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Factors Affecting Off-farm Employment of Small Farmers in Peshawar Valley

Haidar Ali*, Malik Muhammad Shafi and Noor Paio Khan

Institute of Development Studies, Faculty of Rural Social Science, The University of Agriculture, Peshawar, Pakistan

***Corresponding author:** Ali H, Institute of Development Studies, Faculty of Rural Social Science, The University of Agriculture, Peshawar, Pakistan, Tel: +923339350722; E-mail: haiderkpk59@gmail.com

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Abstract

The present study investigated the factors affecting off-farm employment of small farmers in Peshawar Valley. A sample of 201 small farmers was selected using random sampling technique and data were collected through a pre-tested interview schedule. This study focuses on two selected districts i.e. Peshawar, and Charsadda. Four villages were selected two each from the sampled districts. Analysis showed that the coefficients of household size, educational level of the sampled respondent, age of the sample small farmer, were positively related to the off-farm employment, while farm area operated was negatively but significantly related to off-farm employment. Similarly the small farm households of developed villages perform more off-farm employment than the small farm households of underdeveloped villages. This could be associated to the developed means of transport and communications, better education facilities, market facilities as well as availability of off-farm jobs locally. In developed villages of two districts, average per month income of sample small farmers from farm output was higher than the undeveloped villages of these districts due to the high sale price of vegetables grown on large area and more milk production. Similarly, in developed villages income from off-farm employment was more than undeveloped villages. Because large number of family labors of sample respondents were working on high paid jobs or employed else or self-employed and thus contributed a good amount to their family's income. The study recommends that unemployment in the agriculture sector is likely to increase with the decrease in the size of holdings. To generate off-farm employment opportunities agro based industries seems to potential area. Simultaneously there is need for initiating skill development programs.

Keywords: Off-farm employment; Heteroscedasticity corrected model; Small farmers; Peshawar valley; Khyber Pakhtunkhwa; Developed and underdeveloped villages; Multicollinearity; White test

Introduction

Most small farm households in the world are located in the countryside, where both institutional and physical infrastructure bounds their enlargement. Lack of access to proper roads, for example, limits the ability of a farmer to transport inputs, products and also access to information. The infrastructure is generally poor, markets for agricultural inputs and outputs are often lacking and unreliable for small farm holder. This means that the acquisition of agricultural resources is difficult and the supply of services for the market is also limited. On the other hand it must be recognized that there are risks associated with participation, which means that the markets offer both opportunities and pressures for small farm households [1].

Low level of education, land fragmentation, large household size and livestock are one of the key factors limiting the growth of agriculture for small farm households in African countries. These important factors will force small farm households to grow their own food and less fresh products that cause lower productivity [2].

In most developing countries non-farm activities are playing vital role in livelihood strategies among rural households. In developing countries rural employment's share in the off-farm sector varies from 20% to 50% [3].

In Pakistan, small farmers (<12.5 acres) are occupied 30.5 million acres out of the total 47.58 million acres of farm area. Out of the total number of farms small farmers represent 93.12 %, accounting for 61.4 % of the total agricultural area [4].

The main objective of the study is to identify the determinants (i.e. household size, level of education of household head, age of the household head and farm size operated) of off-farm employment among small farm households in the Peshawar valley of Khyber Pakhtunkhwa. As the Valley constitutes 5 districts namely Peshawar, Charsadda, Mardan, Nowshehra and Swabi out of which 2 namely Peshawar and Charsadda were selected for the present study. Because most of the farm families have small land holdings and their average size of holding is around 2.03 hectare [5]. Small farm households also keep livestock for supplementing their family income.

Materials and Methods

Peshawar Valley constitutes the study area for this research. The reason for the selection of Peshawar valley is that most of the agricultural activities are carried out in this zone. It is also worth mentioning that Peshawar valley is considered as food basket for the entire province. So the study was conducted in Peshawar Valley. Peshawar Valley is a fertile plain having light and porous soil, which is a mixture of clay and sand. Peshawar Valley is comprised of five districts namely Peshawar, Charsadda, Mardan, Nowshehra and Swabi. Two districts were random selected for collecting of the required data. The random selection were made in such a manner that the sample area is the representative of the entire region. A list of small farming

household head was obtained from the patwari of the concerned patwar circle of revenue department.

Selection of villages was made on the basis of socio-economic features of these villages using purposive sampling technique. The main features required were to select villages with agricultural background but where development of infrastructure and other socio economic factors have resulted in the diversified the livelihood. Also we need to consider the backwardness and development factors [also known as external factors e.g. road infrastructure, health facilities etc.] of the villages, so that we can compare the impact of different internal factors like household size, farm size, educational status, age of small farmers etc. of different villages. On this criterion, Dawood Zia, and Rajjar, comparatively developed villages and Garhi Baghbanan, and Mufti Abad, comparatively underdeveloped villages were selected. Dawood Zia, and Rajjar, having almost all type of infrastructural facilities including; transport, communication, education, health, and allied markets for various commodities. In contrast to that, Garhi Baghbanan, and Mufti Abad are underdeveloped villages lacking all the major facilities mentioned above. The dominant source of livelihood is agriculture in these villages.

For present study household were taken as a unit of analysis and data were collected at household level from the head of small farm households. A 20% sample was fixed due to human and financial constraints. In present research random sampling technique was used for data collection from the selected sample of small farm households. This technique is useful in overcoming the selection bias. Sample was properly divided in the above-mentioned villages through proportional allocation method. A sample of 201 small farm households was taken from total population of small farm households 1006. To collect the relevant data for present research study both primary and secondary sources were used. Published reports from government as well as private sources are taken as a secondary data. While on the other hand primary data regarding level of off-farm employment and its factors were collected directly from 201 small farm households through structured questionnaire. The questionnaire was pretested and necessary improvements were made in the light of objectives of the study and ground realities prevailing at village level.

Model for Identifying Major Factors Affecting Off-farm Employment

Major factors affecting off-farm employment to be tested in the study were; household size, educational level of the sample small farmer, age of the household head and farm size operated. Following Khan [6] and Ali et al. [7], the following multiple linear regression model (OLS) was used.

Econometrically it was expressed in the following way:

$$Y_i = \beta_0 + \beta_i \sum_{i=1}^{4} X_i + \varepsilon_i \qquad (1)$$

Functional Form of the Above Model;

$$Y_i = \beta_0 + \beta_1 D_1 + \beta_2 D_2 + \beta_3 D_3 + \beta_4 D_4 + \varepsilon_i \qquad (2)$$

Where;

β_0=intercept

β_1 to β_4=regression coefficients

Y_i Represents off-farm employment, was analyzed in the hours spent by farm operator(s) of a household on off-farm job per week,

X_{1i} Household size (number of family members)

X_{2i} Level of education of the ith household head (number of years of schooling)

X_{3i} Age of the ith household head (number of years)

X_{4i} Farm size operated by ith household (number of acres)

ε_i Error term

Diagnostic tests

As the data was cross sectional so the assumptions for this study were; Multi-Co-Linearity among the explanatory variables and Homoscedasticity (constant variance of error term). Diagnostic tests are applied in order to check that whether the data/model employed for present research satisfy these assumptions or not.

Data analysis

Data were analyzed by using SPSS (Statistical Product for Social Science) 20 version and Gretel 1.9.8 version.

Results and Discussion

Table 1 describes age groups of the sample respondents in the study area. The households were classified into three age groups i.e. 16-30 years, 31-45 years and 46-65 years. Majority (39.30%) of the small farm households were falling in the age group of 46-65 years.

The comparison of age among sample small farmers in the study area demonstrates that in developed and underdeveloped villages' majority of sample households belonged to the age groups of 31-45 years and 46-65 years. Due to low income and large families in underdeveloped villages most of the sample respondents send their male youth to other cities in search of better employment. On other hand, in developed villages, comparatively, young persons were involved in farming.

A promising reason of this may be high yield which support small farm households in increasing their farm income. The current results are supported by the findings of Bojnee and Dries [8], Bojnee and Siphambe [9] who concluded that due to meager income outputs of farming in underdeveloped villages, the young person were always found absent regarding farm activities as compared to their counterparts in the developed villages. These young persons were mostly engaged in off-farm activities in the village or outside the village to meet daily requirements of household (Table 1).

According to Table 2 the educational level of the sample households is categorized into six (06) groups on the basis of their educational level viz. primary, middle, matriculation, intermediate, graduation and masters. The findings show that among the educated households majority (35.51%) had got education up to matric level followed by 22.43%, 22.43%, and 19.63% were having middle level, from intermediate to graduation and onwards, primary level, respectively.

Age (years)	Percentage Distribution of the Sample Farm Households Head in						
	Peshawar		Charsadda		Mardan		Overall
	Dawood Zai	Garhi Baghbanan	Rajjar	Mufti Abad	Mado	Mian Khan	
16-30	18 (34.62)	10 (21.74)	15 (25.42)	8 (18.18)	19 (33.93)	6 (14.63)	51 (25.37)
31-45	20 (38.46)	13 (28.26)	27 (45.76)	11 (25)	25 (44.64)	13 (31.71)	71 (35.32)
46-65	14 (26.92)	23 (50)	17 (28.81)	25 (56.82)	12 (21.43)	22 (53.66)	79 (39.30)
All	52 (100)	46 (100)	59 (100)	44 (100)	56 (100)	41 (100)	201 (100)

Source: Field Survey, 2014

*Figures in parentheses are percentages

Table 1: Distribution of the sample households' head in different age groups.

Level of schooling might affect off-farm employment by increasing the length of time spent on education. It might provide better off-farm opportunities in terms of quality and quantity. Educational level of developed villages of the sample small farmers was higher than the underdeveloped villages. The noticeable cause may be more educational facilities in developed villages as compared to underdeveloped villages that reinforce the sample respondents of developed villages to gain more education. These results are in-line with the findings of Mecharla [10] and Man and Sadiya [2] who stated that the educational level of the sample households was more in developed villages as compared to underdeveloped villages.

Level of Education	Percentage of Small Farm Households				
	Peshawar		Charsadda		Overall
	Dawood Zai	Garhi Baghbanan	Rajjar	Mufti Abad	
Primary (1-5)	5 (15.63)	6 (26.09)	4 (12.5)	6 (30)	21 (19.63)
Middle (6-8)	4 (12.5)	5 (21.74)	8 (25)	7 (35)	24 (22.43)
Matric (9-10)	14 (43.75)	8 (34.78)	12 (37.50)	4 (20)	38 (35.51)
From Intermediate (11-12) to Graduation (13-14) and Onwards	9 (28.13)	4 (17.39)	8 (25)	3 (15)	24 (22.43)
All	32 (100)	23 (100)	32 (100)	20 (100)	107 (100)

Source: Field Survey, 2014

*Figures in parentheses are percentages

Table 2: Distribution of the sample small farmers by Level of education.

Table 3 elucidates distribution of small farm households by family size. It was found during the field survey that in developed and underdeveloped villages of overall two districts majority (47.76%) had comprised family size from 5 to 8 members. From the remaining greater part (43.28%) had constituted family size from 9 to 10 members or more than 10 members followed by (8.96%) up to 4 members.

Family size of developed and underdeveloped villages was different. The results of developed villages were in line with national as well as provincial levels data (rural Khyber Pakhtunkhawa) i.e. 6.80 and 8.10 per household, respectively [11,12].

The results of underdeveloped villages were different from developed villages due to lack of knowledge regarding the practice of family planning and passive role of the family planning organizations in the research area.

In addition, the rigid and reluctant attitude of the masses, especially, the illiterate folks further contribute in producing more children and this irrational attitude can be attributed to the more religious as well as traditional outlook which commonly prevails in backward and rigid societies in most parts of the underdeveloped and developing world.

There is inverse (negative) relationship between off-farm employment and farm size holding. The larger the farm size holding less access to off-farm employment of a household.

Family Size	Percentage Distribution of Family Size in				
	Peshawar		Charsadda		Overall
	Dawood Zai	Garhi Baghbanan	Rajjar	Mufti Abad	
Up to 4	7 (13.46)	4 (8.70)	4 (6.78)	2 (4.55)	18 (8.96)
5- 8	27 (51.92)	18 (39.13)	32 (54.24)	20 (45.45)	96 (47.76)
9-10≤	18 (34.62)	24 (52.17)	23 (38.98)	22 (50)	87 (43.28)
All	52 (100)	46 (100)	59 (100)	44 (100)	201 (100)

Source: Field Survey, 2014

*Figures in parentheses are percentages

Table 3: Family size distribution of the sample households.

Results in Table 4 shows that highest (36.32%) had a farm size up to 1 acre followed by (21.39%) from 1.1 to 2 acre, (16.92%) from 2.1 to 3 acre, (13.93%) from 3.1 to 4 acre and (11.44%) above 4 acre in an area. Furthermore, no large variations were found in the farm size holding distribution among sample respondents in the research area.

Farm Size (acre)	Percentage Distribution of the Sample Farm Households in				
	Peshawar		Charsadda		Overall
	Dawood Zai	Garhi Baghbanan	Rajjar	Mufti Abad	
Up to 1	23 (44.23)	17 (36.96)	21 (35.59)	12 (27.27)	73 (36.32)
1.1-2	11 (21.15)	8 (17.39)	15 (25.42)	9 (20.45)	43 (21.39)
2.1-3	9 (17.31)	7 (15.22)	10 (16.95)	8 (18.18)	34 (16.92)
3.1-4	5 (9.62)	8 (17.39)	7 (11.86)	8 (18.18)	28 (13.93)
Above 4	4 (7.69)	6 (13.04)	6 (10.17)	7 (15.91)	23 (11.44)
All Farms	52 (100)	46 (100)	59 (100)	44 (100)	201 (100)

Source: Field Survey, 2014

*Figures in parentheses are percentages

Table 4: Distribution of sample small farmers according to farm size holding.

The small size holdings among large number of sample small farm households are due to increase in population which leads to fragmentation of lands. These results verify the assumption that the research area was the abode of small farm. These results are in line with the results of the Bojnec and Dries [8] and Babatunda who stated that most of the people were operating small farms up to 1 acre land in their study area.

In Table 5 the off-farm employment of the sampled respondents was classified into three main occupational groups on the basis of comparison, i.e. permanent employment, trade and commerce (business activities) and daily paid labor.

The study results show that a total of (78.11%) farmers of the sample households were engaged in various type of off-farm employment in overall two districts and their respective developed and underdeveloped villages. Number of sample small farmer engaged in off-farm jobs was significantly high when compared with the study conducted by Khan [6] who observed that a ratio of 25.33% only. An auspicious reason may be high ratio of off-farm employment unlike Khan [6] that this research was conducted only small farms of Peshawar Valley.

The occupational pattern shows that maximum (45.22%) was found to be daily paid labors in the study area. From the remaining (36.31%) were belonged to trade and commerce followed by (18.47%) permanent employee (government). The above facts and results reveal that greater part of small farm households operating small farms area were performing off-farm employment to expand their income sources. Because of low educational level amongst the sample respondents, daily paid labors and trade and commerce (livestock merchant, timber associated business and shopkeeper) jobs of casual nature were the main occupations of sample households in developed and underdeveloped villages. These results are similar with the findings of Zahid [1], Kuhnen [12], Siphambe [9], Bojnee and Dries [8] who reported that due to low level of education among small farm land holders' daily paid labor were more followed by trade and commerce and permanent employee.

Types	Percentage Off-farm Occupational Pattern in				
	Peshawar		Charsadda		Overall
	Dawood Zai	Garhi Baghbanan	Rajjar	Mufti Abad	
Permanent Employees	8 (19.51)	4 (11.43)	12 (25)	5 (15.15)	29 (18.47)
Trade and Commerce	14 (34.15)	10 (28.57)	16 (33.33)	13 (39.39)	57 (36.31)
Daily Paid Labors	19 (46.34)	21 (60)	20 (41.67)	15 (45.46)	71 (45.22)
All	41 (100)	35 (100)	48 (100)	33 (100)	157 (100)
Source: Field Survey, 2014 *Figures in parentheses are percentages					

Table 5: Off-farm occupational status among sample households.

Table 6 explains average time spent by small farm households on off-farm employment according to farm size in the research area. Highest (39.81 hours) average working hours spent per week on off-farm employment by small farmers was observed on farm size up to 1 acre followed by from 1.1 to 2 acre (34.85 hours), from 2.1 to 3 acre (25.34 hours), from 3.1 to 4 acre (19.53 hours) and above 4 acre (13.14 hours) in overall two district and their respective developed and underdeveloped villages.

In the study area working hours used up week on off-farm employment was decreasing as farm size increase. Which show negative relationship between off-farm employment and farm size. Average working hours spent per week on off-farm employment by sample respondents on farm size up to 1 acre were more in the research area. It may be availability of more family labors for off-farm employment due to less farm size. While average working hours consumed per week on off-farm employment by small farmers belonged to different farm size (from 1.1 to 2 acre, from 2.1 to 3 acre, from 3.1 to 4 acre and above 4 acre) was less in the study area. It may be due to more engagement of family labors in different farming activities with the increasing farm size. Average working hours used up per week on off-farm employment by sample households belonged to different farm size in developed villages of two districts were more as compared to underdeveloped villages of these districts. It may be due to availability of more off-farm jobs (govt.jobs, part time employment and small business activities) and easy accessibility to local markets in developed villages as compared to underdeveloped villages. These results are similar with the findings of Babatunda, Monica [13] and Vijay [14]. Who found that off-farm activities were more in developed villages as compared to underdeveloped villages.

To check whether multicollinearity problem exists, correlation matrix between explanatory variables of the off-farm employment was estimated (Table 7). Since the coefficients of correlation between the variables are less than 0.80. So there is no multicollinearity between the variables.

Farm Size (acre)	Time Spent of Small Farm Households in				
	Peshawar		Charsadda		Overall
	Dawood Zai	Garhi Baghbanan	Rajjar	Mufti Abad	
Up to 1	49.75	36.50	42.50	30.50	39.81
1.1-2	43.25	33.50	39.00	23.65	34.85
2.1-3	33.65	21.90	29.80	16.00	25.34
3.1-4	24.40	17.65	22.75	13.30	19.53
Above 4	18.20	11.40	17.00	5.95	13.14
All Farms	39.52	30.65	34.07	22.36	31.65
Source: Field Survey, 2014					

Table 6: Time spent by sample households on off-farm employment per week (Hour).

To check the presence of heteroscedasticity problem, there are many tests that could be used. While in present research white test was used.

Name of Variables	(X1)	(X2)	(X3)	(X4)
(X1) (Farm size operated)	1			
(X2) (Age of the household head)	.434 (0.000)	1		
(X3) (Household size)	.383 (0.000)	.404 (0.006)	1	
(X4) (Level of education of the household head)	.422 (0.000)	.483 (0.000)	.370 (0.000)	1
Note: () figure in parentheses show P-value				

Table 7: Correlation matrix of coefficients.

White test

White suggested the following test:

W=nR2 (3)

White's test for heteroscedasticity

Null hypothesis: heteroscedasticity not present

Test statistic: LM=154.259

With p-value=P (Chi-square (53) > 154.259)=0.000

As the P-value (0.000) is less than the level of significance 0.05. So, the null hypothesis is rejected and alternate hypothesis is accepted. From the result it is concluded that there seems to be heteroscedasticity problem in the data.

Remedial measure

The results overall show heteroscedasticity problem. To correct the OLS model for heteroscedasticity, a simple command heteroscedasticity corrected, in Gretl 1.9.8 version was used. We can conclude after performing all the diagnostic tests that the model and data are free from the problem of multicollinearity and heteroscedasticity. Hence, all assumptions of the multiple regression models are fulfilled and results of the model could be interpreted with full confidence. Results of the modified model are discussed and interpreted in detail in lines.

Results of the modified model and its relationship with off-farm employment and all the independents variables are given in the Table 7.

Table 7 shows the empirical results of factors affecting off-farm employment. We can interpret from these results that the model has a goodness of fit with a high F-ratio (99.34) with P-value (F)=0.000. The R2 (Co-efficient of determination) value=0.7564 indicates that 75.64% variation in the off-farm employment is explained by the independent variables incorporated in the model. In other words, it means that R2 is significantly different from zero. Moreover, most of the coefficient has correct sign based on the theory of economics which gives us considerable confidence in the results.

Positive signs of the variables except FSO (Farm Size Operated) show that all these variables have direct relationship with the off-farm employment. However, Age of the household head showed no effect on off-farm employment. The remaining variables showed significant effect on off-farm employment activities of small farm households (Table 8).

Ind. Variables	Coefficient	Std. Error	t-ratio	p-value	Collinearity Statistics	
Constant	0.911918	0.887241	1.0278	0.30490NS	Tolerance	VIF
X1	-0.429811	0.1381	-3.1123	0.00204***	.337	2.967
X2	0.00901349	0.0116228	0.7755	0.43868NS	.391	2.560
X3	0.20843	0.0388854	5.3601	0.00001***	.525	1.904
X4	0.104236	0.0380623	2.7386	0.00656***	.318	3.147
R-squared=0.7564; Adjusted R-squared=0.7488; F=99.34; P-value (F)=0.000						
*Significant ***Highly Significant NS=Non-significant						
Note: X1 (Farm Size Operated) X2 (Age of household head)						
X3(Household Size) X4 (Level of Education of the household head)						

Table 8: Empirical Results of Model 1: Heteroscedasticity-corrected, using observations 1-201 Dependent variable: Off-farm employment, (Factors Affecting Off-farm Employment of S mall Farm Households).

X1 (Household Size): The results of the study showed that household size had positive coefficient and statistically significant at 5 % probability level. The coefficient implies that increase in household size could increase the level of off-farm employment and vice versa. Mecharla [10], Zahid [1] and Ali et al. [7] also found the positive relationship between household size and off-farm employment.

X2 (Level of education of the household head in years): The coefficient of education was positive and statistically significant at 5% probability level. Which indicates that education improves the level of off-farm employment activities? The research studies of Siphambe [9], Bonjee and Dries [8] concluded that education enhances the level of off-farm employment.

X3 (Age Household Head): The results of the study show that the co-efficient of age was positive and statistically insignificant at 5% probability level, which means that increase in age of small farm households would decrease the number of income sources (off-farm employment activities). The findings of the Mecharla [10], Siphambe [9], Zahid [1], Khan [6] and Edelberg confirmed our results who stated that the number of income sources (off-farm employment activities) of the small farm households decreases as age increases and vice versa.

X4 (Farm Size Operated in acres): Farm size showed adverse relationship with the off-farm employment and statistically significant at 5% probability level. It can be concluded that as the farm size of small farm households increases, the off-farm employment decreases and vice versa. Larger the farm size can increase on farm activities and less time can be left for off-farm activities. Furthermore farm production and hence income from farm may be higher and the small farm households may not be in need of generating extra income from off-farm activities. These results are supported by the findings of Kuhnen [12], Khan [6].

They reported that in rural areas of Pakistan, there was a negative relationship between the farm size and off-farm employment. Similarly, Mecharla [10] stated that in rural areas of India, there was inverse (negative) relationship between off-farm employment and farm size [15-28].

Conclusion and Recommendations

Major factors affecting off-farm employment in the sample districts and their respective developed villages and underdeveloped villages were household size, educational level of the sample farmer, age of household head and farm size operated. Household size, educational level of the sample farmer was positively related to off-farm employment; whereas farm size was negatively associated with off-farm employment, while age of the household head was insignificant. It was also established that the small farm households of relatively developed and more accessible areas devote more time to off-farm employment as compared to the small farm households of relatively underdeveloped areas. This can be associated with the availability of jobs at local market and easy access to surrounding areas as well as better level of education. Most of the small farm households sell their labors services for wage and salary because business is out of their reach due to lack of capital and skill.

On the basis of the research study, following recommendations are suggested.

- Level of off-farm employment is negatively related with the farm size. Farm size is likely to decrease overtimes due to the Islamic law of inheritance. There is a need to generate off-farm employment opportunities through public and private partnership.
- Government should make policies to stop marginalization so that the division of agriculture land should be up to a certain limit from which the farm households could be able to earn their livelihoods.
- It is necessary to improve the agriculture marketing system through expanding network of farm, market roads and storage facilities to provide a wider market for agriculture produce.

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