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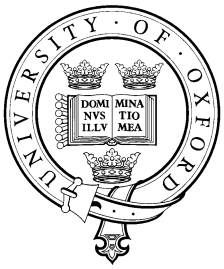

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Selecting a Targeting Method to Identify BPL Households in India

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Abstract

This paper proposes how to select a methodology to target multidimensionally poor households, and how to update that targeting exercise periodically. We present this methodology in the context of discussions regarding the selection of a targeting methodology in India. In 1992, 1997, and 2002 the Indian government identified households that are Below the Poverty Line (BPL) and in updating the 2002 methodology, alternative methods have been proposed and vigorously debated. A fourth BPL method was published and a corresponding Socio Economic Caste Census (SECC), implemented. Using the third National Family Health Survey (NFHS3), this paper illustrates how a BPL targeting method using SECC variables might be calibrated to a multidimensional poverty measure. This paper compares the fit between a benchmark measure of multidimensional poverty and several plausible targeting methods to determine which method(s) approximate it – as well as related measures – most closely. We find a ten-item binary scoring method, which uses variables already available in the SECC questionnaire, provides a strong proxy. The emphasis of this paper is to illustrate how a particular targeting method can be justified, rather than to advocate any particular solution.

Keywords: Multidimensional Poverty, Below the Poverty Line (BPL), Socio Economic Caste Census, Targeting Methods, Binary Scoring, Poverty in India

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1. Introduction

The identification of 'Who is Poor' is a central question in both targeting and measurement exercises. At a fundamental level, Sen (1991) observes that identification requires value judgements regarding what poverty is. Value judgments are concretized in the choice of variables, weights and cutoff(s) (how much is enough). This paper focuses on the design of methodologies to target multidimensionally poor households. How should such targeting methodologies be developed and justified? And should they relate – in any way – to multidimensional poverty measures?

To motivate and ground our discussion, we engage with a recent targeting exercise in India. In India, a series of exercises have been completed to identify households as 'below the poverty line' (BPL) thus eligible for certain benefits. In 1992 the identification of households was directly based on the self reported income. In 1997 BPL households were identified by collecting information on consumption expenditure. In 2002 the focus 'was shifted from income or consumption to socio-economic indicators of well-being' (Saxena 2009, GOI 2006). Nevertheless, the 2002 exercise was imperfect. Hence methodological and data issues were at the fore of proposals for the subsequent BPL exercise. It is with these that we engage to propose and illustrate some basic design principles.

There is an extensive literature on targeting methods which proxy unidimensional poverty. Although the accuracy of proxy means targeting methods can be limited,[1] many of those techniques can and should be explored in multidimensional space. Yet before embarking on that technical exercise it can be useful to address prior conceptual and practical issues in the choice of a methodology.

This paper proceeds as follows. Section two briefly summarizes the history of BPL methods and recently proposed BPL identification methods. The third section proposes how to generate a targeting measure that approximates a multidimensional poverty measure which itself reflects a salient definition of poverty. Section four introduces the NFHS-3 dataset and the sample used. Section five reviews the high discrepancies between alternative proposed BPL identification methods. It then presents an illustrative benchmark measure of multidimensional poverty and identifies a set of multidimensionally poor people. It notes that the benchmark measure, which may rely on more precise survey data, can be used to monitor changes in poverty over time. Subsequently, the paper explores which of several proposed or feasible BPL targeting methods match the set of poor most closely. For robustness, the fit with an alternative multidimensional set of measures is also explored. The final section concludes.

2. Identifying BPL Households in India

To target services effectively, successive governments of India have developed and modified a measure by which families are categorized as living 'Below the Poverty Line' (BPL) and thus

[1] For example, for Cote D'Ivoire, Glewwe and Kannan (1989) finds it harder to predict accurately the per capita expenditure of rural residents. Using cross-country simulations, for 30% eligibility threshold, Grosh and Baker (1995) finds that the under-coverage rate and leakage rate in urban Jamaica to be 43% and 26.1%, respectively. The corresponding rates are 39.3% and 24.1% for urban Bolivia, and 53.8% and 35.1% for urban Peru. Narayan and Yoshida (2005), in case of Sri Lanka, find that the under-coverage rate and the leakage rate for the model with best predicting power to be 28% and 31% for the 40th cutoff percentile.

eligible for various government benefits, such as subsidized food or electricity, or schemes to construct housing and encourage self-employment activities. Each BPL census applied a distinct identification technique. We introduce the first three identification methods, then elaborate several recent proposals for improving the identification method including that which has been formally announced.

2.1. BPL 1992

In 1992, at the beginning of the 8th five-year plan, the identification of BPL households was based on self-reported income data. A household was identified as BPL if household income was less than Rs. 11,000 per annum. But because of potential under-reporting of household income, this criterion identified almost twice as many poor as estimated by the planning commission (Saxena 2009). It also had other major limitations. First, the self-reported income data were almost impossible to verify, as more than 90% of the rural household members were occupied in informal or unorganized sector (Sengupta 2007). Additionally, income data may be less accurate and reliable than the data on consumption expenditure (Atkinson and Micklewright 1983; Grosh and Glewwe 2000), and this was argued to be the case in the BPL exercise. Finally, the identification method did not adjust for the household size. In other words, total income of the household was used during identification, rather than per-capita income.

2.2. BPL 1997

A second BPL exercise was conducted in 1997 for the 9th five-year plan, which improved upon the previous identification method. The 1997 BPL census was carried out in two stages (Saxena 2009). In the first stage, the census was administered to all rural households and a household was identified as 'visibly non-poor' if it met any one of the following five requirements: (i) owned and operated land holdings of more than two hectares (ii) owned a 'pucca house', (iii) had an annual household income exceeding Rs. 20,000, (iv) owned consumer durables such as a television, refrigerator, ceiling fan, motorcycle/scooter or three wheeler, or (v) owned farm equipment such as a tractor, power tiller or combined thresher/harvester. In the second stage, information on consumption expenditure over the past 30 days was collected for all households except those who were visibly nonpoor. A household was identified as BPL if the per-capita consumption expenditure of the household was below the poverty line as determined by the planning commission of India.

Despite its improvements, the 1997 method was later criticized for four reasons (See Hirway 2003; Jalan and Murgai 2007; Sundaram 2003). First, the exclusion criteria were too stringent (the possession of a single ceiling fan was grounds for exclusion). Second, poverty lines were not available for all states/UTs. Third, the BPL criteria for exclusion and identification of households as BPL were not different across states, thus not capturing the inter-state heterogeneity. Fourth, there were no procedures available to add new families to the BPL lists. Fourth, the non-poor households were identified according to their resources rather than what household members were capable of being and doing, which is the fundamental distinction between the resource-based approaches and the capability approach of Amartya Sen. For example, a household with a member requiring a wheelchair would need a higher level of per capita consumption to achieve an equivalent level of functionings, but such differences in converting consumption into functionings were not considered.

2.3. BPL 2002

From 2002 the BPL households were to be identified using a 'multi-dimensional view of poverty' (p. 18) which was also called a 'multiple deprivation' view (p. 24) in contrast with a norm based on calories or income (GOI 2006). The 2002 rural BPL census associated with the 10th five-year plan contained 13 questions or dimensions covering topics such as food, housing, work, land ownership, assets, and education.[2] Depending upon the response category selected, a household was given a score for each of the 13 dimensions. The scores for each dimension ranged from zero to four, where zero referred to the worst possible achievement, and four to the best. The scores were then aggregated across the 13 dimensions to create an overall score for each household, whose value ranged from zero to 52. Finally, a BPL poverty cutoff was fixed for each region. Any household whose overall score fell below that region's poverty cutoff was identified as BPL. For example, when the poverty cutoff was set at 20 points, a household scoring 16 points would be identified as BPL. The poverty cutoffs for the 2002 BPL exercise varied across states and union territories, enabling these to match poverty caps based on consumption poverty.

Once again, though it sought to be more rigorous than the two earlier BPL exercises, the 2002 census and methodology came under criticism from many sides (Sundaram 2003; Hirway 2003; Jain 2004; Mukherjee 2005; Jalan and Murgai 2007; Alkire and Seth 2008; Saxena 2009; Mehrotra and Mander 2009; Thomas et al 2009; Drèze and Khera 2010; Roy 2011).

The criticisms of the 2002 methodology may be classified into three major categories: methodological drawbacks in identification, data quality and corruption, and data content.

2.3.1 Methodological Drawbacks in Identification

Cardinalization and Substitutability – The method by which the categories within the 13 dimensions were scored and by which the 13 dimensions were aggregated was criticized (Sundaram 2003, Alkire and Seth 2008 and Saxena 2009). The scoring of categories was disputed because most responses were qualitative but the values were used as if they were cardinally meaningful within and across dimensions. For example, a household was assigned a score of two if the household members enjoyed only one square meal per day throughout the year. The same score of two was assigned if the household had at least one member who completed secondary schooling. Yet the second deprivation is arguably less severe than the first. With the aggregation of dimensions, it was implicitly assumed that the dimensions were perfect substitutes: A one-point gain in one dimension could be compensated by an equivalent one-point reduction in any other dimension, at any other level of achievement (Alkire and Seth 2008).

Weighting – The 13 dimensions were combined using equal weights, which implied that each dimension made an equally important contribution to poverty. Jalan and Murgai (2007) argue that the relative weights on dimensions should be allowed to vary across states, with education being differently weighted in Bihar and Kerala, for example.

Poverty Caps – In BPL 2002, the number of households identified as BPL could not exceed the 1999–2000 monetary poverty estimates based on consumption expenditure by more than 10%. Poverty caps reflecting this number were set at state or district level. This cap was widely disputed and sometimes led to different scoring thresholds in neighbouring districts (Jain 2004).

2 The questionnaire appears in Appendix 1.

Hirway (2003) also questioned the use of consumption poverty caps, given that the state levels of multidimensional poverty may not match the levels of consumption poverty.

2.3.2 Data Quality and Corruption

Data Quality – Given that BPL households access multiple benefits, and given an absence of stigma, many households wished to be considered BPL. Concretely, the rich and powerful would often pressurize the local leaders to include their names in BPL lists (Hirway 2003; Khera 2008).[3] Data quality also suffered due to poor field supervision. For instance, Jain (2004) found that a person was excluded from the BPL list because the enumerator did not even visit the household while filling out the form.

Manipulation – Corruption also crowded out the poor from BPL card ownership (Jalan and Murgai 2007; Saxena 2009). Drawing on village-level studies in Rajasthan, Khera (2008) reported the striking finding that 44% of poor households did not have a BPL card, and 23% of those with a BPL card were non-poor. Hirway (2003) found 11–18% of the 1997 BPL list members in Gujarat were clearly local elites, and 14% of the poor households were excluded from the BPL lists (in West Bengal see Mukherjee 2005). Although some crosschecks were successful in revising BPL lists to correct inaccuracies, others processes were infiltrated. For example, in a study of 100 panchayats in Madhya Pradesh, Jain (2004) found that in 67 panchayats, the required second gram sabha meeting for approving the list had not occurred.

2.3.3 Data Content

Questionnaire Design – Even if the 2002 BPL census instrument had been implemented accurately and without corruption, many argued that the outcomes would still be inaccurate (Sundaram 2003; Jain 2004; Jalan and Murgai 2007; Saxena 2009). The BPL 2002 census questions mostly focused on resources, such as land, housing, clothing, food, sanitation, consumer goods, and loans, rather than on capabilities, so neglected interpersonal differences in converting resources to capabilities. Also some questions created incentives for households not to access BPL benefits lest they be removed from BPL lists.

Response Structure – The response structures were also criticised heavily (Sundaram 2003; Jalan and Murgai 2007; Alkire and Seth 2009). For example, the question on land holding did not reflect land quality. The question on indebtedness gave the highest score of "4" to the household that was not indebted, but the poorest households might not be indebted because they lack access to credit.

Periodicity – A final and recurrent set of criticisms were that the BPL surveys were conducted every five years (at most), but households' economic status could shift rapidly. Without ways to update the BPL status between surveys, even if the initial identification of BPL households had been accurate, it was certain to become inaccurate over time.

2.4. The Saxena Committee Expert Group Report

In 2008, the Government of India's Ministry of Rural Development appointed an Expert Group Committee, under the chairmanship of N. C. Saxena, to provide a critical review of the 2002 BPL methodology and data contents, and to propose a new method for identification. The

[3] For an example on how corruption could cause loss of welfare during a redistribution of subsidized rice to poor households in the Indonesian context, see Olken (2006).

Commission proposed far-reaching changes in the BPL methodology that exceed the scope of this paper. For example, the questionnaire was thoroughly redesigned to focus on verifiable indicators that did not have perverse incentives.

Table 1: Criteria for Identifying the BPL Households

PANEL I: Saxena Committee Expert Group Criteria (2009)

First Stage (Exclusion)	Second Stage (Inclusion)	Third Stage (Scoring)
i. Families who own double the district average of agricultural land per agricultural household if partially or wholly irrigated (3 times if completely un-irrigated).	i. Designated 'Primitive Tribal Groups'	i. SC/ST: 3 points; Denotified Tribes and Designated 'Most Backward Castes': 2 points; Muslim/OBC: 1 point.
ii. Families who have three or four wheeled motorized vehicles, such as jeeps, SUVs, etc.	ii. Designated most discriminated against SC groups, called 'Maha Dalit Groups', if so identified by the state	ii. Landless agricultural worker: 4 points; agricultural labourer (with some land): 3 points; casual workers: 2 points; self-employed artisans or self-employed fisherfolk (including those employed by others in such professions): 2 points.
iii. Families who have at least one piece of mechanized farm equipment, such as a tractor, power tiller, thresher, harvester, etc.	iii. Households headed by single women	iii. No adult (above 35 years of age) has studied up to class 5 in the household: 1 point.
iv. Families who have any person who is drawing a salary of over Rs. 10,000 per month in non-government/private organizations or is employed in government (including para-statals) on a regular basis with pensionary or equivalent benefits.	iv. Households with a disabled person as bread-earner	iv. Any member of the household has TB, leprosy, disability, mental illness or HIV-AIDS: 1 point.
v. Income tax payers.	v. Households headed by a minor	v. Household headed by an old person of age 60 and above: 1 point.
	vi. Destitute households which are dependent predominantly on alms for survival	
	vii. Homeless households	
	viii. Any member of the household is bonded labourer	

PANEL II: Alternative Scoring Criteria (Third stage)

Occupational	Social Group	Vulnerable
i. Destitute/dependent on alms: 4	i. SC/ST: 3	i. Household headed by single woman: 4
ii. Forest gatherer: 4	ii. MBC (Designated Most Backward Castes): 1.5	ii. Disabled worker: 4
iii. Landless worker: 3.5	iii. Muslims: 1.5	iii. Bonded workers (workers or dependent): 4
iv. Tenant/sharecropper: 3	iv. Designated Primitive Tribal Group: 5	iv. Household headed by elderly person: 4
v. Marginal farmer: 3		v. Worker with HIV-AIDS, leprosy, mental illness: 4
vi. Small farmer: 2.5		vi. Worker with TB: 2
vii. Self-employed artisan and worker: 3		vii. Disabled dependent: 2

PANEL III: Socio Economic Caste Census (2011) Criteria

First Stage (Exclusion)	Second Stage (Inclusion)	Third Stage (Scoring with equal weights)
i. Motorized two/three/four wheeler/ fishing boat	i. Households without shelter	i. Households with only one room, kucha walls and kucha roof
ii. Mechanized three/four wheeler agricultural equipment	ii. Destitute/living on alms	ii. No adult member between the ages of 16 and 59
iii. Kisan credit card with credit limit of Rs. 50,000 and above	iii. Manual scavengers	iii. Female-headed households with no adult male member between 16 and 59
iv. Household with any member as a government employee	iv. Primitive tribal groups	iv. Households with a disabled member and no able-bodied adult member
v. Households with non-agricultural enterprises registered with the government	v. Legally released bonded labourers	v. Scheduled Caste/Scheduled Tribe households
vi. Any member of the family earning more than Rs. 10,000 per month		vi. Households with no literate adult above 25 years
vii. Paying income tax or professional tax		vii. Landless households deriving a major part of their income from manual casual labour
ix. Three or more rooms with all rooms having pucca walls and roof		
x. Own a refrigerator or a landline phone		
xii. Own 2.5 acres or more of irrigated land with at least one piece of irrigation equipment		
xiii. Five acres or more of irrigated land for two or more crop seasons		
xiv. Owning at least 7.5 acres of land or more with at least one piece of irrigation equipment		

Methodologically the committee proposed a three-stage methodology: (i) automatically exclude those who are clearly above the poverty line (non-poor); (ii) automatically include the poorest and the most vulnerable people, who might otherwise be left out; and (iii) grade the rest of the households by a score structure and identify the poorest amongst them as BPL until reaching the maximum number of BPL determined by the planning commission.

In the *first* stage of identification, the committee suggested excluding all those households that satisfied at least one criterion listed in the first column of Panel A in Table 1 and these households would correspond to only a small fraction of the total number of households. In the *second* stage, the committee suggested allowing all households that satisfied any of the criteria listed in the second column of Panel A to receive BPL cards. In the *third* stage, the committee suggested attaching a score to the rest of the households on a 0–10 scale using the criteria outlined in the third column. Then, the households with the highest score should first be identified as BPL, followed by the second highest score and so on until the total number that needed to be identified by the panchayat was reached. The criteria are presented in Table 1 below.

The score structure was justified as follows. Scheduled Tribes (ST) and Scheduled Castes (SC) formed nearly a quarter of the Indian population, but both groups have been historically discriminated against and have lower socioeconomic indicators. A higher score based on their group identity increases their likelihood of being identified as BPL and thus being a beneficiary of social assistance. An additional point was also awarded to Muslims (see Sachar 2006; Hasan 2008) and other backward classes (OBC). Households in the low-wage job category have also been awarded a higher score. Finally, households in the other three categories – households with no adult completing five years of education; households with any member having TB, leprosy, disability, mental illness or HIV-AIDS; and households headed by an older person of age 60 and above – were also considered vulnerable and scored accordingly.

Various modifications of Saxena (2009) were suggested, including modification of the weights, and of the inclusion and exclusion criteria.[4] To demonstrate the sensitivity of the method to different weights, this paper implements one *alternative scoring method* which uses *alternative scoring criteria*. It uses somewhat different exclusion criteria from Saxena (2009), but does not have inclusion criteria, and scores households using the criteria outlined in Panel B in Table 1. The criteria for identifying the BPL households are divided into three categories – occupational, social group, and vulnerable.

Both Saxena (2009) and the alternative scoring method first apply the exclusion criteria. Thus, if a household was excluded by the exclusion criteria, then that household would not be considered for a BPL card even if the household would have satisfied the inclusion criteria or had a high score.

2.5. Sequence of Applying Criteria

Drèze and Khera (2010) analyzed four possible sequences by which to apply the inclusion and/or exclusion criteria when identifying BPL households: exclusion, play safe, inclusion, and restrictive. The *exclusion approach* identifies everyone as BPL except those who satisfy at least one exclusion criterion. The *play safe approach* identifies as BPL everyone who does not satisfy at least

4 For example, one method was proposed by Mehrotra and Mander (2009) and we have used an adaptation of that simply as a matter of convenience. The second author was a member of the Saxena Committee expert group and the first author was a former member (See Datta, 2009).

one exclusion criterion (like the exclusion approach) *and* households who satisfy at least one exclusion criterion but also satisfy any inclusion criterion. The *inclusion approach* identifies as BPL everyone who satisfies at least one inclusion criterion. Finally, the *restrictive approach* identifies as BPL those households who satisfy at least one inclusion criterion (like the inclusion approach) *unless* they also satisfy any exclusion criterion, in which case they are not identified as BPL.

Comparing these approaches we note that the set of households that satisfy any of the inclusion criteria but no exclusion criteria are identified as poor by all four approaches. The play-safe approach is the *union* of both the exclusion and the inclusion approaches; whereas, the restrictive approach is the *intersection* of these two approaches. So the play-safe approach identifies the highest proportion of households and the restrictive approach identifies the lowest proportion.

2.7. Socio Economic Caste Census (SECC) 2011

In 2011, India's Ministry of Rural Development initiated the fourth rural BPL census called the Socio Economic Caste Census (SECC) 2011. The census included the caste and tribe of the households as well as other BPL questions. The SECC 2011 was launched on June 29, 2011 in Hazemora Block in West Tripura. The SECC 2011 was planned assuming that BPL identification would be conducted in three stages: households satisfying any exclusion criterion would be excluded automatically from the BPL list, households satisfying any inclusion criterion would be automatically included in the list, and the rest of the households would be identified through a seven-item binary scoring criteria set. Hence, the SECC 2011 planned to identify the BPL in three stages following Saxena (2009), but using a set of simplified scoring criteria (Panel C, in Table 1).

The SECC 2011 census instrument was also thoroughly revised from 2002 (GOI 2011). The SECC 2011 aims to correct the large exclusion and inclusion errors observed in the BPL 2002 questionnaire. Also, the SECC 2011 questions are argued to be easy to answer, the responses verifiable, and questions were screened so as not to create perverse incentives. These changes are anticipated to improve data quality in comparison with BPL 2002.

But how might the SECC 2011 methodology for identifying BPL households be justified or improved? Section five explores these issues empirically, but before that, section three discusses how multidimensionally poor should be targeted and section four briefly introduces the data.

3. Targeting the Multidimensionally Poor

When different targeting methods lead to diverse identification outcomes, as it does in this case (Alkire and Seth 2012), it is vital to consider how empirical analysis could support the choice of targeting method and ensure that targeting is as accurate as possible and that identification is robust to a range of plausible targeting methods. This section sketches an approach for selecting a targeting methodology based on the fit between the population identified as BPL and the population identified as poor using a robust multidimensional poverty measure which we call a 'benchmark'. The following section describes the methodology to select a BPL targeting method in an illustrative manner.

3.1 Identification in Targeting and Poverty Measurement

As stated earlier, the identification of 'Who is Poor' is the central question of both *targeting interventions* through various assistance programs for poor people and *measuring* poverty over time.

If the targeting exercise focuses on households, like BPL, then the exercise must identify *each household in the population* as eligible or not-eligible for a particular benefit. Key practical challenges in targeting methods are that poor people should be identified relatively accurately and the indicators for identifying the poor should be inexpensive to collect. The indicators should not create perverse incentives for the poor. To minimize corruption, the indicators should be easily verifiable, and the identification method should be simple and transparent.

The identification of 'who is poor' is also a first step in measuring poverty. That is, each household in the relevant dataset – usually a representative survey – is first identified as poor or non-poor. A poverty measure – whether it be unidimensional or multidimensional – then aggregates information about poor people into an overall measure, which is usually used to compare poverty across time, regions and population groups, and to explore the composition and determinants of poverty.

Targeting and poverty measurement usually draw on different data sources, which significantly affect their design. Official national poverty measures, whether reflecting income or on multidimensional poverty, ordinarily draw upon periodic household survey data. Data for household targeting are normally taken from a census of potentially eligible households. The scale of census data collection, as well as the interests involved, affects the questions that can be implemented. For example, a number of the indicators relevant to India's 11th plan goals are not included in the SECC, because they are i) expensive to administer (such as body mass index), ii) not verifiable hence likely to be under-reported by those seeking BPL cards (such as years of schooling), or iii) might create perverse incentives not to participate in government schemes lest they lose their BPL benefits (such as sanitation). Moreover, a number of stock or identity indicators *are* included in the SECC and proposed scoring methods because these avoid the above issues and are correlated with poverty. Such indicators – such as caste – are unlikely to show meaningful changes over time. If they do change, their change may not necessarily signify a corresponding change in poverty. Rather, they might reflect phenomena such as migration, new legislation (e.g. on divorce), secularization, or women's empowerment.[5]

Thus both targeting and poverty measurement involves identification of the poor, and these identification exercises are usually accomplished using distinct data sources each of which contain distinctive insights and inaccuracies. We suggest that, when a targeting exercise is related to, and aims to contribute to, a reduction in multidimensional poverty, there could be powerful benefits to having linked measures, including policy coherence, monitoring and evaluation synergies, and the ability to update the targeting methodology and census instrument consistently across time. In practice, a set of multidimensionally poor households can be identified using a survey instrument that contains key indicators with high data quality reflecting the characteristics that are judged to indicate poverty. A targeting method can be selected that best replicates the set of multidimensionally poor, using the more restricted set of feasible census indicators. If the 'match' between the measures is sufficiently high and robust, then linked analyses across time of the kind mentioned above can be undertaken.

5 For example, the share of female-headed households increased from 5.2% in NFHS-2 for 1998/99 to 9.2% in NFHS-3 for 2005/06. It is important to monitor and understand the levels of deprivation among these different identity-based groups in order to understand whether to interpret this increase as an increase in poverty—or not. To do so requires a benchmark measure.

3.2 Counting Approaches to Identification

There are a number of possible measurement methodologies for identifying who is multidimensionally poor, including those using counting approaches, multiple correspondence analysis, latent variable techniques, and fuzzy set theory. In what follows, we identify the set of multidimensionally poor using a counting approach, in which each household is given a score that reflects the weighted sum of their deprivations. A 'set' of multidimensionally poor is selected by applying a poverty cutoff (Alkire and Foster 2011), which identifies a person as multidimensionally poor if they experience deprivations in some percentage of dimensions that is equal to or greater than the poverty cutoff. The poverty cutoff could be uniform nationally, or could be set at state or district levels. While identification of the poor is fundamentally a normative exercise, the poverty cutoff used to benchmark a targeting measure can be selected so as to target a given percentage of persons. The 'binary scoring' approach mentioned in Drèze and Khera (2009) is an example of a counting technique, where the second cutoff is set so as to match the BPL cap.

A counting approach to identifying a set of multidimensionally poor responds to key methodological criticisms of BPL 2002. First, each deprivation contributes to the overall score at the identification stage which reduces substitutability. Second, a person is identified as deprived or non-deprived (binary) with respect to each indicator, which solves the problem of inappropriate cardinalization. Third, the dimensions can be equally weighted to facilitate ease of communication (Atkinson et al 2002) or alternative weights can be used. Fourth, the cross-dimensional poverty cutoff can be used like a sliding scale to identify different percentages of the population as poor in order to match state poverty caps. One can also identify groups among the BPL poor having different intensities of poverty. Fifth, as an identification technique, a counting technique can be decomposed by states and provinces, by caste or religion, gender of household head, and other relevant groups. Sixth and finally, the counting approach to identification can be integrated into an overall national poverty measure. For example Alkire and Foster (2011) combine the percentage of households who are identified as poor with their intensity – the average percentage of deprivations poor people experience – to generate the simplest multidimensional poverty measure in their class. This could be used as a national multidimensional poverty measure.[6]

3.3 Linking BPL Targeting with a National Poverty Measure

As the review of the sequence of BPL exercises from 1992 to 2002, and the debates surrounding the current update suggest, the resource cost of developing a totally new BPL methodology for each update are not insignificant. Linking the targeting of BPL households to a national poverty measure could create a number of diverse synergies. First, improvements in services, education or health of the BPL households will be reflected immediately in a linked national poverty measure, whereas there may be a lag before these improvements are seen in consumption or expenditure variables. Second, an Alkire-Foster measure in particular will positively reflect situations in which households who remain BPL nonetheless experience fewer deprivations (a lower intensity of poverty) than in the previous period – which a headcount method fails to do.

6 For an application of multidimensional poverty to Mexico, see Foster (2007) and CONEVAL (2011); for an application to Colombia, see Angulo, Diaz and Pardo (2011); for Bhutan, see Centre for Bhutan Studies (2011). The counting approach has also been used to identify the BPL card recipients in Kerala, see Thomas et al. (2009).

Third, a linked national measure could be used, alone or alongside consumption poverty, to set caps, as it will provide the multidimensional poverty profiles of each state or district.[7] Fourth, even if the percentage of BPL households remains constant over time for political reasons, a national measure can show how the composition and intensity of multidimensional poverty experienced by BPL families has changed. And finally, such a methodology could be used in successive BPL exercises – the SECC census instrument could be updated in the next round with indicators that, at that time, best correlate with the national multidimensional measure, and the weights could be adjusted to create, again, the best proxy for the national measure. Simply put, linked targeting and national poverty measures might create synergies and efficiencies.

4. Data

For the analysis in this paper, we use the third round of National Family Health Survey dataset (NFHS-3) for 2005/06. Because of the age of this dataset (as well as the sample drop described below), all results are used to illustrate the proposed methodology only. In many ways it would be desirable to use the National Sample Survey (NSS) dataset, because of its frequency, currency, and because it also includes consumption and expenditure items. However the NSS datasets exclude direct anthropometric data on under-nutrition, which is arguably one of the most prevalent and salient deprivations for the BPL programme given its focus on food security, whereas the NFHS dataset includes anthropometric data on women and children and some men.

The 2005/6 NFHS-3 data is nationally representative and representative of all twenty-eight states and the union territory of Delhi. The information of household characteristics is available for 109,041 households.[8] This paper uses information on rural households in 28 states. The NFHS-3 dataset contains information from 58,805 rural households, of which 58,544 households have at least one usual resident. In our analysis, we use certain information on individual characteristics – such as occupational status and nutritional status – that are not available for all household members. Occupational information is available only for male and female respondents. Our final sample contains 48,005 households, which have information available for all household and individual characteristics of interest to us. We retain 82.4% of the sample.[9] Applying the samplings weights, the final sample of 48,005 households represents 82.4% of rural households from 28 Indian states[10] and these households are home to 88.7% of the rural population in India.[11]

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7 The multidimensional nature of poverty has also been acknowledged by Tendulkar (2009), while devising an improved method for estimating consumption poverty.

8 The number of interviewed women and men reported above are usual residents. Overall, the survey interviews 124,385 women from 87,016 households and 74,369 men from 51,443 households.

9 10,539 sample households with at least one usual resident, do not have all information available. The sample drop normally varies between 11.9 and 23.8% across states. The two states with extreme values are 9% in Manipur and 29% in Goa. This does not invalidate our results: if we show that the disagreement in identification exists for this subsample, then the extent of disagreement in *absolute number* cannot be lower if the whole sample were used.

10 Our sample does not cover the rural population of the union territories including Delhi, but these regions cover merely 0.2% of the entire rural population of India.

11 Our sample does not represent those households headed by elderly members with no member in the respondent's age group (which tend to be smaller in size: only 5.2% of the total rural households). As a result, households in certain criteria may be non-representative. For example, for the missing sample, the percentage of households with no adult member between the ages of 16 and 59 is 29.9%, which is nearly 5.1% of the rural population of 28 states. Our results thus are likely to under-report elder poverty.

5. A Benchmark Poverty Measure and a New Proposal for Identifying the BPL Poor

This section demonstrates how empirical analysis using survey data can complement political and procedural considerations when selecting a BPL-targeting method. In particular, this section identifies a set of multidimensionally poor persons based on public policy priorities and calibrates a linked targeting method that draws on questions similar to those in the SECC. The section thus demonstrates a methodology for choosing a BPL-targeting method. Naturally it is intended as merely illustrative due to data limitations as well as the need for public and policy debate.

5.1. Does Methodology Matter?

But does methodology matter? If the methodological choices proposed above all identify roughly the same set of households as BPL, then it would be of little consequence which methodology were chosen. However, as we found earlier (Alkire and Seth 2008, 2012), methodology matters. Indeed, we found substantial divergence, even though we were only able to match the methodologies imperfectly. If we could have matched all criteria, the difference could have been larger.[12]

To summarize, in Alkire and Seth (2012), we constructed pseudo-scores for each household that, insofar as the NFHS-3 data for rural households permits, match the indicators for the Saxena, the alternative scoring technique, and the Socio Economic Caste Census (SECC) BPL targeting methodologies. We then compared the households identified as BPL poor by the three methodologies at different poverty cutoffs ranging from about 35% to over 80%. When a national average of between 55% and 59% of the households were identified as BPL, we found that only 41% of the households were identified as poor and 27% were identified as non-poor by all three methods. The three methods disagreed about the status of the remaining 32% of the rural households. When coverage rates rose to nearly 80%, agreement between methods was obviously much higher. So if the BPL caps were set at rural average levels closer to 60% than 80%, the errors from using one method rather than another could affect up to 32% of rural households.

Similarly, we explored whether the exclusion criteria of three methods excluded the same households. To do so we also created imperfect pseudo-scores using NFHS-3 rural data. On our match of the SECC criteria, nearly a quarter of all rural households were excluded, as compared with much lower proportion of households excluded by Saxena and the alternative scoring method. Note that these different exclusion rates already limited the possible areas of agreement. Out of the households excluded by the SECC criteria, nearly 58.5% of them would not have been excluded either by Saxena or the alternative scoring method. For example, 4.2% of all rural households were automatically excluded by the SECC criteria, but would have had scored three or more by the Saxena scoring – so would have been identified as BPL if, nationally, at least 57% of people were identified as BPL. Also, 2% of all rural households were automatically excluded by the SECC criteria, but would have had been automatically included by the Saxena criteria.

Most strikingly, nearly 31% of the rural households were excluded according to at least one exclusion method, but all three methods only *agreed* regarding the exclusion of less than one-

12 The exclusion criteria and the criteria that have been used to construct the pseudo-BPL-scores for Saxena (2009), the alternative method, and SECC 2011 are listed in Appendix 2.

fourth of them or 7% of all rural households. The state of the other 24% of rural households was disputed. So simply put, for these three particular exclusion methods, when 75%-90% of rural households are identified as BPL, the pseudo-exclusion approaches generate very different results. In this illustration, it seems that scoring and inclusion approaches generate lower disagreements when over 75% of rural households are identified as BPL than the exclusion approaches at the same level. For this reason, we will calibrate the benchmark using inclusion and scoring methods rather than exclusion criteria. Naturally, a similar methodology could be used to calibrate an exclusion method.[13]

5.2. A Benchmark for Multidimensional Poverty

In the 11th plan (GOI 2008), the government of India recognized certain important aspects of deprivation that should receive attention. Because multiple deprivations afflict the most disadvantaged and are to be influenced by public policy, poverty was described as multidimensional in nature. Ahluwalia (2011), while discussing the prospects and policy challenges in the 12th five-year plan, emphasized the multidimensional nature of poverty, which includes and goes beyond per-capita consumption expenditure.

Recently Alkire and Santos (2010) in collaboration with the UNDP Human Development Report Office developed an international multidimensional measure of poverty known as the Multidimensional Poverty Index (MPI), which is included in the Human Development Report. It is based on three dimensions and ten indicators of well-being and has drawn attention for its simplicity and applicability. These MPI indicators match with some of the important aspects, if not all, that are present in the 11th plan. Furthermore, it is a relatively simple measure built from the NFHS-3 data. Thus in this paper, for illustrative purposes, we first calibrate a BPL methodology using the dimensions and indicators that have been used to construct the MPI. Subsequently we do a robustness check using a set of multidimensional measures which introduce additional indicators related to the 11th plan with alternative weighting structures.

The relevant statistics for the MPI, across our sample of rural households, are reported in Table 2.

We use the joint distribution of this set of indicators to examine how closely the various proposed selection criteria identify the same multidimensionally poor (MD-poor) households and the extent of the differences. Naturally any official benchmark measure, which reflects value judgements as to what poverty is and who is poor, must be made by public reasoning and adopted by proper procedures in the relevant institutions. In this paper we begin by using the MPI variables as a convenient tool to illustrate the methodology for selecting targeting methods and their value-added.

Table 2: Dimensions, Indicators, Deprivation Cutoffs and Headcount Ratios

Dimension	Indicator	Household Deprived in Indicator if	Percentage Deprived
Education	Years of schooling	No household member has completed five years of schooling	23.9%
	Child school attendance	Any school-aged child in the household is not attending school up to class 8[14]	20.1%
Health	Child mortality	Any child has died in the household[15]	29.3%

13 Note that our conclusions are constrained by our ability to match the inclusion, scoring, and exclusion criteria. In each case there are some inaccuracies introduced by differences between NFHS variables and the proposed criteria. As we cannot know the overall direction or magnitude of the errors, our conclusions are illustrative only.

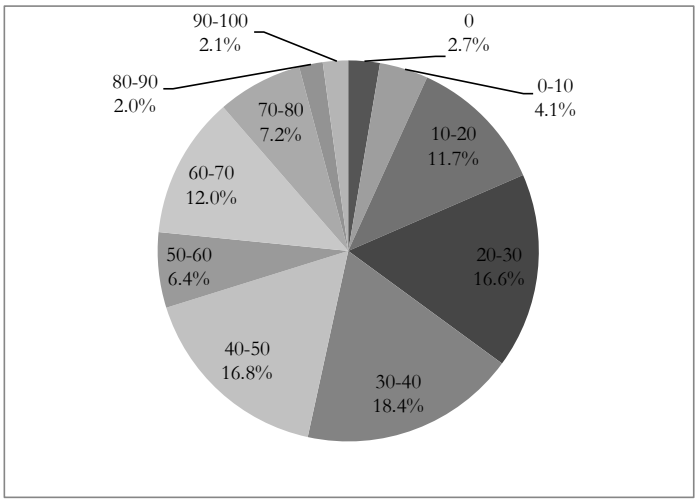
14 If a household has no school-aged children, we treat the household as non-deprived in attendance.

	Nutrition	Any adult woman or child in the household with nutritional information is undernourished[16]	52.7%
Standard of Living	Access to electricity	The household has no electricity	43.1%
	Access to improved sanitation	The household´s sanitation facility is not improved or it is shared with other households	81.7%
	Access to safe drinking water	The household does not have access to safe drinking water or safe water is more than 30 minutes walk round trip	19.1%
	Type of flooring material	The household has a dirt, sand or dung floor	63.3%
	Type of cooking fuel	The household cooks with dung, wood or charcoal	90.4%
	Asset ownership	The household does not own more than one of: radio, TV, telephone, bike, motorbike or refrigerator, and does not own a car or truck	59.7%

Source: Columns 1-3 are reproduced from Alkire, Roche, Santos and Seth (2011). Figures in the fourth column have been computed by the authors of the current paper drawing on the sample of rural households described in Section 4.

The MPI identifies the multidimensionally poor households following the dual cutoff method of Alkire and Foster (2011), detailed in the introduction to this special issue. The first column of Table 2 reports the dimensions in which the ten indicators are grouped. The second column reports the indicators and the third column reports the deprivation cutoffs for each indicator. The fourth column of the table reports the percentage of rural households (note, not of the population) deprived in the indicators. In order to identify a household as poor, a *deprivation score* of that household is computed by taking a weighted average of the deprivation in all ten indicators. We use the same weighting structure that has been used in the construction of the MPI. An equal weight is attached to each of the three dimensions and then the weight of one-sixth is assigned to the two health and education and weights of one-eighteenth to the six living standards indicators. The MPI identifies a household as MPI poor if they are deprived in 33% or more of the weighted indicators. However for this exercise we consider different poverty cutoffs, so first describe all deprivations.

Figure 1: Distribution of Households by Deprivation Score



In order to have an understanding of the joint distribution, in Figure 1, we present the distribution of households that are jointly deprived in multiple dimensions.[17] Only 2.7% of the

15 If no woman in a household has been asked this information, we treat the household to be non-deprived in mortality.

16 An adult is considered undernourished if his/her BMI is below 18.5 m/kg^2. A child is considered undernourished if his/her weight-for-age z-score is more than two standard deviations below the median z-score provided by the WHO Child Growth Standards. If a household has no woman/child with nutritional data, we treat the household as non-deprived in nutrition.

households are not deprived in any indicator; whereas 2.1% of households are deprived between 90% and 100% of weighted indicators. Going around the circle we see that 11.7% of households are deprived between 10% and 20% of weighted indicators, 16.6% between 20-30% and so on. In what follows, we refer the MPI deprivation profile based on these ten indicators and the particular weights, as the 'benchmark' measure of multidimensional poverty. A benchmark measure may be used over time to evaluate and monitor the effectiveness of the targeting exercise. We identify different sets of households as *MD-poor* by selecting different poverty cutoffs (k). In what follows, we choose the k cutoff to be uniform nationally and to take a value such that it identifies the appropriate proportion of poor people (headcount ratio) for relevant comparisons. In practice, an actual poverty cutoff should be set by value judgements and informed by the purpose of the exercise.

5.3. Which Methodology Identifies the Multidimensionally Poor Most Closely?

After outlining various proposals for improving the BPL-2002 method and introducing the illustrative multidimensional benchmark measure, we try to understand which of these proposals identifies the MD-poor best. We refer the set of pseudo-BPL poor identified by Saxena (2009) as S-poor and the set of pseudo-BPL poor identified by SECC 2011 as SECC-poor. Note that for all these methods, the pseudo-BPL poor are identified after applying the respective exclusion criteria listed in Table 1. For S-poor, we use the exclusion criteria listed in the first column of Panel I in Table 1 and for SECC 2011, we use the exclusion criteria listed in the first column of Panel III in Table 1. We choose the poverty cutoffs for identifying the MD-poor in such a way that the number of MD-poor match the number of pseudo-BPL poor households identified at the national level by two methods: Saxena and SECC.[18] For example, we find that 64.9% of rural households are deprived in one-third or more of all weighted indicators, and so when the poverty cutoff is set at one-third of all weighted indicators, 64.9% of the rural households are identified as MD-poor. Similarly, when the poverty cutoff is 50% of all weighted indicators, 33.8% of all rural households are identified as MD-poor.

Table 3 compares the households identified as MD-poor to the households identified as BPL by these three methods. The first column of the table reports the pseudo-BPL identification method. The second column reports the percentage of households identified as poor by the respective pseudo-identification method and the third column reports the similar percentage of households that can be identified as MD-poor. Note that the numbers could not be matched perfectly due to the bunching problem in the case of SECC's seven indicators, but they are capable of showing the difference in identification.[19]

Panel I of the table compares the percentage of households identified as MD-poor to the percentage of households that would be identified as S-poor for different poverty caps. When

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17 Ferreira and Lugo (2012) argue that it is crucial for policy analysis to understand the joint distribution of deprivations in multidimensional analysis besides when constructing indices. They suggest three different approaches for understanding joint distribution: by stochastic dominance analysis, by simple cross tabulation and Venn diagrams, and by using the copula function. However, the use of Venn diagram becomes complicated when there are more than three dimensions or indicators. In this paper, we try to understand the number of dimensions in which households are jointly deprived in order to explore the extent of joint deprivations.

18 Note that all comparisons in this section refer to the proportion of poor households rather than poor people, because the BPL targeting exercise identifies the household as a unit of analysis.

19 What we call a bunching problem occurs when the fraction of households identified as poor changes drastically due to a change in the poverty threshold – for example because too few variables are being considered.

35–36% of households are identified as BPL and MD-poor, only 17.2% of them would be identified as poor by both methods. The corresponding match index is 0.48 which means that 48% of the people who are identified as MD-poor are also identified as BPL by the Saxena methodology. Thus, 17.2/35.9 = 0.48. Put differently, 52% of the MD-poor would not be identified as BPL, so what we call the under-coverage rate is 52%. Looking at the match from the other side, 51.2% of those who are identified as BPL by the S-poor method would not be MD-poor. So – presuming the benchmark measure to be accurate – we refer to this as the 'leakage rate'. When nearly 46% of households are identified as BPL and MD-poor, the under-coverage rate and the leakage rate are 39.1% and 38.8%, respectively. It is evident from this that, as might be expected, as the poverty cap increases and a higher percentage of households are identified as poor, both the under-coverage rate and the leakage rates fall.[20]

Panel II compares the percentage of households identified as MD-poor to the percentage of households identified as SECC-poor for different poverty caps. Using the SECC 2011 method it is not possible to identify more than 54.9% of the rural population as poor (which is problematic in and of itself). We choose the poverty cutoffs in such a way that nearly 30% and 55% of the households are identified as MD-poor and SECC-poor, respectively. When nearly 30% of households are identified as MD-poor, 15.9% of households are identified as poor by both methods with the match index being 0.53. The under-coverage rate is 46.8%; whereas the leakage rate is 48.2%. When the poverty cap is set at nearly 55%-56%, 40.1% of the households are identified as both MD-poor and BPL poor. Although the match indices are slightly higher for SECC 2011 than Saxena (2009), what we see from this exercise is that the errors from either of these two methods are quite high. It is worth noting that if a smaller number of households are identified as poor, then these methods identify a lesser fraction of MD-poor. This means that these methods rank the poorest households differently than our benchmark measure. However in the BPL figures, the rural poverty caps are likely to be on the order of 70-80% at the national level.

Table 3: Comparison between the Set of Multidimensionally Poor and Different BPL Methods

	BPL (%)	Multidimensionally Poor (%)	Both BPL and Multidimensionally Poor (%)	Match Index	Under-Coverage Rate (%)	Leakage Rate (%)
			Panel I			
Saxena Committee (2009)	35.4	35.9	17.2	0.48	52.0	51.2
	46.3	46.6	28.4	0.61	39.1	38.8
	56.8	56.2	38.6	0.69	31.2	31.9
	66.9	64.9	49.8	0.77	23.3	25.5
	82.4	81.5	70.4	0.86	13.6	14.6
			Panel II			
SECC 2011	30.6	29.8	15.9	0.53	46.8	48.2
	54.9	56.2	40.1	0.71	28.7	27.0

Now let us compare the extent to which the SECC *exclusion* criteria rightly exclude the non-MD-

20 We have also compared the percentage of households identified as MD-poor to the percentage of households identified as BPL by the alternative scoring method for different poverty caps. When 35–36% of households are identified as BPL and MD-poor, only 15.9% of them are identified as poor by both methods. Similarly, when 45-46% of households are identified as BPL and MD-poor, only 25.5% of the MD-poor are identified as BPL. Thus the corresponding match indices are lower, and under-coverage rates and leakage rates are higher, for the alternative method than for Saxena (2009) with similar poverty cutoffs.

poor. Note that we were only able to match a subset of proposed exclusion criteria. If we were able to match all, the share of automatically excluded households may have been much larger. Recall that SECC excludes nearly 24% of rural households using our approach. If we consider the 10 MPI indicators among those who are excluded by the SECC criteria, we find that 19.1% of excluded households are deprived in years of schooling, 29.8% are deprived in child school attendance, 38.1% are deprived in Child mortality, 48.2% are deprived in nutrition, 31.2% are deprived in access to electricity, 50% are deprived in access to improved sanitation, 38.5% are deprived in access to safe drinking water, 45.6% are deprived in type of flooring material, 46.9% are deprived in type of cooking fuel, and 36.0% are deprived in asset ownership.

Given the high rate of deprivations in some of the indicators among households that are automatically excluded by the SECC 2011, are there households that are automatically excluded but are deprived in multiple dimensions? The answer is yes. In fact, we find that 57.1% of the households that would be automatically excluded by the SECC criteria (this is equivalent to 14% of all rural households) would be deprived in 20% of weighted indicators so would be considered vulnerable according to the UNDP's definition used in the 2010 and 2011 Human Development Reports; 34.4% of the excluded households (8.4% of all rural households) would be deprived in one-third of weighted indicators; and 12% of excluded households (2.9% of all rural households) would be deprived in half of weighted indicators or considered to be severely poor. The disagreement seems real: among the 8.4% of households that would be excluded by the SECC 2011 but are deprived in one-third or more of indicators, 76% have a malnourished woman or child and 93% lack clean cooking fuel.[21]

As the occupation exclusion criterion is available only for respondents and their partners (if available) and not all household members, it may create inaccuracies. So to probe the finding above we apply only the first six exclusion criteria (Appendix 2). We find that 45.3% of households that would have been excluded by these more stringent characteristics are deprived in 20% of all weighted indicators; and 26.1% of all excluded households (6.4 of all rural households) are excluded by the first six exclusion criteria and deprived in one-third of all weighted indicators.[22] Hence, we see that not only is it the case that the SECC scoring criteria do not match the MD-poor identification, the SECC exclusion criteria also may exclude the MD-poor incorrectly. Indeed over one-quarter of those excluded from BPL status by SECC were otherwise identified as MD-poor. For this reason, in what follows we do not apply the exclusion criteria.

5.4. Ten-Item Binary Scoring: A Proposal

The previous section showed that the pseudo-scoring structures of Saxena (2009) and the SECC do not identify the set of MD-poor very closely. The exclusion criteria of the SECC also mis-identify the non-poor according to the MD-poor method. Additionally, due to bunching, the SECC 2011 criteria at the third stage of identification effectively categorizes the population into

21 Among those 8.4% of all rural households who are deprived in one-third of all weighted indicators but would have been automatically 'excluded' by the SECC exclusion criteria, 79.4% do not have an improved sanitation facility, 75.9% have at least one woman or child under-nourished, 92.8% use unimproved cooking fuel, and 60.3% do not live in houses with improved floor material. Thus it seems that the exclusion criteria may be mis-identifying as non-poor households that should qualify as BPL.

22 Among those 6.4% of all rural households who are deprived in one-third of all weighted indicators but would have been 'excluded' by the first six SECC exclusion criteria, 78.9% do not have an improved sanitation facility, 76.9% have at least one woman or child under-nourished, 91.9% use unimproved cooking fuel, and 56% do not live in houses with improved floor material.

only three or four groups and cannot identify more than 54.9% of households as BPL. So even after applying these methods, additional criteria would be needed in many states. Is it possible to have a simpler alternative? We explore a binary scoring method, which is similar to Alkire and Seth (2008). In this case we explore an inclusion scoring approach rather than an exclusion approach but in practice an improved targeting method could do either. In this binary scoring method, people are identified as deprived or not according to each of ten equally weighted indicators. They are then given a BPL score, which is the number of those indicators in which the household is simultaneously deprived. Households are identified as BPL if their deprivation score is higher than the BPL cutoff.

To proxy direct deprivations of households, we select ten equally-weighted indicators that are already available in the SECC questionnaire, hence have been judged to be easy to understand, inexpensive to collect, and easily verified.[23] The ten indicators are listed in Table 4. The second and third columns of Table 4 list the ten indicators and their definitions. We have divided the first scoring criteria of SECC 2011 into three indicators – housing (wall), housing (roof) and over-crowding – so that more variability across the deprived households can be captured. We have also divided the seventh criteria into two more indicators – landlessness and occupation – for the same purpose. We have also amended some of the indicators in such a way that household deprivation is better captured and they do not adversely affect any household member. For example, instead of just looking at the child-adult ratio, we use a slightly modified definition of dependency ratio because the former may encourage households to abandon the older dependent members in order to be eligible for a BPL card, whereas the intention must be to create humane incentives.

Table 4: the Ten-Item Binary Scoring Indicators

No.	Indicator	NFHS Indicator Definition	Deprived	MD-Deprivation Score	
				Deprived	Non-Deprived
1	Landlessness	1 if household is landless; 0 otherwise	40.7%	4.15	4.04
2	Housing (Wall)	1 if the roof of the house is build with unimproved material; 0 otherwise[24]	45.9%	4.94	3.36
3	Housing (Roof)	1 if the wall of the house is built with unimproved material; 0 otherwise[25]	27.7%	5.04	3.72
4	Community	1 if household is SC/ST; 0 otherwise	31.2%	4.70	3.81
5	Singleness	1 if household head is a single woman, a minor, or elderly and there is no adult male in age group 16-59; 0 otherwise[26]	9.9%	4.66	4.02
6	Occupation	1 if any household member is engaged as a plantation labourer, casual labourer, and agricultural labourer; 0 otherwise	49.7%	4.72	3.46
7	Education	1 if no household member is educated beyond Class 4; 0 otherwise	29.9%	5.99	3.28
8	Disability	1 if any household member has Tuberculosis; 0 otherwise	2.4%	5.02	4.06
9	Over-crowding	1 if three or more members live per bedroom, 0 otherwise	48.2%	4.66	3.55
10	Dependency	1 if the (child plus elderly)-to-adult ratio is larger than two; 0 otherwise[27]	8.8%	5.47	3.95

23 The questionnaire was accessed at http://rural.nic.in/sites/downloads/circular/questionnaire09082011.pdf on March 8, 2012.

24 The roof of a house is considered unimproved if the roof is made up of thatch/palm leaf, mud, mud and grass mix, plastic/polythene sheet, rustic mat, palm/bamboo, raw wood planks/timber, unburnt bricks, loosely packed stone or there is no roof.

25 The wall of a house is considered unimproved if the wall is made up of cane/palm/trunks, mud, grass/reeds/thatch, bamboo with mud, stone with mud, plywood, cardboard, unburnt brick, raw/reused wood or if there is no wall.

26 A minor is someone who is less than 18 years old. An elderly person is a member of the household, who is older than 59 years. Note that our sample does not cover all those households headed by an elderly. The headcount could have been much higher, otherwise.

The fourth column of Table 4 reports the percentage of households that are deprived in each of these indicators using our proxy from NFHS-3 rural dataset. Nearly half of the households are deprived in occupation and over-crowding. Only 2.4% of households are deprived in the very imperfect proxy for disability. We were not able to include other disabilities because the relevant information was not available in the NFHS dataset.[28] The fifth and the sixth columns report the average deprivation score based on the benchmark measure for the households that are deprived and non-deprived in each indicator. As can be seen, the average deprivation score for the households that are deprived in each indicator is much larger than those that are not deprived in the corresponding indicator.[29] The differences in deprivation scores are much larger for education and residence, and much smaller for landlessness.

Table 5: Comparison between the Set of Multidimensionally Poor and Ten-Item Binary Scoring Indicators (no exclusion criteria)

	BPL (%)	MD-Poor (%)	Both BPL Poor and MD-Poor (%)	Match Index	Under-Coverage Rate (%)	Leakage Rate (%)
10-Item Binary Scoring	37.2	35.9	22.3	0.62	37.8	39.9
	56.5	56.2	41.7	0.74	25.9	26.3
	75.8	74.2	62.8	0.85	15.4	17.3

As previously compared with other BPL methodologies, Table 5 shows how the ten-item binary scoring method identifies the MD-poor. When 35%–37% of households are identified as poor, 22.3% of the households are identified as both MD-poor and BPL poor. The match index is 0.62. The under-coverage rate and the leakage rate are 37.8% and 39.9%, respectively, which are much lower than the respective rates for the previous two methods when similar numbers of households were identified as poor. This can be seen from Table 5. When 56%–57% of households are identified as poor, the ten-item binary scoring method identifies 41.7% of the MD-poor, with the under-coverage rate and leakage rate being 25.9% and 26.3%, respectively. Finally, when 74%–76% of households are identified as poor, the under-coverage rate is 15.4% and leakage rate is 17.3%. Clearly, the match is much better for lower poverty cutoffs and not worse for the higher poverty cutoff than the methods using exclusion criteria.

5.5. An Alternative Benchmark Method: A Robustness Check

Until now, we have used the international MPI as an illustrative measure, because of its resonance with the 11th plan and its simplicity. But in practice, each country might design its own multidimensional poverty index with the dimensions, indicators, cutoffs and weights that best reflect poverty. In this subsection, we test the robustness of the results above using an alternative benchmark measure that draws upon ten indicators that are closely related to the goals

27 A child is any member who is younger than 18 years. An elderly is any member whole is older than 59 years. A child and elderly to adult ratio is the ratio of the number of children and elderly members to the number of adult members in the age group 16-59 years in the household.

28 We have also calibrated the ten-item binary scoring method using other criteria, such as the source of clean drinking water or the type of cooking fuel used, instead of the disability indicator and find that match between the multidimensionally poor and BS-poor (Table 5) are robust to these alternatives. However, we do not choose to use these criteria as they are similar to the sanitary latrine criteria used in BPL-2002, which the Ministry of Rural Development refers as disincentive criteria.

29 We have conducted the standard t-test for the difference in means and find the differences to be statistically significant at the 99% level.

mentioned in the 11th five-year plan (GOI 2008) and Ahluwalia (2011), which are also present in the NFHS-3 dataset. We then recalibrate the analysis to check the robustness of our findings in the previous subsections. The indicators are outlined in Table 6, where the first column reports the number of the indicators that will be useful in subsequent table. The third column of the table reports the percentage of households (recall, not of the population) deprived in these indicators.

As earlier, a household can be identified as poor if the household's deprivation score falls below a poverty cutoff, where the deprivation score is based on the particular weighting structure selected for aggregating the deprivations. In order to develop an identification methodology that is robust to a range of plausible weighting structures, in this paper, we supplement the identification used in the alternative benchmark measure with an even stronger approach. Given that the methodology needs to be robust with respect to the set of people identified as BPL, we identify a household as multidimensionally poor if the household is deprived by the alternative benchmark measure and *also* by the same indicators aggregated using three additional weighting schemes. We refer the set of poor households as MD_A-poor. Table 3 reports what might be a set of plausible indicators and a set of weighting schemes, based on how these indicators may be grouped into different dimensions. As in case of our benchmark measure, dimensions are equally weighted, and indicators within each dimension are equally weighted to give the respective weighting structure.

Table 6: Indicators, Deprivation Cutoffs and Headcount Ratios

Sl No.	Indicator	Household Deprived in Indicator if	Percentage Deprived
1	Housing	lives in a kachha house	18.4%
2	Access to electricity	does not have access to electricity	43.1%
3	Nutrition	at least one member suffers from under-nutrition[30]	55.9%
4	Improved sanitation	has no facility or uses pit latrine without slab, composting /dry/other unimproved facilities, bush or field	76.3%
5	Clean drinking water	if sources are unprotected well and spring, river/dam/ lake/ponds/stream, tanker truck, cart with small tank, bottled water, other unclean sources	15.6%
6	Improved cooking fuel	does not have separate room for cooking and the sources of fuel are coal, lignite, charcoal, wood, straw/shrubs/ grass, agricultural crop, animal dung, and other unimproved sources	30.8%
7	Economic well-being	owns any one of the four items: a b/w television, an electric fan, a pressure cooker, or a radio; and does not own any of the following items: car, motorcycle, landline phone, refrigerator, mattress, table, colour TV, computer, thresher, or tractor	32.9%
8	Education	does not have any adult member completing five years of education[31]	29.9%
9	Employment	either the primary occupation is agricultural labourer or sharecropper; or the primary occupation of the respondent and her partner is either artisan or casual work and the household falls in the bottom two quintiles in terms of wealth index; or is identified as destitute or bonded labourer	34.5%
10	Status of children[32]	at least one incidence of child labour[33] or at least one child aged 5 to 14 does not attend school for any reason	16.1%

The dimensions and indicators in Group I belong to the alternative benchmark measure. Group II classifies the indicators into only four dimensions then uses nested weights. It combines infrastructure and the ownership of assets to create a unified dimension called material well-being. Similarly, health and hygiene dimensions are combined together to obtain health and hygiene dimension. Child status and employment dimensions are also combined together to create a dimension on the working status of the households and referred to as livelihood. Note

30 Defined as for MPI

31 If a household is headed by a minor or the household does not have any adult member (older than 14 years), then the household is assumed to be deprived.

32 Note that only 66.7% households have at least one child in the age group of 5 – 14, and so 24.6% of those households are deprived in terms of child status.

33 The NFHS3 does not allow us to incorporate the labour status of the children in the age group of 15 –18.

that the education dimension receives a relatively higher weight in Group II. Group III had four dimesniosn as it combines education and employment together. These categorizations give a much higher weight to the material well-being and health and hygiene, and the largest weight to child status. Finally, Group IV has five dimensions, and is most analogous to the MPI. The standard of living dimension has the six MPI indicators exactly. Besides the three dimensions in the MPI, two other dimensions are added: employment and children.

Table 7: Grouping the Eleven Indicators into Different Dimensions

I			II			III			IV		
Dimension	**Sl No.**	**Weight**	**Dimension**	**Sl No.**	**Weight**	**Dimension**	**Sl No.**	**Weight**	**Dimension**	**Sl No.**	**Weight**
Infrastructure	1	1/16	Material well-being	1	1/12	Material well-being	1	1/12	Standard of living	1	1/30
	2	1/16		2	1/12		2	1/12		2	1/30
Health	3	1/8		7	1/12		7	1/12		4	1/30
Hygiene	4	1/16	Health & hygiene	3	1/16	Health & hygiene	3	1/16		5	1/30
	5	1/16		4	1/16		4	1/16		6	1/30
Air quality	6	1/8		5	1/16		5	1/16		7	1/30
Assets	7	1/8		6	1/16		6	1/16	Health	3	1/5
Education	8	1/8	Education	8	1/4	Education and employment	8	1/8	Education	8	1/5
Employment	9	1/8	Livelihood	9	1/8		9	1/8	Employment	9	1/5
Children	10	1/8		10	1/8	Children	10	1/4	Children	10	1/5

As mentioned earlier, to desensitize the identification of a household as multidimensionally poor to any single weighting structure using the alternative indicators, we identify a household as *MD_A-poor* if the household is identified as multidimensionally poor according to *all four* weighting structures. In other words, we identify the set of MD_A-poor by the intersection of these four groups. In order to identify a set of MD_A-poor, we select a cross-dimensional cutoff (k) and apply it across all four measures. In what follows, we choose the k cutoff to be uniform nationally and to take a value such that it identifies the appropriate proportion of poor people for relevant comparisons. In practice, any actual poverty cutoff should be set by value judgements and informed by budget constraints.

Table 8 shows how the Saxena (2009), SECC 2011, and the ten-item binary scoring method identifies the MD-poor. As earlier, we use different poverty cutoffs. When 37%–40% of households are identified as poor by the binary scoring criteria, 27.3% of the households are identified as both MD-poor and BPL poor. The match index is 0.69. The under-coverage rate and the leakage rate are 31.1% and 26.5%, respectively, which are much lower than the respective rates for the previous three methods when similar numbers of households were identified as poor. When 55%–56% of households are identified as poor, the ten-item binary scoring method identifies 44.2% of the MD-poor, with the under-coverage rate and leakage rate being 19.8% and 21.8%, respectively. Finally, when 75%–77% of households are identified as poor, the under-coverage rates are between 14.2% and leakage rates are between 13.4%. As earlier, the match is much better for lower poverty cutoffs and not worse for the higher poverty cutoff than the methods using exclusion criteria.

Table 8: Comparison between the Set of Multidimensionally (MD_A) Poor and Different BPL Methods and the Binary Scoring Method

	BPL (%)	Multidimensionally Poor (%)	Both BPL and Multidimensionally Poor (%)	Match Index	Under-Coverage Rate (%)	Leakage Rate (%)
			Panel I			
Saxena Committee (2009)	35.4	33.0	21.2	0.64	35.8	40.1
	46.3	46.2	33.2	0.72	28.2	28.4
	56.8	55.1	42.4	0.77	23.0	25.3
	66.9	67.0	54.2	0.81	19.0	18.9
	82.4	80.8	71.0	0.88[34]	12.1	13.9
			Panel II			
SECC 2011	30.6	29.9	18.4	0.61	38.5	40.1
	54.9	55.1	42.5	0.77	22.9	22.6
			Panel III			
10-Item Binary Scoring	37.2	39.7	27.3	0.69	31.1	26.5
	56.5	55.1	44.2	0.80	19.8	21.8
	75.8	76.5	65.6	0.86	14.2	13.4

6. Conclusion

This paper has explored methodologies used to identify BPL households in India. To date, the BPL- targeting exercises have been widely criticized because of the census instrument and poor data quality, as well as corruption. In 2011 the methodology used to identify the BPL poor was also vigorously contested, with different proposals being articulated by the Saxena Committee (Saxena 2009) and by the Socio-Economic Caste Census document (GOI 2011), as well as others. Yet the criteria for assessing these different methodological proposals have remained unclear.

By implementing the various proposed criteria insofar as was possible using the same dataset, and comparing mismatches in the selected BPL households, we have shown that the choice of targeting methodology matters empirically..

This paper proposes selecting the BPL-targeting methodology that most closely approximates a benchmark multidimensional poverty measure. The benchmark measure will reflect multidimensional poverty at the national and state levels. The BPL-targeting methodology should most closely proxy the set of people identified as poor by the benchmark, using the census data variables and a transparent, easy-to-understand method. The benchmark measure could be used to understand and analyse the reduction of multidimensional poverty over time. Given that verifiable proxy indicators for multidimensional poverty will change over time, future

34 When between 75-83% of households are identified as BPL, the match index for Saxena (2009) appears slightly larger than that for the 10-item binary scoring as evident from Table 8. However, we should note first that 1.6% less households is identified as MD_A-poor than those identified as BPL by Saxena (2009) which increases the likelihood of larger share of BPL-poor being identified as MD_A-poor. Whereas 0.7% less households are identified as BPL than MD_A-poor by SECC 2011 increasing the likelihood of smaller fraction of BPL poor being identified as MD_A-poor. Secondly, the match index increases with an increase in the number of households identified as BPL and MD_A-poor. If the share of households identified as BPL by the SECC 2011 increases from 75.8% to 82.4%, the corresponding match index is expected to increase.

BPL/SECC census design, and exclusion or inclusion or scoring methodologies, could be updated as required, with reference to the benchmark measure. This would release time and effort in subsequent BPL exercises to focus on other important issues.

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APPENDIX 1: 2002 BPL Census 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	Houseless	Kachha	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 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 defection	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 items - computer, telephone, refrigerator, colour TV, electric kitchen appliances, expensive furniture, LMV@/ LCV@, tractor, mechanised two-wheeler/ three-wheeler, power tiller, combined thresher/ harvester [@ 4-wheeled mechanised vehicle]
7	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
8	Status of the Household Labour Force	Bonded labour	Female and children labour	Only adult females and no child labour	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 possess 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 more than Rs. One lakh or no assistance needed

Source: Sundaram (2003).

APPENDIX 2: Pseudo-Criteria for the Saxena Method and the Socio-Economic Caste Census (SECC) 2011 Method

No.	Criteria	Saxena Committee	Percentage of Households
1	Household having double the land than the PSU average if the land is irrigated or three times the PSU average if it is unirrigated	Exclusion	5.6%
2	Household owning a car	Exclusion	1.0%
3	Household owning a thrasher or a tractor	Exclusion	4.1%
4	Any member of the household having health insurance and the household not falling in the bottom two quintiles of the wealth score	Exclusion	2.4%
5	Household headed by a single woman	Inclusion	12.0%
6	Household headed by a minor	Inclusion	0.3%
7	Any member of the household being a bonded labourer	Inclusion	0.2%
8	Household being considered as destitute	Inclusion	0.4%
9	Household being scheduled caste (SC)/scheduled tribe (ST)	3	31.2%
10	Household being Muslims/Other Backward Class (OBC)	1	48.4%
11	Any member in the household having tuberculosis	1	2.4%
12	Household headed by an old person	1	16.2%
13	Primary occupation of the household is landless agricultural labourer	4	12.2%
14	Primary occupation of the household is share cropping	4	3.3%
15	Primary occupation of the household is artisan or casual work	2	8.2%
16	Primary occupation of the household is agricultural labourer and the households owns some land	3	10.3%
17	No household member (older than 30 years) studied up to class 5	1	45.4%
	Households being excluded by Saxena (2009)		**10.9%**

Socio Economic Caste Census 2011			
No.	**Criteria**	**Type of Criteria**	**Percentage of Households**
1	Has a four wheeler car or jeep	Exclusion	1.0%
2	Has a tractor or a thrasher	Exclusion	4.1%
3	The housing is pucca with more than 3 bedrooms	Exclusion	2.2%
4	The household has a refrigerator	Exclusion	6.8%
5	The household has a landline phone	Exclusion	8.2%
6	Has a motorized cycle	Exclusion	11.7%
7	If the household has Health Insurance	Exclusion	2.4%
8	The respondent or her partner works in a professional, managerial, or technical position	Exclusion	6.5%
9	Households with only one room kachha house	Scoring	12.4%
10	No adult member between the ages 16 and 59	Scoring	0.1%
11	Female headed households with no adult male member between 16 - 59	Scoring	7.7%
12	Any household member with Tuberculosis	Scoring	2.4%
13	Scheduled Caste/Scheduled Tribe households	Scoring	31.2%
14	Households with no literate adult above 25 years	Scoring	34.1%
15	Primary occupation of the household is manual labourer and owns no land	Scoring	23.2%
	Households being excluded by the exclusion criteria		**24.5%**

Source: Columns 1-3 are reproduced from Alkire and Seth (2012). Figures in the fourth column have been computed by the authors of the current paper drawing on the sample of rural households described in Section 4.