A Perspective of Poverty and Distribution of Income in Coastal Areas of Sindh Province of Pakistan

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Abstract:

Thatta District is one of three districts along the coast of Sindh Province of Pakistan. Total population of the district is around 1.4 million of which 89% lives in rural settlements. There are three distinct areas of the district viz. hilly, canal area, and coastal delta. Out of 9 nine Talukas (administrative units), 6 Talukas are coastal and 3 are not coastal. In comparison of non-coastal areas, coastal areas are not so thickly populated, but incidence of poverty is much higher. This study attempted to measure the poverty and distribution of income, and to explore the factor enhancing poverty level. Estimates of the study revealed that average income of household was Rs. 18,801 (US$ 219; @Rs. 86 = 1 US$). Lowest level of income (Rs. 14,334) was recorded for Keti Bunder Taluka in coastal area. Per capita per month income was recorded as Rs. 2,549 (US $ = 30). Agriculture and livestock were major sources of income of the people contributing about 49 and 25% of the total income, respectively. On an overall basis, around 40% of the population was living in poverty in Thatta District. More than half (55%) of the households of Keti Bunder Taluka were

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recorded in poverty. Sen Index reflecting the severity of poverty revealed higher incidence of poverty in Keti Bunder (0.36) while the overall Sen Index was estimated at 0.27. On the other hand, highest income inequality was found in Mirpur Sakro where poverty was relatively low (33%) against the overall proportion of 40%. Education, number of earners, number of buffaloes and cows, and possession of land was the major contributors of increasing incomes and getting the households out of poverty. However, number of household members increased the level of poverty.

Key words: Poverty, distribution of income, logistic regression model

Introduction

There are two major types of poverty: absolute and relative poverty. Absolute poverty refers the lack of basic things leading to starvation. Acute poverty is also described as lack of access to education and health. Relatively poverty reveals comparison of living standard with that of average (Batool 2009).

Poverty has remained one of the most serious problems of Pakistan- over one third of the population is living under the poverty line. About forty-four percent of population is below the poverty line on the human poverty index (UNDP 2002). Although governmental bodies, local and international NGOs, and international organizations operating in Pakistan have made eradication of poverty a top priority and have operated many social development programmes, poverty has been on a rise when compared to the level of 26 percent in 1988 (GoP 2003).

A significant proportion of Pakistan's population does not have adequate levels of food, access to basic services and opportunities and hence are particularly vulnerable to economic, environmental and political shocks. Sixty five percent of Pakistan's population lives in rural areas and majority of them live below poverty line (World Bank 2002).

Karachi, Thatta, and Badin are coastal districts of Sindh Province. Except Karachi, which is the most urbanized district of Sindh and its economy dependents upon commerce, trade, and industry, two districts (Badin and Thatta) along the coastal areas of Sindh province are facing economic problems due to depleting natural resources. As a result, poverty is increasing at an alarming rate.

Lawal *et al.* (2009) estimated rural poverty using Head Count Ratio and reported that 56 percent of the households were living below the poverty line in one union council (Bughra Memon) nearby coastal area of District Badin. In fact, the ratio is much larger than poverty estimates recorded for other areas of Sindh province. The same study reported 52 percent head count ratio (estimate of the poverty) in Sanghar district. Lawal validated his research estimates with Arif *et al.*, (2000) who reported that in some areas of Sindh poverty is as high as 57%. The main reason of the poverty in coastal areas of Sindh has always been linked with the low supply of freshwater in Indus Delta since population living along the coastal area depends upon natural resource based livelihoods viz. agriculture, forestry, fish, and livestock.

This study was conducted in Thatta district of Sindh province with the following objectives:

1. To estimate incomes and poverty level in rural settlements;
2. To estimate distribution of income using Gini coefficient; and,
3. To explore the factors enhancing poverty level.

2. Methodology

This chapter presents the methodological aspects of the study. Qualitative and quantitative research methods were used to collect, summarize and report the information to achieve meaningful results and address the study objectives.

The following sections describe the research design, target populations, samples and sampling methods, development of questionnaires, collection and analysis of data:

2.1 Target Population

Target population of this study was Thatta district of Sindh Province.   There are 9 talukas in Thatta District. Names of Taluka are as under: 1) Ghora Bari; 2) Jati; 3) Mirpur Bathoro; 4) Mirpur Sakro; 5) Shah Bunder; 6) Sijawal; 7) Thatta; 8) Kharo Chan; and, 9) Keti Bunder.

2.2 Study Population and Representative Sample Size

From Nine (9) talukas, four (4) Talukas namely Thatta, Keti Bunder, Sijawal, and Mirpur Sakro were purposively selected considering the location depicting different agro-ecological system.

Table 1: Description and Selection of Talukas

Name of Taluka	Agro-Ecological Description	HHs
Thatta	Rocky area (Kohistan area)	150
Mirpur Sakro	Karachi site (Urban site)	150
Sijawal	Agriculture based	150
Keti Bunder	Coastal	150
Total		600

HHs means household selected for data collection

Rationale behind selecting each Taluka was described as: Thatta Taluka representing rocky area (Kohistan side), Keti Bunder being coastal area, Sijawal as Agriculture based, and Mirpur Sakro having advantage of main highway to Karachi.
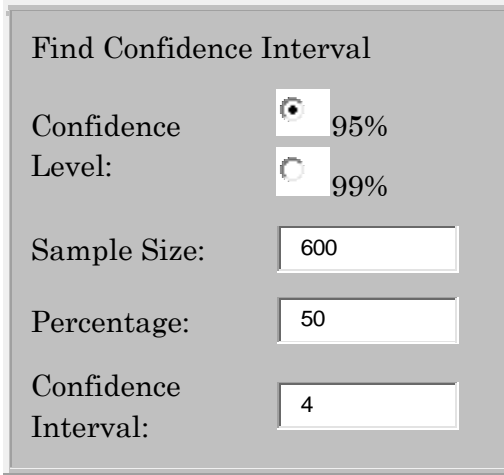
2.3 Justification of Sample Size

Since this study was based upon household survey, therefore, sampling unit was a household. In order to know the error rate (confidence interval) of the suggested sample size of 600 households, the following formula was used:

$$C = \sqrt{\frac{\pi(1-\pi)}{n}} \times Z_{\alpha/2}$$

Where C is $\pm$ error rate, π is characteristic of interest, n is recommended sample size, and $Z_{\alpha/2}$ is tabulated value for confidence level (Tryfos 1996). Using 0.5 for the proportion of interest (π), 1.96 for 95% confidence level, and sample size of 600 households, the error rate (C) was estimated at 4. The same results were validated with the online calculator for determining sample size and confidence interval (http://www.surveysystem.com/sscalc.htm). Usually error rate up to 5% is allowed for higher standard empirical studies.

Figure 1: Sample Size Calculator

Find Confidence Interval

Confidence Level: ⊙ 95%
                     ○ 99%

Sample Size: 600

Percentage: 50

Confidence Interval: 4

2.4 Sampling Method

Two stage cluster sampling was applied to select a representative sample of households. In the first stage, 40 villages were selected considering the size of villages. Villages were divided into three strata: 1) less than 50 households 2) between 51 and 100 households, and 3) above 100 households. Twenty small villages, 12 medium villages, and 8 large villages were selected; thus, a sample of 40 villages was selected in the

first stage. In the second stage, on an average basis, about 15 households were selected. However, survey team was flexible to select more number of households from large households.

Table 2: Selection of Villages by Size

	Size of Village/Settlements			Total
	Small (Up to 50 HHs)	Medium (51 to 100 HHs)	Large (> 100HHs)	
Thatta	5	3	2	10
Mirpur Sakro	5	3	2	10
Sijawal	5	3	2	10
Keti Bunder	5	3	2	10
Overall	20	12	8	40

HHs means households

2.5 Collection and Analysis of Data

Before development of questionnaires, preliminary survey was conducted and basic information was collected about the selected Talukas, UCs, Dehs, and Villages. Household questionnaire was developed with special reference demographic characteristics of to respondents, household members, and, monthly household incomes and their sources. Personal interviews were conducted to collect data. Average time taken to interview a respondent was estimated at 45 minutes.   Data were collected during June and July 2010. Statistical Package for Social Sciences (SPSS, Version 17) and Statistix program were used to analyze the data. A brief on measures of poverty, inequality of income, and logistic regression model has been given as follows:

2.6 Measurement of Poverty

2.6.1 Relative Poverty Line

Expenditure on calorie intake of 2350 calories per adult equivalent per day along with consumption expenditure on non-food items was aggregated to construct poverty line. For 2004-

05, national poverty line was estimated at Rs. 878.64 (GoP 2006). The available literature did not show any national poverty line for 2010. Using the inflation rate of 12 per year, new poverty line was worked out to be Rs. 1383 per capita per month.

2.6.2 Head Count Ratio

Head count ratio is the proportion of households whose income is less than some specified level. The following formula is used to estimate head count ration.

$$HCR = \frac{h}{n}$$

Where h and n represent the number of poor and total population, respectively (Jonathan, 1999).

2.6.3 The Average Poverty Gap

Average poverty gap is the amount of money (income short fall) required to get the poor from poverty. The following formula has been furnished to estimate average poverty gap.

$$AGP = \frac{1}{H} \sum_{i=1}^{H} (y_p - y_i)$$

Where H is number of the poor, y_p is Poverty line, and y_i is income of poor.

2.6.4 Sen Poverty Index

Sen Poverty Index shows the severity of poverty and the same was developed by the Noble Laurrete Dr. Amaryta Sen. Sen Poverty Index is calculated by using the following expression:

$$SI = \frac{P}{N} \times \frac{B - A}{A}$$

Where p is number of people below the poverty line, N is total number of people, B is poverty line, A is average income of those people below the poverty line (Jonathan 1999).

2.7 Distribution of Income

2.7.1 Lorenz curve

Lorenz curve, developed by Max O. Lorenz, in 1905, is developed to visualize the inequality of income and assets. Cumulative share (%) of people from lower income and cumulative share (%) of income are plotted on x and y axis of the plot (Lorenz 1905). Lorenz curve provide basis to estimate Gini coefficient.

2.7.2 Gini coefficient

The Gini coefficient is a standard measure and widely used a measure of income inequality. Gini coefficient varies from 0 to 1. Zero that each and every person in the society has the same income while 1 reveals perfect income inequality; one person possesses all the income of the society while other persons have zero income (Gini 1909).

Figure 1: Lorenz Curve and Gini Coefficient
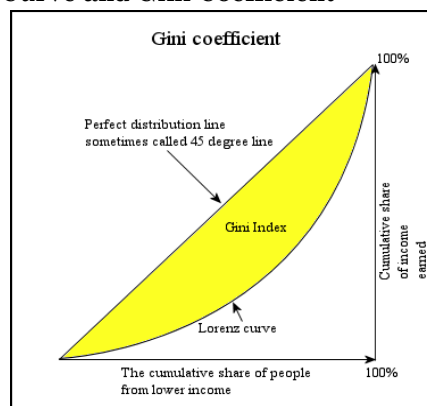
2.8 Logistic regression Model

Logistic regression is a type of regression used to develop the relationship between independent variable (s) and a binary dependent variable, expressed as a probability. The logistic regression model is frequently used to explore the determinant(s) of poverty expressed as a binary variable (poor or not poor). The logistic regression model has been expressed in flowing logistic function.

$$f(z) = \frac{e^z}{e^z + 1} = \frac{1}{1 + e^{-z}}$$

Where Z is defined as:

$$z = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \cdots + \beta_k x_k,$$

where ß0 is called the "intercept" and ß1, ß2, ß3, and so on, are called the "regression coefficients" of x1, x2, x3 respectively. Each of the regression coefficients describes the size of the contribution of that risk factor.

3. Survey Results

3.1 Average Monthly Income

On an overall basis, the average monthly income of a household was estimated at Rs. 18,801 with standard error of the mean of Rs. 960. Per capita income per month was estimated at Rs. 2,559 with standard error of Rs. 164. The lowest monthly household income (Rs. 14,334) and monthly per capita income (Rs. 2,549) was recorded for Keti Bunder Taluka which reveals higher prevalence of poverty in Keti Bunder. Keti Bunder Taluka is on coastal zone and preliminary based upon natural resources especially fish catch in creeks and open sea. Fish catch and other resources has decreased in the area especially due to environmental degradation in the form of low supply of industrial effluents containing poisonous water, over fishing, and low supply of fresh water during the last 20 years.

Table3: Profile of Income

Taluka	Household		Per capita	
	Mean*	SE	Mean*	SE
Thatta	18,777	1,203	2,285	153
Mirpur Sakro	21,495	2,794	3,329	552
Sijawal	20,596	1,933	2,608	247
Keti Bunder	14,334	1,273	1,974	198
Overall	18,801	960	2,549	164

* Pak. Rupees per month

3.2 Sources of Income

Table 4 revealed that agriculture and livestock was the major source of income contributing 49 and 25%, respectively. Segregated data of livestock showed that about 19% of income was recorded for the sale of milk and 6% for livestock sale. Share of unskilled labour was 10%, followed by Govt. Service (5.2%), Fishing (4.5%), Skilled (3.6%), Private (1.8%), Business (1.3%). Fishing was recoded to be one of the major profession of Keti Bunder contributing 13% against overall proportion of 5%.

3.3 Head Count Ratio

Table 5 reveals the head count ratio of poverty. On an overall basis, the head count ratio was estimated at 40%, which in-fact is much higher as reported by public sector intuitions (33%).   Relatively higher prevalence (55%) of poverty was recorded in Keti Bunder. Among the selected talukas of district Thatta, lowest poverty ratio was found in Mirpur Sakro, this is due to more employment opportunities available since this taluka is nearby Karachi, matropolitian city.   Exactly the same head count ratio (36) was computed for Thatta and Sijawa talukas.

Table 4: Sources (%) of Income

Profession	Thatto	Sijawal	Mirpur Sakro	Keti Bunder	Overall
Agriculture	42.8	48.3	58.2	45.6	48.5
Milk	23.2	19.6	18.0	15.5	19.2

Unskilled	11.9	10.5	6.3	9.9	9.5
Livestock sale	5.6	7.1	6.1	6.3	6.3
Govt. Service	5.5	6.7	5.1	3.1	5.2
Fishing	2.6	0.9	1.0	13.4	4.5
Skilled	4.5	4.1	2.9	2.7	3.6
Private	2.6	1.9	2.0	0.6	1.8
Business	1.3	0.9	0.5	2.9	1.3
Total	100.0	100.0	100.0	100.0	100.0

Table 5: Head Count Ratio

	Poor		Non-Poor		Total	
	N	%	N	%	N	%
Thatto	54	36.0	96	64.0	150	100.0
Mirpur Sakro	49	32.7	101	67.3	150	100.0
Sijawal	54	36.0	96	64.0	150	100.0
Keti Bunder	82	54.7	68	45.3	150	100.0
Overall	239	39.8	361	60.2	600	100.0

3.4 Poverty Gap and Sen Index

Sen index measuring the severity of poverty, which is the multiple factor of head count ratio and poverty gap, revealed that on an overall basis, sen index was 0.27 (Table 6). The highest Sen Index was estimated for Keti Bunder Taluka while the lowest for Thatta Taluka while Sen index for Mirpur Sakro and Sijawal was the same (0.25).   These figures may inivite attention that rural development programs may be initiated in Taluka Keti Bunder where majority of the people are confronting with poverty menace.

Table 6: Poverty Gap and Sen Index

Taluka	Poverty Gap	Sen Index (Severity)
Thatta	532	0.23
Mirpur Sakro	600	0.25
Sijawal	572	0.25
Keti Bunder	553	0.36
Total	562	0.27

3.5 Inequality of Income

Inequality of income was measured by Gini coefficient. Lorenz Curve developed for Mirpur Sakro is relatively away from the perfect distribution line, leaving a larger proportion for Gini-coefficient. Therefore, the highest Gini-coefficient (0.524) was estimated for Mirpur Sakro followed by Keti Bunder (0.453), Sijawal (0.442), and Thatta (0.400). Lorenz curves developed for Sijawal and Keti Bunder overlapped each other very well; hence, Gini coefficient is almost the same.

Figure 3: Lorenz Curve and Gini Coefficient
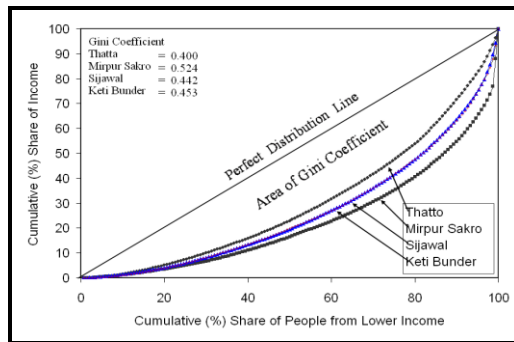
3.5 Determinants of Poverty

Coding scheme of 0 being a poor and 1 being not poor was used for dependent variable designated as poverty. Logistic regression model reveals that education, number of earners in the family, number of buffaloes and cow, land holding were found to be significantly contributed to being not poor. On the other, probability of poverty increased as a number of family members increased.

Table 7: Estimates of Logistic Regression

Variables	Coef.	P	Odd Ratio
Constant	0.72563	0.0063	------
Education	0.25092	0.0089	1.29
Family members	-0.37093	0.0000	0.69

Earners	0.30708	0.0000	1.36
Buffaloes	0.81886	0.0000	2.27
Cows	0.12442	0.0002	1.13
Area acres)	0.11001	0.0000	1.12
Deviance	614.36		
P-Value	0.2636		
Degrees of Freedom	593		
Proportion correctly classified	74%		

Deviance of the model was non-significant (p=0.263) at 5% level of significance, which revealed that the proposed model was fit to data. The following equation was developed between poverty and its associated variables:

$$Poverty = \frac{e^Z}{1 + e^Z}$$

Where

Z = 0.725627 + 0.25092 (Education) - 0.37093 (Family members) + 0.30708 (Earners) + 0.81886 (Buffaloes) + 0.12442 (Cows) + 0.11001 (Farm size)

All the variables were found to be highly correlated (P < 0.01) with poverty. Odd ratios are displayed in the last column of Table 7. Except family member (0.69), odd ratios for determinants are greater than 1 which reveals that likelihood of being not poor increases as values of variables increase (0 =poor and 1 = not poor).

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