POVERTY ACROSS DISTRICTS IN IRRIGATED PUNJAB, PAKISTAN

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Abstract

Poverty is one of the main issues that is worrying most of the third world nations. These nations have focused their efforts towards the welfare of their people. A wide variation in incidence of poverty is experienced across countries and within countries across different regions. Similarly, the determinants of poverty also vary spatially and temporally. Poverty is a complex phenomenon and it is difficult to analyze and find out specific reasons that escalate it. A significant proportion of Pakistan's irrigated area, consisting of different agro-ecological zones, is also coping with poverty, which is menacing the material welfare as well as dignity of the affected people. A number of studies have attempted to estimate its incidence, depth, and severity showing large variation. However, it can be generalized that poverty is higher in the rural areas than in urban areas. Present study is also an attempt to analyze the variation in incidence of poverty across different districts of Punjab province of Pakistan, presenting different agro-ecological zones. A relatively lower poverty incidence was measured for Gujarat and Mandi Bahauddin districts as compared to Sargodha, Toba Tek Singh, and Bahawalnagar districts. Landholding, family size, dependency ratio, education of household's head, and gross value of production per hectare were found as major determinants of poverty in irrigated areas of Punjab, Pakistan.

Introduction

Understanding the phenomenon of poverty is imperative in order to curb its expansion and raise the welfare level of the population. Government of Pakistan (2002) has claimed the extent of poverty as 28 percent with recognition of higher poverty incidence in rural areas (32 percent) than in urban areas (19 percent). This indicates that the poor living standards would be fatal for rural population, if necessary measures were not taken. In a country like Pakistan where around 70 percent of the population resides in rural area and depend on agriculture directly or indirectly, curtailment and declining poverty require serious efforts.

Though poverty in rural areas is directly correlated with productivity of agriculture, the variation in incidence of poverty can be experienced across different ecological zones based on variation in cropping pattern, availability of surface water supplies, quality of groundwater available and other socio-economic characteristics of the area. As different areas differ with respect to their reliance on agriculture for income, the composition of their income sources also play a critical role in assessing the poverty status of the

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households. In general, the areas in upper part of Punjab are well developed as compared to the areas in the lower part of Punjab, Pakistan. Similarly, a higher incidence of poverty would be expected in lower Punjab areas as compared to the upper Punjab areas.

The agriculture sector, in general, experience unstable earnings owing to inequities in land distribution. Fragmentation of landholding (due to law of inheritance) decrease the availability of sufficient hectares of land needed to be used as viable and sustainable unit as a source of income to meet the basic needs of the households. This results in decrease of productivity and makes agriculture uneconomical for such landholding. Another important aspect that affects the productivity is the availability of surface irrigation water supplies. The insufficiency, inequitable distribution, and unreliability at the time of need are the main characteristics of the prevalent surface irrigation system. This hampers the income generating capacity of the farm households, resulting in lower productivity and profitability especially when the groundwater available is also of poor quality. Due to these two factors, the risk of falling into poverty trap increases and shows significant increase over the recent years.

Poverty has various dimensions. In-depth perception of these dimensions is useful in understanding the phenomenon of poverty and differentiating between the myths and realities attached with it. Incidence of poverty is directly dependent on income/expenditure of the households, which are not constant over all the months in a year. Moreover, good or poor harvest in different years are due to various agro-climatic and management factors. Incomes/expenditure fluctuate over times and so does the incidence of poverty. It is also empirically established that incidence of poverty varies across different areas.

The vulnerability of households to fluctuation in output produced and prices fetched increase the risk of earning low income in the agricultural sector. Even a good harvest may result in lowering of the farm incomes and increasing the risk of poverty. Degree of this risk varies spatially as the cropping pattern changes. In this context, it would be interesting to analyze the depth and severity of poverty in order to dig out the real root causes of poverty. Keeping in view these facts, incidence of poverty and its various dimensions are analyzed spatially for better comprehension of the phenomenon, which would lead to suggestions/policy implications for poverty reduction.

The current paper is divided into five parts. Methodology is described in part II. General results are discussed in part III of the paper while in part IV, the determinants of poverty are assessed. The paper ends with conclusions and implications made on the basis of current study.

Methodology

Study Area

The study was conducted in the Upper Chaj Doab (comprising Gujrat and Mandi Bahauddin districts) irrigated by Upper Jehlum Canal (UJC); Lower Chaj Doab (comprising Sargodha district) irrigated by Lower Jehlum Canal (LJC); Rechna Doab (comprising of Jhang and Toba Tek Singh districts) irrigated by Lower Chenab Canal (LCC) East, and tail part of the Hakra irrigation system (comprising Bahawalnagar district) irrigated by Hakra canal system (Figure 1).

Figure 1: Location of the Chaj Doab, Rechna Doab & Hakra 4-R area in the Punjab, Pakistan.

Total geographic area of the Chaj Doab, Rechna Doab and Hakra area is reported to be 1.2 million hectares, 2.98 million hectares and 20,000 hectares, respectively. The salient features of irrigation system in the study area are shown in Table 1.

Table 1: Salient features of the selected irrigation systems in Punjab.

System	District	Name of Distributary	GCA (100 ha)	CCA (100 ha)	Length (Km)	Outlets	
						Number	Discharge (Cusecs)
UJC System	Gujrat	9-R *	61.9	59.5	10.24	29	39
		10-R*	45.3	43.7	11.05	23	25
	Mandi Bahauddin	13-R **	30.4	28.7	13.81	18	26
		14-R **	241.6	221.8	47.94	135	193
Gujrat System		Kakowa*l	97.9	92.7	38.68	50	84
		Phalia**	299.1	269.1	75.24	152	289
LJC System	Sargodha	Lalian*	486.4	444.8	59.80	195	351
		Khadir*	520.0	474.3	89.05	166	235
LCC System	Toba Tek Sing	Khikhi*	419.7	329.4	53.30	158	341
Hakra System	Bahawalnagar	Hakra 4-R*	201.9	178.5	36.08	131	189

*P=Perennial **NP=Non-perennial

A stratified random sampling design was used to select the sample households in the study areas. The irrigated areas were divided into five irrigation systems listed below:

I. UJC System II. Gujrat System III. LJC System

IV. LCC System V. Hakra System

These systems are irrigated through Upper Jehlum Canal (UJC), Gujrat System, Lower Jehlum Canal (LJC), Lower Chenab Canal (LCC) East and Hakra 4-R, respectively. Since there were variations in irrigated systems in terms of cropping patterns and nature of perennial and non-perennial irrigation water supplies, therefore at the second stage, distributaries were selected on the basis of the agro-ecological characteristics based on cropping patterns, nature of water supplies (perennial/non-perennial) and location of the watercourses across head, middle and tail of the distributary. According to this criteria, the entire study area was divided into seven cropping zones, and ten distributaries were selected that irrigated areas in five different districts. While each distributary was fairly homogenous within its boundaries in terms of above characteristics, however, there could be intra-distributary variations especially in terms of access to water (head, middle and tail) due to differences in availability of water resulting from locational differences. These intra-distributary variations were captured through sampling across head, middle and tail within a distributary by selecting a watercourse. Households from each of the selected watercourses were selected through systematic random sampling from a complete sampling frame for each watercourse (i.e. list of all households on the watercourse). Landless households were selected from the voters' list through systematic random sampling, based on their proportion in total number of households on each selected watercourse. Equal allocation method was adopted for selecting distributaries and watercourses across head, middle and tail reaches of the selected distributaries and the sample households across each of the selected watercourses. A well-represented sample of 1224 farm households was selected for collecting information from the field through a well-designed pre-tested questionnaire. Details of sample size are provided in Table 2.

Table 2: Number of watercourses and sample household in selected distributaries.

District	Distributaries	No. of watercourse	No. of household	Total Number
Gujrat	9-R, Khoja and 10-R Dhup Sari	12	30	180
Mandi Bahauddin	13-R, Saroki, 14-R Maggowal, Phalia, and Kakowal	24	60	360
Sargodha	Lalian and Khadir	18	38	342
Toba Tek Singh	Khikhi	9	19	171
Bahawalnagar	Hakra 4R	9	19	171
	Total Sample	72	166	1224

Monetary Measures of Poverty

The measurement of income poverty involves specification of an indicator of well being such as income/expenditure, and specification of an income level or threshold below which a person or household is considered poor – the poverty line, and construction of poverty measures.

Foster-Greer-Thorbecke (FGT) class of measures are the most commonly used measures of poverty, which capture three aspects of poverty: incidence, depth/intensity, and severity of poverty. These measures are the Head Count Index, the Poverty Gap Index and the Squared Poverty Gap Index.

Headcount Index is defined as the share or proportion of the population which is poor, or whose income is below the specified poverty line. This is a measure of incidence of poverty. Suppose in a population of size n, there are q number of poor people whose income y is less than the poverty line z, then head count index can be defined as:

Head Count Index (HC) = q/n

Poverty Gap Index is defined as the mean distance separating the population from the poverty line. This can be interpreted as a measure of depth of poverty. Non-poor is given a distance of zero. This measure can be mathematically represented as following:

Poverty Gap $PG = \frac{1}{n}\sum_{i=1}^{n}\frac{z - y_i}{z}$

Where z is the poverty line, y_i is the income of the individual or household i, and the sum is taken only on those individuals who are considered poor (below the poverty line).

The poverty gap can also be defined as the product of the income gap and the head count index ratio, represented as following:

PG = I*HC, where I is the income gap

Where $I = \frac{Z - y_q}{Z}$ and $y_q = \frac{1}{q}\sum_{i=1}^{q} y_i$ is the average income of the poor.

Squared Poverty Gap Index is a measure of severity of poverty. The poverty gap takes into account the distance separating the poor from the poverty line, while the squared poverty gap $[PG]^2$ takes into account the square of the distance. The squared poverty gap index gives more weight to the poor, by taking into account the inequality among the poor, greater weights are given to larger gaps and the weights are simply the poverty gaps. It is represented as following:

Squared Poverty Gap $(PG)^2 = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{z - y_1}{z}\right)^2$

Both Poverty Gap Index and the Squared Poverty Gap Index put more emphasis on those people who are further away from the poverty line. The general formula for all three measures is given below, which depends on parameter α, and takes a value of zero for the Head Count Index, one for the Poverty Gap Index and two for the Squared Poverty Gap Index:

$$P(\alpha) = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - y_1}{z}\right)^{\alpha}$$

The above measures can be analyzed for various socio-economic groups and different geographic locations (within irrigation systems).

Poverty Line Used for Current Study. For the analysis of poverty situation in the present study, a rural poverty line of Rs. 676.31 per capita was used, which was established by Qureshi and Arif (1999) by using HIES survey data in 1998-99 prices on basic need basis. This was inflated to the prices of 2001, which resulted as inflated poverty line of Rs. 730.78 per person monthly. It should be noted that this poverty line in terms of money is almost equal to official poverty line (Rs 673.54 per capita for 1998-99 prices) as announced by the Government of Pakistan. Additionally for sensitivity analysis, another poverty line was also used as Rs. 530.78 per person.

Results and Discussions

Monetary measures of poverty were estimated for each of the five districts that encompass ten distributaries representing different physical, hydrological, agricultural, socio-economic, and institutional characteristics. Table 3 indicates poverty indices for each district based on household expenditure. The head count index based on poverty line I (PL I) shows that about 59 percent of the sample households were living below the poverty line. The highest proportion of poor household belonged to the Hakra 4-R system (Bahawalnagar district) while the lowest head count was observed among households living in the command area of Upper Jehlum Canal in the Gujrat district. Similarly, highest incidence of poverty across distributaries was estimated (77%) in case of Khadir distributary in Sargodha district while lowest count was found (40 percent) for 10-R Dhup Sari distributary in Gujrat district.

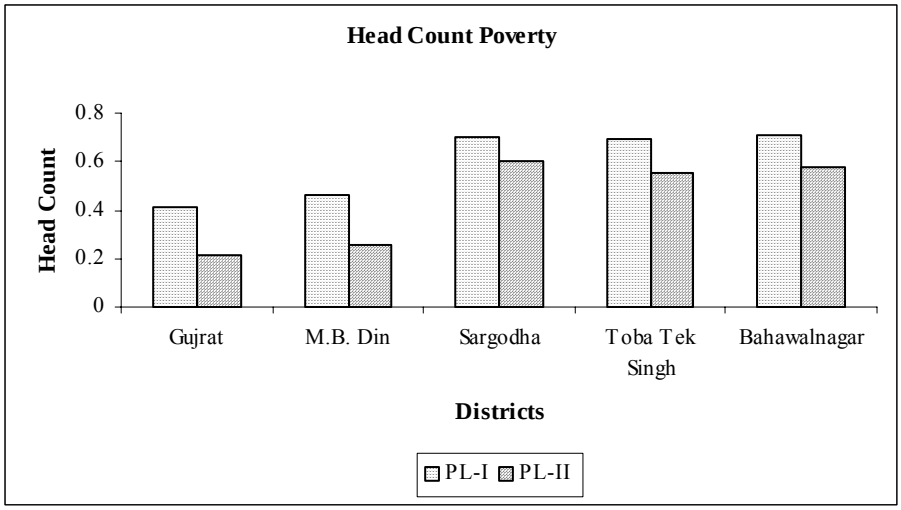
Sensitivity analyses show that at lower poverty line (PL-II) 43 percent of the households were poor indicating a sharp decrease of 16 percent in total poor households from PL-I estimates. These estimates conveyed that about 43 percent of households were chronic poor in nature, whereas about 16 percent households were on the verge of poverty line waiting for a productive push to convert them from poor to non-poor category.

However, the highest proportion of the poor (60%) was estimated for Sargodha district whereas the lowest proportion (21.5%) was found in case of Gujrat district. The comparison of head count poverty across all selected districts is shown in Figure 2. These results were consistent with other studies. Ahmad (1998) reported 47 percent poverty in 1992-93 and 50 percent in 1995-96 in Punjab, by using basic need poverty approach. Similarly, Bhatti et al. (1999) also reported that 50 percent of rural population was living below the poverty line.

Table 3: Estimates of poverty head count indices for households in irrigated areas (based on annual expenditure).

		PL-I = Rs. 730 per capita per month		PL-II = Rs. 530 per capita per month	
District	Distributary	Non Poor	Poor	Non Poor	Poor
Gujrat	9-R Khoja	0.578	0.422	0.800	0.200
	10-R Dhup Sari	0.598	0.402	0.770	0.230
	Group Total	0.588	0.412	0.785	0.215
M.B. Din	13-R Saroki	0.584	0.416	0.787	0.213
	14-R Maggowal	0.489	0.511	0.711	0.289
	Phalia	0.500	0.500	0.721	0.279
	Kakowal	0.568	0.432	0.773	0.227
	Group Total	0.535	0.465	0.748	0.252
Sargodha	Lalian	0.367	0.633	0.482	0.518
	Khadir	0.226	0.774	0.315	0.685
	Group Total	0.296	0.704	0.398	0.602
Toba Tek Singh	Khikhi	0.310	0.690	0.450	0.550
Bahawalnagar	Hakra 4-R	0.294	0.706	0.424	0.576
All Cases		0.411	0.589	0.568	0.432

Figure 2: Head count poverty across irrigated districts using PL-I and PL-II



Poverty Gap and Squared Poverty Gap

Table 4 shows the figures for the poverty gap according to PL-I, the overall poverty gap was estimated to be around 42 percent, indicating that poor households needed an additional 42 percent of the present expenditures to attain minimum basket of basic needs. Comparison of districts shows that the incidence of poverty was higher in Mandi

Bahauddin district as compared to Gujrat district; however, depth of poverty was lowest in Mandi Bahauddin (28.9%), while slightly high estimate was calculated for Gujrat (29.3%). The estimated depth of poverty was 17, 19.4, and 19.6 percent higher in Toba Tek Singh, Sargodha and Bahawalnagar districts than Mandi Bahauddin district, respectively.

The application of PL-II revealed that the highest poverty gap of 38.7 percent was estimated for Bahawalnagar district while lowest gap of 20.5 percent was computed for Mandi Bahauddin district. It is also clear that poverty gap was lower in case of distributaries for Mandi Bahauddin where it ranged between 17.9 percent in case of 13-R Saroki distributary to 24.6 percent in case of Kakowal distributary. Comparison of poverty gap using PL-I and PL-II reveals an overall decline of 8.6 percent. Highest decline in depth of poverty was estimated for Sargodha district (11.9%) while the lowest was estimated for Gujrat district (7.4%).

Table 4: Estimates of poverty gap and squared poverty gap in irrigated areas - based on annual expenditure.

		PL-I = Rs. 730 per capita per month		PL-II = Rs. 530 per capita per month	
District	Distributary	Poverty Gap	Squared Poverty Gap	Poverty Gap	Squared Poverty Gap
Gujrat	9-R Khoja	0.281	0.108	0.225	0.069
	10-R Dhup Sari	0.307	0.122	0.213	0.063
	Group Total	0.293	0.115	0.219	0.066
M.B. Din	13-R Saroki	0.270	0.099	0.179	0.050
	14-R Maggowal	0.291	0.115	0.203	0.058
	Phalia	0.285	0.110	0.194	0.057
	Kakowal	0.307	0.129	0.246	0.089
	Group Total	0.289	0.113	0.205	0.063
Sargodha	Lalian	0.457	0.248	0.347	0.159
	Khadir	0.504	0.286	0.377	0.179
	Group Total	0.483	0.269	0.364	0.171
Toba Tek Singh	Khikhi	0.459	0.247	0.357	0.161
Bahawalnagar	Hakra 4-R	0.485	0.276	0.387	0.192
All Cases		0.415	0.215	0.329	0.147

In case of PL-I, the lowest estimate of squared poverty gap of 11.3 percent was computed for Mandi Bahauddin district while the highest was estimated for Bahawalnagar district (27.6%), showing relatively high severity of poverty in Bahawalnagar district as compared to Mandi Bahauddin district. Employing PL-II, the highest severity of poverty was found to be 19.2 percent for households in Bahawalnagar district while the lowest (6.3%) was estimated for Mandi Bahauddin district.

The difference of poverty gap square estimated by using PL-I and PL-II showed the decline in severity of poverty across districts while using different poverty lines. The highest decline in severity of poverty estimate was observed 9.8 percent in case of Sargodha district. On the other hand, lowest decline in squared poverty gap estimate was estimated 4.9 percent for Gujrat district. Overall decline in severity of poverty was worked out 6.8 percent for all the sample households in the study area. The change in poverty gap and squared poverty gap across districts, using both poverty lines, is shown in Figure 3 and Figure 4, respectively.

Figure 3: Poverty gap across irrigated districts using PL-I and PL-II.

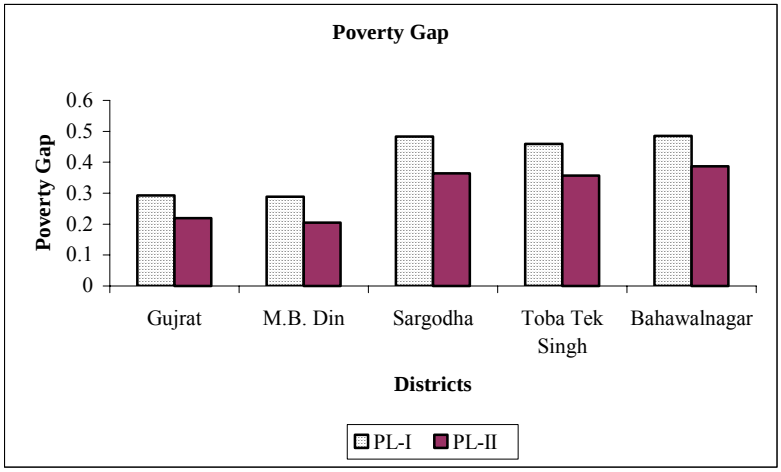
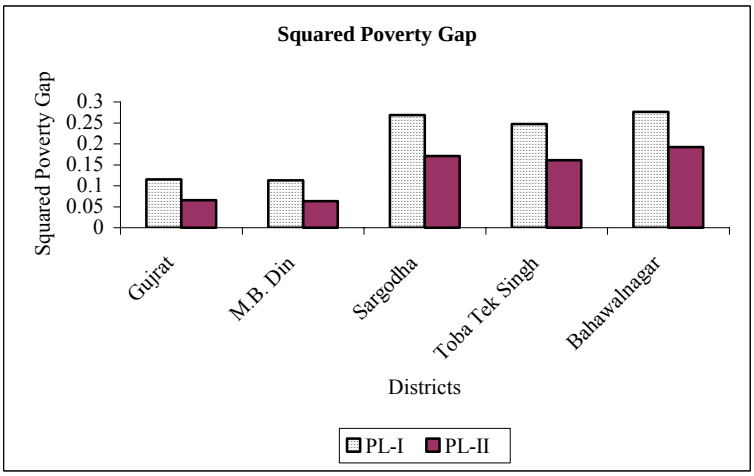


Figure 4: Squared poverty gap across in irrigated districts using PL-I and PL-II.



Sources of Income of Households

It was found that on an average, the highest annual income earning households were concentrated in Toba Tek Singh district indicating an average annual income of

Rs.100394 while the lowest annual income was reported for the households in Gujrat district (Rs. 59940) as shown in Table 5. Furthermore, it is evident that the households in the Gujrat and Mandi Bahauddin districts reported lowest annual income. However, a critical view reveals that the households in Gujrat district were heavily dependent on the non-crop income (80 % of annual income) for meeting their basic needs. It was due to the fact that one or more members of the households were settled abroad and the rest of the members were receiving remittances from them. Moreover, crop income constituted only 17.63 percent of the income for the households in Gujrat district whereas it was about 43.61 percent of income for the households in Sargodha district. Income from selling animals was high for the households in Sargodha district while it was lowest for the households in Gujrat district. Income from renting out of agricultural assets was very low across all the households in the five districts, though it was highest for the households in Bahawalnagar district.

Table 5: Various sources of household income across irrigated districts.

	Gujrat	M.B. Din	Toba Tek Singh	Sargodha	Bahawal-nagar	All
Crop income	10569	23635	29803	36448	21125	25788
	(17.63)	(33.25)	(29.69)	(43.61)	(24.69)	(32.60)
Non-crop income	48138	43012	64805	38993	55200	47463
	(80.31)	(60.51)	(64.55)	(46.66)	(64.52)	(60.00)
Income from selling animals	946	3158	3248	6940	6271	4333
	(1.58)	(4.44)	(3.23)	(8.30)	(7.33)	(5.48)
Income from agricultural Assets	287	1273	2539	1191	2960	1523
	(0.48)	(1.79)	(2.53)	(1.42)	(3.46)	(1.93)
Total annual income	59940	71078	100394	83571	85556	79108
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Note: Figures in parentheses are percentages

Determinants of Poverty

Efforts to curtail the expansion of poverty are needed to address the key issues that are confronting the households. In order to determine the effects of different factors on poverty, Logit modeling was employed. Logit modeling technique is used when dependent variable is binary with values 1 or 0. The coefficients of independent variables tell about the probability of happening or not happening of one of the two possibilities of the dependent variable.

The model specifications are as follows:

$$\text{Poverty} = \beta0 + \beta1 * FS + \beta2 * DR + \beta3 * Edu\_HH + \beta4 * NLH ++ \beta5 * GVP\_Ha + \beta6 * DG + \beta7 * DM + \beta8 * DS + \beta9 * DT + e$$

Where:

Poverty	=	1 if poor, otherwise 0
FS	=	Family Size in number
DR	=	Dependency Ratio
Edu_HH	=	Number of formal schooling years completed by household head
NLH	=	Net Landholding (hectares)
GVP_Ha	=	Predicted values of gross value of production per hectare (in thousands rupees)
DG	=	Dummy for the Gujrat district
DM	=	Dummy for the Mandi Bahauddin district
DS	=	Dummy for the Sargodha district
DT	=	Dummy for the Toba Tek Singh district
$\beta 0$	=	Constant term
$\beta 1 \ldots \beta 9$	=	Coefficients to be estimated
e	=	Error Term

From the estimated coefficients of the model, marginal effect of each independent variable was calculated. The marginal probability is defined by the partial derivative of the probability that dependent variable assumes a value of 1 with respect to that independent variable. The marginal probability is defined by:

$\partial P / \partial B = f(BX)\, B$

Where B is the slope of the coefficient. X is the independent variable while f is the density function of the cumulative probability distribution function [F(BX)] (ranges from 0 to 1).The marginal effect could be interpreted as the change in the probability of household being poor with a one-unit increase in the explanatory variable. The marginal probability values were estimated as the mean values of the explanatory variables.

Family Size

It was expected that higher the family size, higher would be the probability of a household to be poor. Due to this fact, with increase in family size, higher amount of money would be required to meet the basic needs of the entire members of household. It was expected that coefficient of family size would have positive sign.

Dependency Ratio

Dependency ratio was defined as the ratio of number of household members below 16 years and above 60 years divided by family size. It was expected that with increase in number of dependents in the household, probability of being poor became higher due to higher amount of money demanded to fulfill the basic needs of the households. Moreover, as these dependent members did not earn any money, it was hard for the household to be above the poverty line. A positive sign for the coefficient of dependency ratio was expected, indicating an increased probability of the household to be poor with high dependency ratio.

Education of Household Head

Higher education leads to higher earning potential by better management of the household resources. It was expected to have a negative impact on poverty. Consequently, more education of household head would lead the household out of vicious circle of poverty. Therefore, expected sign for the coefficient was negative.

Net Landholding

The entitlement of more landholding was expected to result in more crop production and higher incomes. It was expected that increase in net landholding would decrease the probability of the household to become poor. So, a negative sign was expected for the coefficient of net landholding indicating inverse relationship with poverty.

Gross Value of Production per Hectare

Gross value of production was indicative of performance of individual farm households. Higher land productivity would result in higher annual income of the household that would eventually improve the ability of the household to provide all the basic needs to the family members by spending more. It was expected that with increase in gross value of production per hectare, poverty would decrease. Therefore, a negative sign was expected for the coefficient of gross value of production per hectare.

Location of the Households

The location of the households in different ecological zones reflected variation in access to surface irrigation water, groundwater quality, and relatively different socioeconomic situation prevailing in these areas. Thus, it was expected that these households had lower probability to become poor as compared to the households in other districts. The dummies used for different zones would explain the effect on poverty.

Model Results

The results of the Logit regression are presented in Table 6. Signs of all the explanatory variables were in conformity with *a priori* expectations. All the coefficients except dummies for Mandi Bahauddin, Toba Tek Singh and Sargodha districts were found significant at 99 percent level. However, dummies for Mandi Bahauddin and Toba Tek Singh districts were significant at 95 percent level. Dummy for Sargodha district was found insignificant. It was found that one member increase in family would increase the probability of household being poor by 0.026 due to the fact that higher family size required more income to meet the basic needs of the household members. One unit increase in dependency ratio would increase the probability of being poor by 0.283. It was according to this perception that if dependency ratio increases, additional burden of the new dependent would also be shared by limited number of earners, who were already taking care of other family members. Education of the household head was found as a tool to decrease the probability of the household to be poor since education enhances the capabilities of household head in making optimal and rational decisions. One more completed year of household head's education would decrease the probability of household being poor by 0.014. Similarly, land being the most important factor in

agricultural production and income was found important to reduce the probability of household to be poor. It was found that one-hectare increase in net landholding would reduce the probability of being poor by 0.034. The improvement of the welfare in case of rural household is directly attached with higher productivity and profitability of crops grown. It was estimated that an increase of one thousand rupees in gross value of production per hectare would diminish the probability of being poor by 0.012. Owing to the variation in family size, dependency ratio, and education, especially of the household head, and other members in general, lactation of household was found having a significant impact in ascertaining the probability to be or not to be poor. It was also found that probability of being poor decreases by 0.175, 0.115, 0.121, and 0.04, if household were located at Gujrat, Mandi Bahauddin, Toba Tek Singh, and Sargodha districts, respectively, instead of Bahawalnagar district. It clearly indicates that probability to be poor was minimum if households was located in Gujrat district when compared to a household in Bahawalnagar district.

Table 6: Regression results for farm households across irrigated districts.

Variable	Coefficients	Std. Error	Sig.	Marginal Probability
Constant	1.318	0.29	0.00**	0.290
Family size (Number)	0.116	0.023	0.00**	0.026
Dependency ratio (ratio)	1.286	0.294	0.00**	0.283
Education of the household head (Years)	-0.066	0.016	0.00**	-0.014
Net landholding (ha)	-0.156	0.021	0.00**	-0.034
Gross value of production per hectare (thousands)	-0.055	0.005	0.00**	-0.012
Dummy for Gujrat district	-0.796	0.271	0.003**	-0.175
Dummy for Mandi Bahauddin district	-0.523	0.241	0.03*	-0.115
Dummy for Toba Tek Singh district	-0.548	0.274	0.046*	-0.121
Dummy for Sargodha district	-0.179	0.243	0.46	-0.040
-2 Log likelihood =	1184.536			
Cox & Snell R Square =	0.276			
Nagelkerke R Square =	0.379			
Chi-Square = 389.278	Df = 9	Sig. = 0.00**		

* Significant at 95 percent significance level
** Significant at 99 percent significance level

Conclusions and Implications

- Incidence of poverty was highest in Bahawalnagar district while it was lowest in Gujrat district.
- Higher proportion of the households in Mandi Bahauddin district was lying on the verge of poverty line showing high sensitivity to variation in poverty line.
- Depth of poverty (poverty gap) was found highest for Bahawalnagar and Sargodha districts.

- Severity of poverty was highest for households in Bahawalnagar district.
- Higher proportion of annual income was captured by non-crop income for the households in Gujrat district as compared to other districts.
- The households in Sargodha district were heavily dependent on crop income as compared to the households in other districts.
- Annual income per household was highest in Toba Tek Singh district while it was lowest for the households in Gujrat district.
- An increase in family size was found to increase the probability of household to be poor. More investment in population planning was evident.
- Increasing size of landholding would reduce the probability of being poor for any particular household. This requires a new round of land reforms as well as legislation to stop further defragmentation of land into uneconomical unit size.
- Higher education to the head of the household would reduce the probability of household to become poor. More investment on education, especially on improving and strengthening the already prevailing setup, would impart its benefits quickly and efficiently.
- Measures to increase the productivity of land would decrease the probability of household to become poor as reflected by gross value of product per hectare.

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