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Determining BPL Status: Some Methodological Improvements[β]

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Abstract

Many have criticized the 2002 Below the Poverty Line methodology used in the rural areas of India to identify eligible beneficiaries. On the one hand, the data were of poor quality and coverage, and were influenced by corruption; on the other hand, the methodology suffered a number of flaws, particularly in treating ordinal data as cardinal, and allowing complete substitutability among all levels of achievement. In order to isolate and scrutinize the methodological points, this article uses the 2005-06 National Family Health Survey (NFHS) dataset, to generate two scores: a pseudo-BPL score, and our preferred score, which we call M_0. M_0 uses the Adjusted Head Count methodology developed by Alkire and Foster (2007). Not only is the newly proposed methodology able to identify the poor households more effectively, but it also provides additional insights for policy. For example, since the M_0 measure can be broken down by dimensions, we can immediately show significant differences in the components of poverty in different states.

Since liberalization in the early 1990s, India has enjoyed a strong rate of economic growth in terms of its Gross Domestic Product (GDP). Yet after over 15 years of growth, 46 per cent of the children in the country are still undernourished[1] (NFHS, 2005/06), about 50 per cent of the adult females are illiterate, 67 per cent of the population does not have access to improved sanitation, and 44 per cent of the population has no access to electricity. Considerable concern has been raised by the sustained divergence between India's rapid economic growth, and far slower growth in human development achievements. For example child under nutrition was only reduced one percent, from 47 to 46 per cent, since 1999. In addition, when families are trapped by multiple deprivations, not only is their daily life very difficult, but the cost of reducing deprivations in any single dimension also increases. For these reasons, a measure of human deprivation should be able to identify households that are deprived in several dimensions simultaneously. It should also reveal the most prevalent components of deprivation among those households in different states and districts.

The Indian government has already undertaken initiatives to identify families that are poor in many dimensions at the same time. Among them, in 2002 rural families were categorized as living 'below the poverty line' (BPL) on the basis of 13 kinds of deprivations. As in previous BPL exercises (in 1992, 1997, 2002), the rural families identified as BPL were eligible for government support such as subsidized food or electricity, and schemes to construct housing and encourage self-employment activities. Each of the successive BPL exercises has been subject to significant criticism on methodological grounds. This article reviews the criticisms of the 2002 BPL exercise and proposes a new methodology for identifying the BPL poor.

This article proceeds as follows. First, we identify the main themes of criticism of the 2002 BPL process, focusing particularly on the methodological drawbacks. Next, we use the

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2005-06 National Family Health Survey (NFHS) dataset, which is arguably of good quality, to match the dimensions in the rural BPL census, and find ten plausible matching indicators. For identification and aggregation, we apply the Adjusted Head Count methodology developed by Alkire and Foster (2007) as it is suited for targeting. Although the results are surrounded by caveats because the questions of the surveys differ, we compare the BPL status using a pseudo-BPL method with those that would be generated by the new methodology using NFHS data. If all else were equal, according to our measure, a significant number of poor households would not have BPL cards—they would have been denied access to services that they deserved and required. The new methodology that we use also provides additional insights for policy from the same dataset. Since the Alkire and Foster (AF) measure can be broken down by dimension, we are also able to detect significant differences in the components of poverty in different states. The article closes by recommending that upcoming BPL exercises consider this or related methodologies of multi-dimensional poverty measurement.

HISTORY OF THE BPL MEASURES

The methodology for identifying Indian families who are eligible for public services has evolved gradually. In 1992, the first BPL survey gathered income data only, and used the all-India income poverty line to identify BPL households. This generated very high estimates of rural poverty (52.5 per cent), and was also based on income data which may be less accurate than consumption data ((Atkinson and Micklewright, 1983)).

The 1997 BPL Census used expenditure data rather than income data alone, and excluded the visibly non-poor. It was developed in two stages. The first survey was administered to all rural households, and identified as 'visibly non-poor' households which satisfied certain criteria. Visibly non-poor households were excluded from the second stage. In the second stage, each household was administered a survey which gathered basic socio-demographic information, household characteristics, and consumption expenditures over the past 30 days. However the exclusion criteria were too stringent – poor families were excluded, and poverty lines were not available or were not uniform across states and district territories.[2]

In 2002, the revised BPL methodology was implemented, which identified rural households as 'below the poverty line' according to a 13-item census questionnaire. Gathering census data from households potentially increases the power and accuracy of the analyses greatly. Furthermore, focusing on direct shortfalls in living standards (rather than using income data) potentially increased the accuracy of the targeting, not least because some questions could be visually verified by enumerators. Unfortunately, during the implementation of the 2002 BPL methodology, several strong disadvantages became apparent, such as a weak methodology, corruption, low data quality, and inadequate coverage.

BELOW THE POVERTY LINE (BPL 2002): METHODOLOGY AND CRITIQUES

The 2002 rural BPL census comprises 13 questions for each household.[3] The household is assigned an integer score between 0 and 4 in each dimension, depending on their response to the question. If a household is in the worst possible category, then a zero score is attached to the household in the corresponding dimension. Households falling in the best possible category are given a score of four, whereas, the intermediate scores are one, two, and three. The scores of the ith household in all 13 dimensions are then summed to create an aggregate score G_i. The highest possible aggregate score for a household is 52, whereas, that of the lowest is zero ($0 \leq G_i \leq 52$). A poverty cut-off z_s is fixed at the state level or at lower levels for the aggregate score.

Households with an aggregate score falling below that area's poverty cut-off are identified as 'BPL'. Therefore, the ith household is identified as poor if $G_i < z_s$ and non-poor otherwise. At the state or union level, a further limit was fixed: the number of people identified as BPL was limited to 10 per cent above the NSS income poverty figures estimated in 1999-2000.

Critiques of the BPL Process and Results

The 2002 BPL results have been strongly criticised (Hirway, 2003; Jain, 2004; Jalan and Murgai, 2007; Mukherjee, 2005; Sundaram, 2003).[4] The criticisms might be roughly divided into three kinds: methodological drawbacks in identification and aggregation, data quality and corruption, and issues of data content. In the current article, we primarily focus on the first criticism.

Several technical flaws in the 2002 BPL aggregation procedure have been (accurately, in our view) identified by BPL critics. These are delineated below.

Cardinalization of Ordinal Data—The response variables ranked 0-4 are treated as if they were cardinal. This is problematic because the *distance* between the response categories within each dimension is not necessarily equal. Treating the responses as if they were cardinal is both technically problematic and practically misleading.

Complete Substitutability across Dimensions—The scores on 13 dimensions are summed up into an aggregate score, and the poor are identified according to a cut-off set across this aggregate score. In practice, this means that a one-point gain in one dimension can be compensated by an equivalent one-point decrease in *any* other dimension, at any other level of achievement. For example, if a family eats only once a day, this situation can be completely irrelevant if the family happens to have quite a few items of clothing or have a pressure cooker and an electric fan, or do well in terms of any other dimensions.

Equal Weighting of Dimensions—The 13 dimensions are combined using equal weights across all dimensions, without providing any ethical justification for this. On what ground, for instance, would a policy-maker defend the fact that the deprivation arising from having fewer sets of clothing is equivalent to food insecurity or landlessness?

Varying Poverty Lines— No national poverty line is set; rather nearly all states and in some cases districts set their own poverty line across the 52-point scale, such that the declared total BPL population is within 10 per cent of the proportion of poor declared in 1999/2000. This may seem arbitrary: a household that is not declared BPL in their state might be considered as BPL if they lived in a neighbouring state.

Imposed Poverty Quotas—The states' BPL estimates were capped such that they could not exceed the NSSO 1999-2000 estimates by more than 10 per cent. This cap was imposed for fiscal reasons, but has been widely disputed.

Inaccurate Representation of Monetary Poverty—Using the 1999-2000 and 2004-05 NSS datasets, Jalan and Murgai (2007) find that 'having a BPL card' is an inadequate proxy for consumption poverty. "The BPL score misclassifies *nearly half* (49 per cent) of the [consumption] poor as non-poor, and conversely, 49 per cent of those identified as BPL poor are actually [consumption] non-poor." (p. 7). While this is not *necessarily* a flaw in the methodology in that a multi-dimensional measure may accurately target a somewhat different sector of the population—the BPL census need not be seen merely as a proxy for income poverty—many of the concerns they raise are echoed here.

Apart from these methodological considerations, the BPL results are challenged by problems in the 2002 BPL census data by which it is constituted. These criticisms are detailed below.

Corruption, Data Quality and Data Coverage—The first criticism is that of outright corruption. This includes rich village members ensuring that their names appeared on the BPL list (Hirway, 2003, Khera, 2008). Also, the Census data do not include some relevant populations such as pavement dwellers without an address, internally displaced persons, scavengers and prostitutes. Finally, in some cases, the questionnaires were reportedly filled out by enumerators inaccurately, or even without consulting the households concerned.

Data Content and Periodicity—The second criticism addresses the particular 13-item questionnaire that was implemented. Naturally, any rural census operates under evident and defensible constraints such as the need for brevity and simplicity, and the difficulty of obtaining comparable questions across the entire rural population. Yet even given these constraints, the 2002 instrument could be improved. For example, the interpretation of some questions is reasonably disputed (such as the question on migration and on what a household wishes to obtain from the government). Some questions, such as maximum household education, should be retained, but others would benefit from adjustment, drawing on the experience from 2002. Further, the BPL lists were set to be updated every five years, but given the movement in and out of poverty by populations, interim updates seem crucial.

PROPOSED METHODOLOGY

A Planning Commission Report from the Working Group on Poverty Alleviation (2006) explicitly takes a "multi-dimensional view of poverty" (p. 18), which it also calls a 'multiple deprivation' view (p. 24) rather than a norm based on calories or income. It interprets the BPL not as a proxy means for income or expenditure poverty, but rather as a direct measure of multi-dimensional poverty that encompasses expenditure poverty and goes beyond it.[5] The Report explicitly states that "the possibility of conflict between the magnitude of poverty as revealed by the BPL surveys and as estimated on the basis of NSS surveys... need not be a major issue..." (p. 25). This approach is in line with other empirical work, which has identified the inherent value of multi-dimensional poverty measures for guiding policy (see Ruggeri-Laderchi, *et al.*, 2003; Ruggeri-Laderchi, 2008.)

In order to address the methodological weaknesses of the BPL identification and aggregation process, we use a recent methodology for multi-dimensional poverty measurement proposed by Alkire and Foster (2007). The Alkire and Foster (AF) methodology was selected because it addresses the methodological concerns of the current BPL aggregation method discussed in the previous section. We first introduce the methodology and then compare both methodologies.

Identification and Aggregation under AF Methodology

Like every multi-dimensional poverty measure, the AF methodology involves two stages. In the first stage, the poor are identified. The second stage aggregates data on the poor across a district, state or nation into a single number. Let us provide a sketch of the identification process before we move into the aggregation process.

The first step is to choose the unit of analysis, which is the household as in the BPL approach. Next, the dimensions of deprivation are chosen. For this purpose, most researchers

rely on either one or a combination of the following five selection methods (Alkire, 2008): *participatory exercises* that elicit the values and perspectives of stakeholders; *public consensus* such as the declaration of universal human rights, the Millennium Development Goals (MDGs), or similar lists at national and local levels; *implicit or explicit assumptions* about what people do value or should value; *convenience or a convention* that is taken to be authoritative; and *empirical evidence* regarding people's values. Clearly, these processes overlap and they are often used in tandem empirically. After the proper dimensions are selected, the corresponding indicators are chosen on the basis of the principles of accuracy and parsimony. We interpret the 13 indicators of the 2002 BPL to be 13 dimensions, with each having one indicator.

The third step is to set a deprivation cut-off for each dimension. This does not occur in the BPL, but is vital to prevent complete substitutability across dimensions. By applying a cutoff, every household is identified as deprived (attached a value of '1') or non-deprived (attached a value of '0') with respect to each dimension. For example, if the dimension is housing ("What is the type of house the household live in?") then 'semi-*pucca* or *pucca*' might identify a household as non-deprived (housing = '0') while 'homeless or *kutcha* house' might identify deprivation (housing = '1'). Then, if we continue the assumption of equal weighting, the number of deprivations is counted for each household.[6]

The final step in identification is common among NGOs and local programmes, but missing from the current BPL. We set a second cut-off which we call *k*. This cut-off denotes the *number of dimensions*[7] in which a household must be deprived in order to be considered [multi-dimensionally] poor. For example, we might say that every household which is deprived in 4 of the 13 dimensions will be considered poor. The cut-off (*k*) is applied to obtain the set of poor households. All information on the non-poor is censored or given a 0 value.

The second stage of the poverty measurement involves aggregation. Initially we calculate the multi-dimensional headcount ratio (*H*), by dividing the number of multi-dimensionally poor people by the total number of people in the society. For example, when there are 13 dimensions and *k* = 4, then the headcount ratio is merely the proportion of households which are poor in at least 4 out of 13 dimensions. The multi-dimensional headcount is useful for measuring multiple deprivations, but it does not rise if poor people become more deprived. Additionally, the headcount cannot be broken down by dimensions in order to analyse the contribution of each dimension towards total poverty.

The second step in the aggregate measure is to compute the average number of deprivations across poor households, which we denote by *A*. This figure is calculated by adding up the proportion of total deprivations that each household suffers and dividing by the total number of poor households.

The aggregate measure (for ordinal data) is then simply calculated as *H* times *A*. We call this the Adjusted Headcount, M_0. After constructing M_0 for an area (such as a state or district), we can break it down to study the main components of overall poverty in that area. To break down by components or dimensions, let A_d be the contribution of dimension *d* to the average poverty gap *A*. A_d could be interpreted as the *average deprivation share* across the poor in dimension *d*. The dimension-adjusted contribution of dimension *d* to overall poverty, which we call M_{0d}, is then obtained by multiplying *H* by A_d for each dimension.

Comparison of the AF Methodology with the BPL 2002 Methodology

In Section 2, we discussed the methodological criticisms of the BPL method and introduced the AF methodology with the aim of addressing them in the following ways:

Valid Treatment of Ordinal Data: The AF methodology uses ordinal data in a rigorous fashion. By applying dimension-specific cut-offs, households are classified as either 'deprived' or 'non-deprived' in that dimension. This has the effect of dichotomizing ordinal data, thus avoids the problem of cardinalization from which the 2002 BPL suffers.

Poverty and Deprivation Focused: By applying cut-offs to each dimension, each household is judged to be deprived or not in that dimension *independently* of its achievements in other dimensions. Thus, we do not have a situation of perfect substitutability like in the BPL approach. Rather, multi-dimensional poverty status only depends upon dimensions in which the households are deprived.

Equal or General Weights: It is possible to weight the dimensions equally, or, to weight indicators and dimensions differently, or indeed to explore several weighting structures and the robustness of the BPL status according to variable weights. In contrast, the 2002 BPL *requires* equal weights.

Informative for Policy: Finally, in the current BPL measure, the rural Census is used solely to *designate* households as BPL. However, by using the AF measure, the BPL population of any state or ethnic group can be scrutinized to determine *the dimensions that constitute their multi-dimensional poverty.* This information, taken together with other analyses made possible by the same data, can inform policy more fully at no greater expense. Through the use of the AF method, responses can be tailored to address the composition of poverty in different states or districts, thereby making them more efficient. As censuses are costly, it is important that best use be made of their data to inform local as well as district, state, and national initiatives.

EMPIRICAL EXAMPLE

In the previous section, we proposed an alternative methodology of aggregation for BPL households. In this section, we provide an empirical example to illustrate how both methods perform differently, and show how the AF methodology can be decomposed by dimensions. First, we provide a brief description of the NFHS-3 sample dataset and identify the dimensions we use from the NFHS questionnaire to match the BPL questionnaire as closely as possible. Then, we calculate the proposed measure, compare it with the BPL, and demonstrate the disaggregation.

Data

We use the third National Family Health Survey (NFHS-3)[8] data for the year 2005-06, and focus on rural respondents. Our unit of analysis is the household. Numerous questions in the survey are analogous to the questions asked in the BPL questionnaire. This allows us to compare the BPL methodology with the AF methodology of poverty measurement. We list all the related questions in Table 1. The NFHS data are not problem-free in terms of data quality (James and Rajan, 2004). However, the data quality is widely regarded to be higher than that of the BPL Census data.

Dimensions, Indicators, and Cut-offs

We select NFHS variables or questions that match, as closely as possible, to those used in the 2002 BPL questionnaire (Appendix 1). Since the data are different, the match of questions is not perfect and no proxy is available for BPL questions 3[9], 12, and 13, our BPL variable will differ from the 2002 BPL data, hence we call it a 'pseudo-BPL measure.[10] Out of the ten questions, some are directly matched; the rest are obtained by manipulating various other questions.[11] Information on the ten chosen dimensions restricts the sample size to 42,717 households from 28 states of India.[12] The third column of Table 1 reports the dimension-specific headcount poverty rates for different dimensions.

Table 1: NFHS— Three Questions Analogous to BPL Questions and Dimensional Headcount Ratios

BPL Questions	*Relevant NFHS—3 Questions*	*% Population Deprived (NFHS)*
1. Size group of operational holding of land	Acres of irrigated and un-irrigated agricultural land holdings	74
2. Type of house	Type of house	19
3. Average availability of normal wear clothing	N/A	--
4. Food security	Body mass index of the respondent	42
5. Sanitation	Type of toilet facility	76
6. Ownership of consumer durables	Access to different assets	33
7. Literacy status of the highest literate adult	Highest education level attained by the family members	30
8. Status of the household labour force	Number of hours the children worked for household and non-household members (5-14)	14
9. Means of livelihood	Occupation of the respondent and her partner	31
10. Status of children (5-14 years) [any child]	The reason why the children do not go to school (5-14)	06
11. Type of indebtedness	Any one in the household having a Bank or Post Office account	66
12. Reason for migration from household	N/A	--
13. Preference of assistance	N/A	--

Source: Alkire and Seth (2008).

It can be seen from Table 1 that the rural Indian households are mostly deprived in three dimensions: sanitation, land, and loans. However, a household which is deprived in one dimension may not be deprived in any other dimension, and it is also important to identify the households which are deprived in multiple dimensions. In Table 2, we report the number of rural Indian households that are deprived in exactly one dimension, in two dimensions, and so on. For example, 9.47 per cent of the sample households are deprived in exactly one dimension (it does not matter which one as we follow the BPL equal weighting in this example), and not deprived in the other nine dimensions. The second and the third rows report the number and percentage of households deprived in exactly that many dimensions.

Table 2: Indicators and *k* Cut-offs of the Chosen Dimensions

Number of Dimensions	0	1	2	3	4	5	6	7	8	9	10
Percentage of people who are poor in each number of dimensions	2.9%	9.6%	13.9%	16.7%	17.5%	17.0%	12.6%	6.8%	2.5%	0.5%	0.1%

Source: Alkire and Seth (2008).

Only 2.9 per cent of all rural households are not deprived in any dimension. If total poverty were based on the union approach, where a household is identified as poor if it is deprived in *at least one* dimension, then 97.1 per cent of all households would be living in poverty. In contrast, if a household were identified as poor according to the intersection approach, which requires a household to be deprived in *every* dimension, only 0.1 per cent of Indians would be regarded as poor. Nearly 30 per cent of all rural households are deprived in either two or three dimensions and, roughly, a third of all rural households are deprived in either four or five dimensions.

Implementing the AF Methodology

For the purpose of comparison with the existing BPL measure, we match the BPL assumption of equally weighting the dimensions. We present the multi-dimensional headcount ratio (MD Headcount) and Adjusted Headcount ratio (M_0) in Table 3. In the first column, we indicate the poverty cut-off (k), which establishes multi-dimensional poverty. In the second column, we report the number of households that are deprived in at least that many dimensions. The third column reports the multi-dimensional headcount. For example, 57 per cent of rural households are poor in at least four out of ten dimensions. If the poverty cut-off is five out of ten dimensions, then 39 per cent of households are poor.

Table 3: India: Multi-dimensional Poverty Measures

Poverty Cut-off (k)	MD Headcount (H)	M_0	A = M_0/H	Pseudo BPL Headcount	Under-coverage[13]	Over-coverage[14]
3	0.736	0.353	0.480	0.730 (z=24)	5.52%	4.79%
4	0.569	0.303	0.532	0.578 (z=21)	7.92%	9.31%
5	**0.394**	**0.233**	**0.591**	**0.397 (z=18)**	**13.21%**	**13.88%**
6	0.224	0.148	0.660	0.216 (z=15)	22.24%	19.63%
7	0.098	0.072	0.737	0.087 (z=12)	36.50%	28.58%

Source: Alkire and Seth (2008).

The multi-dimensional headcount ratio does not take into account the breadth of multi-dimensional poverty, and it is not decomposable by dimensions. Therefore, we report the adjusted headcount (M_0) in the next column. If the poverty cut-off is four out of ten dimensions, then M_0 is 0.303. Recall that $M_0 = HA$. For the same poverty cut-off (4/10), $H = 0.569$ and $A = 0.303/0.569 = 0.532$, where A can be interpreted as the poor being deprived in 5.3 out of ten dimensions on average. We choose to use $k = 5$ and 39 per cent of the population is designated as poor in this situation.

On the basis of the ten chosen questions and NFHS data, we generate a pseudo-BPL score for each household (Appendix 2). Because we construct the pseudo-BPL and M_0 scores from the same dataset, we isolate the methodological issues in BPL construction from criticisms of corruption and poor data quality.[15] We compare the pseudo-BPL with M_0 directly. The maximum possible score is 38 (instead of 52 in case of the original BPL 2002 survey). A household is classified as poor if it fails to score above a certain threshold z. In the fifth column of Table 3, we report the pseudo-BPL poverty rate that matches as closely as possible with the

MD headcount ratio. For example, the BPL poverty rate for $z = 24$ is 73 per cent, which is reasonably close to the MD headcount for $k = 3$.

In the sixth column of Table 3, we report the percentage of households that are identified as non-poor by the BPL approach among the households identified as poor by the AF identification method. This gives us the under-coverage rate from the M_0 point of view. In this case, the pseudo-BPL failed to identify some poor people, and hence did not provide them the necessary assistance. This is a form of type I error—an error of omission—and represents the proportion of truly poor people that the specific BPL methodology overlooked. For example, the under-coverage is 5 per cent, which means that BPL cards were given to 95 persons, but actually there were 100 poor persons, so five have been left out. Similarly, in the seventh column, we report the percentage of households that are identified as poor by the pseudo-BPL approach, but are classified as non-poor by the AF method. This is a type II error, in which non-poor people were mistakenly identified as poor. The percentage represents the proportion of non-poor people that the BPL funded. If the over-coverage is 5 per cent, it means that BPL cards were given to 100 families, but five of them were not poor. An increase in the poverty cut-off (k) implies that the number of deprivations among poor households increases and the percentage of pseudo-BPL non-poor among the M_0 poor households increases rapidly.[16] Similarly, as the poverty cut-off for pseudo-BPL becomes more and more stringent (z falls), the percentage of M_0 non-poor among the pseudo-BPL poor also increases. This is the under-coverage rate from the pseudo-BPL point of view. Both the under-coverage rate and the over coverage rate for M_0 increase as the cut-off k becomes more stringent, implying that BPL cards would have been taken away from the poor who needed them and distributed among those who were not in need of those cards. We can anticipate from this analysis that the AF approach is likely to be more powerful than the BPL 2002 approach in terms of the identification of poor households.

Until now, our discussion was confined to the country level. We also calculate the state-wise headcount of those who are multi-dimensionally poor and the M_0 poverty rates for various cut-offs (k). In order to check for the robustness of the MD headcount ranking of states under different levels of k cut-offs, we calculate the Spearman's rank correlation coefficient between different pairs of rankings. We find that the rankings are highly correlated, and thus robust to changes in the cut-off k.[17]

In the final step of this analysis, we turn to a vital question for policy. It could be useful for a policy-maker to be able to see easily the dimensions of deprivation that are prevalent in particular areas. It is here that the practical use of decomposability becomes apparent. In the case of the M_0 measure, we are able to decompose the poverty measure by state (or, if the data were census data, to any level of analysis) and show exactly which dimensions dominate multi-dimensional poverty in each area. Similarly, if the data permit, we could decompose the measures by other policy-relevant variables such as caste, gender of the household head, and so on.

Table 4: State-wise Decomposition: West Bengal and Bihar Compared

States	Land	House	Nutrition	Toilet	Asset	Education	Labour	Live-lihood	Child Status	Bank	M_0
West Bengal	0.44	0.17	0.29	0.38	0.36	0.31	0.08	0.22	0.05	0.41	0.27
Break-down	*16.3%*	*6.4%*	*10.8%*	*14.2%*	*13.3%*	*11.4%*	*2.8%*	*8.2%*	*1.8%*	*15.0%*	*100.0%*
Bihar	0.45	0.28	0.32	0.47	0.04	0.35	0.13	0.21	0.03	0.45	0.27
Break-down	*16.6%*	*10.2%*	*11.8%*	*17.3%*	*1.4%*	*12.9%*	*4.6%*	*7.6%*	*1.1%*	*16.4%*	*100.0%*

Source: Alkire and Seth (2008).

In order to illustrate the insights that can arise from decomposition, we show the dimensional decomposition of poverty for two neighbouring states: West Bengal and Bihar. In Table 4, we see in the far right column the total M_0 poverty for each state; the remaining columns show the relative contribution of each dimension to multi-dimensional poverty in that state. In Bihar, as in most states, the leading contributors to poverty are lack of sanitation (Toilet) facilities, and lack of bank account ownerships. Beyond this, we see that the most prevalent deprivations include the possession of only small landholdings, a low level of education for the highest educated family member, malnutrition, and poor housing quality. The situation is starkly different in West Bengal, which has a very similar M_0 rank and value. Here small landholding is even more important than lack of sanitation, and low assets constitute the fourth largest contributor to poverty. Decomposing the M_0 measure in this way can empower policy-makers to identify the constituents of poverty easily, and focus their analyses precisely and efficiently on addressing them.

CONCLUSION

The past five years have seen a surge in the literature on multi-dimensional poverty, and the development of improved techniques of measurement. This article explored the possibility that a future BPL exercise in India might make use of improved methodologies of identification and aggregation of BPL data. After presenting a brief introduction to the succession of BPL measures, the paper identified the various criticisms of the 2002 Below the Poverty Line (BPL) measure in rural India: problems with the aggregation method, problems of data quality, data coverage, and corruption, and issues of data content and periodicity. The article focused on the first of these criticisms.

In order to explore the viability and potential insights that could arise from a change in methodology, we matched 10 of the 13 BPL dimensions with rural NFHS-3 data. We then applied dimension-specific cut-offs, and computed a multi-dimensional headcount and adjusted headcount measure (M_0), using the methodology proposed by Alkire and Foster, 2007. We constructed the measure by way of a second cut-off, specifying the minimum number of dimensions in which a household must be deprived to be regarded as 'poor'. We compared results with the pseudo-BPL scores, and found significant differences as the k cut-off rose. For example, if we focus on those deprived in 7 out of 10 dimensions, 36 per cent of the poor people (according to the new methodology) would not have been identified as poor by the BPL methodology. We then illustrated the policy value of implementing a decomposable multi-dimensional poverty methodology, because the decompositions can immediately reveal to any policy-maker the composition of poverty in her or his area, and hence can inform multi-sectoral planning.

While additional work is clearly required to improve the BPL data content and quality, we suggest that the multi-dimensional poverty methodology implemented in this article should be considered when identifying BPL families. Furthermore, the BPL measures currently in use do not provide information on the composition of multi-dimensional poverty, yet an analysis of this rich rural census data, for example by using a decomposable measure, might be an important component of effective multi-sectoral planning across different states and districts.

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APPENDIX 1: BELOW POVERTY LINE (BPL) SURVEY QUESTIONS (2002)

Sl No	Characteristic/ Questions	Scores				
		0	1	2	3	4
1	Size group of operational holding of land	Nil	Less than 1 ha of un-irrigated land (or less than 0.5 ha of irrigated land)	1-2 ha of un-irrigated land (or 0.5-1 ha of irrigated land)	2-5 ha of un-irrigated land (or 1.0 -2.5 ha of irrigated land)	More than 5 ha of un-irrigated land (or 2.5 ha of irrigated land)
2	Type of house	Houseless	*Kutcha*	Semi-*pucca*	*Pucca*	Urban type
3	Average availability of normal wear clothing (per household in pieces)	Less than 2	2 or more, but less than 4	4 or more, but less than 6	6 or more, but less than 10	10 or more
4	Food security	Less than one square meal per day for a major part of the year	Normally, one square meal per day, but less than one square meal occasionally	One square meal per day throughout the year	Two square meals per day with occasional shortage	Enough food throughout the year
5	Sanitation	Open defecation	Group latrine with irregular water supply	Group latrine with regular water supply	Clean group latrine with regular water supply and regular sweeper	Private latrine
6	Ownership of consumer durables: Do you own (tick)—TV, electric fan, radio, pressure cooker	Nil	Any one	Two items only	Any three or all items	All items and/or any one of the following items—computer, telephone, refrigerator, colour TV, electric kitchen appliances, expensive furniture, LMV@/ LCV@, tractor, mechanized two-wheeler/three-wheeler, power tiller, combined thresher/harvester [@ 4-wheeled mechanized vehicle]
7	Literacy status of the highest literate adult	Up to Primary (Class V)	Completed Secondary (passed class X)	Graduate/Professional diploma	Post-graduate/ Professional graduate	Up to Primary (class V)
8	Status of the household labour force	Bonded labour	Female and child labour	Only adult females and no child labor	Adult males only	Others
9	Means of livelihood	Casual labour	Subsistence cultivation	Artisan	Salary	Others
10	Status of children (5-14 years) [any child]	Not going to school and working	Going to school and working			Going to school and not working
11	Type of indebtedness	For daily consumption purposes from informal sources	For production purpose from informal sources	For other purpose from informal sources	Borrowing only from institutional agencies	No indebtedness and possession of assets
12	Reason for migration from household	Casual work	Seasonal employment	Other forms of livelihood	Non-migrant	Other purposes
13	Preference of assistance	Wage Employment/TPDS (Targeted Public Distribution System)	Self-employment	Training and skill upgradation	Housing	Loan/subsidy of more than Rs. 1,00,000 or no assistance needed

*Source: Government of India, Ministry of Rural Development (2002), and Sundaram (2003).

APPENDIX 2: SCORE STRUCTURE OF THE TEN MATCHED NFHS-3 QUESTIONS

Sl. No	Characteristic/ Questions	Scores				
		0	1	2	3	4
1	**Size group of operational holding of land**	Nil	Less than 1 ha of un-irrigated land (or less than 0.5 ha of irrigated land)	1-2 ha of un-irrigated land (or 0.5-1 ha of irrigated land)	2 -5 ha of un-irrigated land (or 1.0 -2.5 ha of irrigated land)	More than 5 ha of un-irrigated land (or 2.5 ha of irrigated land)
2	**Type of house**		*Kutcha*	Semi-*pucca*	*Pucca*	
3	**Minimum BMI of the respondent in the household**	Less than 16 kg/m²	Higher than 16 kg/m² but less than 18.5 kg/m²		Higher than 18.5 Kg/m²	
4	**Sanitation**	No facility/uses bush/field or others	Composting toilet or Dry toilet or share the following type of facilities with others: Pit latrine – ventilated, Pit latrine - with slab, Pit latrine - without slab	Pit latrine - without slab or share the following facilities with others: Flush - to piped sewer system, Flush - to septic tank, Flush - to pit latrine, Flush - to somewhere else, Flush - don't know where	Pit latrine – ventilated, Pit latrine - with slab	Flush - to piped sewer system, Flush - to septic tank, Flush - to pit latrine, Flush - to somewhere else, Flush - don't know where
5	**Ownership of Consumer durables: Do you own (tick) – B/W TV, electric fan, radio, pressure cooker**	Nil	Any one	Two items only	Any three or all items	All items and/or any one of the following items - refrigerator, motor cycle, car, phone, mattress, table, colour TV, computer, thresher, and tractor
6	**Literacy status of the highest literate adult**	Illiterate	Up to Primary (Class V)	Completed Secondary (Passed Class X)	Graduate/ Professional Diploma	Post Graduate/ Professional Graduate
7	**Status of the Household Labour Force**	Only children work and no adult work or no one works	Female and child labour	Only adult females and no child or adult male works	Adult males only	Both adult male and adult female work but no child works
8	**Means of livelihood**	Labourer, others, and no occupation	Agricultural labourer and Plantation labourers	Other unskilled and manual except labourer	Clerical and Salary	Professional, Technical, Management, Sales, other agricultural employee
9	**Status of children (5-14 years) [any child]**	Not going to school irrespective of working	Going to school and working			Going to school and not working
10	**Bank Account**	No one in the household has bank account				Has bank account

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[1] Right-to-Food-Campaign, 2006. See also Drèze and Sen, 2002; Dreze, *et al.*, 2007.)

[2] Government of India (2002): *Report of the Expert Group on Identification of Households below Poverty Line (BPL Census 2002)*, New Delhi, submitted to the Ministry of Rural Development, September 2002. (Hirway, 2003; Sundaram, 2003; Jalan and Murgai, 2007).

[3] These questions and the response categories are reprinted as Appendix 1 of this article.

[4] A more extensive account of these criticisms is found in Alkire and Seth, 2008.

[5] Government of India, Planning Commission, Report of the XI Plan Working Group on Poverty Elimination – Programmes, December, 2006.

[6] If dimensions are not equally weighted, dimension-specific weights can be easily incorporated.

[7] This refers to the equally weighted case or the sum of weighted dimensions otherwise.

[8] The survey is collaboratively conducted by the International Institute for Population Sciences (IIPS), Mumbai, India; ORC Macro, Calverton, Maryland, USA; and the East-West Centre, Honolulu, Hawaii, USA.

[9] The earlier version of NFHS contained information on how many clothes the surveyed households owned, but the current version of the survey does not ask that question.

[10] The full description of the indicators and the corresponding poverty cut-offs are present in the working paper, found on www.ophi.org.uk

[11] For a detailed description of the related NFHS variables, please see Table 1 in Appendix 2.

[12] Delhi is excluded from our analysis as Delhi primarily consists of urban areas instead of rural areas. Note that all results are corrected for population weights.

[13] Under-coverage is the ratio of M_0-poor households that are not identified as poor by the pseudo-BPL approach to the total M_0-poor households.

[14] Over-coverage is the ratio of households that are not M_0-poor but are identified as poor by the pseudo-BPL approach to the total number of pseudo-BPL poor households.

[15] The NFHS includes a question as to whether the household has a BPL card, but as the 2002 BPL survey was fielded in 2006, the NFHS responses identify the 1997 BPL cardholders, so we do not use this information (Ram, Mohanty and Ram, 2009).

[16] Although we pursue our analysis using the under-coverage rates, we did not report any statistical robustness check in this article, which would be an interesting exercise for further research.

[17] We find the Spearman correlation coefficient to be more than 0.95 between each pair of dimensions.