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Multidimensional Poverty Reduction in India between 1999 and 2006: Where and How?

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Summary. — India has witnessed high economic growth since the 1980s, and a confirmed reduction in monetary poverty, particularly in poorer states. Poverty, however, has multiple dimensions. This paper thoroughly analyzes the change in multidimensional poverty in India between 1999 and 2006. We find a strong reduction in national poverty and each of its dimensions, but this has not been uniform across regions, castes, or religions. Probing further, we analyze changes in the distribution among the poor people nationally as well as within population subgroups. We find strong reductions among the poorer population nationally, but slower progress for most of the poorest groups.
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Key words — multidimensional poverty, poverty measurement, India, destitution, poverty dynamics, subgroup decomposition

1. INTRODUCTION

India has sustained strong economic growth at over 5% on average during every five-year plan since the 1980s. [1] Although the growth in India's Gross National Income has been much higher than her neighbors, Drèze and Sen (2011, 2013) powerfully demonstrate that progress in key social indicators has been slower. Thus understanding progress only in terms of economic growth is not sufficient. Distinct measures are required to ascertain whether rising national income translates into social gains and poverty reduction.

Poverty in India has traditionally been assessed by monetary measures (GoI, 1979, 1993, 2009, 2014). [2] Yet monetary measures are limited to the ability to spend on goods and services rather than the capability to enjoy valuable beings and doings (Sen, 1992). Furthermore, these are subject to methodological debates (Deaton & Drèze, 2002, 2009; GoI, 1993, 2009; Sen & Himanshu, 2004; Subramanian, 2011), and do not reflect the multidimensional nature of poverty (GoI, 2009, p. 3). While discussing the prospects and policy challenges for the 12th five-year plan 2012–17, Ahluwalia (2011) acknowledges the need for Indian growth to be more inclusive in terms of improving child and maternal health, quality of education, access to basic services; and of reducing disparity across social groups and states. What poverty measures might display such a change?

Poverty is multifaceted and monetary deprivation is one important dimension, but, surprisingly, it does not accurately proxy other deprivations. Empirical studies have shown that significant percentages of those who are multidimensionally deprived are not monetary poor and *vice versa* (Alkire & Kumar, 2012; Ruggeri-Laderchi, Saith & Stewart, 2003). There is a need to supplement India's long and august tradition of monetary poverty measurement with multidimensional poverty measures capturing the joint distribution of key deprivations across the population. Such measures can be used to describe national poverty levels (Sen, 1980); to monitor changes by subgroups; and to inform the Below the Poverty Line (BPL) targeting methodologies (Alkire & Seth, 2013a). Like monetary measurement, multidimensional poverty measurement is also subject to methodological debates in terms of the choice of methodology and the choice of parameters and thus requires robustness tests (Alkire & Santos, 2014).

Various multidimensional indices of poverty have been proposed in the past decade. [3] Given that many deprivation indicators are either binary or ordinal, counting-based approaches prove both feasible and rigorous. An exploratory empirical illustration of multidimensional poverty is that of Jayaraj and Subramanian (2009). Identifying eight dimensions from the first and third rounds of National Family Health Survey (NFHS) datasets, they showed that multidimensional poverty decreased between 1992–93 and 2005–06, but that disparity across states widened, supporting the findings of Deaton and Drèze (2002). Extending this study using both NFHS and National Sample Survey (NSS) datasets, Mishra and Ray (2013) find that multidimensional poverty reduction has been due to a steady reduction in rural poverty.

Jayaraj and Subramanian raise the issues clearly and our paper builds on theirs to conduct a more exhaustive multidimensional poverty analysis. In this paper, we use the Global Multidimensional Poverty Index (MPI) reported in the *Human Development Report* (UNDP, 2013) for the purpose of international comparisons across countries. We use this global index for our analysis in the same spirit as the World Bank's $1.25/day measure, while acknowledging that a multidimensional measure with a different set of parameters could be developed to reflect India's plans and goals more directly (Alkire & Seth, 2013a).

The global MPI is one implementation of the measure – called the adjusted headcount ratio or M_0 – proposed by Alkire and Foster (2011). Some studies have already used the global MPI in the Indian context. For example, Alkire and Seth (2013a) find that the rank of Indian states differs between the global MPI (estimated from NFHS dataset 2005–06) and monetary poverty (national poverty estimates from the NSS dataset 2004–05 based on GoI (2009)). Implementing the MPI using data from three districts of Madhya Pradesh and Rajasthan, Alkire and Kumar (2012) find that of the 40–47% of households that are identified as multidimensionally poor or monetary poor, only 14% are poor by both measures at the same time.

In this paper, we compare multidimensional poverty using the second and third rounds of NFHS datasets. The global MPI, whose robustness has been assessed and data limitations discussed in Alkire and Santos (2014), is adjusted to create precise comparability across time. Our analysis shows a statistically significant reduction in multidimensional poverty between 1999 and 2006. This finding supplements studies of India's monetary poverty reductions. To understand *where* the reduction has occurred, we explore the changes in poverty across various population subgroups. We find that the reduction has not been uniform across subgroups, and that the initially poorer subgroups have shown slower progress. Our finding contrasts with the pattern of national monetary poverty reduction across states between 1993–94 and 2004–05 estimated in GoI (2009), but conforms to Radhakrishna (2014)'s assessment.

In order to understand *how* the reduction has taken place, we ask several questions: Has poverty been reduced by reducing the incidence of poverty or by the intensity of deprivations among the poor? Which indicators' deprivations have been reduced the most? Has poverty decreased among different sets of the poorest of the poor? We find that poverty has mainly been reduced by a statistically significant reduction in the incidence rather than the intensity of poverty. Nationally, absolute improvements in certain standard-of-living indicators – access to electricity, access to water, type of housing, and access to improved sanitation facilities – have been larger than improvements in health and education. These patterns, however, differ across subgroups.

In a methodological innovation first presented in this paper, we explore trends among the poorest of the poor. Who are the poorest of the poor? We identify two types of the poorest: people who suffer deprivations in more indicators at once than moderately poor persons (referred as *intensely poor*); and people who are particularly badly deprived in certain indicators simultaneously (referred as *deeply poor*). Tracking poverty reduction among these two kinds of "poorest of the poor", both nationally as well as within different subgroups, is of high policy relevance as it helps to assess whether poverty alleviation strategies have reduced poverty uniformly in different parts of the distribution. In the Indian context we find significant improvements nationally among both the intensely poor and the deeply poor, with significant variations within states.

Our paper advances as follows. Section 2 briefly outlines the methodology for the adjusted headcount ratio, the data and sample design and presents in detail the amendments in the global MPI indicators necessary for making the two rounds of NFHS datasets comparable across time. Section 3 presents and analyzes the inter-temporal results of multidimensional poverty at the national level as well as across population subgroups. Section 4 investigates the changes among two distinct sets of the poorest of the poor: the intensely poor and the deeply poor. Section 5 concludes.

2. AN MPI$_I$ ADJUSTED FOR INTER-TEMPORAL ANALYSIS

The global MPI was developed by Alkire and Santos (2010, 2014) in collaboration with the UNDP and first appeared in the 2010 *Human Development Report* (HDR). It is one particular implementation of the adjusted headcount ratio (M_0) proposed in Alkire and Foster (2011).

(a) *The adjusted headcount ratio*

Suppose there are n people in the sample and wellbeing is evaluated by d indicators. We denote person i's achievement in indicator j by $x_{ij} \in \mathbb{R}_+$ for all $i = 1, \ldots, n$ and $j = 1, \ldots, d$ and achievements are summarized by matrix $X \in \mathbb{R}_+^{nd}$. The *relative weight* attached to each indicator j is denoted by w_j, such that $w_j > 0$ and $\sum_{j=1}^{d} w_j = 1$. The *sample weight* assigned to each person i is denoted by $W_i > 0$, which reflects the representativeness of each unit to the concerned population.

A person is identified as poor in two steps. First, the person is identified as deprived or not in each indicator j using a deprivation cutoff z_j. Each person is assigned a deprivation status value g_{ij}, such that $g_{ij} = 1$ if person i is deprived in indicator j or $x_{ij} < z_j$; and $g_{ij} = 0$, otherwise. Second, an overall *deprivation score* $c_i \in [0, 1]$ is computed for each person i, such that $c_i = \sum_{j=1}^{d} w_j g_{ij}$. The person is identified as poor if $c_i \geqslant k$, where $k \in (0, 1]$; and non-poor, otherwise. [4] Note that a person may have positive deprivation score but not be identified as poor if the deprivation score is less than the poverty cutoff k. We denote the number of poor people in the sample by q. Then the share of poor population or the *incidence of poverty* or the multidimensional headcount ratio (H) is denoted by:

$$H = \frac{\sum_{i=1}^{q} W_i}{\sum_{i=1}^{n} W_i}, \tag{2.1}$$

and the average deprivation score among the poor or the *intensity of poverty* (A) is denoted by:

$$A = \frac{\sum_{i=1}^{q} W_i c_i}{\sum_{i=1}^{q} W_i}. \tag{2.2}$$

The adjusted headcount ratio or M_0 is the product of the incidence and intensity of poverty:

$$M_0 = H \times A = \frac{\sum_{i=1}^{q} W_i c_i}{\sum_{i=1}^{n} W_i} = \frac{\sum_{i=1}^{n} W_i c_i \mathbb{I}[c_i \geqslant k]}{\sum_{i=1}^{n} W_i}; \tag{2.3}$$

where $\mathbb{I}$ is an indicator function such that $\mathbb{I}[c_i \geqslant k] = 1$ if $c_i \geqslant k$ and $\mathbb{I}[c_i \geqslant k] = 0$ otherwise.

The M_0 measure has certain useful properties. First, it is subgroup decomposable, which means that M_0 can be expressed as a population share weighted average of the M_0 values of mutually exclusive and collectively exhaustive subgroups. Second, M_0 can also be expressed as a relative weighted sum of the censored headcount ratios of indicators. The Censored Headcount Ratio of an indicator j is the proportion of the population that is multidimensionally poor and is simultaneously deprived in that indicator. For detailed discussions about the properties of M_0, see Alkire et al. (2015).

In considering changes over time, we analyze both absolute and relative changes. The absolute rate of reduction shows the simple difference in values between two periods t_1 and t_2: $\Delta y = (y^{t_2} - y^{t_1})$. The relative reductions are computed by dividing the absolute changes by the corresponding initial values; they show by what percentage the figure in period 1