

## **Mapping and Measuring of Multidimensional Poverty in Pakistan: Empirical Investigations**

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### **Abstract**

**This study aims at identifying various socio-economic dimensions to be included in the mapping of multidimensional poverty along with establishing cut-off points according to Millennium Development Goals (MDGs). These new methodological initiatives handled the cardinal as well as ordinal data that was taken from Federal Bureau of Statistics for the years 1998-99 and 2007-08. It was revealed from the analysis that the incidence of multidimensional poverty decreased from 43.34 percent in 1998-99 to 38.31 percent in 2007-08. The percentage decrease was substantial in rural areas. This indicated that growth has been effectively translated to the rural poor during that specific decade. Sindh urban was the only region where incidence of multidimensional poverty increased. In terms of percentage contribution to the overall country level poverty, Balochistan ranked number one followed by KPK, Sindh and Punjab. There is need of designing such a poverty alleviation policy as keeping multidimensional poverty statistics in view rather than merely focussing of uni-dimensional results.**

**Key Words:** Pakistan, Multidimensional poverty, Adjusted FGT measures

### **Introduction**

Poverty is the fundamental predicament in the developing countries of the world. Around 1.8 billion in 1990, 1.4 billion in 2005 and 920 million people in 2009 were living below the poverty line in the world as per international poverty line less than \$1.25 a day, with varying impact across the region and countries (Millennium Development Goal's Report, 2010). In South Asia, around 300 million people out of 550 million population were living below the poverty line (UNDP, 2008). The World Bank report (2009)

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indicates that out of the population of 1.42 billion, around 400 million people are poor in the South Asia region and this burden is going to increase with the passage of time. According to United Nation (2004), around 42 percent of the world population and 20 percent of South Asia region, were deprived of the improved water sanitation, improved toilets and other facilities in 2002. The overall poverty in the developing world has declined at a rate of 1 percentage point a year during the last decade, but due to previous global financial crisis about 64 million more people were expected to fall in the extreme poverty on \$1.25 a day poverty line by the end of 2010 (World Bank, 2010).

“Poverty” is primarily perceived as pronounced deprivation in the wellbeing of individual or households and the poor are those who do not have sufficient income or consumption to put themselves above some ample minimum threshold of wellbeing in the society (World Bank, 2000). Laderchi, et al. (2003) argued that it is an improved way to measure the wellbeing by either expenditure or income. The drawback of income approach is linked to some non-monetary attributes that cannot be valued because respective markets do not exist for example public goods (Thorbecke, 2005). In order to understand the threat that the problem of poverty poses, it is essential to know its various dimensions and the process through which it seems to be deepen and widen (Bourguignon and Chakravarty, 2003). The solution needs to attack through multiple pillars to alleviate poverty (UNDP, 2008).

On the whole, measurement of poverty in the uni-dimensional perspective has been broadly criticized in the recent literature. Ravallion (1994) argued that income is not a well defined concept to explain the various potential pitfalls in most of the developing countries, particularly in rural areas. Sen (1999) indicated that income poverty is not a good reflector of a person's deprivations in other dimensions that are intrinsically important such as health, education, as well as human security. Jamal (2009) criticized that uni-dimensional measures only advocate the case for transfer policies that alleviate poverty in the short run. In this context poverty is regarded as a problem of capability failure and is a consequence of lack of

human needs (Chakravarty, 2008). The measurement of poverty in the multi-dimensional angle is based upon the recently developed methodology framed by Alkire and Foster (2008).

Historically, there has been growing concern on the dilemma of poverty in Pakistan. In the years of 1970s Pakistan seems to have made good progress in reducing poverty. However the overall poverty level declined during the decade of 1980s, which reversed in 1990s and continued increasing trend at the end of the last decade (Amjad and Kemal, 1997). According to Arif (2000) poverty is more a rural phenomenon than urban in Pakistan and almost all the studies on poverty support this argument. According to the Planning Commission of Pakistan, out of 160 million population over 64 million people were living below the poverty line in 2008 and interestingly 40 percent of the urban population lives in the slum areas. In the same way, UNDP (2010) estimated the multidimensional incidence of poverty as 54 percent in Pakistan. Poverty irrationally went up from 2008 to 2010 (World Bank, 2010).

As far as uni-dimensional studies are concerned there is a lot of literature. Poverty is a scarcity or lack of command over the resources or commodities to meet the materialistic needs and live a tolerable life (Townsend, 1970). Laderchi et al. (2003) explained the four different approaches to the definition and measurement of poverty. Makoka and Kaplan (2005) described the concepts of poverty and vulnerability. Haq (2004) argued that poor are generally classified into absolute poor and transitory poor. Ravallion and Chen (2008) explained that various poverty lines are used in different countries in terms of their purchasing power. Bidani et al. (2001) defined the methodology to establish the poverty line for the purpose of making comparison over the time and space. Kakwani (2003) critically examined the various methodologies to construct an accurate poverty line. Rao (2006) discussed the expenditure approach to estimate poverty level. Albert and Collado (2004) summarized information on poverty by analyzing the data and identified the various characteristics of the poor. World Bank (2002) analyzed the poverty level in Pakistan. CPRSPD (2008) explained the higher incidence of poverty in rural area. Kemal (2003) argued that the magnitude of poverty varies across the different studies due to variety of poverty lines and the method used to estimate the poverty level. Cheema (2005) criticized the use of variety of poverty lines and the methodology used for the measurement of poverty. Arif (2006) analyzed the poverty reduction measures adopted by the government of Pakistan.

Similarly, the work on multidimensional poverty is of varied nature. Bourguignon and Chakravarty (2002)

argue that poverty of a person arises due to insufficiency of different attributes such as housing, health, literacy, provision of public services, income etc. Atkinson (2003) argued that multiple deprivations are not covered under the income poverty. Bourguignon and Chakravarty (2003) argued that the multidimensional framework visualizes poverty in broad perspective. Baulch and Masset (2003) explained that it is not possible to capture all the different dimensions of poverty in conventional measurement. Alkire (2002) argued that income is not enough to manipulate the multi-strategic phenomena. Wagle (2007) used the comprehensive multidimensional framework to examine poverty in the United States. Bibi (2004) took into consideration household expenditures per capita as a proxy of income deprivation and number of rooms as a proxy of housing deprivation. Beranger and Chouchane (2007) measure the multidimensionality of wellbeing through the Standard of Living (SL) and Quality of Living (QL) index. Foster (2007) empirically estimated the multidimensional poverty in Mexico. Yu (2008) estimated the multidimensional poverty through making the use of identification and aggregation methods in China. Battiston et al. (2009) estimated multidimensional poverty in the six Latin American countries. Busch and Peichi (2010) defined the concept of poverty that goes beyond the lack of economic well-being. UNDP (2010) emphasized the multidimensional poverty index (MPI) that reveals a vivid spectrum of challenges facing the poorest.

Therefore in order to understand the issue of poverty in composite perspective, it is necessary to know its various dimensions through which the poverty is understood in deeper and wider sense. Keeping the National and International importance of the issue, this study was aimed at mapping and measuring of multidimensional poverty in Pakistan by estimating incidence, depth and severity across regions and over two period of times.

## Materials and Methods

For mapping and measuring multidimensional poverty in Pakistan, this study used the available information and reported data on various household indicators from Pakistan Social and Living Standard Management (PSLM)/ Household Integrated Economic Survey (HIES). The study was based on two data sets (1998-99 and 2007-08) of HIES/PSLM. In this study to analyze the multidimensional poverty, the dimensions and sub dimensions used are shown table 1.

### Procedure for Measurement of Multidimensional Poverty

The methodology for the estimation of multidimensional poverty intuitively consists of a

**Table 1 Dimensions and sub-dimensions**

Dimensions	Sub-dimensions	Cut-off
Y= Income	Uni-dimensional	1- If Income is < Poverty line than 1, otherwise 0.
H1=Education	Years of Education	1- If highest class is <= 6 than 1, otherwise 0.
	Read & write	2- If can not Read & write in any language than 1, otherwise 0.
H2=Health	Immunization	1- Health-1, if not immunized than 1, otherwise 0.
	Purity of Water	2- If source of water not piped than 1, otherwise 0.
	Pre-natal	3- If did not go for any pre-natal consultation than 1, otherwise 0.
H3=Housing & Services	Occupancy Status	1- If not owned than 1, otherwise 0.
	Electric	2- Absence of electric connection is 1, otherwise 0.
	Gas	3- Absence of gas connection is 1, otherwise 0.
	Telephone	4- Absence of telephone connection is 1, otherwise 0.
	Toilet	5- If flush not connected to public sewerage/ pit is 1, otherwise 0.

number of steps which can be classified into two groups such as common and specific steps. The choice of dimension was an important step and carried out through the ongoing deliberative participatory exercise and MDG’s standards. Another step establishes the first cut-off in the methodology of poverty for each dimension to identify the deprived or non-deprived with respect to that attribute. Finally, the number of deprivations was counted for each dimension. Moreover equal weights were given to each indicator for the simplicity of analysis.

**Multidimensional Headcount Ratio**

It shows the percentage of the multidimensional poor population, by using an aggregate cut-off point “k” and it is denoted by “H”. The value of “k” was determined as the minimum number of deprivations of poor in order to be declared as multidimensional poor (Naveed and Islam, 2010). The number of deprivations of poor person is greater than/equals to the cut-off “k” or  $c_i \geq k$ , where “k” is an integer between one and d, the number of dimensions. Multidimensional headcount ratio “H” can be calculated as:

$$H(x; z) = \frac{1}{n} \sum_{i=1}^n \left[ \sum_{j=1}^d g_{ij} (k) \right]^0 = \frac{q}{n}$$

**Adjusted Headcount Ratio (M<sub>0</sub>)**

The adjusted headcount ratio is the total number of deprivations experienced by the poor divided by maximum possible number of deprivations experienced by the all people (Alkire and Foster, 2008). In this way, it combines the information of the incidence of poverty “H” and the average extent of deprivation of the poor person, which was denoted by “A”; where “A” is the average deprivation gap and calculated as sum of deprivation divided by the total number of the poor people.

$$M_0 = HA$$

$$A = \sum_i (c_i^*/d)/q$$

**Adjusted Poverty Gap Ratio (M<sub>1</sub>)**

The adjusted poverty gap “M<sub>1</sub>” incorporates the information on the depth of poverty and calculated as

the product of “M<sub>0</sub>” and “G” or “HA” and “G”, where “G” is the average normalized gap across all the cases of deprivation or sum of the normalized gap of the poor divided by highest possible sum of the normalized gaps. The average normalized poverty gap “G” was calculated as “poverty line minus the persons achievements divided by the poverty line.

$$G = \sum_i^q \left( \frac{z_i - y_i}{z_i} \right)$$

**Adjusted Squared Poverty Gap Ratio (M<sub>2</sub>)**

It can be calculated as the product of “M<sub>0</sub>” or “HA” and average severity of deprivation “S”, where “S” was obtained by squaring each poverty gap individually or replacing the “G” with the squared normalized poverty gap “S”. The “M<sub>2</sub>” measure can be expressed as M<sub>2</sub>=HAS or sum of squared normalized gaps divided by the highest possible sum of squared normalized gaps.

**Results and Discussion**

Mapping of multidimensional poverty provides quick information on incidence, depth & severity with the spatial distribution of poverty and used to inform decision making & in designing interventions from local to national governments (Akinyemi, 2010).

**Incidence of Multidimensional Poverty**

Table 2 explains the mapping of multidimensional incidence of poverty and the percentage contribution of each province in the overall incidence of poverty. The results explained that overall M<sub>0</sub> in the country was estimated as 43.34 percent in 1998-99 which decreased to 38.31 percent in 2007-08. The study showed that in Punjab the incidence of multidimensional poverty was 40.14 percent in 1998-99, but it decreased to 35.56 percent in 2007-08 and the percentage contribution of Punjab at the national level remained almost constant over the period. The highest incidence of multidimensional poverty was observed in Balochistan, which was 49.08 and 44.49 percent for study years. The urban contribution of Sindh in overall poverty was found be the lowest

followed by Punjab, KPK and Balochistan. But in 2007-08, the proportional contribution of Balochistan in the overall multidimensional poverty was the highest both in rural and urban areas.

The overall multidimensional incidence of poverty decreased over the span of ten years (1998-99 to 2007-08). However, the decline in the rural region, which is largely attributed to agriculture sector, that was more pronounced than urban across the time & space. These findings are parallel to Bourguignon and Ckavrarty (2002) who argued that poverty of a person arises due to insufficiency of different attributes like as housing, health, literacy, provision of public services, income etc. which are necessary to maintain the subsistence level of living. The higher insurgency of multidimensional incidence of poverty in the rural area is due to the mainly dependence on agriculture sector as source of employment and large household sizes. The existing situation necessitated the compatible growth between labour intensive agriculture and advanced non-agriculture sector for generating the farm as well as non-farm employment activities in the rural areas (Arif, 2000). Along with the unequal assets and land distribution system, the biased situation of other basic services such as education, health facilities, housing & sanitations are also the key determinant of the rural poverty (Jamal, 2009; Naveed and Islam, 2010 and Chaudhry et al., 2010). Moreover the demographic characteristics of the family vary between the urban and rural segments of population. However the large household size also matters to keep the individual or family in the state of poverty (Chaudhry, 2009). The research findings demand the improvements in the socio- economic aspects of life particularly in the rural areas.

#### **Depth of Multidimensional Poverty**

Table 3 indicates the mapping of multidimensional depth of poverty and the percentage contribution of each province in the overall poverty gap along with the regional bifurcation. The results explained that overall  $M_1$  in the country was estimated as 20.20 percent in 1998-99 but decreased to 18.73 percent during 2007-08. Moreover the regional contribution with the higher index in the rural area moved parallel to the overall figure over the time. The results further revealed that in Punjab, the depth of multidimensional poverty was 18.95 percent in 1998-99, but it decreased to 17.42 percent in 2007-08. In Sindh, the depth of multidimensional poverty was 19.15 percent in 1998-99 and slightly decreased to 18.45 percent in 2007-08. The declining trend of multidimensional depth of poverty in KPK was higher than Punjab, Sindh and Balochistan. However, the percentage contribution of Balochistan in the national profile over the period increased.

The overall situation of multidimensional depth of poverty in Pakistan decreased over the span of ten years (1998-99 to 2007-08). However, the declining scenario in the rural region was distinct, which is largely attributed to agriculture sector, whereas the urban situation was approximately same over the time. The situation was contrary to the finding of Qureshi and Arif, 2001; Haq and Bhatti, 2001. The present study concluded that the issue of poverty was more severe in rural region than urban, due to multiple reasons such as incompatibility of agriculture growth, imperfection of markets, limited network of roads, etc. The results are in line with the findings of other researchers like as Asselin and Anh (2000); Atkinson (2003); Chakravarty (2003); Alkire (2002); Preece, (2006) and Jamal, (2009).

#### **Severity of Multidimensional Poverty**

Table 4 shows the multidimensional severity of poverty along with the percentage contribution of each province & region in the overall respective level of severity of poverty in Pakistan. The results indicated that overall  $M_2$  in Pakistan was estimated as 9.41 percent in 1998-99 which decreased to 9.16 percent in 2007-08. However the regional contribution with the higher multidimensional severity of poverty in the rural area moved parallel to the overall figure over the period of study. Provincial estimates have also been shown along with rural-urban bifurcation.

Punjab was the least affected province with the multidimensional severity of poverty and its contribution percentage remained little throughout the studied period. The contribution of Punjab declined over the time with greater rate than that of Sindh. The declining trend of  $M_2$  in the Punjab was less than KPK. Throughout the study period, Balochistan was not only the top affected province with multidimensional severity of poverty, but also situation became more horrible over the time. The same phenomenon has been observed by Cheema (2005). The overall inequality in the multidimensional perspective declined over the period of (1998-99 to 2007-08) in Pakistan, parallel to other studies like Chaudhry (2009) and Haq (2001). The study also concluded that over the time & place, the issue of multidimensional severity of poverty was not only larger in the rural sector, but also moved in the inverse directions in most of the population groups. The empirical evidences necessitate the compatible growth between labour intensive agriculture and advanced non-agriculture sector for generating the farm as well as non-farm employment activities to improve the wellbeing (Arif, 2000). In addition to these, the demographic circumstances also matters in the determination of wellbeing (Datt and Jolliffe 1999 and Chaudhry,

**Table 2 Incidence of Multidimensional Poverty in Pakistan**

Group	1998-99		2007-08	
	M0	% Contrib.	M0	% Contrib.
<b>Punjab</b>	40.14	22.55	35.56	22.67
Urban	27.17	22.38	25.62	22.30
Rural	48.64	23.26	42.38	23.22
<b>Sindh</b>	41.54	23.34	38.40	24.48
Urban	22.30	18.37	25.50	22.19
Rural	53.32	25.50	47.29	25.91
<b>KPK</b>	47.23	26.54	38.39	24.48
Urban	34.76	28.63	29.73	25.87
Rural	52.53	25.12	42.54	23.30
<b>Balochistan</b>	49.08	27.57	44.49	28.37
Urban	37.19	30.63	34.05	29.63
Rural	54.61	26.12	50.33	27.57
<b>Pakistan</b>	43.34	100.00	38.31	100.00
Urban	28.56	100.00	27.64	100.00
Rural	51.62	100.00	44.80	100.00

**Table 3 Depth of Multidimensional Poverty in Pakistan**

Group	1998-99		2007-08	
	M1	% Contrib.	M1	% Contrib.
<b>Punjab</b>	18.95	22.94	17.42	22.74
Urban	12.93	22.53	12.61	22.34
Rural	22.91	23.71	20.77	23.33
<b>Sindh</b>	19.15	23.19	18.85	24.61
Urban	10.59	18.45	12.55	22.24
Rural	24.47	25.33	23.17	26.02
<b>KPK</b>	21.82	26.42	18.66	24.36
Urban	16.44	28.64	14.60	25.87
Rural	24.11	24.96	20.63	23.17
<b>Balochistan</b>	22.67	27.45	21.67	28.29
Urban	17.44	30.38	16.68	29.55
Rural	25.12	26.00	24.46	27.47
<b>Pakistan</b>	20.20	100.00	18.73	100.00
Urban	13.54	100.00	13.57	100.00
Rural	23.90	100.00	21.86	100.00

**Table 4 Severity of Multidimensional Poverty in Pakistan**

Group	1998-99		2007-08	
	M2	% Contrib.	M2	% Contrib.
Punjab	8.91	23.31	8.54	22.82
Urban	6.14	22.70	6.20	22.37
Rural	10.75	24.16	10.18	23.44
<b>Sindh</b>	8.81	23.03	9.26	24.75
Urban	5.02	18.55	6.17	22.26
Rural	11.20	25.16	11.35	26.13
<b>KPK</b>	10.06	26.31	9.07	24.24
Urban	7.75	28.65	7.17	25.87
Rural	11.03	24.79	10.01	23.05
<b>Balochistan</b>	10.45	27.34	10.55	28.19
Urban	8.14	30.11	8.18	29.51
Rural	11.52	25.89	11.89	27.38
<b>Pakistan</b>	9.41	100.00	9.16	100.00
Urban	6.42	100.00	6.66	100.00
Rural	11.07	100.00	10.67	100.00

2009) and inflated the situation particularly in the rural segment of the population.

A variety of policy inputs can be retrieved from the investigated findings. It is proposed that the poverty alleviation strategies should be area specific and dimension focused, keeping the profile of respective incidence, depth, severity and its percentage contribution to overall poverty in view. Moreover, policies framed on the basis of multidimensional poverty would be more effective in translating the fruit of economic growth to the poor. And it is only by mitigating rural poverty particularly in Sindh and Balochistan provinces, the dream of overall poverty alleviation can be materialized.

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