ESTIMATION OF UNDEREMPLOYMENT IN AGRICULTURAL SECTOR OF PESHAWAR VALLEY

Dilawar Khan, Muhammad Bashir and Muhammad Zulfiqar

ABSTRACT

This study was conducted to estimate the level of underemployment in agricultural sector of Peshawar Valley during 2005. The data was collected from 200 sampled respondents of 12 villages of Charsadda Tehsil using multistage stratified sampling technique. Average land holding of sampled respondents was found to be 6.12 acres. However, about 50% of sampled respondents had their land holding below 5 acres. On average, 1.50 adult units of family labour were engaged in agricultural activities ranging from 1 to 1.91 adult units. The results of the study revealed that average level of underemployment was 21 percent in the study area ranging from zero to 35%. Level of underemployment was inversely related with size of land holding. Other factors affecting the level of underemployment were family size, size of livestock herd, off-farm employment, distance of the village from the main road and educational level of sampled respondents. The results of study show that coefficients of farm size, size of livestock herd, off-farm employment and level of education were negatively correlated and significant while coefficients of family size and distance of village from main road were positively correlated. With the decrease in the size of holdings as a result of division and subdivision of land holdings due to Islamic Law of Inheritance underemployment in the agricultural sector is likely to increase in future. There is need to create off-farm employment opportunity. Agro based industries seems to potential area to generate employment opportunities. Simultaneously there is need for initiating skill development programs.

Keywords: Agriculture, Peshawar, Tenure, Underemployment

INTRODUCTION

Agriculture is the dominant sector of Pakistan's economy. It accounts for 21.6 percent to Gross Domestic Product (GDP) and employees 44.8 percent of total labour force. It also contributes substantially in earning precious foreign exchange for the country. It also serves as engine of growth as a supplier of raw materials to industry as well as a market for industrial products and about 65.9 percent of country's population is living in rural areas and vast majority of it depends on agriculture to earn its livelihood (GoP, 2006).

Pakistan's population increased at the compound growth rate of 2.83 percent per annum during 1951-2005. Pakistan's population will almost double in the next 36 years at the current growth rate of 1.9 percent. Higher population growth supplies more workforce in the market and given the low economic growth, it creates unemployment. Thus, it puts pressure on educational and health facilities on one hand and gives birth to unemployment, underemployment, land fragmentation, overcrowding, katchi abadis, poverty, crime and environmental degradation on the other hand. During 1951-2005, the population of Pakistan has increased 4.52 times from 33.74 million to 152.53 million (GoP, 2005)

The problem in the labour market of Pakistan is not only that of open unemployment, but there is also significant underemployment. Underemployment was first considered by the second International Conference of Labour Statisticians (ICLS) in 1925, the first international statistical definition was adopted in 1957 and the last resolution by the 16th ICLS in 1998. Time-related underemployment according to this resolution refers to "insufficient hours of work in relation to an alternative employment situation that a person is willing and available to engage in". Labour Force Survey of Pakistan (2006) shows that a significant number of those who were employed during the survey period were classified as having been underemployed. Underemployment was defined in the survey as persons who worked for less than 35 hours a week for an economic reason and they were available for additional work while underemployment rate is estimated as a ratio of the employed who worked less than 35 hours a week to the total labour force. In Pakistan, around 5.8 million or 14.0 percent of the total employed were working less than 35 hours a week (GoP, 2004). Based on available information, the proportion of underemployment has increased from 13.4 percent to 15.53 percent during 2002-05. Agricultural sector and rural area are reservoirs of disguised and underemployed labor force. Underemployment in rural area was greater than urban area.

Underemployment in the agricultural sector, like other developing countries, is a common phenomenon in Pakistan. Cultivated land per person is 0.14 hectares during 2004-05 in the country. Population is increasing over time whereas there is rare increase in the cultivated land. Cultivated area of Pakistan was 20.30 million hectares in 1981 and it was increased to 22.51 million hectares in 2005. Population of Pakistan was 85.09 millions in 1981 and it was increased to 152.53 millions in 2005. During the past 25 years, cultivable land has increased by 27 percent compared to 98 percent increase in population,

Department of Agricultural Economics, NWFP Agricultural University, Peshawar - Pakistan.

resulting in reduced individual land holdings in Pakistan (GoP, 2006). However, it may be pointed out at this juncture that each year, a sizable portion of fertile and cultivated land, in the vicinity of cities, towns and villages is going out of cultivation and some marginal lands are brought under cultivation. According to 1998 Population and Housing Census of Pakistan, there were 19.30 million housing units in the country as compared with 12.60 million enumerated in 1980, showing an increase of 53.20 percent (GoP, 1998).

Farming in Pakistan is characterized by small and fragmented holdings. Due to operation of Islamic law of inheritance, each piece of cultivated land is being broken into small and scattered parcels generation after generation. In Pakistan, 86% of holdings were below subsistence level (12.5 acres) during 2000. This figure was 94% in NWFP during the same period. Over the last 25 years division and sub division of land holding has reduced farm size. Many of small farmers do not have enough land to fully utilize their labour hours. The number of small farms of less than 2 hectares increased from 34% of the total in 1980 to 58% in 2000. The share of both, the medium and the large farms in the total numbers of farms also decreased during the same period (GoP, 2000).

Due to increasing man-land ratio, unemployment and underemployment is increasing in the agricultural sector. Small farmers are finding it difficult to make their living solely from their smallholdings. Some of them are leaving agriculture and joining others professions, while others, in addition to agriculture, are looking for some other job to make their both ends meet. The number of farmers engaged in multiple employments is increasing overtime. Intensive cultivation on such small farm is a dilemma. Here is clash between the individual and the national interest. Individual farmer wants to maximize his earnings and his rate of return which may be higher in the non-agricultural jobs, so he cannot devote more time for intensive cultivation, whereas the national interest is to optimize the earnings from the agricultural enterprises. This process of multiple employments is demanding new dimensions for national agricultural policy. If we want to optimize the use of land resources and increase our agricultural productivity, we need to devise our national agricultural policy accordingly.

Mechanical agricultural technology is further reducing employment for both farm family members and hired farm workers. The use of agricultural machinery is increasing day by day in Pakistan like other agricultural countries of the world. Farm area exclusively using bullock power has generally declined over time. All over Pakistan

tractor is the dominant mode of traction power. It has gradually reduced the bullock's power. Literally all the wheat crop is now threshed with mechanical threshers and similar progress was recorded in the use of rice husking machines. There were 157310 tractors operating on farms in Pakistan in 1984. This figure was increased to 401663 in 2004 (GoP, 2004). Several studies showed that tractor displaces labour. Khan and Karim (1991) have concluded that complete agricultural mechanization in Pakistan would displace two-third of the labour force. Besides tractors, there has been phenomenon of increase in other agricultural machinery (also see Reddy, 1995).

In the past very rare efforts have been made to estimate the level of underemployment in the agricultural sector of Pakistan. However, several research studies have been undertaken in other countries to underscore the level of underemployment in agricultural sector. Robinson and Abbasi (1979) found that the extent of underemployment in Pakistan was concentrated mostly in agriculture, trade and services sector. Aubert (1990) concluded that hidden agricultural underemployment became an open and officially acknowledged problem. Sain and Joshi (1994) explored a direct relationship between hired labours used in terms of the farm size while Lindsay and Gleeson (1997) concluded that farm numbers have gradually declined and farm size increased, with a higher proportion of small farms leaving agriculture rather than larger ones. Similar studies were also taken by [Singh et al. (1996); Shintani (2001); Bojnec and Dries (2005); Rawal (2006)].

Underemployment is a broad and complex issue. The problem of underemployment is very acute and it is worsening over time. Policy makers and economists alike have focused extensively on the incidence of unemployment. Studies of the underemployed as an underutilized labour resource have been scarce. Research on this topic appears to be particularly relevant for developing countries like Pakistan where the incidence of underemployment in agriculture is commonly assumed to be a more acute problem. This study was directed in Peshawar valley of NWFP to estimate the level of underemployment in agricultural sector. According to the knowledge and information of this research, no study of this nature has carried out so for in this region. This study can help policy makers to make rational employment policies for rural areas. It can also help NGOs, agricultural experts and people working on employment situation. Unemployment and underemployment are the chief source of poverty in rural areas and government is committed

to eradicate poverty. So this study can also help in making appropriate policies for poverty alleviation. From the results of this study, the policy makers will be able to make a decision, which will help the government to improve the living standard of the people living in these areas. It can also serve as a bare for other researchers and scientists to conduct the study of this nature in other parts of the country.

MATERIALS AND METHODS

This study was conducted in Peshawar Valley of NWFP during the year 2005. Due to financial and time constraints, the study was restricted to Charsadda Tehsil of Peshawar Valley. Both primary and secondary sources were used to collect the relevant data for research study. The primary data regarding level of underemployment, age and educational profile of people engaged in agriculture was collected directly from 200 sampled respondents of 12 villages through a structured questionnaire. Before collecting actual data, the questionnaire was pretested based on which minor improvements were made keeping in view the objectives of the study.

Multistage stratified sampling technique was used to collect primary data. Villages were sampled from a distance of 1 km, 1-4 km and over 4 km from main road. From each village respondents were categorized into five categories. The total sampled respondents were 200. The sampling proportion in each village was obtained by the following formula (Chaudhry and Kamal, 1997).

$$n_k = n\left(\frac{N_k}{N}\right)$$

Where:

n_k is the proportion of the sample in the k_{th} village, n is the size of the sample, N_k is the population of the k_{th} village and N is the total population.

The notion of underemployment that this study is seeking to investigate is known as time-related underemployment in the terminology of International Labour Organization (ILO) that was adopted at the Sixteenth International Conference of Labour Statisticians (ICLS) (ILO, 1998). Labour Force Survey of Pakistan also followed this criterion (GoP, 2006). According to the ILO definition, time-related underemployment comprises of all persons in employment who satisfy the following three conditions during the reference period:

i.   Willing to work for more hours in addition to their current job(s) or willing to replace current job(s) with another job(s) that increases work hours or a combination of both options;

ii. Available to work for additional hours and

iii. Worked fewer hours than specified for working by a national authority.

There are two main types of measures of underemployment. The first one is headcount measures, which means number of persons underemployed. The second is volume measures i.e. number of hours of underemployment. Headcount measures provide information about the pervasiveness of underemployment showing number of labour force affected while volume measures provide information about the extent of excess supply of labour force i.e. how many hours of supplied labour are not utilized. Estimation of volume measures is possible using the survey data as data on both actual and preferred working hours of all those in employment whether full-time or part-time will be collected.

Underemployment measures are more informative if expressed in terms of relative measures, which is the approach that will be adopted in this study. The volume measure can be estimated by using the following formula (Wilkins, 2004).

$$V = \frac{\sum_{i=1}^{n} U_i}{\sum_{i=1}^{n} S_i}$$

Where:

V   is the volume measure of underemployment

U_i is the number of hours of underutilization of individual i

S_i is the preferred number of hours of work of individual i.

The definitions of both U and S can be varied to produce different volume measures; the main constraint being that U should be a subset of S. For example, U is 'additional hours wanted by part-time workers', and S 'total desired hours of part-time workers' or 'total desired hours of all workers'; or U may be 'additional hours wanted by part-time workers, up to a maximum of 35 hours per week inclusive of hours already being worked', and S may then be 'hours desired by employed persons, up to a maximum of 35 hours per week'.

Econometric Model

In the light of literature reviewed and preliminary discussion with farmers of the area, major determinants of underemployment are farm size,

size of family, size of livestock, off-farm employment, distance from main road and level of education. Key factors affecting underemployment in agricultural sector was analyzed by using the econometric model:

$$U_i = (FS_i, SF_i, SL_i, OFE_i, DM_i, LE_i) + u_i$$

Where,

U_i = Level of underemployment of individual i and

FS_i = Farm size of individual i (in acres)

SF_i = Size of family of individual i (number of family members)

SL_i = Size of livestock of individual i (number of livestock held).

OFE_i = Off-farm employment of individual i, if engaged in off-farm employment takes the value of 1, or 0 otherwise.

DM_i = Distance of village from main road of individual i (in kilometers)

LE_i = Level of education of individual i (number of years of schooling)

u_i is the vector of random error.

RESULTS AND DISCUSSION
Age of Sampled Respondents
Seventy five percent of sampled respondents were between the age of 30 and 69 years while 22.5% sampled respondents were in the age group between 40 and 49 years. No respondent was less than 20 years of age. Research findings support the hypothesis that gradually old people are being piled up in farming profession.

Educational Level of Sampled Respondents
Sixty two percent of respondents were illiterate while 8.5% of sampled respondents had primary level of education followed by middle 1.5%, and matriculation 11%. The study showed that 16% of sampled respondents had their education above matriculation. These results support the hypothesis that most of people engaged in farming are either illiterate, or have very low level of education.

Tenurial Status of Sampled Respondents
Tenurial status reflects relationship between land and man. The majority (47.5%) of the sampled respondents of the research area were tenants. The remaining 36% and 16.5% were owners and owner-cum-tenant, respectively.

Size of Land Holdings
Most of the sampled respondents in the study area were small landholders. Average size of land holding in the study area was 6.12 acres. Over fifty percent of sampled respondents had land holding less than 5 acres. The remaining 28.5 percent of respondents had land holding between 5 and 10

acres and 19 percent of respondents had land holdings over 10 acres.

Family Labour of Sampled Respondents
To investigate the level of underemployment, understanding of engagement of family labour is important. Generally, the level of engagement of family labour is linked with the farm size. Small farmers do not have enough land to fully engage family labour. Table I depicts the working hours of family labour according to size of the farm. Highest working hours per week (37.68 hours) were observed on the farm size of 10 acres and above, followed by 5 to less than 10 acres where working hours were found to be 24.0 hours. At the farms of 2 to less than 5 acres, the working hours were found to be 12.0 hours while 1 to less than 2 acres it was 7.92 hours and at the farms of less than 1 acre employment was 4.74 hours per week. On farm size of 10 and above acres working hours of family labour were comparatively high, as this category of farm requires more labour.

Casual Hired Labour of Sampled Respondents
Small farms generally perform all the farming operations themselves. Medium and large farms hire casual labour at peak agricultural period like harvesting of cops, picking of vegetables/fruits and sometimes for sowing of crops. Table II gives number of man-hours of casual labours hired by various sizes of farms. Highest amount of casual labours (720 hours) was hired by farm size of 10 acres and above followed by (410 hours) farm size 5 to less than 10 acres. Farms 2 to less than 5 acres were hiring 125 hours and 1 to less than 2 acres (80 hours) while farms less than one acre did not utilize any casual labour

Time Spent on Livestock Activities
Number of animals kept by various size of farms and average time spent by an adult unit per week on livestock activities is given in Tables III. Time spent by various size of farms was positively correlated with the number of animals kept. There was not much variation in the number of animals kept by various categories of farms. Number of animals kept varied from 1.33 to 2.55 adult units. The average time spent by an adult unit per week varied from 8.64 to 10.20 hours.

Time Spent On Farm And Off-Farm Activities
Time spent per week on farm related activities varied from 14.94 to 47.28 hours at various size of farms. As off-farm employment is concerned, 26.5 percent sampled respondents were found engaged in off-farm activities. Main off-farm activities were business, daily paid labour and government service. Time spent per week on off-farm activities varied

from 3.72 to 7.8 hours. Time spent on farm and off-farm activities is given in Table IV.

Level of Underemployment in Agriculture

Underemployment was defined in the labour force survey of Pakistan as "if a person is working less than 35 hours a week for an economic reason and is available for additional work" (GoP, 2006). According to the findings of this research study, overall level of underemployment was 21% varied from zero to 35%. Underemployment was negatively correlated with the farm size. Highest level of underemployment was found on farm size less than one acre (35%), followed by farms 1 to less than 2 acres (29 %), 2 to less than 5 acres (21%) while farm size 5 and above 5 acres had no underemployment. Level of underemployment in rural area of Peshawar Valley is likely to increase in future due to division and subdivision of land, and increase in population. Pace of rural industrialization is very slow and availability of off-farm employment opportunity is limited. Total time spent per week by an adult unit and the level of underemployment in the study area is given in Table V.

Econometric Analysis

To analyze the effect of independent variables on dependent variable, to examine the relative share of independent variables in the dependent variable and to make predictions econometric model was used. Shazam Professional Edition Version 10.0 was used for econometric analysis. It was observed that the level of underemployment is related with the farm size, size of family, size of livestock herd, off-farm employment, level of education and distance of the village from the main road. Linear relationship was assumed between dependent and independent variables.

Table VI depicts the econometric results of factors affecting the level of underemployment. Coefficients of size of farm, livestock herd, off-farm employment and level of education were negatively correlated and significant at 1, 5, 1 and 5 percent level respectively. It implied that higher size of farm, livestock herd, off-farm employment and level of education lower will be underemployment in agriculture. Similarly the coefficient of family size and distance of village from main road were positively correlated. Size of family is significant at 1 percent level while distance of village from main road is insignificant

because the villages are situated almost at the same distance from main road.

CONCLUSION AND RECOMMENDATIONS

The research concluded that most of the people engaged in agricultural profession were illiterate or with low educational qualifications. Agricultural profession was not attractive for young educated people. In the long run it may seriously hamper the development of agricultural sector. Due to small size of holdings underemployment was a common phenomenon in the agricultural sector. In the study area, overall level of underemployment was 21 percent. It ranged from zero to 35 percent. About 32 percent of working hours of rural households were allocated towards livestock activities. In the light of results of the study, following recommendations were made:

i. Level of underemployment was negatively correlated with the farm size. Proportion of small farmers was increasing over time. Farm size was likely to further decrease overtime due to Islamic law of inheritance. There is need to generate off-farm employment opportunities through public and private partnership to reduce the level of underemployment in agriculture and rural areas.

ii. Livestock sector was vital source of self-employment. About 32 percent of working hours of rural households were being allocated to livestock activities. There is need to encourage livestock sector at micro and macro level through appropriate supportive policies so that livestock keeping is encouraged. This will improve employment hours at family level.

iii. The capacity of agricultural sector and livestock sector to absorb agricultural labour is limited. It is high time for policy maker to look towards agro-based cottage industry for processing and value addition of agricultural and livestock products. This will help to reduce underemployment from rural areas.

iv. There is need to open skill development centers in rural areas to impart training and skills in the needed professions like bee keeping, welding, electrification works and handicraft activities, etc to generate off farm employment opportunities in rural areas. This will help in controlling underemployment in the rural areas.

Table-I: *Family labour of sampled respondents*

Landholdings	Sampled respondents (%)	Adult units engaged/farm	Average time spent/week by an adult unit (Hrs)
Less than 1	1.50	1.00	4.74
1 to less than 2	8.00	1.18	7.92
2 to less than 5	43.00	1.70	12.00
5 to less than 10	28.5	1.91	24.00
10 and above	19.00	1.60	37.68

Source: Survey

Table-II: *Casual hired labour of sampled respondents*

Landholdings	Sampled respondents (%)	Adult units engaged/farm	Working hours of casual hired labour/annum
Less than 1	1.50	-	-
1 to less than 2	8.00	10	80
2 to less than 5	43.00	16	125
5 to less than 10	28.50	52	410
10 and above	19.00	90	720

Source: Survey

Table- III *Time spent on livestock activities*

Landholdings	Sampled respondents (%)	Animals/farm	Total time spent/week (Hrs)	Average time spent by adult unit/week (Hrs)
Less than 1	1.50	1.33	19.14	10.20
1 to less than 2	8.00	1.50	20.34	9.60
2 to less than 5	43.00	2.08	25.68	9.06
5 to less than 10	28.5	2.49	27.60	8.64
10 and above	19.00	2.55	27.54	9.60

Source: Survey

Table -IV *Time spent on farm and off-farm activities by an adult unit*

Landholdings	Sampled respondents (%)	Time spent on farm related activities/week (Hrs)	Time spent on off-farm activities/week (Hrs)
Less than 1	1.50	14.94	7.80
1 to less than 2	8.00	17.52	7.26
2 to less than 5	43.00	21.06	6.66
5 to less than 10	28.50	32.64	5.88
10 and above	19.00	47.28	3.72

Source: Survey

Table -V: *Level of underemployment in agriculture*

Landholdings	Sampled respondents (%)	Total time spent/week (Hrs)	Underemployment (%)
Less than 1	1.50	22.74	35
1 to less than 2	8.00	24.78	29
2 to less than 5	43.00	27.72	21
5 to less than 10	28.50	38.52	0
10 and above	19.00	51	0
Total	100	-	21

Source: Survey

Table VI *Factors affecting the level of underemployment in agriculture*

Independent variables	OLS Coefficients	t-values	P-values
Constant	28.373	2.45	0.0655
Farm size	- 5.756 *	- 27.13	0.0045
Family size	2.675 *	22.45	0.0062
Size of livestock herd	- 2.193 **	- 6.675	0.0471
Off-farm employment	- 7.674 *	- 32.789	0.0065
Level of education	- 2.897 **	- 5.342	0.0346
Distance from main road	1.876	1.2843	0.4563
Adjusted R^2	0.86	-	-

*, ** Significant at 1% and 5% level respectively.

REFERENCES

Aubert, C. 1990. The Chinese Model and the Future of Rural Urban Development, Communist Agriculture: Farming in the Far East and Cuba. 2: 16-66. London, UK.

Bojnec, S. and L. Dries. 2005. Causes of Changes in Agricultural Employment in Slovenia: Evidence from Micro-data, American J. of Agric. Economics, 56: 4: 399-416.

Chaudhry, S.M. and M. Kamal. 1997. Introduction to Statistical Theory, Part-II. Ilmi Kitab Khana, Kabir Street, Urdu Bazar, Lahore, 5400, Pakistan. pp.18.

GoP. 1998. Population and Housing Census of Pakistan. Population Census Organization, Federal Bureau of Statistics, Statistics Division, Islamabad, Pakistan.

GoP. 2000. Pakistan Agricultural Census. Agricultural Census Organization, Econ. Affairs and Stat. Div. Islamabad, Pakistan.

GoP. 2004. Labour Force Survey of Pakistan. Federal Bureau of Statistics, Statistics Division, Islamabad, Pakistan.

GoP. 2004. Pakistan Agricultural Census. Agricultural Census Organization, Econ. Affairs and Stat. Div. Islamabad, Pakistan.

GoP. 2005. Pakistan Economic Survey. Ministry of Finance, Eco. Advisor's Wing, Finance Division, Islamabad, Pakistan.

GoP. 2006. Labour Force Survey of Pakistan. Federal Bureau of Statistics, Statistics Division, Islamabad, Pakistan.

GoP. 2006. Pakistan Economic Survey. Ministry of Finance, Eco. Advisor's Wing, Finance Division, Islamabad, Pakistan.

ILO. 1925. Report of the Second International Conference of Labour Statisticians, Int'l Labour Organization, Geneva.

ILO. 1998. Report of the Sixteenth Conference of Labour Statisticians, International Labour Org. Geneva.

Khan, F. K. and K. Karim. 1991. Agriculture Problems and Solutions in Geography of Pakistan: Environment People and Economy, Oxford Univ. Press, Karachi, Pakistan.

Lindsay, R. and T. Gleeson. 1997. Changing Structure of Farming in Australia, Australian Bureau of Agric. and Resource Econ. Canberra Australia, No. 4: 7.

Rawal, V. 2006. The Labour Process in Rural Haryana, India: A Field Report from Two Villages. J. of Agrarian Change, 6:4: 538–583.

Reddy, V.R. 1995. Labour Absorption in Agriculture, Rawat Publications; Jaipur; India.

Robinson, W.C. and N. Abbasi. 1979. Underemployment in Pakistan. Pakistan Dev. Review. 18: 313-331.

Sain, I. and A. S. Joshi. 1994. An Empirical Study of Human Labour Employment in the Punjab Agriculture: Agricultural Situation in India, 48: 11, 785-787.

Shintani, M. 2001. Underemployment in the Agricultural Sector of Vietnam: a Production Function Approach, Japanese J. of Rural Econ., 3: 26-35.

Singh, A.L., S. Fazal and H. Sajjad. 1996. Employment of Landless Labourers Inside and Outside the Villages of Aligarh District, U.P. Indian J. of Regional Sci., 28: 1, 13- 26.

Wilkins, R. 2004. The Extent and Consequences of Underemployment in Australia: Evidence from Wave 1 of the HILDA Survey, Working Paper No. 16/04, Melbourne Instt. of Appl. Econ. and Social Res., Univ. of Melbourne.