

Approximate Poverty

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The changed survey methodology of the 55th round (and the consequent furore that has ensued) has demonstrated that there is indeed uncertainty surrounding estimates of poverty. The uncertainties concern the analysis of the NSS data, the poverty line benchmarks and the data themselves. This commentary discusses some of these issues and suggests that the intrinsic uncertainty surrounding who is, or not, poor is worth further evaluating.

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Since 2001, there has been a flurry of papers and articles dealing with data from 55th round of the National Sample Survey (NSS) many of them to do with the changes to the methodology and its effect on poverty estimates. This commentary takes a somewhat more cynical (hopefully more realistic) view of this important issue, its main focus being on uncertainty in such estimates, in other words how well can the extent of poverty be evaluated from such surveys.

Data and Statistics

India is a world leader in regularly collecting information on the characteristics of its people. Two databases that I wish to comment on concern the National Accounts database, common to nearly all countries, and that produced by the NSS through field surveys. These two sets of statistics constitute a top-down system – the National Accounts – and a bottom up system – the NSS. Estimates of consumption from the two sets of statistics are not the same, which is not surprising to those who have used both approaches for modelling socioeconomic and technological behaviours of people and nations. The general practice for reconciling the two approaches has been to use the National Accounts estimate of consumption as the standard and to normalize outputs from the NSS using the ratio of the NA/NSS consumption estimates. This practice has fortunately been abandoned in India and reliance for information on performance regarding poverty issues is, properly in my view, on the NSS data. Deaton and Kozer (2005) provide a nice overview of the NSS v NA dispute.

A related, but more philosophical, consideration concerns whether or not economic information collected at the national level (ie the National Accounts) form an example of an emergent phenomenon. This concept questions whether data at the individual level (ie a bottom-up approach) can ever be aggregated to form the National Accounts and conversely whether the National Accounts can be de-convolved to provide outputs at a highly disaggregated level as is involved in the NSS. This is analogous to the situation in physics where the macroscopic properties of matter cannot be known from the underlying quantum mechanical equations concerning the individuals atoms that constitute the matter in question and conversely the quantum mechanical properties can not be inferred from Newtonian inspection. Similarly, in biology, a complex organism seems to be greater than the sum of its constituent cells. For a broad discussion of emergent phenomena (mostly from a physics perspective but which does include socioeconomic considerations) see Laughlin (2005) and for a more economic focus, see Rosser (1999).

Putting such ‘emerging’ doubts to one side let me turn to the issue of poverty and the 55th NSS round. Being above the poverty line is considered to happen when one has enough food and enough income to begin to take one’s part in society. This is benchmarked by a total monthly expenditure that should just guarantee sufficient expenditure on food to meet the India recommended intakes, viz 2100 kcal per day for urban people and 2400 kcal for rurals. The benchmark varies across states and sectors. The total monthly expenditure also includes purchase of non-food items which can be viewed as the purchase of minimum necessary goods and services. The NSS surveys collect data (every fifth year or so) from a sample of households on expenditure by income classes in terms of food and other items based on a 30 day recall of consumption. From the number of households whose monthly income is below the benchmark, one can estimate how many people are ‘poor’. The surveys also collect much other data on demographics, religious and social group affiliations, etc which can be used to assess the influence of a range of parameters on the chances of being poor. In between the five yearly so-called ‘thick rounds’ there are intermediate lesser surveys (*aka* thin rounds) performed each year but with somewhat different objectives. By looking at the trend with time on the numbers above or below the poverty line, it is possible to get an estimate of how, for example, India is performing in terms of poverty reduction.

In the last, detailed, 55th round the NSSO changed its survey technique by including a 7 day and a 365 day recall; the former for food, the latter for those very occasional expenditures that poor people make. Whilst updating survey methodologies is to be commended [again see Deaton and Kozer, 2005], there is evidence that the memory of expenditures over these different multiple recall periods varied. Given the different time frames and the impact of one recall period on another (contamination), the problem was how to allow for this in order to quantify poverty in such a way as to be consistent with results of analysis from earlier rounds to allow trends to be assessed. This has received detailed discussion in *Economic and Political Weekly* and elsewhere, in particular, papers by Sen and Himanshu (2004a, 2004b). Deaton and Kozer (2005) also provide a review. The arguments and counter-arguments on how best to adjust (often a euphemism for introducing a ‘fiddle factor’) to get the results to meet expectations at times seem almost scholastic. An article by Popli, Parikh and Palmer-Jones (2005), entitled ‘Are the 2000 poverty estimates for India a myth, artefact or real’, puts the issue into perspective. They attempted to estimate poverty using non-parametric methods and concluded on the basis of their results and those in the literature that the different methods proposed for adjusting the 55th round data were unlikely to produce even approximately correct estimates of poverty.

This prompts me to ask, even in the absence of the problems plaguing the analysis of 55th round data, what can be the inherent accuracy of poverty estimates, given that different recall periods give different results and, therefore, are not accurate? If poverty was estimated at eg 28.1% for the 50th or whatever round, does this mean about 28% or somewhere between 26 and 30%? What are the real uncertainties? To what extent do any errors cancel out when comparing rounds to establish trends? That errors might cancel out seems a reasonable assumption, but I suspect that it is an act of faith to assume they do. It is worth noting that statistical methods generally determine how well the data fit the theory rather than how well the theory fits the data so the uncertainty estimates produced by statistical analyses are not necessarily a good indicator and, in fact, may only address part of the overall uncertainty.

Poverty Lines and Calories

There is also the question of how well the poverty line benchmarks reflect the border between those below and above poverty in the real world. Is this important or do we just want some approximate, semi-arbitrary baseline against which to make statistical comparisons for political or planning purposes? Aswani Saith (2005) has discussed the problems with the use of a one-dimensional measure of poverty. He considers that, as much of the heavy labour is performed by the poor, the recommended guidelines are inadequate and thus the numbers of poor are likely to be underestimated. Saith also points out that the numbers who appear to have inadequate food are considerably greater than those officially defined to be poor as is also indicated by Sen (2005) and which can be inferred from the data in the table below.

I now turn to the article by Sen (2005) concerning nutrition, poverty and consumption. Sen also argues against the use of poverty lines in poverty alleviation measures, questioning the use of the calorie norm as it is nutrition that is important. He suggests that nutritious food is more readily assimilated and therefore one needs less input calories if consuming a better mix of foodstuffs. He also suggests that poverty lines be defined as having enough nutritious food rather than just calories - a very sound recommendation but food habits of the poor are hard to change.

In his paper he presents a table of calorie consumption from the 55th round of surveys according to whether one is below (BPL) at or above (APL) the poverty line (PL) for rural and urban sectors. This is reproduced below (Sen's Table 4).

Class-wise Calorie Consumption, 1999-2000

	Rural (kcal/day)			Urban (kcal/day)		
State	BPL	PL	APL	BPL	PL	APL
A Pradesh	1406	1662	2097	1643	1792	2201
Assam	1585	1767	2136	1286	1478	2246
Bihar	1769	1977	2401	1690	1952	2407
Gujarat	1468	1684	2065	1517	1617	2158
Haryana	1523	1745	2539	1242	1457	2275
H Pradesh	1982	1942	2495	1351	N/A	2718
Karnataka	1442	1646	2151	1573	1841	2206
Kerala	1100	1389	2073	1376	1602	2152
M Pradesh	1649	1888	2305	1732	1961	2382
Maharashtra	1584	1780	2145	1684	1773	2169
Orissa	1792	2117	2421	2013	2450	2511
Punjab	1506	1712	2440	1572	1590	2235
Rajasthan	1755	2003	2532	1774	1986	2474
Tamil Nadu	1307	1543	1960	1464	1624	2191
U Pradesh	1839	1990	2548	1653	1796	2344
West Bengal	1664	1935	2296	1621	1771	2224

What I wish to focus on is not the PL class but those below. According to the table, the calorie intake of the poor ranged from 1100 kcal/day for Kerala to 1982 kcal/day for Himachal Pradesh. To understand these figures better it is necessary to understand what are the minimum calories required in order to survive.

A person takes in energy as food to (1) maintain the functioning of the body organs, (2) make up for heat loss from the body in the usually cooler surroundings (clothing provides

insulation to reduce this need) and (3) carry out physical work. It should be noted that when there is significant muscular work being performed then there is a need to get rid of the waste heat this generates through sweating; also, in parts of India, the climate at times can be such that the body gains heat from the environment rather losing it. There are various recommendations for calculating the calories required for performing a range of activities from standing still to hard labour, often involving a function of body mass, age, sex, climate and ethnicity; the values of 2100 and 2400 kcal/day used by India for average urban and rural people is one of them.

The minimum calorie intake just to maintain the functioning of the body is called the basal metabolic rate (BMR). This is determined by whole body calorimetry where the heat generated by the body (and/or the oxygen uptake) is measured by placing a person, at rest, in an isolated thermo-neutral environment. With regard to BMR, the energy needs have been reviewed by Froehle (2004) for his master's thesis. He found that influences of age, sex and ethnicity on BMR were removed if fat free body mass (FFM) rather than just body mass was used as a predictor; in other words body fat is considered to be a deposit rather than a fully respiring organ and is thus taken out of the metabolic equation. Unfortunately, data on body mass, rather than FFM is the norm. Froehle did find that tropical people seem to have a slightly lower specific BMR than those from colder climes, possible as an adaptation. Although Indians generally have more body fat than Europeans, it is probably safe to say that the poor do not. Assuming an average body weight of 45 kg with 10 per cent body fat to represent the BPL class, then Froehle's equations yield an estimated BMR of ~1300 kcal/day for a tropical situation. It would require a person of only 35kg in weight to get down to a BMR need of 1100 kcal/day. Thus if Sen's table is correct, and bearing in mind that these BMR calculations are for zero activity in thermo- neutral surroundings, those falling below the poverty line in Kerala must be literally starving to death. This seems to be curious as that state has one of the highest levels of literacy and lowest proportion of malnourished children of any state in India [NCP, 2005]. Even the PL class calorie consumption for Kerala is inadequate. The other explanation is that the values listed in the table for Kerala BPL and PL classes are in error for some reason, maybe inherent uncertainty is showing itself? The value for Tamil Nadu BPL also looks suspect on the same grounds.

An interesting trend in the BPL calorie data listed by Sen is that apart from Haryana and Punjab, they increase in value from south to north, the highest being for Himachal Pradesh. Although, from the above discussion, I have doubts about the accuracy of these numbers, it is possible that we are seeing the effect of climate. The Gangetic plains get quite cold during the winter months and the poor would certainly need more calories to offset loss of body heat to survive, insulation both in terms of clothing and housing being generally inadequate. An increase in food intake equivalent to 200 kcal/day for our poor 45 kg person would not be unreasonable. This raises the question of the time of year for which the NSS food consumption recalls applied in the regions affected by cold winters, and opens another potential avenue for uncertainty when analyzing the NSS data.

Conclusion

To summarise, India produces a gold mine of information on its people through the use of field surveys. This data lode is eagerly mined by armies of economists and others to get at the nuggets of information that lay buried there. However, in trying to extract every ounce of gold, there is chance that some of the glitter might be from iron pyrites rather than the

real stuff. The changed survey methodology of the 55th round (and the consequent furore that has ensued) has demonstrated that there is indeed uncertainty surrounding estimates of poverty. The uncertainties concern the analysis of the NSS data, the poverty line benchmarks and the data themselves and prompt me to suggest that the intrinsic uncertainty surrounding who is, or not, poor is worth further evaluating.

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