

Research Article



Nexus between Off-Farm Employment and Farm Size Among Small Farm Holders in Peshawar Valley of Khyber Pakhtunkhwa

Haidar Ali¹, Malik Muhammad Shafi^{1*}, Himayatullah Khan¹ and Hamra Haidar²

¹Institute of Development Studies, Faculty of Rural Social Sciences, The University of Agriculture, Peshawar, Khyber Pakhtunkhwa, Pakistan; ²Scholar at Institute of Development Studies, The University of Agriculture, Peshawar, Khyber Pakhtunkhwa, Pakistan.

Abstract | Main theme of the present research was to identify the nexus between farm size and non-farm employment (off-farm employment) among farm households (small farmers) in the research area during February 15 to July 27, 2018 by using research tools such as interview schedule or direct observations. Random sampling technique was used for selecting a sample size of 195 small farmers. The present study is focused on two selected districts of Peshawar Valley namely Mardan and Peshawar. Analysis showed that there was a significant difference in the off-farm employment among various sizes of farms. Sampled farm households who were operating farm size up to 1 acre (74.88 hours/week) were performing more off-farm employment followed by farm size more than one (1) but less than or equal to two (2) acres land (59.32 hours/week), more than two (2) acres but less than or equal to three (3) acres land (41.86 hours/week), more than three (3) acres but less than or equal to four (4) acres land (33.97 hours/week) and more than four (4) acres land (25.62 hours/week). The study suggests that there should be no barriers for the entrance of small farmers in to the non-farm sector (rural). This involves improving the educational level in rural areas.

Received | January 15, 2019; Accepted | May 22, 2019; Published | August 26, 2019

*Correspondence | Malik Muhammad Shafi, Institute of Development Studies, Faculty of Rural Social Sciences, The University of Agriculture, Peshawar, Khyber Pakhtunkhwa, Pakistan; Email: shafimalikmuhammad77@gmail.com

Citation | Ali, H., M.M. Shafi, H. Khan and H. Haidar. 2019. Nexus between off-farm employment and farm size among small farm holders in Peshawar valley of Khyber Pakhtunkhwa. *Sarhad Journal of Agriculture*, 35(3): 874-879.

DOI | <http://dx.doi.org/10.17582/journal.sja/2019/35.3.874.879>

Keywords | Dummy variables, Off-farm employment, Peshawar valley, Regression model, Small landholders

Introduction

It is difficult for agriculture sector to wrap up surplus labors produced by rapid population expansion and increased agricultural mechanization. For absorbing underemployed farm labors, non-farm sector plays a pivotal role. Rural off-farm activity is an additional and alternative source of the rural income and employment for increasing rural population on land. Rural off-farm activities and agriculture are interdependent on each other (Vijay and Gupta, 2011).

Cultivated area of The Khyber Pakhtunkhwa province is 1.8 million hectare which representing 17.7 percent of total area of the province. Major portion of farming

community in Khyber Pakhtunkhwa are performing small farming activity. In Khyber Pakhtunkhwa farming community can be divided into 3 types according to farm size holding i.e. small farmers are those who are operating farm area of less than or equal to 12.5 acres; similarly, medium farmers are those who are operating farm area more than 12.5 acres but less than or equal to 25 acres while large farmer are those who are operating farm area more than 25 acres but less than or equal to 50 acres. Small farms are 87 percent of total number of farms. Agriculture and livestock are to be considered subsistence livelihood for small farmers in this province. Small farm holders are unable to afford modern facilities and technology. Medium and large farm holders are the producer of

bulk marketable surplus ([Tareen, 2017](#)).

In Pakistan, main emphasis of programs and policies is based on the development of agriculture sector for rural development and poverty mitigation. While very little attention is given to off-farm sector. So, to assess and evaluate the rural off-farm economy a comprehensive research is required. In this respect, the present research is an effort with the goal to identify nexus between farm size and non-farm employment (off-farm employment) of farm households (small farmers) in the research area.

Materials and Methods

Universe for the present research constitutes Peshawar Valley. Because most of the agriculture activities are carried out in Peshawar Valley. Furthermore, for the entire province Peshawar Valley can be considered food basket. Area (Peshawar Valley) selected for intensive research consists of five districts i.e. Charsadda, Mardan, Peshawar, Swabi and Nowshehra. For collecting the required data two districts i.e. Mardan and Peshawar were randomly selected. Unit of analysis for present research was a farm household. The required data from the head of the small farm household were collected at household level. A total of 195 sample size of small farm households were taken from the total 976 small farmers and randomly selected from four villages namely Dawood Zai and Mado (relatively developed villages having all type of modern facilities including educational, health, market and transport) on other hand in Garhi Baghbanan and Mian Khan, (all the aforementioned facilities were not available). In the above villages the dominant source of livelihood is agriculture.

Because of financial constraints and limited time only 20% sample size was fixed. In the aforementioned villages sample was properly divided through proportional allocation method. A total of 195 sample size of small farm households were randomly taken from the total 976 small farm households.

Model selection and Specification

The dependent variable in regression analysis is frequently influenced not only by variable which are quantitative in nature but also qualitative. Usually such variables show the presence or absence of phenomena. For the computation of such phenomena artificial variables are constructed that takes on value of 1 or 0 showing the presence or absence of phenomena

called dummy variable. For finding nexus between off-farm employment and farm size a multiple linear regression model having dummy variables was used. A similar model was also used by [Khan \(2007\)](#) for the estimation of underemployment. To avoid dummy trap model was used with care. So, (m-1) dummy variables were used with an interceptor without intercept. In this study regression was run without intercept and four dummy variables D_{1i} , D_{2i} , D_{3i} and D_{4i} were used which representing the four categories of small farmers.

Five categories of small farm households were made on the basis landholding such as farmers operating ([Khan, 2007](#)).

- (i) Up to 1 acre land; (ii) More than one (1) acre but less than or equal to two (2) acre land; (iii) More than two (2) acre but less than or equal to three (3) acre land; (iv) More than three (3) acre but less than or equal to four (4) acre land; (v) more than four (4) acre land.

Econometrically it was expressed in the following way:

$$Y_i = \sum_{i=1}^4 \beta_i D_i + \varepsilon_i$$

Whereas;

β_1 to β_4 = Representing dummy coefficients; Y_i = Off-farm employment of household i (hours/week); $D_{1i}=1$ if household farmer was operating up to 1 acre land, 0 otherwise; $D_{2i}=1$ if household farmer was operating more than one (1) acre but less than or equal to two (2) acre land, 0 otherwise; $D_{3i}=1$ if household farmer was operating more than two (2) acre but less than or equal to three(3) acre land, 0 otherwise; $D_{4i}=1$ if household farmer was operating more than three (3) acre but less than or equal to four (4) acre land; 0 otherwise; ε_i = Error term.

Data analysis

SPSS (Statistical Package for Social Sciences) 20 version and Gretle 1.9.8. were used for analysis of data.

Results and Discussion

As farm size have an inverse (negative) impact on non-farm sector (off-farm employment). So, for small farmers opportunities in the non-farm sector will be less, if farm size increases. According to [Table 1](#) small farmers operating farm size up to one (1) acre

land were more in percentage (38.46%) as compared to small farm households who were operating farm size more than 1 acre but less than or equal to two (2) acre land, more than two (2) acre but less than or equal to three (3) acre land, more than three (3) but less than or equal to four (4) acre land and more than four (4) acre land in the study area. Furthermore, no large variation was found in the farm size holding distribution among sample small farmers in the research area. Fragmentation of land among small farmers is due to rapid increase in population size. The above outcomes show that study area is consist of small land. The outcomes are identical with the findings of [Bojnee and Dries \(2005\)](#) and [Babatunda \(2017\)](#) because according to them majority small farm households were working on small farms up to 1 acre.

Table 2 explains working hours spent per week by family labor according to farm size. The results illustrate that with increase in the farm size the working hours spent per week by family labors in farming activities are increasing. Weekly average working time (7.67 hours) spent on farms by family labors. Furthermore, small farmers operating farm size more than four (4) acre were having highest weekly average hours 12.74 hours. While on other hand, small farmers operating farm sizes i.e. more than three (3) acre but less than or equal to four (4) acres land, more than two (2) but less than or equal to three (3) acre land, more than one (1) acre but less than or equal to two (2) acre land and up to one (1) acre land were having weekly average hours, (9.69), (7.38), (5.32) and (3.23), respectively. Family labors belonging to developed villages as compared to underdeveloped villages were having more weekly average working hours. It may be due to availability of more cultivable and irrigated land as well as easy access to markets (local markets) in Dawood Zai and Mado villages (developed villages). The above findings are consistent with outcomes of the [Mecharla \(2002\)](#) and [Vijay \(2017\)](#).

Small farm holders weekly average working time (hours) spent on non-farm sector with respect to farm size are revealed in **Table 3**. 27.94 hours were the weekly average working (hours) spent by sample farm households on non-farm sector (off-farm employment). Moreover, farm households operating farm size up to one (1) acre land were having highest (41.44 hours/week) on non-farm sector (off-farm employment). As farm size have an inverse (negative) impact on non-farm sector (off-farm employment). So, those farm households (small farmers) who were

operating farm size up to one (1) acre land were having more weekly average working hours on non-farm sector (off-farm employment) as compared to those who were operating different farm sizes. Furthermore, weekly average working hours of farm households (small farmers) on non-farm sector (off-farm employment) in Mado and Dawood Zai villages (developed villages) were more as compared to farm households (small farmers) belonging to Main Khan and Garhi Baghbanan villages (underdeveloped villages). The possible reason may be easy access to markets (local markets) and opportunities of non-farm jobs in Mado and Dawood Zai villages (developed villages) as compared to Main Khan and Garhi Baghbanan villages (underdeveloped villages). The above said findings are more or less in line with the outcomes of [Monica \(2003\)](#), [Babatunda \(2017\)](#) and [Vijay \(2017\)](#).

Table 4 illustrates the comparison of off-farm employment of the sample farmers by farm size is regressed with the model specified in [Equation 1](#). Regression results show slop coefficients of D_1 , D_2 , D_3 and D_4 are highly significant as indicated by t-statistic values and can be accepted with 95% confidence level. The overall model is significant because the F-statistic is very much significant. Constant is the base category and show the overall off-farm employment (25.62 hours/week) of those whose operational holding is above 4 acres. Therefore, all comparison of different operational holding are made in relation to this category. Compared with this, the off-farm employment of those who are operating farm size up to 1 acre is higher by 49.26 hours/week, for an actual off-farm employment of 74.88 hours/week ($=25.62+49.26$). By contrast, the off-farm employment for those who are operating farm size from 1.1 to 2 acres is higher by 34.06 hours/week, for an actual off-farm employment of 59.32 hours/week ($=25.62+34.06$). Similarly, the off-farm employment for those who are operating farm size from 2.1 to 3 acre is higher by 16.24 hours/week, for an actual off-farm employment 41.86 hours/week ($=25.62+16.24$). Finally, the off-farm employment for those who are operating farm size from 3.1 to 4 acre is higher by 8.35 hours/week, for an actual off-farm employment of 33.97 hours/week ($=25.62+8.35$). As the farm size have an inverse (negative) impact on non-farm sector. So, when the farm size increases the non-farm employment (off-farm employment) decreases and vice versa.

Table 1: Arrangement of farm households (sample small farmers) with respect to farm size in percentage.

Farm (acre)	Size	Percentage Distribution of the Sample Farm Households in				Overall	
		Peshawar		Mardan			
		Dawood Zai	Garhi Baghbanan	Mado	Mian Khan		
Up to 1		23 (44.23)	17 (36.96)	22 (39.29)	13 (31.71)	75 (38.46)	
1.1-2		11 (21.15)	8 (17.39)	12 (21.43)	8 (19.51)	39 (20)	
2.1-3		9 (17.31)	7 (15.22)	11 (19.64)	7 (17.07)	34 (17.44)	
3.1-4		5 (9.62)	8 (17.39)	6 (10.71)	8 (19.51)	27 (13.85)	
Above 4		4 (7.69)	6 (13.04)	4 (7.14)	6 (14.63)	20 (10.26)	
All Farms		52 (100)	46 (100)	56 (100)	41 (100)	195 (100)	

Source: Field Survey, 2018 *Figures in parentheses are percentages.

Table 2: Times spent per week by family labor of sample households according to farm size (hours/week).

Farm Size (acre)	Engagement and Time Spent by Family Labor in				Overall	
	Peshawar		Mardan			
	Dawood Zai	Garhi Baghbanan	Mado	Mian Khan		
Up to 1	4.39	3.37	3.11	2.11	3.23	
1.1-2	6.50	5.48	5.15	4.15	5.32	
2.1-3	8.44	7.42	7.32	6.32	7.38	
3.1- 4	11.10	10.13	9.26	8.26	9.69	
Above 4	14.09	13.07	12.40	11.40	12.74	
All Farms	8.90	7.89	7.45	6.45	7.67	

Source: Field Survey, 2018.

Table 3: Time spent by sample households on off-farm employment per week (hour).

Farm Size (acre)	Time Spent by Small Farm Households in				Overall	
	Peshawar		Mardan			
	Dawood Zai	Garhi Baghbanan	Mado	Mian Khan		
Up to 1	49.75	36.50	44.50	35.00	41.44	
1.1-2	43.25	33.50	41.75	28.55	36.76	
2.1-3	33.65	21.90	33.50	22.50	27.89	
3.1-4	24.40	17.65	23.60	13.85	19.88	
Above 4	18.20	11.40	17.50	7.85	13.74	
All Farms	39.52	30.65	36.59	24.66	27.94	

Source: Field Survey, 2018.

Table 4: Comparison of off-farm employment by farm size (hours/week).

Size of Operational Holding (Acres)	Coefficients	Std. Error	t-ratio	P-value
D ₁ (up to 1)	49.26	2.01	24.51	.000***
D ₂ (1.1-2)	34.06	1.50	22.71	.000***
D ₃ (2.1 -3)	16.24	.91	17.85	.000***
D ₄ (3.1-4)	8.35	.55	15.18	.000***
Constant	25.62	.88	29.11	.000***

**Highly Significant R-squared=0.526; Adjusted R-squared=0.515; F-statistic= 137.236; P-value (F) = .000; Note: Above 4 acres operational holding is a base category.

Sample households' up to 1 acre were engaged more in non-farm sector (off-farm employment) activities in the research area. The possible reason may be less farm size due to which more family labors

would be available for non-farm activities (off-farm employment activities. The above outcomes are in line with the outcomes of [Mecharla \(2002\)](#), [Monica \(2003\)](#), [Zahid \(2006\)](#), [Khan \(2007\)](#), [Babatunda \(2017\)](#) and [Vijay \(2017\)](#) and Vijay (2017). Who found negative relationship between farm size and off-farm employment.

Conclusions and Recommendations

Agriculture is the major source of employment in Peshawar Valley due to which most of the people are engaged in agriculture profession. Due to small size of holdings, off-farm employment was a common phenomenon in the agriculture sector. Farm size is negatively related to off-farm employment. On average, small farmers operating up to 1 acre land perform more off-farm work. It was also observed that small farmers of Dawood Zai and Mado (developed villages) perform more non-farm activities (off-farm activities) than Garhi Baghbanan and Mian Khan (underdeveloped villages). The most possible reason for small farmers belonging to Dawood Zai and Mado villages (developed villages) may be easy access to markets (local markets) and more opportunities of non-farm jobs than Garhi Baghbanan and Mian Khan villages (underdeveloped villages).

This study suggests:

- There should be no barriers for the entrance of small farmers in to the non-farm sector (rural).
- There should be strong policy for the expansion (enhancement) of agriculture wages in rural areas.

Novelty Statement

In Pakistan, main emphasis and policies is based on the development of agriculture sector for rural development and poverty mitigation. However, the current research has been conducted to asses and evaluates the rural off-farm economy with the goal to identify nexus between farm size and off-farm employment of small farmers.

Author's Contribution

Haidar Ali conceived the idea and wrote the manuscript. He also worked in modeling and analysis. This research work was supervised by Malik Muhammad Shafi and co.supervised by Himayatullah Khan. Hamra Haidar helped in data collection and manipulation of data.

References

- Ali, H., M.M. Shafi and M. Siraj. 2014. Determinants of off-farm employment among small farm holders in rural areas of district Mardan. Sarhad J. Agric. 30(1): 145-150.
- Babatunda, R.O. 2017. Determinants of participation in off-farm employment among small-holder farming households in Kwara State, Nigeria. J. Ext. Rural Dev. 6(2): 1-14.
- Bezemer, D.J. and J. Davis. 2003. The rural non-farm economy in Romania. J. Agric. Econ. 53(3): 378-392. <https://doi.org/10.2139/ssrn.695281>
- Bojnee, S. and L. Dries. 2005. Causes of changes in agricultural employment in Slovenia evidence from micro-data. J. Agric. Econ. 56(4): 399-416. <https://doi.org/10.1111/j.1477-9552.2005.00020.x>
- Davis, J.R. 2003. The rural non-farm economy, livelihoods and their diversification: issues and options. Nat. Res. Inst. Rep. No. 2753. <https://doi.org/10.2139/ssrn.691821>
- Ellis, F. 2000. Determinants of rural livelihood diversification in developing countries. J. Agric. Econ. 51(2): 289-302. <https://doi.org/10.1111/j.1477-9552.2000.tb01229.x>
- Ministry of finance. 1998. Economic survey of Pakistan 1997-98. Finance and economic affairs division, ministry of finance, GoP, Islamabad, Pak.
- Ministry of finance. 2014. Economic survey of Pakistan 2013-14. Finance and economic affairs division, ministry of finance, GoP, Islamabad, Pak.
- Haggblade, S., H. Peter and T. Reardon. 2002. Strategies for stimulating poverty-alleviating growth in the rural non-farm economy in developing countries. Issue 92. Enviro. Prod. Tech. Dev. World Bank. Rural Dev. Deptt. Discuss. Paper.
- Hardaker, J.B. and M.F. Robzen. 2002. Making agricultural diversification work for the poor; the challenge for the Asia-Pacific region. UN-FAO CUREMIS workshop 30-31 May, 2002. Univ. Bangkok, Bangkok, Thai.
- Hazell, P., S. Haggblade and T. Reardon. 2002. The rural non-farm economy pathways, way out of poverty or pathway in Michigan State Univ. USA.
- Lanjouw, P. and A. Sharif. 2002. Rural non-farm employment in India, access income and

- poverty impact. Working paper No. 81, U.N. Dev. Prog. Nat. Counc. Appl. Econ. Res. India.
- Lewis, W.A. 1954. Economic development with unlimited supplies of labor, Manchester School of Econ. Soc. Stud. 22 (4): 139-191. <https://doi.org/10.1111/j.1467-9957.1954.tb00021.x>
- Islam, N. 1997. The off-farm sector and rural development: food, agriculture and environment. Discuss. paper No. 22, Int. Food Policy Res. Inst. Washington DC.
- Janowski, M. and A. Bleahu. 2001. Factors affecting household level involvement in rural off-farm economic activities in two communities in Dolj and Brasov judete, Romania, Paper presented at the workshop "Rural off-farm employment and development in transition economies", Univ. Greenwich, London.
- Kimhi, A. and R. Eliel. 2004. Time allocation between farm and off-farm activities in Israeli farm households. Am. J. Agric. Econ. 86. (3): 716-721. <https://doi.org/10.1111/j.0002-9092.2004.00613.x>
- Khan, D. 2007. An investigation into the underemployment in the agricultural sector of valley Peshawar, Ph.D. thesis, Dep. Agric. Econ. NWFP Agric. Univ. Peshawar, Pak.
- Kuhnen, F. 1989. Rural household survival strategies in the third world. Institute for Rural Entwicklung, Universitat Gottingen, and Busgenweg 2, 3400 Gottingen, Ger. Fed. Repub. 23 (5): 33-41.
- Mecharla, P.R. 2002. The determinants of rural off-farm employment in two villages of Andhra Pradesh, India. Working Paper No. 12, Poverty research unit at sussex university of sussex falmer, Brighton, United Kingdom.
- Monica, J. 2003. Rural off-farm livelihood activities in Romania, Georgia and armenia: Synthesis of findings from fieldwork carried out at village level. 2001—2002.
- Man, N. and S.I. Sadiya. 2009. Off-farm employment participation among paddy farmers in the Muda Agricultural Development Authority and Kemasin Semerak Granary areas of Malaysia. J. Agric. Econ., 16(2): 34-42. <https://doi.org/10.18356/be439b1f-en>
- Siphambe, H.K. 2003. Understanding unemployment in Botswana. South Afr. J. Econ. 71(3): 200-230.
- Tareen, W.H., 2017. Farming system in the marginalized mountainous region of district Battagram in Khyber Pakhtunkhwa, Pakistan. J. Agric. Res., 53(2): 12-20.
- Thakur, S.C.P., A.K. Chaudhary and R.K.P. Singh 1993. Employment and labor productivity in developed and under-developed agricultural regions in Bihar. J. Manpower. 29 (2): 25-36.
- Tahir, M. 2008. Factors determining off-farm employment amongst small farmers. S. J. Agric. 28(1): 13-20.
- Vijay, M. and R.K. Gupta. 2011. Non-farm opportunities for small holder agriculture. Conference on new directions for small holder agriculture 24-25 January 2011, Rome, IFAD HQ.
- Vijay, M. and R.K. Gupta. 2017. Off-farm opportunities for small farm householder agriculture. Conference on new directions for smallholder agriculture 24-25 January 2014, Rome, IFAD HQ.
- Zahid, M.A. 2006. Determinants of off-farm-income in the mixed cropping zone of Punjab, Pakistan, M.Sc. (Hons) Thesis, Dep. Agric. Econ., Univ. Agric. Faisalabad, Pak. 46-74.