and Kelly (2012) group the factors influencing household decisions to operate NFE into two: the push (necessity) and pull (opportunity) factors. As agricultural income is seasonal, households during this period look for opportunities outside agriculture - pull factor. The push factors, on the other hand, focus on income shocks associated with agricultural production (Barrett et al., 2001). In the presence of credit market and crop loan insurance imperfections, in some cases, households are motivated to operate enterprises to maintain current consumption and to ease agricultural production loss/income shocks (Janvry and Sadoulet, 2006; Dercon, 2009). Further, in times of employment shocks, i.e. when any member faces the loss of employment, these enterprises often absorb the surplus labour, thus reducing the income shocks (Bridges et al., 2013). These enterprises often reduce the burden on fixed farmland (Reardon, 1997; Reardon et al., 2006; Babatunde & Qaim, 2010). Based on the experience from rural Africa, Ngenzebuke et al. (2014) concluded that household enterprises sometimes maximise a single utility function. Alternatively, collective decision-making occurs (Chiappori, 1992), sometimes in a cooperative or in a non-cooperative way (Manser & Brown, 1980), meaning conflicts can arise. For example, given the gender norms, female-owned enterprises may be limited in number. Female enterprises are constrained by discrimination in labour markets and 'rigid social norms' (Minniti & Naudé, 2010). Nevertheless, females tend to be more involved in non-farm activity than men, given its nature – home-based work (Canagarajah et al., 2001; Rijkers & Costa, 2012; Ackah, 2013).

2. *Contribution of NFE to Household Income*

Agriculture as a main source of generating income has become unsuccessful in generating a secure and sustainable income and livelihood for the majority of the households residing in rural regions and depending on farming in developing countries. Henceforth, there is a dire need for modification from traditional farming into off-farm and/or non-farm activities, as it has become a survival approach for most of the households associated with rural farms (Pritchard et al., 2019; Seng 2015; Nagler and Naudé, 2014; Haggblade et al., 1989, Davis et al., 2014). Various studies, which are based on cross-country data, depict that approximately 44 per cent of the rural households in

Africa are involved in non-farm activities (Davis et al., 2014). Recently, Adeyonu, A. et al. (2024), employing the Nigerian Living Standard Survey, concluded that households participating in the non-farm enterprise experience a lower incidence of poverty.

In Mexico, non-farm activities contributed an average of 55 per cent to rural household income (Janvry & Sadoulet, 2001), while in Peru, the contribution reported is around 51 per cent (Escobal, 2001). Further, Lanjouw & Lanjouw, 2001 reported the contribution of non-farm activity for Brazil is around 39 per cent, 41 per cent for Chile, 50 per cent for Colombia, and 59 per cent for Costa Rica. For China, Shi et al. (2007) reported a contribution of around 46 per cent to household income. The non-farm sector has the potential to absorb surplus labour from agriculture, reduce urban-rural migration, and eliminate poverty by contributing to household income substantially (Davis, J. R. 2003 and Davis, J. R. & Pearce, D. 2001).

Moreover, the NFA is essential for the rural economy because of its linkages with production and employment generation. The households in rural regions with landless and near-landless status are heavily reliant on non-farm income for their survival (Haggblade, S., Hazell, P. & Reardon, T. 2010). Moreover, farm households depend entirely on farm income to satisfy their consumption demands. But for households with additional income, the budgetary constraints are relaxed, making more profit available for investment (O'Brien, M., & Hennessy, T. 2008). Non-farm activities in rural regions contribute meaningfully to poverty alleviation, food security, and improved rural household welfare. Consequently, the expansion of activities which are not farm-related in rural regions has the potential to create income divergence, as it is the most desirable policy objective, since they can potentially give individuals and households an extra option to expand their livelihood security and living standards (Bayissa, F. W. 2011). Overall, non-farm income is reported to play a significant role in total income (Zhu, N. and Luo, X. 2005). According to Haggblade, S., Hazell, P. & Reardon, T. (2010), non-farm earnings account for 35 to 50 per cent of rural household income in many developing countries.

3. *Studies on Pakistan*

Though NFA plays a pivotal role in poverty alleviation if available to poor households, very few studies have explored its role in Pakistan's rural economy. Recently, Rashidin et al. (2020) indicated that households in NFA could also invest in agricultural activity to increase agricultural production. According to the study, farm income can be invested in the NFA, and the profits generated from the NFA can be reinvested in agricultural activities. They also explored the impacts of other factors, such as age, gender, location, etc., on non-farm income and agricultural productivity. In addition, according to Saqib et al. (2018), the contribution of NFA to rural household income is influenced by many factors such as land, technological resources, capital, and labour. Finally, some earlier studies conducted on the topic include: Nasir (1999)

analysed the link between poverty and employment; Arif et al. (2000) viewed the level of poverty among the various farm and non-farm groups; Sur and Jian (2006), World Bank (2007) and Malik (2008) analysed the structure of the rural non-farm economy. However, to date, very limited literature has analysed its importance for employment and income generation, specifically in the case of the rural economy.

III. Methodology

Non-farm or small household enterprises give economic power and remove the financial constraints that poor rural households often face. The NFEs are presumed to have a direct impact on income and employment. But to assess its impact, the study must address the selectivity issue – the decision to own and operate a non-farm enterprise in rural settings where agriculture is always considered a primary source of livelihood, which may be influenced by selection into entrepreneurship instead of employment in agriculture. For this, the study has scrutinised factors like socio-economic aspects that significantly impact household choices before assessing the factors influencing household income. Therefore, the study employed the Heckman selection model (Tobit Type 2), which corrects selectivity bias.

More precisely, the study has incorporated the two-step Heckman Selection Model to examine the impact of NFEs on household yearly earnings. In step 1, the probit model was employed to generate the inverse Mills ratio based on the aspects affecting the household's decision regarding operating and owning enterprises. In step 2 of this technique, the outcome equation is employed to assess the influence of socio-economic factors, after correcting for the selection into own and operate an enterprise, on household income. The significant and positive sign of the inverse Mills ratio coefficient suggests that the selection equation (ownership of an enterprise) is ruled by the unobservable selection process. If it turns out insignificant, we consider ordinary least squares as the best unbiased estimator. In our model, the selection equation determines the factors influencing ownership of an enterprise, while the outcome equation shows factors influencing household income. The decision to get involved in entrepreneurial activity while one is a resident of a rural community is given in Equation (1);

$$ent_i = \beta_0 + \beta_1 MALE_i + \beta_2 \sum_{s=1}^2 HOUS_{is} + \beta_3 CONG_i + \beta_4 \sum_{k=1}^2 HEAD_{ik} + \beta_5 POV_i + \beta_6 REG_i + \varepsilon_i \quad (1)$$

ent_i is a dependent variable representing ownership of the enterprise, where i depicts the household, whereas $MALE_i$, the proportion of males in the household is an independent variable – the main labour supply needed to run the enterprise. Household characteristics are represented by $HOUS_{is}$ here; it includes the availability of gas and electricity in the household (energy resources needed to run the enterprise); meanwhile, $HEAD_{ik}$ indicates the head characteristics, i.e. his/her age and

education, that can motivate or demotivate the household members to operate an enterprise. The dummies for provinces POV_i and regions REG_i are also incorporated in the model. Likewise, the error term is indicated by ε_i .

Subsequently, the outcome model, which assesses the impact on household income, is expressed in Equation (2);

$$HHIN_i = \beta_0 + \beta_1 \sum_{s=1}^5 HOUS_{is} + \beta_3 \sum_{k=1}^2 HEAD_{ik} + \beta_4 \lambda_i + \beta_5 POV_i + \beta_6 REG_i + \varepsilon_i \quad (2)$$

In Equation (2) $HHIN$ - the dependent variable is the annual household income. The model includes the inverse Mills ratio generated from the above probit regression - the lambda. The significance of the λ_i , helps to conclude the presence of selection bias. In the outcome model, the study has included the characteristics of the head of the household (his/her age and education) and the housing characteristics, the same as in equation 1. Further, by adding a few more housing characteristics, such as the availability of piped water and improved toilet facilities, the study aims to seek the effect of a household's socioeconomic status on household income – if the condition deteriorates, the household will be motivated to generate more income.

Moreover, the study has also included the number of earners in the outcome model to examine its influence on the decision to own and operate an enterprise, given the argument that surplus labour, such as family labour, is allocated to these enterprises to avoid the cost of hired labour.

1. *Assessment Technique -The Heckman Selection Model*

The estimation is conducted using Heckman's two-step model, which specifies that taking part in NFA is a decision that probably positively and significantly influence household income. The first stage identifies factors that affect the decision to take part in such activities, examined by employing the Probit model in Equation (3);

$$Z_i = X_i \beta + \mu_i \quad (3)$$

Z_i is the dichotomous variable having (1, 0) values; 1 indicates that the household is operating the NFE, 0 otherwise. Whereas X_i is a set of household and head of the household personal characteristics. Further to this, the variable X_i also includes the dummies to capture the Provincial and regional variation as well, while μ_i depicts the error term. The inverse Mills' ratio is calculated by using the probit model in Equation (4);

$$\lambda_i(b) = \phi(b)/1 - \Phi(b) \quad (4)$$

where; $b = X_i \beta / \sigma$

Here, the λ_i indicates the inverse mill's ratio; ϕ displays the density function, and Φ is the cumulative distribution function. In the second step of regression, the mill's ratio is also included as a variable to demonstrate its effect on the outcome variable.

The outcome model will help explore the core factors that tend to affect households' total income after adjusting for the choice to own and operate the NFE. According to the Heckman approach, the first step model will employ the Probit model for estimation purposes, while the second step regression is based on OLS. It is important to note that in this method, the Probit model's first step helps produce the inverse mills ratio. In case, the coefficient of the inverse Mills ratio is significant, it will affirm that a selection process leads the income model. The outcome Equation (5) can be written as:

$$Y_i = \alpha_0 + \alpha_1 \psi_i + \alpha_2 z_i + \alpha_3 \lambda_i + \varepsilon_i \quad (5)$$

Y_i has been taken as an outcome variable in the above equation, which represents the income of the household, whereas ψ_i is an amalgamation of multiple features, Z_i shows the selection equation, while λ_i is the representative of the inverse mills ratio.

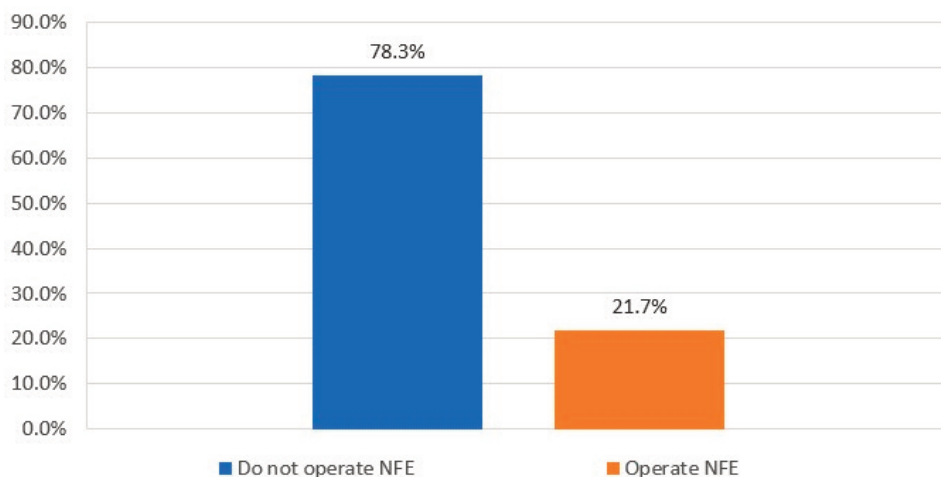
Finally, the study acknowledges that the adopted Heckman Selection model is a classic Heckman sample selection model, employed to estimate strictly on the sub-sample of NFE operators to correct for selection into NFE operation, rather than a treatment effect model. Therefore, the results do not directly isolate the overall treatment effect of NFE ownership across the entire population; instead, it establishes the presence of selection bias ($\lambda_i > 0$) and identifies the determinants of income specifically conditional on choosing to run an NFE. Though the classical Heckman selection model is enough to evaluate the objectives, the study acknowledges that a full endogenous treatment-effects framework remains unanswered, a limitation that this study faces. Future studies may look into this neglected treatment effect.

IV. Results and Discussions

This section begins by exploring the presence of non-farm activities in Pakistan and their contribution in generating employment and income, especially in the context of the rural economy.

1. Descriptive Assessment

As depicted in Figure 1, out of the total 24,809 households surveyed, around 21.7 per cent reported operating non-farm enterprises. The regional distribution shows that out of the total 8,873 urban households, 30.4 per cent are running non-farm enterprises, while among the 15,936 rural households, only 17 per cent are running non-farm enterprises. The distribution of non-farm enterprises across provinces and regions presented in Table 1 shows almost equal distribution patterns among the regions of the



Source: Authors' estimation based on HIES dataset 2018-19.

FIGURE 1
NFE in Pakistan

two provinces, KPK and Punjab (around 54 per cent in rural areas and 46 per cent in urban areas); however, in Sindh, the distribution of NFEs across regions shows variation. The share of NFEs in Urban Sindh is around 65 per cent, while 35 per cent of NFEs are located in rural areas.

The Balochistan case is also similar to Punjab and KPK, with the difference that more NFEs are located in urban areas (57 per cent) than in rural areas (43 per cent).

Tables 2 and 3 show that people are mainly involved in non-farm activities related to wholesale and retail trade, motor vehicle and motorcycle repair, transportation and storage of goods, and activities related to manufacturing wearing apparel, grain mill products, bakery products, furniture, carpentry, wood products, metal, and iron products.¹ Specifically, of the total 699 manufacturing units operated within the household, 595 are presented in Table 3 only; this is in order to avoid giving details about the household NFEs having a very small share. Out of the 595 reported NFEs, 56 per cent are related to manufacturing of wearing apparel.

As far as employment generation is concerned, Table 4 shows that NFE, on average, generates employment for 59 per cent of the working people in rural areas of Pakistan.

¹ Specifically of the total 699 manufacturing units operated within the household 595 are presented in Table 3 of which 56 per cent is related to manufacturing of wearing apparel. However, in the total manufacturing its share is 42 per cent. In order to avoid giving details about the household NFEs having very small share here we focus only on the major ones.

TABLE 1
Presence of Non-Farm Enterprises by Province and Region

Province	Region	Non-Farm Enterprise Ownership
Khyber Pakhtunkhwa		623
	Rural	-53.80%
	Urban	534
		-46.20%
	Total	1157 (21.4%) of the Total 5419
Punjab		1579
	Rural	-53.50%
	Urban	1375
		-46.50%
	Total	2954 (54.5%) of the Total 5419
Sindh		332
	Rural	-34.90%
	Urban	619
		-65.10%
	Total	951 (17.5%) of the Total 5419
Balochistan		155
	Rural	-43.40%
	Urban	202
		-56.60%
	Total	357 (6.6%) of the Total 5419
All Pakistan		2689
	Rural	-49.60%
	Urban	2730
		-50.40%
	Total	5419

Source: Authors' estimation based on HIES dataset 2018-19.

TABLE 2
Presence of Non-Farm Enterprises by Industry

Industries	All Pakistan Rural Areas	
	%	%
Agriculture, forestry and fishing	0.63	0.87
Mining and quarrying	0.03	-
Manufacturing	13.79	14.61
Electricity, gas, steam and air condition	0.05	-
Water supply sewerage, waste management and remediation	0.19	0.14
Construction	0.87	0.70
Wholesale & retail trade repair of motor vehicles, motorcycles	50.25	48.56
Transportation and storage	16.99	19.83
Accommodation and food service activities	3.79	3.62
Information and communication	0.20	0.10
Financial and insurance activities	0.03	-
Real estate activities	1.57	0.66
Professional, scientific and technical activities	1.04	0.56
Administrative and support service activities	0.51	0.45
Public administration and defence compulsory social security	0.05	0.03
Education	0.85	0.87
Human health and social work activities	1.47	1.29
Arts, entertainment and recreation	0.31	0.17
Other service activities	7.32	7.51
Activities of households as employers undifferentiated goods	0.05	0.03

Source: Authors' estimation based on HIES dataset 2018-19.

TABLE 3
Percentage of NFEs in Major Manufacturing Sector

Sectors	% of Major Manufacturing Units
Manufacture of footwear	2%
Casting of iron and steel	2%
Manufacture of other food products n.e.	2%
Manufacture of clay building materials	3%
Manufacture of builders' carpentry and	3%
Manufacture of other products of wood	3%
Manufacture of basic iron and steel	3%
Manufacture of jewellery and related articles	4%
Manufacture of structural metal product	4%
Manufacture of bakery products	5%
Manufacture of furniture	5%
Manufacture of grain mill products	8%
Manufacture of wearing apparel	56%

Source: Authors' estimation based on HIES dataset 2018-19.

TABLE 4
Proportion of Earners in Rural NFE

Province	Mean
Khyber Pakhtunkhwa	0.62
Punjab	0.6
Sindh	0.52
Balochistan	0.54
Total	0.59

Source: Authors' estimation based on HIES dataset 2018-19.

Table 5 reports that NFEs operating at all Pakistan levels generate a monthly net income of approximately Rs. 140,264, while those operating exclusively in rural areas generate a monthly net income of approximately Rs. 98,828. Taking into account both urban and rural regions, the table shows that NFEs in Sindh and Punjab generate higher net income than those in KPK and Balochistan. The gross profit in Khyber Pakhtunkhwa is slightly higher than in Sindh. Considering the NFEs operating in the rural areas only, Table 6 reveals that net income and gross profit generated by the NFEs operating in Khyber Pakhtunkhwa and Punjab are much higher (greater than Rs. 100,000) than those operating in the rural areas of Sindh and Balochistan. This indicates that the NFEs' business environment is more supportive in these regions. The number of NFEs operating in these regions is also higher, confirming the opportunities available there.

To verify location-based variations in net income, Kernel Density estimates are also employed to evaluate the dispersion of enterprise income across locations, regions, and provinces. Kernel density estimation in the figures below is useful for analysing locations with particularly high or low performance – i.e. having low or high net income in a sample as a function of regional and provincial variations. Figure 2 presents

TABLE 5
Net Income and Gross Profit of NFE – All Pakistan

Province	Net Income (Annual)	Net Income (Monthly)	# NFE
Khyber Pakhtunkhwa	1,557,419	129,785	1157
Punjab	1,790,154	149,179	2954
Sindh	1,613,251	134,438	951
Balochistan	1,391,739	115,978	357
Total	1,683,170	140,264	5419
Province	Gross Profit (Annual)	Gross Profit (Monthly)	# NFE
Khyber Pakhtunkhwa	1,894,103	157,842	1157
Punjab	2,078,296	173,191	2954
Sindh	1,892,043	157,670	951
Balochistan	1,755,723	146,310	357
Total	1,985,032	165,419	5419

Source: Authors' estimation based on HIES dataset 2018-19.

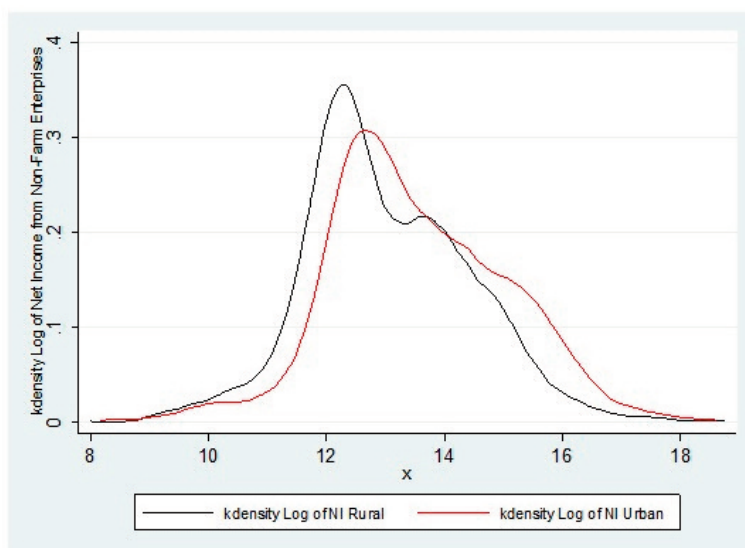
the kernel density plot to compare the distribution of logged net income from non-farm enterprises between rural and urban areas. Urban households tend to generate more income from non-farm enterprises on average and at the most common income level, but their incomes vary much more widely. The rural household, on the other hand, clusters more around a relatively lower but more uniform income level. For the income distribution of rural households, the k-density graph falls off sharply on both sides, indicating that rural incomes are fairly homogeneous—most people earn similar net income. For the household enterprises run by urban households, the distribution is more spread out, indicating greater income variation among them.

Further, all four distributions shown in Figure 3 are unimodal, i.e., having a single peak, and are also right-skewed, meaning most enterprises cluster at lower-middle incomes with a long tail of higher earners. The key takeaway is that Balochistan shows a notably higher concentration of non-farm enterprises earning more, while Sindh and Punjab have lower typical incomes with greater dispersion. Balochistan, in green, stands out with distribution peaks at its highest and furthest to the right, meaning non-farm enterprises there tend to earn the highest net incomes, and incomes are more concentrated around that higher value. KPK in black is second in earnings. Punjab in red,

TABLE 6
Net Income and Gross Profit of NFE – Rural Areas

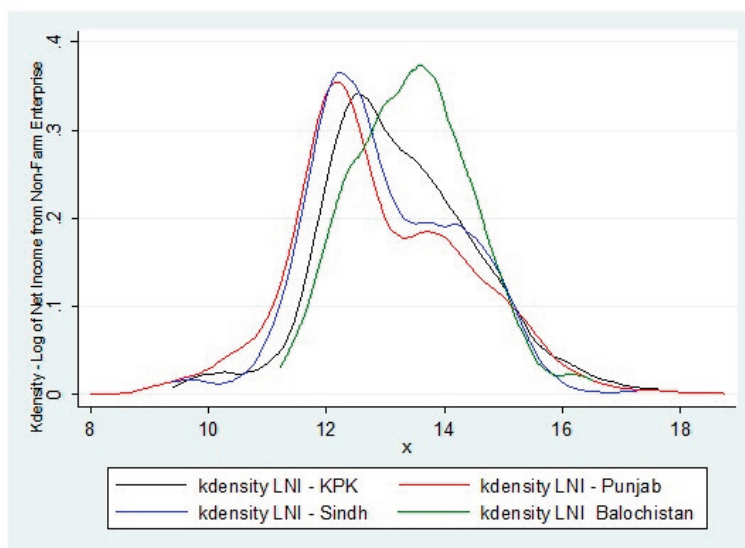
Province	Net Income (Annual)	Net Income (Monthly)	# NFE
Khyber Pakhtunkhwa	1,327,766	110,647	623
Punjab	1,201,433	100,119	1579
Sindh	950,037	79,170	332
Balochistan	963,201	80,267	155
Total	1,185,931	98,828	2689
Province	Gross Profit (Annual)	Gross Profit (Monthly)	# NFE
Khyber Pakhtunkhwa	1,587,165	132,264	623
Punjab	1,412,502	117,709	1579
Sindh	1,162,586	96,882	332
Balochistan	1,284,522	107,044	155
Total	1,414,735	117,895	2689

Source: Authors' estimation based on HIES dataset 2018-19.



Source: Authors' illustration based on HIES 2018-19.

FIGURE 2
Net Income Dispersal by Region



Source: Authors' illustration based on HIES 2018-19.

FIGURE 3
Net Income Dispersal by Province –Rural Areas only

and Sindh in blue sit lower and have broader, flatter peaks, indicating more spread or variation in incomes across enterprises.

The discrepancy among the Tables (5 & 6) and the K-density graphs (Figure 2 & 3) is because the tables report the average net income, which is highly sensitive to extreme values, while the highest peak in a K-density graph represents the most common value – the mode value. The K-density peak indicates the income level at which the highest number of people in that province earn, while the average summarises all incomes divided by the total number of people. Further, net income data is right-skewed, meaning that while a large share of the population in that province clusters at relatively low or moderate incomes, a small fraction earns astronomically high amounts. Moreover, for Balochistan, we discuss the results with caution, as many areas remain inaccessible during surveys due to law-and-order conditions. Therefore, the situation depicted in the figure might differ significantly in reality.

The descriptive assessment above sheds some light on the contribution these small non-farm enterprises made to the rural economy. However, to have a detailed assessment, the study proceeds to the empirical assessment of the model developed above.

2. Empirical Assessment

The empirical assessment began by exploring the impact of the presence of household non-farm enterprise on household income first without correcting selection bias – Table 7. However, as discussed above, in the presence of a selectivity issue, the OLS results would be biased; therefore, in the next stage, the study checked for the selectivity issue by running the Heckman selection model. As the Mills ratio is highly significant, the study considers the results corrected for the selection bias as the final one – the estimates of the Heckman Selection Model.

a) Results without Correcting Selection bias

Table 5 below shows the highly significant positive effect of enterprise ownership on household income for both at all Pakistan levels and for rural regions exclusively as well. Precisely, ownership of household enterprise increases household income by around Rs. 53,099 and Rs. 63,917 annually in all Pakistan and in rural areas, respectively.

Other factors influencing household income include the positive effects of; the number of household earners, availability of facilities except piped water (which shows a negative effect), head age and education.

The results confirm that NFE contributes significantly to raising household income, as illustrated by a positive association of the variables with household income. However, as discussed earlier, these results could be biased if we consider the selectivity issue in the model. Hence, we move to explore the effect of explana-

tory variables on household income, correcting the selection bias—the two-step Heckman selection model.

b) Results after Correcting Selection bias

The Heckman Selection model is based on two steps: the first explores the factors influencing the household decision to own and operate an NFE in a rural setting, while the second examines the factors contributing to household income after controlling for

TABLE 7
Empirical Results – Based on OLS

Household Income	All Pakistan			Rural		
	Coef.	t	P> t	Coef.	t	P> t
Enterprise Ownership	53,099	10.97	0.00*	63,917	12.80	0.00*
# of Earner	75,897	44.24	0.00*	60,232	40.23	0.00*
Gas	76,393	12.94	0.00*	69,247	11.90	0.00*
Electricity	17,056	2.25	0.03**	29,540	4.90	0.00*
Toilet	33,862	6.47	0.00*	22,778	4.86	0.00*
Piped Water	-9,690	-1.64	0.10***	14,286	2.20	0.03**
Head - Years of Education	22,464	48.45	0.00*	17,243	37.86	0.00*
Head Age	3,852	22.87	0.00*	2,740	17.75	0.00*
Province						
Punjab	-12,678	-2.04	0.04**	-16,415	-2.91	0.00*
Sindh	-50,298	-6.93	0.00*	-46,404	-6.66	0.00*
Balochistan	30,554	3.30	0.00*	39,821	4.68	0.00*
Urban	74,186	12.64	0.00*			
Constant	-172,671	-14.96	0.00*	-78,771	-7.81	0.00*
Number of obs.		24752			15894	
F(12, 24739)		612.45			406.62	
Prob. > F		0.00			0.00	
Adj. R-squared		0.23			0.22	

Source: Authors' estimation based on HIES dataset 2018-19.

Note: *, ** & *** represent significance at 1 per cent, 5 per cent and 10 per cent significance levels.

TABLE 8
Empirical Results – Controlling for Selection Bias

Household Income	All Pakistan			Rural		
	Coef.	z	P> z	Coef.	z	P> z
No. of Earner	85,595	20.51	0.00*	71,666	13.98	0.00*
Gas	140,890	8.29	0.00*	129,263	5.52	0.00*
Electricity	104,089	3.63	0.00*	85,748	2.76	0.01*
Toilet	43,048	3.34	0.00*	35,305	2.23	0.03**
Piped Water	-18,772	-1.41	0.16	58,968	2.91	0.00*
Head - Years of Education	22,862	18.44	0.00*	20,597	10.3	0.00*
Head Age	5,177	11.14	0.00*	3,853	6.83	0.00*
Province						
Punjab	-88,108	-5.75	0.00*	-82,517	-4.52	0.00*
Sindh	-229,798	-7.4	0.00*	-190,751	-4.41	0.00*
Balochistan	-131,986	-4.13	0.00*	-106,144	-2.36	0.02**
Urban	148,081	6.65	0.00*	-	-	-
Constant	-675,341	-5.95	0.00*	-435,306	-3.04	0.00*
Enterprise Ownership						
Male	0.38	6.81	0.00*	0.39	5.2	0.00*
Electricity	0.26	7.14	0.00*	0.26	6.52	0.00*
Gas	0.2	8.47	0.00*	0.25	7.79	0.00*
Congestion	-0.39	-11.83	0.00*	-0.39	-8.33	0.00*
Head - Years of Education	0.01	4.85	0.00*	0.022	8.54	0.00*
Head Age	0.003	3.64	0.00*	0.002	2.19	0.03**
Province						
Punjab	-0.05	-1.91	0.06***	-0.04	-1.25	0.21
Sindh	-0.5	-17.16	0.00*	-0.54	-13.4	0.00*
Balochistan	-0.37	-9.67	0.00*	-0.45	-8.67	0.00*
Urban	0.35	15.29	0.00*	-	-	-
Constant	-1.25	-22.01	0.00*	-1.3	-18.3	0.00*
Mills Lambda	312,697	4.76	0.00*	221,564	2.69	0.01*
Wald Chi2(11) – (10 for Rural)		951.83			420.91	
Prob. > Chi2		0.00			0.00	
Number of Observations		24753			15894	
Uncensored Observation		5414			2686	

Source: Authors' estimation based on HIES dataset 2018-19.

Note: *, ** & *** represent significance at 1 per cent, 5 per cent and 10 per cent significance levels.

non-random self-selection. Specifically, Table 8 has two sections. The upper part examines the impact of household-level variables on household income after accounting for selection bias, while the second part investigates the factors that influence a household's decision to own and operate an NFE in a rural setting. It is important to note that the results for all of Pakistan are more or less the same as for the rural sample. Hence, the sub-sections exclusively target rural settings.

c) Decision to operate NFE

Table 8 and Table 9 indicate that the decision to own and operate an NFE, both at all Pakistan levels and in the rural setting, is highly influenced by the presence of males in the household, the head of the household's age and education, congestion in the house (rooms per person) and the facilities available in the household, especially for lighting and heating. Also, note that Table 8 does not directly isolate the overall treatment effect of NFE ownership across the entire population; instead, it establishes the presence of selection bias ($\lambda > 0$) and identifies the determinants of income specifically conditional on choosing to run an NFE.

At all Pakistan levels, the higher the years of education of the head, the higher the probability that the household will operate NFE. The probability of engaging with the NFA increases by around 0.003 points with a year increase in the education of the head [more simply, a one-year increase in education of the head corresponds to a 0.01 increase in z-score for the probability of operating NFE]. Further, the age of the head was also found to have a positive effect. The probability of engaging in the NFA increases by around 0.0007 points with a one-year increase in the head's age.

TABLE 9
Marginal Effects of the First Stage Probit Model

	All Pakistan			Rural		
	Marginal Effects	Z	P> z	Marginal Effects	Z	P> z
Male	0.11	6.83	0.00*	0.094	5.21	0.00*
Electricity	0.07	7.15	0.00*	0.063	6.53	0.00*
Gas	0.06	8.52	0.00*	0.06	7.85	0.00*
Congestion	-0.11	-11.91	0.00*	-0.093	-8.37	0.00*
Head - Years of Education	0.003	4.86	0.00*	0.0054	8.58	0.00*
Head Age	0.0007	3.64	0.00*	0.0005	2.19	0.03**

Source: Authors' estimation based on HIES dataset 2018-19.

As the number of male members increases in the household, the probability of operating an NFE in the household also increases by around 0.11 points. This is not beyond expectation, as the male members provide unpaid labour to these enterprises. Also, these enterprises often absorb surplus labour in the household, generating employment for unemployed members.

Having electricity and gas encourages households to operate NFE, while household congestion discourages its presence. With the increase in the availability of electricity and gas, the probability of operating an NFE within the household increases by 0.07 and 0.06 points while congestion in the household leaves small space for running the enterprise hence decreases the probability of NFE operation by 0.11 points [availability of electricity and gas, corresponds to an 0.26 and 0.20 increase in z-scores for the probability any household member operating NFE while congestion corresponds to an -0.39 decrease in z-scores for the probability any household member operating NFE].

The results for rural areas do not show any variation; hence, for rural areas, we concluded the same as for all Pakistan Levels, i.e., the decision to operate an NFE in a household is positively influenced by the presence of males in the household, the head of the household's age and education, and the facilities available in the household, especially lighting and heating. In contrast, the decision is negatively influenced by congestion in the house (rooms per person).

d) Effect of NFE on Household Income

For the outcome stage, the study explored several explanatory variables proposed in the literature that could explain household income. The first study included the number of earners in a household. The number of earners shows a significant and positive effect i.e. with an increase in the number of earners, household income increases by around Rs. 85,595 annually at all Pakistan levels and by Rs. 71,666 in Rural areas.

The coefficient of education and age of the household head also shows that one more year of education and age would increase the annual income by about Rs. 22,862 and Rs. 5,177, respectively, at all Pakistan levels, while in rural areas, head education and age increase the household income annually by around Rs. 20,597 and Rs 3,853, respectively.

The availability of facilities such as electricity, gas, and toilets also shows a significant positive effect, while the effect of piped water is insignificant on household income. Access to electricity and gas is associated with an annual increase in income by around Rs. 104,089 and Rs. 140,890, respectively, at all Pakistan levels and by Rs. 129,263 and 85,748 in rural areas. By lowering health expenditure and promoting overall health and well-being, flush toilet use can help households save expenditures on diseases and help increase household income by ensuring healthy labour/earners in the house. The indirect effect of toilet facilities within the household increases the

household income by about Rs. 43,048 at all Pakistan levels and Rs. 35,305 in rural areas. Though the effect of piped water is insignificant at all Pakistan levels but in rural areas, it helps in increasing the household income by about Rs. 58,968 annually.

Lambda, the Mills Ratio, is highly significant and positive. The estimates confirm that after controlling for non-random self-selection bias into entrepreneurship, socio-economic characteristics function as significant determinants of total income among households engaged in non-farm enterprise ownership.

V. Conclusions and Policy Recommendations

The paper examines the contribution of non-farm enterprises to household income, first at all Pakistani levels and secondly focusing exclusively on the rural economy. The purpose is to see how these enterprises effect income and employment for rural economy.

Our results show that out of the total households surveyed, around 21.7 per cent reported operating non-farm enterprises. The regional distribution shows that 30.4 per cent urban households, 30.4 per cent are running non-farm enterprises, while among the rural households, only 17 per cent are running non-farm enterprises. The rural household's decision to own and operate an NFE still lags behind the urban household. Further, results also show that decisions to own and operate NFEs are highly influenced by the presence of males in the household, the head of the household's age and education, congestion in the house (rooms per person) and the facilities available in the household, especially for lighting and heating. Further, The statistical significance of the Lambda coefficients justifies the application of the Heckman selection framework over ordinary least squares (OLS) estimation. The positive sign indicates a positive selection bias. This implies that unobserved characteristics that increase the probability of a household establishing an enterprise also independently enhance overall household income. Consequently, study confirms that households that self-select into enterprise ownership possess unobserved advantages making them more productive or higher income earner. As far as employment generation is concerned, results show that NFE, on average, employs around 59 per cent of the working population in rural areas of Pakistan.

Based on the results, it is evident that non-farm enterprises have significant potential to generate employment and ability to enhance the income of impoverished households. To enhance the incomes of poor rural households, rural development policies should focus on diversifying livelihoods by prioritizing household enterprises. These policies should aim to address the financial and market challenges that hinder the entry of poor households into non-farm activities. Improving access to credit for rural farm households may increase their likelihood of engaging in non-farm enterprises. Additionally, it is crucial to establish markets, infrastructures, and institutions that support the sustainable growth of rural non-farm enterprises. Finally, as far as limitations are concerned, we acknowledge that while we observe a strong positive association in our model, a full endogenous treatment-effects framework remains an area for future research.

References

- Ackah C. (2013), Non-farm employment and income in rural Ghana. *Journal of International Development*. 25 (3), 325-339
- Adeyonu A., Akerele D., Olanike K. M., Adesoji O., Ologbon C., Akintayo O., Kola-wole R., (2024). Nexus between participation in nonfarm enterprises and poverty among rural farm households: evidence from Nigeria, *International Journal of Social Economics* Vol. 51 No. 11, pp. 1402-1419.
- Babatunde, R. and Qaim M. (2010). Impact of off-farm income on food security and nutrition in Nigeria, *Food Policy*, 35 (4) (2010), pp. 303-311
- Barrett C.B, Reardon T, Webb P (2001). Non-farm income diversification and household livelihood strategies in rural Africa: Concepts, dynamics and policy implications. *Food Policy*.26:315- 331.
- Bayissa, F. W. (2011). Does off-farm income compete with farm income?: Evidence from Malawi (Master's thesis, Norwegian University of Life Sciences, Ås).
- Bridges, S. Gaggero, A. and Owens T. (2013). Jobs Come and Go, but the Family will always be there. University of Nottingham, Mimeo (2013)
- Canagarajah, S. Newman, C. and Bhattamishra R. (2001). Non-farm income, gender, and inequality: evidence from rural Ghana and Uganda. *Food Policy*, 26 (4) (2001), pp. 405-420
- Davis, B., DiGuseppe, S., Zezza, A., (2014). Income Diversification Patterns in Rural Sub-Saharan Africa. Reassessing the Evidence. Policy Research Working Paper No. 7108.
- Davis, J. R and Pearce, D. (2001). The Non-Agricultural Rural Sector in Central and Eastern Europe. Department for International Development (DFID)/World Bank. Collaborative Program for Rural Development. Natural Resources Institute Report No. 2630.
- Davis, J. R. (2003). The rural non-farm economy, livelihoods and their diversification: Issues and options; Natural Resources Institute (NRI) Report No: 275. Available online at <https://core.ac.uk/download/pdf/42389803.pdf>.
- Dercon S. (2009). Rural poverty: old challenges in new contexts, *The World Bank Research Observer*, Volume 24, Issue 1, February 2009, Pages 1–28, <https://doi.org/10.1093/wbro/lkp003>
- Escobal J. (2001). The determinants of non-farm income diversification in rural Peru. *World Development*, 29 (3) (2001), pp. 497-508
- Farooq S, and Younais Z. (2018), Do Non-farm Enterprises Offer Pathways for Upward Mobility in Rural Pakistan? Evidence from Panel Dataset, *The Pakistan Development Review*, Vol. 57, No. 2 (2018), pp. 203-221 (19 pages)
- Haggblade, S., Hazell, P. and Brown, J. (1989). Farm-non-farm linkages in rural sub-Saharan Africa. *World Development*., 17 (8) (1989), pp. 1173-1201
- Haggblade, S., Hazell, P. and Reardon, T. (2010). The rural non-farm economy: prospects for growth and poverty reduction. *World Development*, 38 (10) (2010), pp. 1429-1441

- Herrington, M., Kelly, D., 2012. African Entrepreneurship: Sub-Saharan African Regional Report. Global Entrepreneurship Monitor.
- Janvry, A.D. and Sadoulet E. (2001). Income strategies among rural households in Mexico: the role of off-farm activities. *World Development*, 29 (3) (2001), pp. 467-480
- Janvry, A.D. and Sadoulet E. (2006); Poverty, Inequality and Development. Chapter: Progress in the Modelling of Rural Households. Springer (2006)
- Labour Force Survey (2014-15), Pakistan Bureau of Statistics, Pakistan
- Lanjouw, J. andLanjouw P. (2001). The rural non-farm sector: issues and evidence from developing countries. *Agriculture Economics*, 26 (1) (2001), pp. 1-23
- Malik, S. J. (2008) Rethinking Development Strategy - The Importance of the Rural Non-farm Economy in Growth and Poverty Reduction in Pakistan. *The Lahore Journal of Economics (Special Edition)*. September, 189-204.
- Manser & Brown, 1980 Manser, M. and Brown M. (1980). Marriage and household decision-making: a bargaining analysis. *International Economic Review*, 21 (1) (1980), pp. 31-44
- Minniti, M. and Naudé W. (2010). What do we know about the patterns and determinants of female entrepreneurship across countries? *The European Journal of Development Research*. 22 (3) (2010), pp. 272-293
- Nagler, P., and Naudé, W., (2014). Non-Farm Entrepreneurship in Rural Africa: Patterns and Determinants. IZA Discussion Paper No. 8008.
- Nasir, Z. M. (1999) Poverty and Labour Market Linkages in Pakistan. Pakistan Institute of Development Economics, Islamabad. (MIMAP Technical Report No. 3.)
- O'Brien, M., & Hennessy, T. (2008). An examination of the contribution of off-farm income to the viability and sustainability of farm households and the productivity of farm businesses. Teagasc End of Project Report (RMIS 5490), Athenry, Co Galway, Ireland: Teagasc.
- Pritchard, B., Rammohan, A. and Vicol, M. (2019), "The importance of non-farm livelihoods for household food security and dietary diversity in rural Myanmar", *Journal of Rural Studies*, Vol. 67, pp. 89-100, doi: 10.1016/j.jrurstud.2019.02.017.
- Rashidin, M. S., Javed, S., Liu, B., & Jian, W. (2020). Ramifications of households' nonfarm income on agricultural productivity: evidence from a rural area of Pakistan. *Sage Open*, 10(1), 2158244020902091.
- Reardon, T. Berdegue, J. Barrett, C. and Stamoulis K. (2006). Household Income Diversification into Rural Non-Farm Activities. Johns Hopkins University Press, Baltimore (2006)
- Reardon T, Stamoulis A, Lanjuow P, Balisacan ME (2000). Effects of non-farm employment on rural income inequality in developing Countries: An investment perspective. *Journal of Agriculture Economics*, Vol. 51(2): pp 266-288
- Reardon T. (1997). Using evidence of household income diversification to inform the study of the rural non-farm labour market in Africa. *World Development* 25 (5) (1997), pp. 735-747

- Rijkers B. and Costa R., (2012); Gender and rural non-farm entrepreneurship. *World Development*, Vol. 40 (12) (2012), pp. 2411-2426
- Saqib, S.E., Kuwornu, J.K.M., Ahmad, M.M. and Panezai, S. (2018), Subsistence farmers' access to agricultural credit and its adequacy: Some empirical evidence from Pakistan, *International Journal of Social Economics*, Vol. 45 No. 4, pp. 644-660. <https://doi.org/10.1108/IJSE-12-2016-0347>
- Seng, K. (2015). The effects of non-farm activities on farm households' food consumption in rural Cambodia, *Development Studies Research*, Vol. 2 No. 1, pp. 77-89, doi: 10.1080/21665095.2015.1098554.
- Shi et al., (2007) Shi, X. Heerink, N. and Qu F. (2007). Choices between different off-farm employment sub-categories: an empirical analysis for Jiangxi Province, China. *China Economic Review*, 18 (4) (2007), pp. 438-455
- Start, D. (2001); The rise and fall of the rural non-farm economy: poverty impacts and policy options. *Development Policy Review*, 19 (4) (2001), pp. 491-505
- Sur, M. and J. Zhang (2006). The Investment Climate and Enterprise Performance in Rural Pakistan: Implications for Rural Non-farm Employment Generation and Poverty Reduction. Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Long Beach, California, July 23-26, 2006.
- UNDP-2018, Unleashing the potential of a young Pakistan, blogs by Shakeel Ahmad, Assistant Country Director and Chief of the Development Policy Unit, UNDP Pakistan Download: <https://www.undp.org/pakistan/blog/unleashing-potential-young-pakistan>
- World Bank (2007) Pakistan Promoting Rural Growth and Poverty Reduction. Sustainable Development Unit, South Asia Region, World Bank.
- Zhu, N. and Luo, X. (2005). Impacts of Non-farm Income on Inequality and Poverty: The Case of Rural China. Manuscript. Available at: https://www.demoscope.ru/weekly/knigi/tours_2005/papers/iussp2005s50376.pdf

Appendix A

Measuring Net Income and Gross Profit

The study focuses on evaluating the extent to which individuals work on their own and generate income. To evaluate the success/failure of the non-farm work, specifically the non-farm enterprise run by the rural household, the net income generated, gross profit, cost of goods sold, total revenues, interest payments, operating expenses, and taxes paid by the non-farm enterprise are first assessed. These indicators also help identify the size of non-farm work in rural settings.

Gross profit and net income of NFEs are estimated by employing simple accounting formulas (i) and (ii), respectively;

$$\text{Gross profit (NFEs)} = \text{Total Revenue} - \text{Cost of goods sold} \quad (\text{i})$$

$$\text{Net Income (NFEs)} = \text{Gross profit} - \text{operating expenses} - \text{interest expenses} - \text{Taxes} \quad (\text{ii})$$

All the data used in measuring the Net Income and Gross Profit are extracted from the Household Income and Expenditure Survey 2018-19.