

Multidimensional Poverty Measurement in Pakistan: Time Series Trends and Breakdown

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1. INTRODUCTION

In the recent literature, consensus has emerged that poverty is a multidimensional phenomenon; see Alkire and Santos (2010) for a review of the major arguments. Nonetheless, the most widely used measures of poverty remain unidimensional, being based on income or caloric intake cutoffs. The logic for the use of income based measures was that it was only lack of income which led to deprivation—with sufficient income, rational agents would automatically eliminate deprivations in all dimensions in the right sequence of priorities. However, careful studies like Thorbecke (2005) and Banerjee and Duflo (2006) show that this does not happen. Even while malnourished and underfed, the poor spend significant portions of their budgets on festivals, weddings, alcohol, tobacco and other non-essential items. The move from abstract theoretical speculation based on mathematical models of human behaviour to experiments and observations of actual behaviour has led to dramatic changes in the understanding of poverty and how to alleviate it. Some of these insights are encapsulated in a new approach to poverty advocated by Banerjee and Duflo (2011).¹

Another motivation for more careful study of poverty is a silent revolution in the understanding of development. Traditional economists treat development as a process of accumulation of wealth, and current textbooks endorse this idea for the most part. On this view, the poor are regarded as labour inputs to the production function, and valued at their marginal product of labour. Elementary as it might appear, the idea that wealth is an input to improving human welfare, and that our goal as economists should be to provide lives of comfort and dignity to all human beings, is revolutionary. Experience with implementing development schemes based on conventional growth theory led Mahbub-ul-Haq to the following important insight:² “..., after many decades of development, we

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¹<http://pooreconomics.com/>

²In another place, he writes that “we were told to take care of our GNP as that would take care of poverty—let us reverse this and take care of poverty as this will take care of our GNP.” See Bari (2012) for an account of the intellectual journey of Mahbub-ul-Haq from conventional wealth oriented views of development to human oriented views based on his experiences with development.

are rediscovering the obvious—that people are both the means and the end of economic development.” Similarly, Sen (1975, 2006) has argued that development is about the process of development of human capabilities, not the accumulation of wealth. A recent study of the wealth of nations by the World Bank shows that most of the wealth on this planet is generated by skills and capabilities of human beings, rather than natural resources or accumulated capital.³ Thus the poor are the most valuable resources in the process of development, and providing for them adequately is the key to rapid economic growth.

In this paper, we calculate the Alkire-Foster Measure (AFM) (2007) of poverty on the basis of available Pakistani data. This is a true multidimensional poverty index, which treats income as means to ends and not an end in itself. We will show that it provides a substantially clearer picture of poverty than large numbers of earlier studies based on unidimensional measures. Because the measure is decomposable, we are able to provide a breakdown across different dimensions, and also across provinces. The sharper conclusions also provide much clearer guidance for anti-poverty policy.

Before proceeding to provide details of this alternative methodology, we provide a brief review of existing approaches to poverty measurement in context of Pakistan. This will place our discussion in a historical context, and provide a benchmark for comparisons.

2. HISTORY OF POVERTY MEASUREMENT IN PAKISTAN

Studies on poverty measurement in Pakistan used various income-based definitions of poverty measurement. Increase in number of measures led to increasing confusion about the true level of poverty. Changes in cutoffs for calories, income, indexation methods, some of which were politically motivated, led to conflicting and contradictory pictures of poverty. A close study of Naseem (1973, 1977), Allaudin (1975), Mujahid (1978), Irfan and Amjad (1984), Ahmed and Allison (1990), and Malik (1988) showed that for same years and same data sets, changes in models of poverty measurement, poverty lines and units of analysis lead to these differing results and trends. Most confusing aspect here was the fact that all models used same income and expenditure poverty definitions and yet achieved different results.

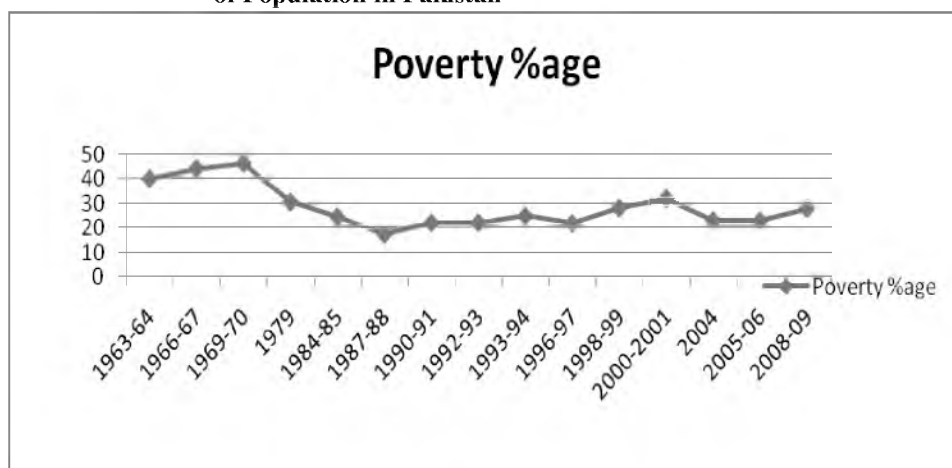
In 2003-04 Economic Survey of Pakistan government admitted that: “... many poverty estimates have ... neither helped in understanding changes in the standard of living of a common man nor facilitated in assessing how to reduce poverty through various policy changes”.⁴ In this 2003-04 year for the very first time in the history of Pakistan an official poverty line of 2350 calories/day/adult was announced. This may have brought uniformity in poverty measurement but it did not bring any improvement in policy area. Ultimately, it is not of much help to know if the headcount of the poor is going up or down, since it does not provide sufficient clues as to policies needed to help them.

Income poverty demonstrated following variations over years in Pakistan.

³“Where is the Wealth of Nations?” study by World Bank (2006) <http://siteresources.worldbank.org/INTEEI/214578-1110886258964/20748034/All.pdf>

⁴*Economic Survey of Pakistan 2003-04*, p. 41.

Fig. 1. Poverty Estimates on the Basis of Headcount as % Age of Population in Pakistan



Source: Created on the basis of data from Federal Bureau of Statistics, Ministry of Planning and Development, Pakistan.

The Headcount poverty estimates only show the percentage of population of Pakistan below different poverty lines. They do not even tell why this poverty is prevailing? Which province of Pakistan is suffering more from poverty? Are the causes of poverty same for different areas of Pakistan? Which policies will alleviate deprivation in which dimension of poverty? They are all based on income and food expenditure approaches of poverty measurement. Therefore, headcount measures fail to depict a true and transparent picture of nature, extent, causes and intensity of poverty in Pakistan.

Despite these deficiencies, the unidimensional poverty indices have been widely used due to three aspects. Firstly, they are simple and easy in application. Secondly, blind trust in 'trickledown' theory suggests that growth is sufficient to remove poverty; this theory has been repeatedly rejected across the globe.⁵ Thirdly, nonexistence of a sound and robust multidimensional poverty index also favoured the use of one dimensional measure.

3. THE ALKIRE-FOSTER MEASURE

A large number of complex and difficult problems have hindered the development of suitable multidimensional measure of poverty. How to select the dimensions of poverty? How to decide upon cut-offs or poverty lines within each dimension? How to aggregate all these different dimensions? What weights to apply at each dimension? How to capture the varying inter-relationships of these dimensions? The Alkire-Foster measure provides satisfactory answers to all of these questions. For a complete discussion of the debates and justifications for the choices, the reader may consult training material for producing national human development reports by Alkire and Seth (2011).⁶ The Alkire-

⁵"For the 1 percent, of the 1 percent, by the 1 percent," Stiglitz has recorded how the top 1 percent of the USA population has massively increased their share of the income and wealth of the entire country over the past two decades. <http://www.vanityfair.com/society/features/2011/05/top-one-percent-201105>

⁶<http://www.ophi.org.uk/wp-content/uploads/MPI-Primer1.pdf?cda6c1>

Foster methodology has been used to construct the MPI, a multi-dimensional poverty index which has specific dimensions and cutoffs.⁷

Internationally this index has been built using eleven different indicators including health, education, shelter, occupation, empowerment, child development, living standard, social exclusion, assets, air quality, and security.

In attempting to adopt this methodology for Pakistan, we found data was only accessible regarding seven dimensions. Another limitation was unavailability of true panel data. Instead 'Household Income and Expenditure Survey' (HIES) and 'Pakistan Social and Living Standard Measurement Survey' (PSLM) were used for available years since 1998-2006. It appears very hard to theoretically agree on the dimensions which should be included as poverty constituents. There is a vast debate going on to include many dimensions some of them are even currently considered as immeasurable like self respect, social exclusion etc. All the same, one does not have to be a genius to identify absolute basic necessities for human survival e.g. health, education, shelter, water and sanitation, nutrition etc. A composite index should include as many of these real dimensions as possible. Data availability as mentioned above hampers the true measurement of poverty. Though no multidimensional poverty measurement has been done in Pakistan before, but people like Zaidi and Devos (1994), Malik (1996), Kemal (2003), Jamal (2005) and Haq (2005) have suggested that it is urgently needed. They have also suggested health, education, living standard, assets, occupation or livelihood to be some of the dimensions of poverty. We have used all dimensions on which data was available to build a version of the MPI in Pakistan.

Table 1

Dimensions and Indicators Used for Current Study

Dimensions	Indicators
Living Standard:	[Housing (main floor, roof and wall material) + electricity]
Health:	[vaccination]
Water and Sanitation:	[drinking water + type of toilet facility]
Air Quality:	[type of cooking fuel]
Assets:	[refrigerator, TV, car, AC/ room cooler, washing machine]
Education:	[max education attained by any member]
Livelihood:	[occupation of respondent and partner]

Who is poor and who is not? A reasonable starting place is to compare each individual's achievements against the respective dimension-specific cutoffs. This is the first stage of dual cutoff strategy to be applied. Within dimension cutoffs are based on the same principle used by Alkire and Seth (2008) in India. Each question of a survey has some answer options. Each option is then marked as deprived or not deprived according to within dimension cut-off. For example living standard is composed of two indicators type of housing and electricity. Within each indicator and sub-indicator cutoffs are applied as follows.

⁷See Alkire and Foster (2007) Counting and Multidimensional Poverty Measures. Oxford University. Oxford Poverty and Human Development Initiative. (OPHI Working Paper 7).

LIVING STANDARD: (Type of House + Electricity)

This dimension corresponds to *Question 109,110,111 & 107* in the PDHS questionnaire (similarly these questions are also present in HIES and PSLM but with different numbers)

Poverty Cut-off Z_1 – in each question **bold ones** were considered as poor⁸ and allotted 1 value and non bold ones were considered as non-poor and allotted 0 value. Poverty cut-off denotes the situation under which a household is deprived in any two of the above mentioned indicators.

Question 109 main material of floor (MFM): **natural floor, earth/sand/mud floor**, finished floor: chips/terrazzo, ceramic tiles, marble, **cement**, carpet, **bricks**, mats, **other**.

Question 110 main material of roof (MRM): **natural roofing: thatch/bamboo/wood/mud, rudimentary roofing, cardboard/plastic**, finished roofing: iron sheets/asbestos, t-iron/wood/brick, reinforced brick cement/RCC, **other**.

Question 111 main material of walls (MWM): **natural walls: mud/stones, bamboo/sticks/mud, rudimentary walls: unbaked bricks/mud, plywood sheets, carton/plastic**, finished walls: stone, blocks, baked bricks, cement blocks/cement, **tent, others**.

Question 107 House has electricity: yes, **no**.

Similarly these within dimension cutoffs are applied on other dimensions of the study. But dimension specific cutoffs alone do not suffice to identify who is poor; we must consider additional criteria that look *across* dimensions to arrive at a complete specification of identification method. This is the second stage of dual cutoff method. The most commonly used identification criterion is called the *union* method of identification. In this approach, a person i is said to be multidimensional poor if there is at least one dimension in which the person is deprived ($k = 1$). The other extreme identification method is the *intersection* approach, which identifies person i as being poor only if the person is deprived in all dimensions ($k=d$) (where d is the number of dimensions under study). This criterion would accurately identify the poorest of the poor but excludes those who are above the poverty threshold in even one dimension, even if they are poor in all others. Secondly, as the dimensions grow the proportion of the population appearing as poor declines to nearly zero. A natural alternative is to use an intermediate cutoff level for ci that lies somewhere between the two extremes of 1 and d . In other words, k identifies person i as poor when the number of dimensions in which i is deprived is at least k ; otherwise, if the number of deprived dimensions falls below the cutoff k , then i is not poor according to k . Since k is dependent on both the *within dimension* cutoffs and the *across dimension* cutoff k , Alkire and Foster have referred to k as the *dual cutoff* method of identification. Here k includes the union and intersection methods as special cases where $k=1$ and $k=d$.

⁸See Alkire and Seth (2008) Measuring Multidimensional Poverty in India: A New Proposal. (OPHI Discussion Paper 15).

Result and Discussion

Table 2

Indicators and Cut-offs of Dimensional Poverty Rates

Dimen- sions	%age Poverty Rate
0	0.7
1	6.8
2	12.9
3	13.9
4	15.2
5	21.9
6	28.5
Total	100

Fig. 2. Distribution of Dimensional Poverty Rates

No. of deprived dimensions	Percentage
0	0.7
1	6.8
2	12.9
3	13.9
4	15.2
5	21.9
6	28.5

Alkire-Foster Measure when applied on PDHS data set 2006-07 showed that only 0.7 percent of Pakistani population is not deprived in any of the six dimensions.⁹ We can see that if union definition (deprived in at least one dimension) is considered 99.3 percent of Pakistan is poor according to this multidimensional poverty measure. Whereas, if intersection definition (deprived in all dimensions) is taken into consideration even then as high as 28.5 percent population suffers poverty. It was observed that increase in the number of dimensions augmented poverty. This leaves us with anticipation that if further dimensions were included like health, empowerment and child status etc. probably the analysis would have shown a bleaker picture. Nearly 47 percent of the population is poor in four dimensions.

In Table 3, the number of poor in multiple dimensions; the cut-off based headcount ratios and the adjusted headcount ratios are shown. The union approach would identify 92.5 percent of rural population as poor. On the other hand, the intersection approach leads to 28.5 percent poverty. If the poverty cut-off is two that means people are deprived in two or more than two out of six dimensions. 65.6 percent of population belongs to poor households and it denotes the multidimensional headcount ratio for this $k=4$ cut-off. To avoid criticisms of the multidimensional headcount ratio (it does not take into account the breadth of multidimensional poverty, does not satisfy dimensional monotonicity, and is not decomposable) the adjusted headcount ratio (M_0) as a measure of poverty has been used instead of a multidimensional headcount. For theoretical properties of M_0 , see Alkire-Seth (2008).

We use the cut-off of two out of six subsequently, because leaving aside union definition $k=2$ is the cut-off showing the broadest picture of deprivation. The third

⁹For the detail of the selection criteria of each dimension, see Annex 1.

column of Table 3 reports the adjusted headcount poverty rates for different cut-offs. If the poverty cut-off is four out of six dimensions, then M_0 is 0.568. As $M_0 = HA$. For the poverty cut-off of four out of six dimensions, H is equal to 0.656 and A is equal to $0.568/0.656 = 0.866$. A can be interpreted as the poor being deprived in 86.6 percent of all dimensions on average. Thus, the fourth column reports the average depth of poverty among the population from the poor households. This shows that if $k=6$ is considered then 28.5 percent of population is poor with 100 percent average deprivation in all dimensions.

Table 3

Pakistan: Multidimensional Poverty Measures

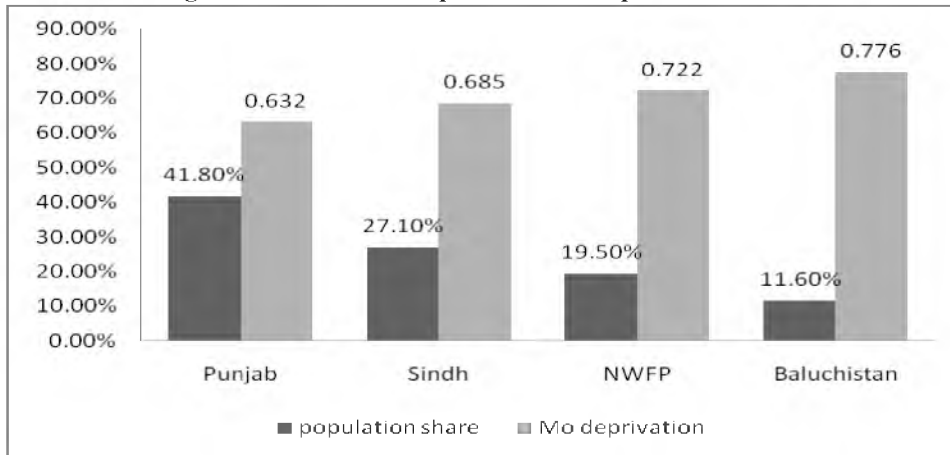
Poverty Cut-offs (k)	Headcount Ratio (H)	Adjusted Head Count	Average Deprivation
		Ratio $M_0=HA$	Share $A= M_0/H$
2	0.925	0.682	0.737
3	0.795	0.638	0.802
4	0.656	0.568	0.866
5	0.509	0.471	0.925
6	0.285	0.285	1

If two or more than two dimensions are considered (union definition with respect to $k=2$) then 92.5 percent of Pakistan's population is poor. However, considering $k=6$ only people those are deprived in all six dimensions available, 28.5 percent of Pakistani population is extremely poor with poor living standard (either with a *kaccha* house or no electricity, with equal weightage), poor water and sanitation (no access to safe drinking water and no proper toilet facilities), poor air quality (unsuitable cooking fuels), with limited or no asset holdings (fridge, TV, car, AC, washing machine), very little or no education (less than primary) and with no proper means of livelihood. This is not a very bright picture compared to results of same measure calculated by Alkire and Seth (2008) for India. Even though more dimensions were considered for India, she is almost free of extreme poverty using same definition.

Table 4

Province-wise Decomposition of Poverty for Unequal Weighting and 2/6 Cut-off

Regions(Provinces)	Population share (%age)	H=q/n	H Rank	Mo	Mo Rank
Punjab	41.8%	.901	1	.632	1
Sindh	27.1%	.92	2	.685	2
KPK	19.5%	.95	3	.722	3
Balochistan	11.6%	.97	4	.776	4

Fig. 3. Province-wise Population and Deprivation Shares

A household identified as poor on the basis of $k=2$ (deprived in two out of six dimensions) showed that Punjab is the least poor province of Pakistan. Sindh has the second lowest poverty rate according to the M_0 measure. Khyber Pakhtunkhwa is the third followed by Balochistan, which is the poorest. These are not just poverty distribution results of provinces, rather they point out the areas of deprivations in every province. These results may help us understand the consequences of these deprivations to Pakistan. Today the deep political frustrations and unrest in Balochistan may have a simple solution: removal of deprivations from the lives of people of Balochistan.

In Table 5, we present the decomposition of poverty across different dimensions within these provinces. This will help us to identify causes and intensity of poverty for each province. Analysis depicts that, education and livelihood in all provinces entail close attention of policy-makers. Punjab and Sindh are not close in their respective M_0 values but causes of poverty are same. For example both have done well in terms of living standard, water and sanitation and air quality. However, assets, education and livelihood show high deprivation levels. On the other hand KPK and Balochistan have close M_0 value, but the causes of poverty in both these provinces are different. This type of decomposition enables the policy-makers to make proper policy recommendations by focusing on exact issues to be resolved. As a result precise causes of poverty can be combated with more targeted planning.

Table 5

Poverty Decomposition by Dimensions at Province Level

Mo Rank	Provinces	Living Standard	Water and San.	Air Quality	Assets	Education	Lively-hood	Mo
1	Punjab	0.023	0.035	0.041	0.051	0.057	0.111	0.63
	- Breakdown%	8.6	13.4	14.7	16.9	21.3	25.1	100
2	Sindh	0.021	0.028	0.023	0.033	0.04	0.044	0.69
	- Breakdown%	11.7	14.8	12.0	17.3	21.1	23.3	100
3	KPK	0.019	0.017	0.022	0.023	0.030	0.032	0.72
	- Breakdown%	13.5	11.7	15.6	16.3	20.5	22.3	100
4	Balochistan	0.017	0.011	0.013	0.014	0.021	0.019	0.77
	- Breakdown%	18.3	12.0	14.2	14.9	19.5	21.1	100

After implementation of this index on 2006-07 PDHS data set, we had to shift to HIES and PSLM for building time-series trends. This analysis showed that over years Pakistani population 'not deprived in any of the dimensions' had declined. In 1998-99, 1.3 percent of this class existed which reduced to 0.7 percent in 2001-02 and then from 2004 onwards this class was totally eliminated.

Table 6

<i>Indicators and Cut-offs of Dimensional Poverty Rates</i>				
Dimensions	%age Poverty Rate (1998-1999)	%age Poverty Rate (2001-2002)	%age Poverty Rate (2004-05)	%age Poverty Rate (2005-06)
0	1.3	0.7	0.0	0.0
1	4.0	2.9	0.6	0.3
2	6.8	5.9	2.8	2.0
3	7.9	7.4	5.7	4.4
4	49.7	60.8	32.1	8.5
5	28.5	20.9	50.1	76.1
6	1.7	1.8	8.6	8.8
7	–	–	0.0	–

We can see that if union definition (deprived in at least one dimension) is considered, 98.7 percent of Pakistan in 1998-99 which increased to 100 percent in 2005-06. Whereas, if intersection definition (deprived in all dimensions) is taken into consideration then 1.7–1.8 percent population suffered from poverty in 1998-99 which increased to 8.8 percent in 2005-06. Also, majority of people were deprived in 4/6 dimensions which increases to 5/6 dimensions later on.

Multidimensional poverty measure represents a more in-depth and detailed picture of poverty. As a result it was observed results that poverty in Pakistan has both increased in its depth and breath, during last decade. Its incline became sharper in the last quarter. For any cut-off, from union to intermediate and intersection definitions, these conclusions hold.

Table 7

<i>Deprivation Index M_0 for Different Cut-offs K (Various HIES Data Sets)</i>				
K	M_0			
	1998-99	2001-02	2004-05	2005-06
1	0.655	0.656	0.647	0.807
2	0.648	0.652	0.647	0.806
3	0.625	0.632	0.639	0.800
4	0.586	0.595	0.614	0.778
5	0.255	0.196	0.431	0.722
6	0.017	0.018	0.074	0.088
7	–	–	0.0002	–

The most depressing discovery done by this data analysis is that over years educational poverty in Pakistan has increased from 2.4 percent to 20.64 percent. This deterioration in education also nullified slight improvements in health, empowerment, living standard and water and sanitation.

Education plays pivotal role in the development of any country. Seminal research by Barro (1997) shows that long run growth is primarily determine by investment in education. Its deprivation leads to tribulations in long-run growth and progress. Pakistan not only needs to find out the causes of this education poverty but also should try and make policies for a quick recovery.

Table 8

Time Series Trends in Dimension-wise Poverty Breakdown (%age) HIES Data

Dimensions/ Years	1998-99		2001-02		2004-05		2005-06	
	M ₀	%age	M ₀	%age	M ₀	%age	M ₀	%age
Occupation	0.043	6.64	0.038	6.0	0.024	3.75	0.019	2.43
Education	0.016	2.4	0.016	2.0	0.091	13.9	0.166	20.64
Health	0.145	22.2	0.144	22.0	0.131	20.1	0.154	19.16
Women Empowerment	0.147	22.5	0.149	22.8	–	–	0.154	19.09
Living Standard	0.156	23.9	0.158	24.2	0.137	21.0	0.159	19.86
Water Sanitation	0.146	22.4	0.147	22.4	0.127	19.5	0.015	18.80
Assets	–	–	–	–	0.121	18.5	–	–
Air Quality	–	–	–	–	0.017	2.59	–	–

If we compare the respective Government poverty % ages for the years we have studied, it becomes evident that multidimensional poverty index presents a far clearer picture of poverty as compared to unidimensional poverty indices in use. Income based poverty is a number which does not tell anything about poverty beyond head count of poor. Multidimensional index for same year not only gives a detailed picture from slightly poor to absolute poor people but also provides a deprivation degree spectrum. It makes multidimensional poverty measurement a better guide for policy designing.

Table 9

Comparative Poverty Percentage of Both Uni-dimensional and Multidimensional Poverty Indices for Given Years

Years	FBS Pakistan % age Poverty Rates	Multidimensional Poverty % Ages Spectrum					Absolutely Poor (6/6)
		Slightly poor (1/6)	(2/6)	(3/6)	(4/6)	(5/6)	
1998-99	28.2	4	6.8	7.9	49.7	28.5	1.7
2001-02	32.1	2.9	5.9	7.4	60.8	20.9	1.8
2004-05	23.1	0.6	2.8	5.7	32.1	50.1	8.6
2005-06	23	0.3	2.0	4.4	8.5	76.1	8.8

CONCLUSIONS

Poverty being a multidimensional phenomenon should have an equally multidimensional measure for its true representation. A dimension level breakdown of poverty analysis will help policy-makers to design proper targeted policy of poverty alleviation on the basis of area, demographic distributions, ethnicity and gender. These results will help people to relate to the other issues in the society as a consequence of deprivations in different dimensions of poverty. Whereas headcount measures do not provide clues to suitable policy, our multidimensional measure shows that the critical fronts are Health and Education. On both of these fronts, we have had a dramatic rise in poverty. Both research and common sense agree on the idea that the future of the nation lies with our youth. Failings on the educational front do not bode well for the future, and it is an urgent need to take suitable measures to rectify this problem.

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