

Analyzing Poverty in India

Aditya Bhattacharjea
Delhi School of Economics
Econ 006, December 2011

Measuring poverty: Sen's axioms

- *Focus*: the poverty index depends only on the incomes of the poor
- *Monotonicity*: a reduction in the income of a poor person must increase the index
- *Weak Transfer*: redistribution from a person below the poverty line to someone better off, leaving the number of persons below the poverty line unchanged, must increase the index.

Let y_i = income of i^{th} person,
 z = poverty line, q = no. below poverty
line, n = population

- *Head count ratio (HCR)* = q/n
 - Measures extent of poverty but ignores its "depth"
 - Violates both monotonicity and WTA
 - Encourages policies directed at those just below poverty line, even if they make poorer persons worse off.

y_i = income of i^{th} person,
 z = poverty line,
 q = no. below poverty line,
 n = population

- *Poverty-gap ratio* = $\frac{1}{n} \sum_{i=1}^q \frac{z - y_i}{z}$
 - Measures total income shortfall of the poor
 - Measures "depth" of poverty
 - Satisfies monotonicity but violates WTA

Foster-Greer-Thorbecke (FGT) indices

$$P_{\alpha} = \frac{1}{n} \sum_{i=1}^q \left(\frac{z - y_i}{z} \right)^{\alpha}$$

- P_0 = HCR
- P_1 = PGR
- P_2 = Squared PG: measures "severity" of poverty and satisfies WTA

The Indian poverty line

- Measures *absolute* poverty in terms of a minimum level of *monthly per capita consumption expenditure* (MPCE).
- Until recently, this was based on the level of MPCE that allowed households to meet *calorie norms* established in the early 1970s.
 - 2100 kcal/person/day in urban areas
 - 2400 " " in rural areas
- These norms were for an individual in an average household, based on ICMR norms for individuals and the age/sex/occupation structure of the 1971 census.

- The calorie norm was converted into money terms using data from the 1973-74 NSS Consumer Expenditure Survey (CES), as follows:
- CES collects data on household's
 - consumption expenditure on all items,
 - quantity consumed of each food item → calculation of total calorie intake per day.
- Dividing both by household size gives rural and urban "calorie Engel curves" relating calorie intake per capita per day to MPCE* across households.
- The relevant calorie Engel curve was used to determine at what level of MPCE were households consuming 2100/2400 calories per capita in 1973-74. (But MPCE data is grouped, so *inverse interpolation* was used.)
- *These MPCE levels gave the poverty lines for 1973-74.*

* Sometimes referred to as per capita total expenditure (PCTE)

- On this basis, poverty line was approx Rs 49 per capita per month in rural areas and Rs 57 in urban in 1973-74.
- The bundle of goods consumed by households at the poverty lines are the *poverty line baskets (PLBs)*.
- For later years, **these poverty lines were updated by various price indices**: i.e. the poverty line for each year was the fixed 1973-74 PLB revalued at current prices.
- After the report of the **Lakdawala Expert Group** (1993), poverty lines were revalued using **state-specific consumer price indices**, and thereafter updated annually using **statewise CPIIW for urban and CPIAL for rural** (but with weights corresponding to the share of food in the MPCE of households near the poverty line in the 1973-74 CES).

- HCR and other poverty measures were obtained from these updated poverty lines using statewise distribution of household MPCE from each year's CES, separately for urban and rural.
- For each state, $HCR \times \text{population} = \text{number of BPL individuals (poverty count)}$, separately for urban and rural.
- All-India poverty lines were calculated so as to give the same national urban and rural poverty counts using national distribution of MPCE.
- In 2004-05 (61st Round CES), the all-India lines were Rs 356.3 for rural and Rs 538.6 for urban. 27.5% of the population was poor.

Bottom line:

- According to the above procedure, India's poverty line *in principle* preserved the real value of the 1973-74 poverty lines, defined as the MPCE levels at which households were consuming the calorie norms in that year.
- So a household was not "poor" if it is able to afford this 1973-74 PLB at current prices.
- This is regardless of whether it was *actually* consuming food sufficient to meet the calorie norm or any other nutritional norm (e.g., proteins or micronutrients).
- Also regardless of whether its non-food consumption on basic needs (e.g. expenditure on health and education) meets any norm.

Debates and controversies

1. Divergence between NSS and NAS consumption figures.
2. Non-comparability of recall periods in 55th Round (1999-2000) CES.
3. Updating the poverty lines using price indices with outdated weight-base.
4. Divergence of poverty lines from calorie norms as well as measures of nutritional outcome. [Covered in detail in Module 2]

1. NSS – NAS divergence

- Private consumption estimated by NAS is much higher than the aggregate inferred from NSS CES, and the gap has been growing: NAS figure is now about double the NSS figure.
- S. Bhalla: NSS consumption is under-reported; we should scale it up for all MPCE groups by the proportion required to reconcile with NAS. This reduces HCR to < 15%.
- But:
 - This adjustment unjustifiably assumes that the NSS mean is wrong but the distribution is right.
 - The NSS figure for *food* consumption closely matches data from NAS, NNMB and per capita availability, so NSS seems reasonably accurate for measuring consumption by the poor. Under-reporting of consumption in the NSS is most likely at higher MPCE levels, so proportionate scaling up at all levels is incorrect.
 - NAS consumption figures are crude estimates, and likely to be exaggerated.

2. The reference period controversy

- Until the 55th Round (1999-2000), poverty estimates were based on reported CES household consumption in the previous 30 days for all items (30-day Uniform Reference Period, or URP).
- The 50th Round (1993-94) experimented with a Mixed Reference Period (MRP) of 365 days for infrequently purchased items (clothing, footwear, durables, education, and institutional health care), and 30 days for all other items, but this MRP data was not used for poverty estimates.
- Four 'thin' Rounds (51-54) experimented with a Mixed Reference Period (MRP) of 7 days for food, 365 days for infrequently purchased items, and 30 days for all other nonfood items from a sub-sample of households, continuing with 30-day URP for another sub-sample.

- 55th Round used a new *uniform* questionnaire for *all* households. This had two significant consequences:
 - a) It asked *both* 7 and 30 days for food. Sharp increase as compared to earlier rounds in reported food consumption by 30-day report, opposite for 7-day. Households inflating 30-day and understating 7-day reports to be consistent?
 - b) It used MRP with 365 day recall for low-frequency items, reported on a 30-day basis. This increases reported consumption of poorer consumers by including their infrequent purchases.
- Both changes raise reported MPCE, and therefore we get a fall in poverty—but this is not comparable with earlier surveys. Various adjustments show the HCR was underestimated, but there is no conclusive way of comparing to earlier surveys.

Recent changes in reference periods

- Poverty estimates of the 61st Round (2004-05) were based on 30-day URP, but the survey also collected MRP data with 365 days for low-frequency items. Poverty estimates based on URP/MRP are comparable with the corresponding reference period of the 50th Round, but not of the 55th.
- For the latest 66th Round (2009-10), NSSO used both MRP and MRP* (7 days for some food items, 365 for low-frequency items, 30 days for all others) → poverty estimates will not be comparable with any earlier Rounds.

3. Updating poverty lines does not adequately capture inflation during 2000-05 (Deaton, 2008)

- The CPIAL and CPIIW used to update the official poverty lines used weights corresponding to expenditure shares in the 1983-84 CES. An even higher weight on food (from 1973-74) was recommended by Lakdawala Committee. But consumption patterns have changed drastically since then, with a fall in the share of food, even for the poor.
- Cereal prices were stable or declining during 2000-05, so the high weight assigned to them makes the price indices used to update poverty lines understate inflation in the cost of the *actual* consumption baskets.

4. Poverty-nutrition linkage

(Covered in detail in Module 2)

- Successive NSS rounds show that real MPCE has been rising across all fractiles, and therefore HCRs have been falling.
- But real *food* expenditure per capita has been stagnant, and calories, protein and micronutrient intakes per capita have been falling, at all MPCE levels since the 1980s.
- Downward shift of calorie Engel curves, so calorie intake at the poverty line is now much lower than the original calorie norms, or HCR for calorie deprivation is much higher.

Changes in the methodology of calculating the poverty line: Tendulkar Committee Report

- Recommendations based on suggestions by Himanshu (later published in EPW 2.1.10)
- Takes note of criticisms of the existing methodology:
 - change in consumption patterns since 1970s
 - under-adjustment for inflation when CPIAL is used for updating
 - HCRs are poorly correlated with anthropometric measures of nutritional outcome, both over time and across states
 - most states show urban HCR >> rural, even though their urban MPCE >> rural
 - calorie norm makes no allowance for non-food basic needs like health and education, which take up an increasing share of MPCE even for the poor.
 - MRP captures consumption of the poor on infrequently purchased items, which are missed out with URP

Major features and recommendations

- Abandon calorie norms and measure poverty as consumption deprivation rather than calorie deprivation.
- Instead of separate poverty norms for rural and urban, use a single poverty line basket, based on the existing urban poverty line of 2004-05, because:
 - Revised poverty lines should be based on some aspect of current practice
 - Existing urban poverty line is less controversial, and the existing urban HCR is close to anthropometric measures of malnutrition while rural HCR is much lower.
- Use MRP instead of URP data from CES (because of change in NSS procedure).

- New reference poverty line: the MRP-equivalent of the URP-based urban poverty line (Rs 538.6) of 61st Round
 - This MRP-equivalent is calculated as the MPCE according to the MRP distribution which gives the same urban HCR (25.7%) as the URP distribution
 - This procedure gives a reference urban PL of Rs 578.8.
- This reference all-India urban poverty line is converted to state-specific urban and rural poverty lines by adjusting for inter-state and urban/rural price differentials, using a combination of
 - unit values derived from CES for food, fuel, clothing and footwear
 - price indexes for health and education, based on actual expenditures per child, treatment or hospitalization episode (from other NSS surveys)
 - CPI data for durables, entertainment and miscellaneous items

(a) We start with the existing urban poverty estimate at all-India as our starting point. The existing urban poverty line is first adjusted for URP-MRP difference. However, since our aggregate indices exclude rent and conveyance, we calculate the poverty line corresponding to the MRP distribution by obtaining the urban poverty line, which gives us the same headcount ratio (25.7%) using MRP distribution as one would obtain using the URP poverty line of Rs 538.60. The poverty line, which gives a poverty headcount of 25.7% in urban areas using MRP distribution is Rs 579. The share of rent and conveyance in total MPCE of this poverty line class is 5.3%. Excluding this share, the MRP poverty line is $(579 \times (1 - 0.053))$ Rs 548.

(b) With this poverty line we arrive at the state urban poverty lines using the state relative to all-India index numbers. Since these urban poverty lines exclude rent and conveyance, we adjust these urban state poverty lines with actual share of rent and conveyance around the poverty line class. The all-India poverty headcount ratio is the population weighted poverty headcount ratio of all states.

(c) We use the final all-India urban poverty lines excluding rent and conveyance to obtain rural poverty lines in each state using the rural to urban Fisher indices. These are then adjusted upwards using the actual share of rent and conveyance around the poverty line class to obtain the final rural poverty line for each state.

uses Fischer index to prepare the price indices for urban-rural and inter state differentials

- These are aggregated into a relative price index for each state and sector (urban/rural), using budget shares of the poverty line class as weights. These price indexes are then used to obtain state-specific urban and rural poverty lines.
- These PLs are increased by the actual expenditure on rent and conveyance by the poverty line class in each state.
- This exercise gives the PLs for 2004-05. HCRs etc can be computed given the expenditure distribution from the 61st Round CES of that year.
- HCRs given by old and new methods are not comparable for a given year, but *decline* in HCRs between 1993-94 and 2004-05 can be compared because MRP data was collected (but not used) in the 50th Round, so the new methodology can be applied to recalculate HCRs for that year also.

HCRs with old and new methodologies, using 50th Round (1993-94) MRP data

	OLD METHODOLOGY		NEW METHODOLOGY	
	1993/4	2004/5	1993/4	2004/5
Rural	37.2	28.3	50.1	41.8
Urban	32.6	25.7	31.8	25.7
All-India	36.0	27.5	45.3	37.2

NB: Note that the new methodology leaves urban HCR for 2004-05 unchanged, by construction.

Validation and cross-checks for new poverty lines (PLs)

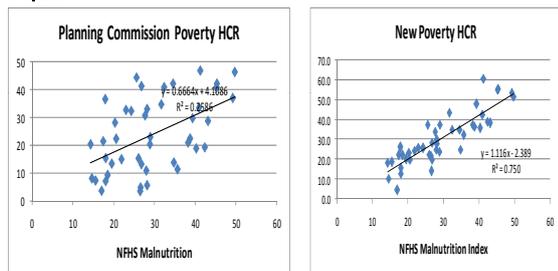
- Per capita calorie consumption of households in 2004-05 at the new urban PL was 1776 calories, which is close to the new FAO norm of 1800 for India. For households at the new rural PL, pc consumption was 1999 calories.
- The reference PL is close to the World Bank's PPP \$1.25 per capita per day international poverty line.

- Actual food expenditure at the new PLs was 6% higher than a normative level of food expenditure per capita, constructed as follows:

- For each state, construct a Malnutrition Index = mean of proportions of underweight children, adult males, and adult females (from NFHS-III). This is obviously a percentage.
- Then rank households in each state by food expenditure per capita in ascending order to get the cumulative distribution.
- Normative food expenditure per capita for a state is the level at which the cumulative population share for this distribution equals its malnutrition index.



Statewise, the Malnutrition Index is much more strongly correlated with HCRs from the new PLs ($\rho = 0.87$) than the official ones ($\rho = 0.5$): see the following charts, adapted from Himanshu (each point represents urban and rural separately for each state)



4. Actual expenditure on education and health at the new PLs >> normative expenditure on these items.

- Normative expenditure on Education = Statewise median* cost per child aged 5-15 x number of children per household at PL
- On Health: (a) Median* cost of non-institutional treatment x age-specific incidence of treatment x statewise age distribution of population. (b) Similarly for hospitalization.

* Median for the population, not the poverty line class.

Moving forward with new PLs

- Tendulkar Committee recommended that PLs for subsequent years can be computed by updating the reference urban PL using unit values and CPIs, and then calculating state-specific urban and rural PLs using the same procedure as above.
- This procedure gives the updated PLs for 2011: Rs 965 per month (urban) and Rs 781 (rural) – this resulted in the widely-reported figures of Rs 32 and 26 per day.

Criticisms of the Tendulkar Committee Report

- The PL has been calculated so as to give the impression of a reduction of poverty – *FALSE*.
- Basing the new PL on the urban PLB of 2004-05 is not justified. The PLB is a statistical fiction and cannot be claimed to be a "socially perceived normative minimal basket of basic human needs".
- Despite rejecting the calorie norm as the basis for the PL, the Committee still validates it on the basis of the FAO calorie norms.

- Malnutrition Index used for validation has conceptual and methodological limitations.
 - Current food consumption cannot be related to measures of nutritional status, which are the result of several economic and non-economic factors over a long period of time.
 - Using the arithmetic mean of three nutrition indicators assumes perfect substitutability between them

- Use of median cost for calculating normative health and education expenditures is unjustified
 - Health and education costs of the median households would make more sense than median cost
 - Median of *actual* costs incurred is an underestimate of reasonable quality health or education
 - Expenditures taken from a six-month NSS survey miss out seasonal variations in health expenditure.
 - The median is not additive, so a weighted average cannot be calculated.
- Actual incidence of treatment is an underestimate of illness requiring treatment

Some uncomfortable facts

- Sengupta Commission (2008): 'poor and vulnerable' defined as those below Rs 20/capita/day. This gives HCR = 77%.
 - Saxena Committee (2009): entitlement to BPL status should be based on households consuming 2100 calories/capita/day. This gives HCR = 50%
- (All of these obtain HCRs by applying their PLs to CES consumption distribution of 2004-05.)

World Bank Poverty Measures

- Convert national poverty lines to US\$, using the new 2005 ICP PPP ratios for consumption (Rs 15.6/\$ for India).
- Take average US\$ poverty line of poorest 15 countries (by per capita consumption) as the international poverty line (\$1.25).
- Convert back to national currencies at PPP for 2005.
- For any country whose last CES was earlier than 2005, apply the growth rate of aggregate consumption from its NAS to estimate the consumption distribution for 2005.
- With the updated consumption distribution and the international poverty line in local currency, calculate each country's HCR etc.
- Some findings:
 - 1.4 billion poor people in the world in 2005.
 - Global HCR declining by about 1 ppa since 1980, but this is mainly because of rapid poverty reduction in China (HCR fell from 84% to 16%).