

Measuring Poverty in Karnataka

The Regional Dimension

Regionally disaggregated estimates of poverty within India's states are typically not computed because of inadequate sample sizes available for geographic or administrative units below the state level. This paper attempts to ameliorate the sample size problem by pooling the 1999-00 NSS 55th round central and state sample data. We use the pooled data to examine regional variation in poverty within Karnataka. The poverty estimates reveal significant geographic imbalances, with much higher levels and concentration of poverty in the northern districts. Regional patterns are found to be reasonably consistent with independent correlates of poverty, including agricultural wages, employment shares, and district domestic products. However, one important inconsistency is that the rural-urban differentials in poverty rates are not credible and warrant further attention.

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I Introduction

Poverty in India has received considerable attention in policy formulation and discussion. Official poverty estimates at the national and state-level are periodically prepared by the government of India's Planning Commission using detailed household consumption and expenditure data from the National Sample Survey Organisation's (NSSO) quinquennial consumer expenditure surveys. While there is considerable evidence available of regional (i.e., sub-state) variation in poverty, typically the GoI Planning Commission does not compute poverty estimates below the state level because of limitations of survey sample sizes. Many state government departments of economics and statistics (DES) conduct households surveys on a matching basis with NSSO, but few if any pool data from these surveys with the central (i.e., NSSO) sample to derive regionally disaggregated estimates, both on account of delays in processing the state sample and because often they lack the requisite in-house capacity to conduct this analysis.

In this context, a noteworthy initiative was undertaken by the government of Karnataka to estimate poverty incidence at the district level from pooled 1993-94 NSS 50th round data for the Karnataka Human Development Report [GoK 1999]. This paper updates these estimates to 1999-00 by combining the central and state samples for Karnataka from the 55th round to examine regional variation in poverty

across the state. Section II presents poverty estimates for different levels of regional disaggregation for Karnataka based on pooled central and state sample data, along with a brief description of the methodology followed to derive them. Section III presents the main findings of sensitivity analysis undertaken to explore the robustness of the conclusions emerging from this regional analysis. Finally, Section IV concludes by summarising the main findings of the paper, as well discusses some policy applications where the results derived may prove useful.

II Regional Poverty Indices: Methodology and Results

The methods we use in this paper to estimate the poverty indices are the same as those followed by the GoI Planning Commission. Poverty incidence – the headcount ratio (P0) – is defined as the proportion of the population below the official GoI urban and rural poverty lines for Karnataka. In addition to the headcount, poverty gap (P1) estimates are also derived from the data, as the two measures in conjunction are potentially more informative about the extent and depth of poverty

levels rather than the headcount alone [Foster et al, 1984]. Monthly per capita expenditure (MPCE) aggregates from the 55th Round Consumer Expenditure Survey are used as an indicator of welfare, and compared to the urban and rural poverty lines for Karnataka to classify the population as either poor or non-poor. An important caveat to bear in mind is the recent debate on the non-comparability of 55th round data with earlier NSS surveys, given the changes in design of the questionnaire [Deaton 2001, Sundaram 2001, Datt and Ravallion 2002]. While the poverty estimates derived from these data may therefore not be directly comparable to those based on earlier rounds, (e.g., those in the 1999 Karnataka HDR), since the revised questionnaire was presumably administered uniformly across regions, the unadjusted consumption aggregates can still be used to study regional variation in poverty incidence.

As noted above, difficulties in estimating poverty rates below the state-level using the central sample alone arise because of inadequate sample size. While small sample size does not per se generate bias in the poverty estimates, it can result in quite high variances in the derived estimates [Deaton and Dreze 2002]. We attempt to ameliorate

Table 1: Official Headcount and Poverty Gap Estimates, by Sector

Sector	Headcount Rate (P0)		Poverty Gap (P1)	
	Karnataka	All-India	Karnataka	All-India
Rural	18.2	26.8	3.0	5.2
Urban	24.5	24.1	5.1	5.2
Overall	20.1		3.6	

Note: Estimates are based on the pooled Karnataka sample, using the official poverty lines.

this problem by combining the central and state samples for Karnataka state, which then provides a greater number of observations per district or region. The central and state samples of the NSS 55th Round for Karnataka include 5,233 and 5,244 households, respectively, leading to a combined sample of over 10,000 households. Pooling the two samples is straightforward, provided appropriate sampling weights are calculated to derive representative estimates from the pooled samples. In calculating the sampling weights, we follow the same basic methodology as recommended by Minhas and Sardana (1990), but adapt it to take into account changes in the sample design strategy introduced in the 55th round.

Table 1 reports the headcount and poverty gap measures derived from the pooled sample. These estimates are fairly close to the official central sample-based Planning Commission poverty estimates for the state (16.8 rural and 24.6 urban). Compared to the all-India poverty level, rural poverty in Karnataka is nearly 7 percentage points lower, and the poverty gap is also considerably lower. By contrast, urban poverty in Karnataka – both headcount rate and poverty gap – is about the same as the all-India level. Table 1 also shows that urban poverty in Karnataka is much higher than rural poverty, a somewhat anomalous finding given differentials across urban and rural areas in other living standards indicators. We shall return to this apparent puzzle in the next section.

Further disaggregating poverty estimates for Karnataka by agro-climatic regions shows that statewide and sectoral poverty measures conceal considerable variation within the state. Table 2, which reports poverty by NSS agro-climatic regions, reveals that the extent and depth of poverty in Karnataka are greatest in the inland northern region, in both rural and urban areas. In sharp contrast, the rural coastal and ghat region, and the inland eastern region have very low levels of rural poverty.

We also compute poverty estimates disaggregated to the district level (Table 3), although the estimates are not separated by rural and urban sectors on account of smaller sample sizes. These estimates confirm that the northern districts of Karnataka tend to be poorer than the rest of the state. There is also evidence of considerable variation within divisions. For example, Kolar district in Bangalore (rural) division is among the poorest in the state, even though poverty incidence in

other districts of this division is not nearly as high. The general patterns for the poverty gap index are similar to those indicated by the headcount rates. Indeed, the poverty-gap series is highly correlated with the corresponding HCR series, with a correlation coefficient of 0.98 or a Spearman's rank correlation coefficient of 0.97.

Combining the poverty incidence rates with the distribution of the population across districts shows that in absolute numbers as well, the poor are concentrated in the northern districts (Table 4). While Gulbarga and Belgaum divisions account for about 40 per cent of the state's population, nearly 60 per cent of the poor reside in these areas. By contrast, Mysore division account for 26 per cent of the state's population, but only 14 per cent of its poor.

III Sensitivity Analysis

Are these sectoral and regional poverty estimates presented in the paper reasonable measures of living standards differences within the state? Or are they simply an artifact of data or methodological quirks? In order to explore this further, we carried out a range of sensitivity analysis to assess the extent to which the findings presented were good indicators of variation in living standards across regions. However, we first explore the degree of similarity between the state and central samples to ascertain the extent to which pooling the two together appears to be driving the poverty estimates.

Figure 1 compares the cumulative distribution functions (CDFs) and Lorenz curves of MPCE separately for the rural and urban sectors, in the two samples. It is readily apparent that the central and state samples have nearly identical MPCE distributions in both sectors, suggesting that rural or urban estimates of poverty from the pooled sample are unlikely to be very different from what would have been obtained with the central sample alone. Similarly, the extremely close correspondence between the two sets of Lorenz curves implies that inequality estimates using either sample are also likely to be

Table 3: Official Headcount and Poverty Gap Estimates, by District

District	Headcount Rate	Poverty Gap
<i>Gulbarga division</i>		
Bellary	33.1	6.0
Bidar	30.4	5.2
Gulbarga	26.8	4.9
Raichur	45.6	6.3
<i>Belgaum division</i>		
Belgaum	17.9	3.2
Bijapur	32.1	6.8
Dharwad	21.4	4.2
<i>Mysore Division (I)</i>		
Chickmagalur	2.3	0.4
Hassan	11.5	1.5
Kodagu	4.9	0.6
Mandya	16.6	2.8
Mysore	15.5	2.0
<i>Mysore division (II)</i>		
Dakshina kannada	7.4	1.7
Uttara kannada	6.7	1.4
<i>Bangalore division (R)</i>		
Bangalore rural	5.2	0.7
Chitradurga	16.3	2.8
Kolar	41.9	10.3
Shimoga	8.1	1.4
Tumkur	18.5	2.7
<i>Bangalore division (U)</i>		
Bangalore urban	9.9	1.5

Note: Estimates are based on the pooled Karnataka sample, using the official poverty lines.

Table 4: Distribution of the Poor in Karnataka, by District

District	Share of Total Population of Poor	Share of Total State Population
<i>Gulbarga division</i>		
Bellary	33.7	20.0
Bidar	7.1	4.3
Gulbarga	4.0	2.6
Raichur	10.0	7.5
Raichur	12.6	5.5
<i>Belgaum division</i>		
Belgaum	24.9	21.2
Belgaum	6.4	7.2
Bijapur	10.7	6.7
Dharwad	7.8	7.4
<i>Mysore division (I)</i>		
Chickmagalur	11.0	17.2
Chickmagalur	0.2	2.0
Hassan	1.8	3.1
Kodagu	0.3	1.1
Mandya	3.2	3.8
Mysore	5.6	7.2
<i>Mysore division (II)</i>		
Dakshina Kannada	3.0	9.3
Dakshina Kannada	2.0	5.5
Uttara Kannada	0.9	2.6
<i>Bangalore division (R)</i>		
Bangalore rural	21.9	22.0
Bangalore rural	1.0	3.8
Chitradurga	3.7	4.6
Kolar	11.9	5.7
Shimoga	1.6	3.9
Tumkur	3.7	4.1
<i>Bangalore division (U)</i>		
Bangalore urban	5.7	11.5
Bangalore urban	5.7	11.5

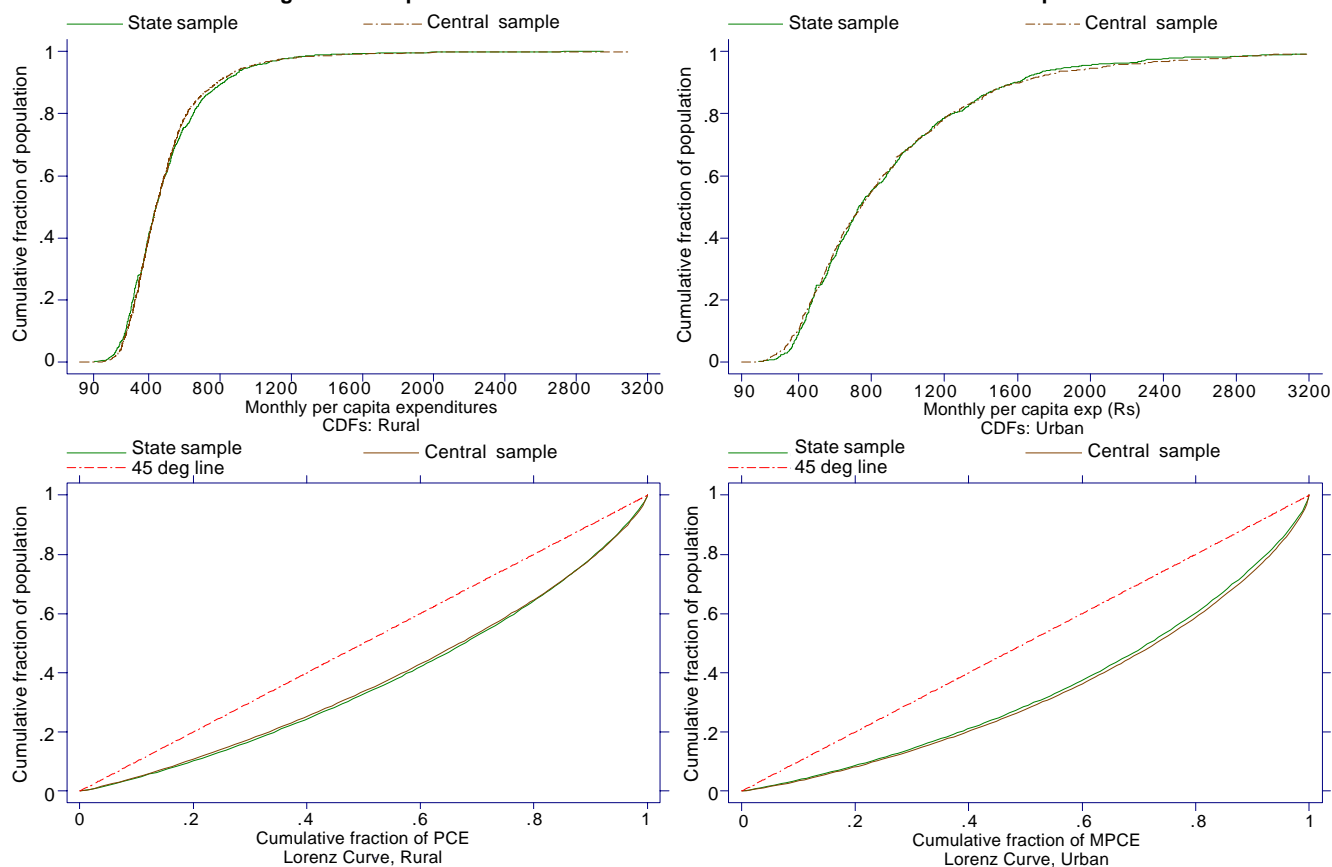
Note: Estimates are based on the pooled Karnataka sample, using the official poverty lines.

Table 2: Official Headcount and Poverty Gap Estimates, by NSS Region

Karnataka NSS Region	Rural Areas		Urban Areas	
	Headcount	Poverty Gap	Headcount	Poverty Gap
Coastal and ghat	3.4	0.7	18.5	4.3
Inland eastern	4.5	0.6	20.6	3.3
Inland southern	18.8	3.6	15.2	2.6
Inland northern	23.7	3.6	39.9	9.1

Note: Estimates are based on the pooled Karnataka sample, using the official poverty lines.

Figure 1: Comparison of MPCE Distributions from the Central and State Samples



very similar: for instance, the gini coefficients are 0.25 and 0.24 for the rural state and central samples, and 0.31 and 0.33 for the urban state and central samples, respectively. On the whole, it is safe to conclude that poverty indices estimated from the combined sample are not unduly driven by peculiarities in either the central or the state sample.

Turning to whether the poverty estimates are indeed measuring differences in welfare across regions, we consider related evidence on living standards from three additional sources – agricultural wages, district domestic products, and employment shares in agricultural labor and non-farm activities. There is a considerable evidence that the rural poor in India are highly represented amongst agricultural labourers [Singh 1989], suggesting therefore that the share of the population employed as agricultural labourers and agricultural wages are likely to be good correlates of poverty [Datt and Ravallion 1998, Sundaram 2001]. Figure 2, which plots district specific daily agricultural wages for males against district poverty rates, provides some tentative indication of the plausibility of the disaggregated poverty estimates. District poverty rates

are found to be highly (and negatively) correlated with agricultural wages, with a correlation coefficient of -0.63 . Similarly, if poverty rates at the NSS region level are compared with agricultural wages derived from the NSS survey itself, workers in the coastal and ghat region are found to command over twice the wage earned by those in the inland northern regions that have higher levels of poverty.

Complementary evidence on employment shares (Table 5) corroborates the poverty estimates. The employment share in agricultural labor (as a percentage of the economically active population) is higher in the poorer inland southern and northern districts.

Further note that the pattern of district poverty rates is also reasonably consistent with independent estimates of per capita net district domestic product (see Figure 3). The correlation between the two series is -0.60 , increasing to -0.68 if the three outlier districts – Bangalore urban, Dakshina Kannada, and Kodagu – are excluded.

Finally, while poverty estimates disaggregated by district and NSS region are largely consistent with other measures of living standards, the rural-urban poverty gap indicated by the estimates reported in

Table 1 is hard to believe. The finding that urban poverty is 6 percentage points higher than rural poverty is difficult to reconcile with other evidence such as superior educational attainments, access to services etc. in urban areas. Higher urban poverty rates come from the fact that the urban poverty line, at Rs 511.44 is around 65 per cent higher than the rural poverty line of Rs 309.59. The large gap between the Planning Commission's urban and rural poverty lines for Karnataka stems from the choice of price indices used for adjusting the poverty lines over time [Deaton 2001]. Using Deaton's proposed poverty lines that explicitly account for urban-rural price differentials within the state in updating

Table 5: Distribution of Rural Population by Principal Economic Activity, by NSS Region

NSS Region	Agricultural Labour	Cultivation	Non-Farm
Coastal	27.6	15.0	57.4
Inland eastern	35.4	38.5	26.1
Inland southern	42.3	34.4	23.4
Inland northern	45.5	37.7	16.7
All	42.0	35.1	23.0

Note: Estimates are based on the 55th round NSS Employment-Unemployment Survey (Schedule 10) for Karnataka.

Figure 2: Agricultural Wages and District Poverty, 1999-00

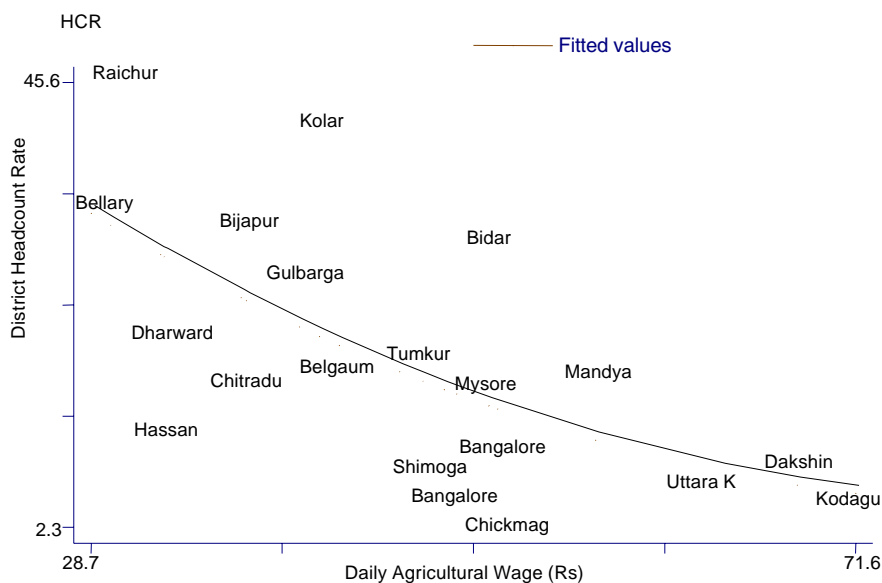
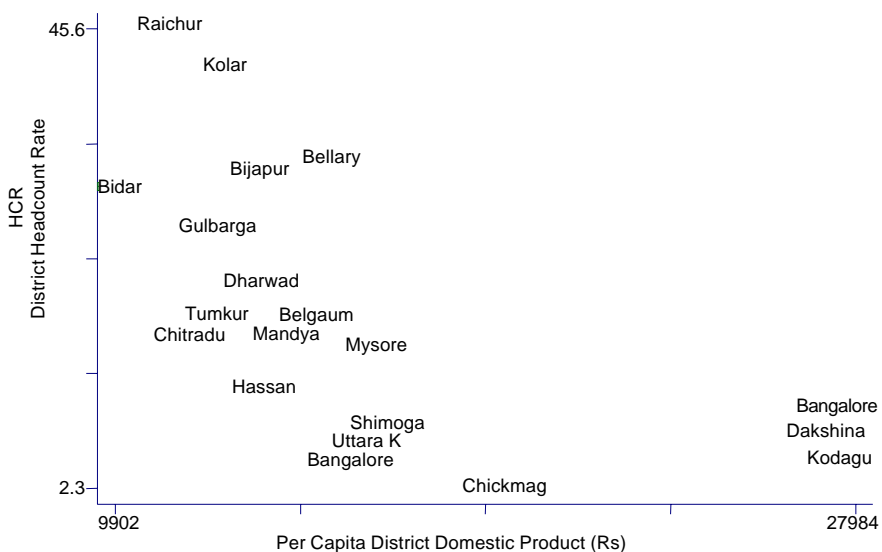


Figure 3: Net Domestic Product and District Poverty, 1999-00



the poverty lines over time, the estimated headcount rate in urban Karnataka declines sharply, to 6.6 per cent. In tentative support of the poverty line adjustments, the correlation coefficient between poverty levels and district domestic products improves significantly, from -0.59 to -0.68 . Revising the official poverty lines so as to more accurately measure the extent of poverty in the state and identify regions where the concentration of poverty is high will be a valuable exercise.

IV

Evidence on regional differences in poverty can be a useful policy tool for focusing resources and development efforts in poor

areas. However, disaggregated estimates of poverty within India's states are typically not computed because of inadequate sample sizes available for geographic or administrative units below the state level. This paper attempts to ameliorate the sample size problem by pooling the 1999-00 NSS 55th round central and state sample data. We use the pooled data to examine regional variation in poverty within Karnataka.

Regionally disaggregated poverty estimates show that there is considerable heterogeneity in the extent and depth of poverty within the state. The broad picture that emerges from the poverty estimates is one of: (i) higher levels of poverty in the northern districts, that are part of the

Gulbarga and Belgaum divisions; (ii) highest concentration of the absolute number of poor also in the northern districts: nearly 60 per cent of the state's poor live in these two divisions; (iii) but also considerable variation in poverty levels within divisions – e.g., Kolar district in Bangalore (Rural) division is about as poor as the northern districts. These poverty estimates are found to be reasonably consistent with independent correlates of poverty, including agricultural wages, employment shares, and district domestic products. However, one important inconsistency worth noting is that the rural-urban differentials in poverty rates are not credible and warrant further attention.

Analysis using this approach – pooling the central and state sample NSS data to derive regional poverty estimates – would be a useful undertaking for other states. In particular, the approach promises to provide a sound basis for evaluating and improving regional targeting of anti-poverty programmes. [4]

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Notes

[These are the views of the authors and should not be attributed to the World Bank or any affiliated organisation.]

- 1 The source of the problem lies in the recall periods used for food, paan, tobacco, and intoxicants. In the 55th Round, the 30-day and 7-day recall periods were simultaneously canvassed (in adjacent columns in the questionnaire) for the same households, while earlier NSS quinquennial rounds employed only the 30-day recall period. The new questionnaire design is expected to have led to reconciliation of expenditures between the 7-day and 30-day reports, which would have raised the expenditures based on the 30-day recall. As a result, headcount ratios in the 55th Round are likely to be biased down compared to what would have been obtained on the basis of the traditional questionnaire.
- 2 NSS region classification is as follows: Inland Northern consists of Gulbarga, Bidar, Raichur, Bellary, Belgaum, Dharwad, Chitradurga, and part of Bijapur. Inland Eastern consists of Kodagu, Chickmagalur, Shimoga, part of Bijapur, and part of Hassan. Inland Southern is Mandya, Mysore, Kolar, Tumkur, Bangalore Rural, and Bangalore Urban. Coastal and Ghat region is Dakshina Kannada and Uttara Kannada.
- 3 To conserve sample size, the current 27 districts have been classified into the 20 districts that existed prior to the recent re-organisation.
- 4 Although district-level poverty estimates have not been available, the fact that regional

disparities persist in Karnataka has been widely noted for a number of decades (e.g. Nanjappa, 1968; Iyengar et al., 1981; Iyengar and Sudarshan, 1983; Vyasulu and Vani, 1997).

5 CDFs plot the cumulative fraction of population that has per capita expenditures below different per capita expenditure levels. Lorenz curves plot the cumulative fraction of population, starting from the poorest, on the x-axis against the cumulative fraction of resources on the y-axis.

6 Wage data are from the Department of Economics and Statistics, GoK which collects monthly district-level data on agricultural wages separately for different categories of land, and further disaggregated by gender and by skilled and unskilled labour. The district agricultural wage used in Figure 2 is an average monthly wage for male agricultural labor across the different land types and skill levels. While the usual caveats regarding limitations of such averages apply (issues of comparability etc), these measures are nonetheless a reasonably good indication of wage laborers' expected income earning potential in different parts of the state.

7 While a day's work in the coastal region purchased about 5 kg of rice in 1999-00, in the inland northern region a day's work purchased around 2 kg. We are grateful to Yoko Kijima and Peter Lanjouw for providing the NSS region-wise estimates of agricultural daily wages and employment shares.

8 We should note that there may be a significant margin of error in district domestic product estimates, given the difficulties inherent in attributing state domestic product to different districts. These estimates are at best an indicative measure of the level of economic activity in the region.

9 This peculiarity has been noted by Deaton and Dreze (2002) who report rural and urban poverty estimates for Karnataka based on the central sample. They also note concerns about the urban-rural price differential implicit in official state-level poverty lines for a number of other states (e.g. Andhra Pradesh) as well.

10 Following the recommendations of the Expert Group in 1993, the original rural and urban All India poverty lines were adjusted for state-wise differences in price levels, separately for the urban and rural sectors. The adjustment procedure, however, did not explicitly consider the urban to rural differentials within states when setting the poverty lines, and after the adjustment, the All India urban to rural differential implicit in the official lines increased from 15 per cent prior to the adoption of the Expert Group recommendations to nearly 40 per cent in 1999-00. In some cases, as in Karnataka, the urban to rural differential implicit in the official poverty lines became unbelievably large.

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