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POVERTY ASSESSMENT OF FARMING COMMUNITY IN RICE WHEAT ZONE OF PUNJAB, PAKISTAN

Purpose. Poverty in Pakistan mostly exists as a rural poverty rather than urban poverty and presents a desolate vision. Rural poverty shows divergence with respect to area, region or any other administrative division. The tenacious rise of rural poverty in the history of Pakistan with some omissions, it affords plenty of material and remains a lot of questions related to poverty in the mind of researchers. The current study focused on three main poverty measures i.e. incidence, depth and severity of rural poverty in the rice-wheat zone of Punjab, Pakistan (Middle Punjab).

Methodology / approach. To overcome the existing poverty issues in the area, we utilize secondary datasets at districts, regions, provinces or at national levels collected from Pakistan Bureau of Statistics, Islamabad (PBS). Poverty assessment for the year 2011–2012 is analyzed through Foster Greer and Thorbecke (FGT) method. Moreover, the Logit model is also used to find out the empirical values existing in the datasets.

Results. The fluctuations in rural poverty for the year 2011–12 in the existing zone was analyzed by using logit regression model and data source was Household Integrated Economic Survey (HIES). The incidence of uni-dimensional and multidimensional poverty in middle Punjab (2011–12) were 35.38 and 27.40 percent has been seen after estimations.

Originality / scientific novelty. The education level, health services, availability of assets, facilities and age of household head are the key factors related to incidence, depth and severity of poverty. All the above mentioned factors have negative relation with poverty measures.

Practical value / implications. The decline in poverty can be achieved via implementation of sharp economic activities including the dimensions as analyzed in the manuscript. At this point, policy makers did not pay attention on the key factors that influence rural poverty at regional levels. There is a dire need to make development in basic standards of life to alleviate poverty in a long way in the middle Punjab.

Key words: Uni-dimensional poverty, multidimensional poverty, middle Punjab, Pakistan.

Introduction and review of literature. Poverty is defined as "a state or condition in which a person or community lacks the financial resources and essentials to enjoy a minimum standard of life and well-being that's considered acceptable in society". Poverty is obvious denial in comfort, and embraces numerous echelons. It comprises trivial incomes and the incapability to attain the rudimentary goods and amenities obligatory for subsistence with pride [1].

Poverty is considered as a uni-dimensional in many countries of the world based on income and consumption. The consumption level acts as a welfare indicator in developing countries and it is more suitable than income level. First, income is construed as a degree of wellbeing prospect while consumption as a degree of wellbeing accomplishment. Secondly, it is normally believed that respondents during

the survey are more enthusiastic to disclose their consumption pattern than their income. Thirdly, it is difficult to find out income for self-employed in developing countries rather than consumption pattern. Finally, income is concerned with seasonal changeability whereas consumption lean towards less flexibility. Currently, Pakistan is based on household consumption used as a welfare indicator. Poverty lines are the thresholds which distinct the poor from non- poor. Ministry of Planning, Development and Reform is responsible to measure poverty on consumption based approach by using data from Household Integrated Economic Survey (HIES). The official poverty line used in Pakistan is calorie based, and absolute poverty based on consumption is assessed after altering the household consumption level to adult equivalent founded on suggested nutritional requirements of 2350 calories per person per day and providing nearly equivalent amount for other basic needs. Table 1 gives the historical perspective of poverty line in Pakistan from 1998 to 2011 collected from economic survey of Pakistan [1].

Table 1

Historical perspective of poverty line in Pakistan (1998–2011)

Pakistan's Poverty Line in Historical Perspective		
No. of Years	Poverty Line	
	(Rs.)	($)
1998–99	673.40	6.40
2000–01	723.40	6.88
2004–05	878.64	8.35
2005–06	948.47	9.01
2007–08	1141.53	10.85
2010–11	1745.00	16.58

Source: Government of Pakistan, Economic survey of Pakistan (2009–2010, 2013–2014) [2].

There are about 900 million extremely poor people across the globe in 2012, according to the updated poverty line of $1.90 per day, which equals 12.7 percent of total global population. The projected acute poverty for 2015 was about 700 million people. It means that about 200 million people expected to be out of extreme poverty in 2015. It was projected that 35.2 percent people will be extremely poor in Sub-Saharan Africa in 2015, which is less than 42.7 percent in 2012. The second highest projected poverty is for South Asia of 13.5 percent in 2015. It means that out of 700 million projected poor in the world, about 578 million extremely poor exist in Sub-Saharan Africa and South Asia [3]. According to Millennium Development Goals Report, 2015 highlight that 836 million people are still falling in the extreme poverty which is falling from 1.9 billion compared to 1990. From 1991 to 2015, the number of people in working middle class nearly tripled based on more than $4 a day. Similarly, the proportion of undernourished people and out of school children of primary school age dropped by almost half since 1990 and 2000 respectively [4]. Sial et al. utilized Pakistan Social and Living Standard Measurement (PSLM) survey data of 2005–2006 and 2010–2011 to measure poverty and inequality in Pakistan. They used equivalent per adult expenditures, enrolment and maximum years of schooling, facilities like natural gas, electricity and safe drinking water etc. They concluded that

education and health are the major drivers of poverty. At the same time, income inequality has been reduced, however, inequality in access to health facilities have been increased in Pakistan [5].

The purpose of the article. The basic objective kept in mind during the study is to evaluate the existing poverty condition of peasants residing in rice-wheat zone of Punjab province. The incidence, depth and severity of poverty has been calculated during the study and arranged in a tabular form to compare the results. The hierarchy of the poor, characteristics associated with poverty and measures for poverty alleviation has been assessed during this attempt.

Results and discussions. As poverty is basically a rural phenomenon in Pakistan as described by [6], therefore rural Punjab is selected as a case study. The socio-economic life of farmers can be improved via providing agriculture services in the area [7]. The rice-wheat zone of Punjab exists in middle Punjab includes nine districts i.e. Sialkot, Gujarat, Gujranwala, Sheikhupura, Lahore, Kasur, Narowal, Hafizabad and Mandi-Bahauddin. The data collected from Pakistan Bureau of Statistics, Islamabad to analyze the poverty line which will prime to determine the socio-economic value of peasants and further via socio-economic profile, we can classify the household characteristics to find out the poverty. Poverty is estimated through statistical data normally based on Household Integrated Economic Survey (HIES) collected from Pakistan Bureau of Statistics, Islamabad, Pakistan. Poverty assessment for the year 2011–2012 is analyzed through Foster Greer and Thorbecke (FGT) method [8]. Moreover, the Logit model is also used to find out the empirical values existing in the datasets. Pakistan focus on absolute poverty line rather than relative poverty because it is more suitable for the developing countries [9].

Procedure of uni-dimensional poverty. Foster Greer and Thorbecke (FGT) method is applied for the implication of Uni-dimensional poverty and utters an individual or household poor if who is not accomplishing the minimum threshold level of income/ expenditure that is necessary for the subsistence of life. The threshold used for given study is Rs. 1937 that is inflated by using Consumer Price Index of year 2011–2012. Three basic measures of poverty headcount ratio, poverty gap ratio, and squared poverty gap ratio are discussed in such class of poverty. The general class of given measure is as follow:

$$P_\alpha = \frac{1}{n} \sum_{i=1}^{q} \left(\frac{Z-Y}{Z} \right)^\alpha \tag{1}$$

Here Z denotes the poverty line and Y is the income/ expenditure of poor individual or households, α takes different value like 0, 1, 2 for the measurement proportion extent and severity of poverty.

Procedure of multidimensional poverty. FGT is the traditional measure of poverty which discussed poverty in the Uni-dimensional model but currently poverty is studied in multidimensional perspective and estimated by applying Alkire and Foster (2009) approach, under such approach three basic indexes are calculated that are adjusted headcount ratio, adjusted poverty gap ratio and adjusted squared poverty gap ratio.

Adjusted headcount ratio. According to [10], adjusted headcount ratio is measured by the multiplying number of deprived individual or household in different dimensions "H" with average deprivation gap "A". Mathematically it is written as $M_o = HA$, where $H = q{:}n$ and $A = \frac{\sum_{i=1}^{n} C_i(k)}{q}$.

Adjusted poverty gap ratio. It quantifies the depth of poverty in multidimensional mode and is measured as the product of Mo and G. Here G is the average standardize gap of deprived across all dimension which mathematically measured as:

$$G = \sum_{i=1}^{q}\left(\frac{Z-Y}{Z}\right) \tag{2}$$

Where z is the proposed dual cut off and y is the sum of deprivation in different dimensions. The Standardized form of Adjusted poverty gap is as given $M_1 = M_o\,G$

Adjusted squared poverty gap ratio. It quantifies the severity of poverty and is estimated by taking product of Mo, G, and H where H is the square of the average standardized gap of deprived across all the dimensions and mathematically calculated as:

$$G = \sum_{i-1}^{q}\left(\frac{Z-Y}{Z}\right)^{2} \tag{3}$$

The Standardized form of adjusted poverty gap is as given $M_2 = M_o\,G\,H$.

Dimensional structure of the problem under assessment. Selection of proper dimension is an essential step of research. The problem under assessment reviewed different studies like [10; 11; 12; 13] for the selection of essential dimensions. Table 2 represents the number of dimensions and sub-dimensions along with cut-off points.

Table 2
No. of Dimensions and Sub-dimensions along with cut-off Points

Dimensions	Sub-dimensions	Cut-off
Expenditure/Income	Crops Revenue	Rs. 1937/- or $ 17.49
Education	Primary to Bachelors	If highest class is ≤ 6
Health	Access to hospital	Less than 3
	Pre-natal, Immunization	
	Post-natal, Consultant	
Facilities	Refrigerator	Less than 5
	Air cooler, fans	
	Washing machine, Television	
	Bike, Car	
Assets	Housing Services	Less than 2

Source: author's own imagination.

After selection of vital dimensions, dual cut-off process is applied to measure poverty. In the given method first cut-off is applied within the dimension to measure deprive and non-deprived and after summing these deprived and non-deprived dual cut-off is applied to consider an individual or households poor and non-poor.

Logit regression model. Due to qualitative features of dependent variable logit regression model is applied as an econometrics technique to analyze the impact of

different socioeconomic variables on poverty. The general form of logit regression model is as follow:

$$Logit = (P_i) = Ln\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \sum_{j=1}^{k}\beta_i X_{ij} + \mu_i \qquad (4)$$

Where $\frac{P_i}{1-P_i}$ measure the response of event occurrence and non-occurrence and known as odd ratios. Their natural log gives the value of the coefficient of the logit model. The general form of odd ratios is as follow:

$$\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \sum_{j=1}^{k}\beta_i X_{ij} + \mu_i \qquad (5)$$

Here $\beta's$ are the slope coefficient and intercept of the model, X_i represents the variables of the model and u_t described as an error term used in the model.

The current study used all available resources to investigate uni-dimensional and multidimensional poverty in rice-wheat zone of Punjab [8; 10] methods are applied as indexing tools to investigate the extent of poverty. The results of both measures are given below in table 3.

Table 3

Uni-dimensional and Multidimensional Poverty in Rice-Wheat Zone of Punjab, Pakistan (2011–2012)

Regions	Uni-Dimensional Poverty			Multidimensional Poverty		
	HCR	PGR	SPGR	M_0	M_1	M_2
Punjab	35.38	8.03	2.56	27.40	12.50	7.90
Sialkot	24.60	3.40	0.76	24.40	10.80	6.70
Gujarat	24.21	4.52	1.36	23.10	9.60	5.60
Gujranwala	32.03	7.34	2.57	28.30	12.10	7.20
Sheikhupura	44.75	10.20	3.14	36.80	16.20	9.70
Lahore	37.28	8.33	2.50	29.50	10.80	5.50
Kasur	44.53	9.33	2.78	41.20	20.00	12.90
Narowal	37.70	6.84	2.08	31.10	13.00	7.80
Hafizabad	34.37	7.57	2.32	35.90	17.50	11.20
Mandi-Bahauddin	21.87	4.11	1.07	29.40	13.70	8.90

Source: analyzed results of model.

The results of table 3 shows that overall percentage of poverty in rice-wheat zone of Punjab is 35.38 with depth of poverty 8.03 and severity of poverty 2.56 percent. In the same way overall Uni-dimensional poverty in Sialkot, Gujarat, Gujranwala, Sheikhupura, Lahore, Kasur, Narowal, Hafizabad and Mandi-Bahauddin is 24.60, 24.21, 32.03, 44.75, 37.28, 44.53, 37.70, 34.37 and 21.87 percent. The depth of poverty in corresponding areas is 3.40, 4.52, 7.34, 10.20, 8.33, 9.33, 6.84, 7.57 and 4.11 percent and severity of poverty is 0.76, 1.36, 2.57, 3.14, 2.50, 2.78, 2.08, 2.32 and 1.07 percent. These results show that households of Sheikhupura and Kasur are facing higher level of income/ expenditure poverty while households of Mandi-Bahauddin showing lower level of poverty.

In Case of multidimensional poverty, overall incidence of poverty in rice-wheat zone of Punjab is 27.40 percent with depth and severity of poverty respectively 12.50

and 7.90 percent. In the same manner, incidence of multidimensional poverty in Sialkot, Gujarat, Gujranwala, Sheikhupura, Lahore, Kasur, Narowal, Hafizabad and Mandi-Bahauddin is 24.40, 23.10, 28.30, 36.80, 29.50, 41.20, 31.10, 35.90 and 29.40 percent. In these areas, depth of multidimensional poverty is 10.80, 9.60, 12.10, 16.20, 10.80, 20.00, 13.00, 17.50 and 13.70 percent. Severity of poverty in given areas is 6.70, 5.60, 7.20, 9.70, 5.50, 12.90, 7.80, 11.20 and 8.90. The given picture of result shows that Kasur and Sheikhupura are the worst affected areas of rural Punjab in the case of unidimensional and multidimensional poverty.

Logit regression model. Like multidimensional analysis, logit model is also applied to check the impact of different socio-economic variables on poverty. Such approach is developed after a strong review of literature like [14; 15; 16]. The analyzed results of data after applying logit regression model are presented in table 4.

Table 4

Results of Logit Regression Model

Variables	Coefficients	Odd Ratios	Marginal Effects	Std. Error Mean	Z-stat	P-value
Dependency Ratio	1.36900	3.931	0.2977	0.1924	12.21	0.0000
No. of Children	0.12920	1.137	0.0281	0.01837	5.52	0.0000
Household Size	0.27670	1.318	0.0602	0.01517	15.40	0.0000
Age of Head	-0.004 2	0.995	-0.0009	0.00158	-2.00	0.0460
Assets	-0.30800	0.734	-0.0670	0.02660	-7.52	0.0000
Facilities	-0.02773	0.972	-0.0060	0.00415	-4.84	0.0000
Education	-0.15194	0.859	-0.0330	0.00470	-22.23	0.0000
Health	-0.06244	0.939	-0.0135	0.01169	-3.90	0.0000
Constant	-0.248631	-	-	0.20149	-1.23	0.2170
Pseudo R^2	0.1904	Pearson	2134.54 P-value (0.5414)	LR Chi-square	3632.44 P-value (0.0000)	-
ROC Curve	0.7915					

Level of significance 1*, 5**, 10***
Source: analyzed results of model.

The results of logit model for poverty in rice-wheat zone of Punjab is reported in table 4. The experiential result shows that the response of coefficient of education in a study area is negative which shows that if education in a rice-wheat zone increases, the probability of being poor will decrease. The coefficient of health services like access to the hospital, safe sanitation and availability of pure drinking water shows that if access to given services increases the probability of being poor falls. The basic household assets and facilities index also shows a negative effect on poverty and increase in such measures decrease the probability of being poor. Moreover, the dependency ratio has a positive sign which indicates that the probability of being poor rises if the dependency ratio of households increases. The coefficient of household size and a number of children has a positive sign which indicates that overall household size and number of children in a house increase the probability of being a poor increase. The coefficient of head age has a negative effect on poverty and shows that probability of being poor decreases if the measure rises.

The results Pseudo R^2, Pearson chi-square and Hosmer- Lemeshow test indicate that overall model is good fitted because their values are two high that reject the null hypothesis that shows model is not good fitted in response to alternative hypothesis of the model which is good fitted.

The value of receiver operating curve (ROC) is almost 79 percent which indicates that given model is acceptable as shown in fig. 1.
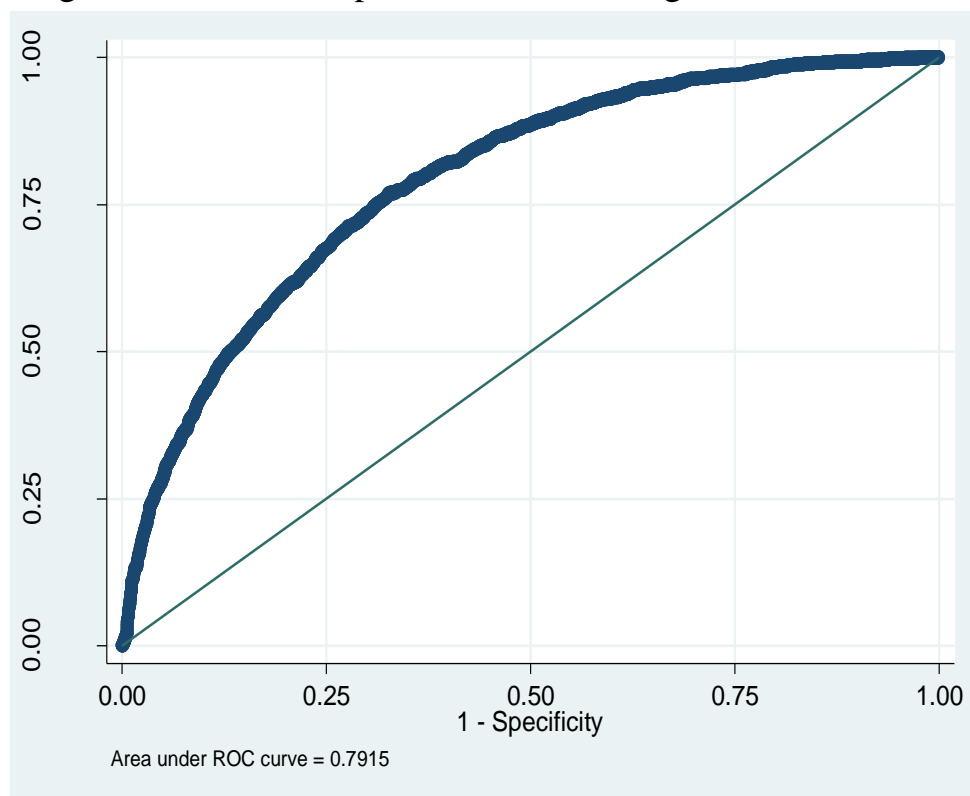

Fig. 1. ROC curve

Source: analyzed results of model.

Conclusions. The analysis of the data proposes that the incidence, depth and severity of Uni-dimensional poverty are greater in extent as compared to multidimensional poverty in the rice-wheat zone of Punjab. The main causes behind this are lax of economic progress and lack of career making options in the existing zone as compared to rest of the areas of Punjab province. The education level, health services, availability of assets, facilities and age of household head are the key factors related to incidence, depth and severity of poverty. All the above mentioned factors have negative relation with poverty measures. The perusal concerning the educational achievements and poverty presented some imperative outcomes. Mostly peasants that are not literate in the study area are miserable to incidence, depth and severity of poverty while poverty decline when educational attainment of households rises. The propensity of health services portrayed negative relation with the poverty measures and more health services means less poverty in the area and poverty will be dreadful in case of limited health services. Moreover, available assets, facilities and household head age have negative relation with poverty measures. The increasing trend of these three factors tend to decline the poverty level at some instant. Similarly, the

household size and dependency ratio have positive relation with incidence, depth and severity of poverty. Both indicators have direct proportion with poverty measures i.e. When household members and dependency ratio increases, poverty measures will incline and if indicators decrease, poverty measures will also decline.

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