Chapter III

CONCEPTUAL FRAME FOR THE MEASUREMENT OF POVERTY
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Introduction:

Though the concept of poverty is as old as society, heightened awareness of its macro dimensions, roots and remedies in the context of economic development is of recent origin. In the past the explanation for its existence was sought in terms of the individual deficiencies of character and lack of productive skills. Though this may be true to a limited extent in explaining instances of individual poverty, it fails in the face of massive and continuing poverty witnessed all over the developing world. As a consequence the need for examining the phenomenon as a process in contrast to its theorization as rooted in the individual has become imminent.\(^1\) The phenomenon has thus come to be viewed in terms of its social origin\(^2\) and causation rather than in terms of individual inhibitions and inadequacies. And the discriminating nature of the process of development has come to be understood in terms of the bargaining strength of the different socio-economic groups which participate in the process; as a consequence

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there is increased recognition and wider acceptance that accelerated economic growth may not by itself solve the unemployment and poverty problems of densely populated countries. Therefore there is a clear need to understand the nature of poverty in its varied dimensions. One of the prerequisites for incorporating the eradication of poverty as an objective in the plan process is the measurement and the identification of the poor.

An attempt has been made in this chapter to delineate the concept of poverty in its varied meanings adopted in the current literature and discuss their relevance to the present study. This is followed in section II by a brief outline of the approaches followed with a focus on the technical measures adopted in the measurement with their limitations. This is rounded up with a discussion bearing on the issues involved in interspatial and intertemporal comparison of poverty in the final section III.

Section I: Concepts of Poverty:

"Poverty has always had several not entirely separable meanings and is always defined according to the conventions of the society in which it occurs". Yet it can be viewed from

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varied angles for purposes of analysis. One may draw a distinction between 'primary' and 'secondary' poverty as enunciated by Rowntree in his pioneering studies and adopted later with variations in the works of Bowley, Beveridge and the social security Administration of the United States. He defined families whose "total earnings are insufficient to obtain the minimum necessaries for the maintenance of merely physical efficiency as being in primary poverty." Relying on Atwater's work bearing on the impact of nutritional intakes on the maintenance of body weight of prisoners, he estimated the average nutritional needs of adults and children, translated these.


needs into quantities of different foods and hence into the cash equivalent of these foods. To these costs he added minimum sums for clothing, fuel and other expenses according to size of family. Rent was treated as an unavoidable addition to this sum and was counted in full. A family was therefore regarded as being in poverty if its income minus rent fell short of the poverty line. Rowntree also classified some of his population as living in 'secondary poverty', "families whose total earnings would be sufficient for the maintenance of merely physical efficiency (primary level) were it is not that some portion of it is absorbed by other expenditure, either useful or wasteful." Rowntree's use of the concept of secondary poverty has enriched the notion of poverty by indicating that living in a state of poverty was not entirely a matter of income. This throws light


10/ Rowntree P.S. Poverty and Progress, Longmans, 1949, p.66.

on the role of demonstration effect in entailing leakages in household budgets by diversion of resources to items wasteful or otherwise even before the primary needs are met.

Another way of examining the concept is to distinguish between 'absolute' and 'relative' poverty. Absolute standards for poverty emphasize subsistence and economic insufficiency as the frame of reference for poverty. Relative standards, however, stress economic inequality as the primary indicator of poverty. While the concept of absolute poverty approximates to the 'primary' category of Rowntree, his 'secondary' poverty could be viewed as a component of the 'relative' type. Absolute poverty is defined in terms of an insufficiency of basic needs though questions regarding the precise nature of 'basic needs' and 'sufficiency' are very much alive. There is a greater measure of agreement on the food component of the needs and their sufficiency in terms of nutritional standards though conditions of climate, nature of work, age, body weight and absorption modify the requirements within agreed

12/ Samuel Hencher, Ibid, p.79.
Yet this leaves wide scope for debate on the nature and sufficiency of other components of basic needs. For instance, what is basic is a temperate zone may be superfluous in a tropical climate and vice versa. Insomuch of all these definitional problems the usual procedure followed in the computation of such a poverty line is as follows: Food requirements are estimated in terms of agreed nutritional factors and the "criteria for needs other than food is dodged by estimating food costs and taking these as a fixed percentage of the total budget stated to be necessary... essentially these percentages are a reflection of actual consumption... But, again, although actual behaviour is more relevant than an arbitrarily defined category of 'poor' it cannot be regarded as a criterion of need. This remains the nagging problem about the entire procedure." Further the circularity in the definition of poverty is obvious as in some respects budgetary practice is redefined as budgetary need.

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33/ For a highly informative discussion on the issues, see P.V. Sukhatme: "The World's Hunger and Future Needs in Food Supplies", Journal of the Royal Statistical Society, Series (a), Part 1, 1961, pp. 413-444; P.V. Sukhatme: "The Protein Problem, its size and nature (with discussion)", Journal of the Royal Statistical Society, Series (a), Part 2, 1974, pp. 166-191. Also "Humanity and Subsistence", Symposium, Vevey (Switzerland), April 1960, Annales Footle, 1961, for stimulating articles on nutrition requirements and absorption states of the body via metabolic matrix and conversion coefficients. Further, the works of Alan Berg and Nevin Scrimshaw are worth mentioning in the context.

14/ Peter Townsend: Poverty as relative deprivation: Resources and style of living, op. cit., p. 19.
While the categorization of poverty as 'absolute' is understandable since it denotes a defined level of living, its limitations should not be lost sight of. The standards are not absolute as they are not invariant over time and there is nothing inherently sacrosanct about the bundle of needs they represent. The definition is static in nature though comparative statics can be brought in through correction for price changes as long as a majority of the items in the bundle do not altogether disappear from the market. This of course happens over long periods of time. For example "the cumbersome garments which convention required women to wear at the beginning of this century were unlikely to be found on the market in the nineteenth-thirties let alone today. Electricity has replaced oil lamps and candles. Even food habits have changed".16/ This is precisely the problem faced by Hosmer in his third survey of poverty, the changing concept of need. 'Absolute standards' become 'contaminated' with notions of relativity as soon as the needs they encompass move beyond such indicators as protein and calorie intake. Whether or

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16/ Brian Abel-Smith and Peter Townsend: The Poor and the Peasant, occasions paper on Social Administration 35, 17, G. Bell & Sons, 1965, p.62.
not a man needs to visit the barbershop a particular number of times a year; a child 'needs' an allowance which will enable him to go to the movies, a family 'needs' a particular number of square feet of living space depends to some extent on what constitutes the average standard of living in his society. Necessities in one society may be luxuries in one whose members are encountering problems in bare survival. Just as the set of needs will vary from one society to another it can vary in the same society as its standard of living changes.\(^{12}\)

In order to avoid some of the problems encountered in fixing absolute standards the concept of relativity has been brought in. "The argument for relative standards rests on the assumption that for practical purposes standards become so fluid that no definition of need, no matter how broad, satisfied the ever changing expectations of modern life. Thus poverty, in advanced industrial democratic nations where the basic physical wants have been met is a matter of deviation from social and economic norms."\(^{13}\)

This concept of poverty as relative to an average standard of living converts poverty into an aspect of social


\(^{13}\) Samuel Hencher, op.cit., p.79.
inequality. Then a relative standard is used there will always be a bottom segment unless there is total equality. This approach no doubt provides a quick cutting point emphasizing the significance of relative differences in defining poverty. One may cite German Miller's suggestion that poor families be defined as those at the bottom fifth of the income distribution, in this context.

Another way of examining poverty is to conceptualize it in terms of 'relative deprivation'; 'poverty' declares Townsend 'can be defined objectively and applied consistently in terms of the concept of 'relative deprivation'. This way of looking at the issue makes the concept too amorphous and brings in dynamic elements of change. It involves an 'interrelated network of deprivations' and can

12/ See the Marxian parable: "A house may be large or small; as long as the surrounding houses are equally small it satisfies all social demands for a dwelling. But let a palace arise beside the little house, and it shrinks from a little house to a hut... however high it (the little house) may shoot up in course of civilization, if the neighbouring palace grows to an equal or even greater extent, the occupant of the relatively small house will feel more and more uncomfortable, dissatisfied and cramped with in the four walls" Karl Marx and Frederick Engels, Selected Works, Vol. 1 (Moscow: Foreign Languages, Publishing House, 1953), pp.934.

20/ Miller H.P. 'New Definition of our 'Poor' ' New York Times Magazine 21, April 1963, p.11 quoted in Samuel Moncier.

21/ Peter Townsend, Ibid., p.15.
be stretched to incorporate political deprivation as well. The relevance of this conceptualization has greater meaning from the point of view of advanced industrial countries where change is fast in all its manifestations. This is not only because "as society becomes wealthier the absolute level of old standards is outdated, but because economic growth alters the availability of different types of commodities, radically changes life styles and the composition of the old standard becomes irrelevant." In such societies there will arise a dual problem. Not only objective conditions but the perception of felt needs also change. In such situations "the social scientist can be the unwitting servant of contemporary social values and in the study of poverty this can have disastrous practical consequences. He may side with the dominant or majority view of the poor. If, by contrast, he feels obliged or is encouraged from the start to make a formal distinction between scientific and conventional perspectives he is more likely to enlarge knowledge by bringing to light information which has been neglected and create more elbow room for alternative forms of action, even if, in the end,

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some colouring of scientific procedure by social attitudes and opinions or individual valuation is inescapable".23/

In practice while the standards of poverty adopted represent a combination of the absolute and relative concepts, the nature of the combination is governed by its appropriateness to the society under study. "The use of absolute standards will be more prominent in nations where much of the population suffers from severe physical deprivation. In these situations the 'average' standard of living may be so low that if one reached it he would still be the victim of serious deprivation of basic needs. As the average standard of living becomes higher, we find relative standards coming more into play, either implicitly as they affect the setting of the absolute standards to be used or explicitly in designating the bottom segment of the population 'poor'... even the latter represents a mix in which selection of the cutting point is guided by an implicit absolute standard."24/

A great variety of studies on poverty have selected one standard or another in estimating the proportion of population suffering from economic insufficiency. For

23/ Peter Townsend, op.cit., p. 24-25.
instance the United Nations Committee of Experts emphasised the desirability of a pluralistic approach in defining levels of living and combined both relative standards and a variety of measures.25/ By standardizing rates for health, education, clothing, housing, etc., it is possible to make inter and intra-national comparisons of poverty as, for example, the infant mortality rates serve in the field of public health.

In the current study an attempt has been made to define poverty in terms of absolute standards based on nutritive norms. The procedure adopted in drawing the poverty lines has two stages. As the focus of nutritional adequacy the emphasis is on calories consumed per day. Hence various caloric levels are chosen, viz. 1800, 2000 and 2250 (per capita/per day) and the corresponding food expenditure is computed with the help of caloric functions. These food expenditure levels are then used in estimating the corresponding total expenditure levels by substitution in the regression equations relating per capita food expenditure as a function of per capita total expenditure. This implies the addition of average nonfood expenditure obtaining to the average food expenditure defined to yield a particular level of calories. Thus the approach postulates

absolute standards in nutritional norms taking food expenditure as the point of departure while obtaining budgetary practice is adhered to in the case of nonfood component involving a kind of partial circularity in taking practice as need. Inspite of the many conceptual difficulties involved this approach is more relevant when we keep the nature of the region in view wherein more than three fourths of the household budget is devoted for food at the average level. This need, however, is so fundamental that poverty lines drawn on the basis of nutrition can provide useful indicators of the proportion of the region's population consisting of households living in poverty.

Section II: **Tools of Measurement**

Though the resolution of conceptual issues is unavoidable in understanding poverty from an objective and scientific angle its quantification is no less basic from an operational point of view. The problem can only be comprehended in terms of concrete figures before any strategy is designed for its mitigation and eventual elimination. Further they form the basis in evaluating the success or otherwise of policy measures pursued in the alleviation of poverty. In general the poor defined by some criteria are counted either in number or as a proportion of the total population. This is the usually adopted approach, the Head count method. The other measure, a more
sophisticated one revealing the intensity of deprivation, is the poverty index put forth by Anantya Sen using an axiomatic framework based on ordinal welfare concept. There are other measures like the poverty gap and its related variants also. Though these measures describe the same objective phenomena these have distinct import in the context of policy formulation in the eradication of poverty. We shall be discussing them presently in detail.

**Head Count Ratio:** Of the various tools of measurement this is the most direct and simple and is extensively used in measurement exercises. The head count ratio is simply the ratio of the number of units with income or expenditure less than or equal to a defined level of income or expenditure, the poverty level. It is \( H = \frac{q}{n} \). Where \( q \) is the number of units below the defined level and \( n \) the total number of units. This does not take into account the variation among the units below the poverty line as it treats all of them uniformly. "The head count ratio, despite its widespread use, is peculiarly nondiscriminatory. If the poverty line is chosen to be, say, Rs. 300 per year, it is completely insensitive to whether a person is earning Rs. 299 or Rs. 100. One might, of course, take the view that if a person's income is much below Rs. 300, then he would
be dead, and thus the concept of the poverty line might be linked up with "subsistence". But this, as a justification of the head count ratio, is just nonsense. If $300 is really a strict subsistence level such that anyone enjoying less than this must perish, then the measure of poverty would always tend to be zero, those who continue to live must earn $300 or more. If on the other hand, $300 is not such a strict subsistence level, then people can survive earning less, but then one persons' income can be more close to $300 than that of another, and their positions are not identical. Starvation can be of various degrees and some causes more acute agony than others. This crude index, to cast the argument in technical language, violates some of the less demanding welfare axioms, viz. the nontransitivity axiom and the transfer axiom. The former is "given other things, a reduction in income of a person below the poverty line must increase the poverty measure." The transfer axiom is "given other things a pure transfer of income from a person below the poverty line to...


27/ The transfer axiom is akin to Dalton's 'principle of Transfers' in measuring inequality. This is also known in this context as Pigou-Dalton criterion.

any one who is richer must increase the poverty measure.\footnote{29} This is because, as already mentioned, this crude criterion is insensitive and ignores the inter-unit variation below the poverty line.

As the measure is simple, its implications are easy to grasp and it gives a rough idea readily about the magnitude of the problem in concrete numbers. This facilitates the working out of commitments involved in an operational strategy of poverty eradication.

\textbf{Poverty gap and its variants:}

One can examine, alternatively, the extent of shortfall in the income or expenditure of each person from the poverty line and devise a measure based on it. The poverty gap is simply "the aggregate shortfall in the incomes or expenditures of all the poor taken together from the poverty line."\footnote{30} That is

\[ G(Y) = \sum (Z - Y_i) \]

where \( Z \) is the poverty line and \( Y_i \) is the income or expenditure of the \( i \)th unit and \( Y_1 < Y_2 < Y_3 \ldots < Z \). This measure satisfies the monotonicity axiom but violates the transfer axiom. As the poverty gap is silent on the number of people


\footnote{30} Amartya Sen, \textit{Ibid.}}
who share this gap it needs to be normalised when comparisons
between two regions of differing population sizes are to be
made. The other variants are $I$, the income gap ratio and
$I^c$, the poverty gap normalised on the total income of the
community and $I_p$ and $I^{pc}$. These are

$$ I = \frac{\bar{A}}{n_p Z}, \quad I^c = \frac{\bar{A}}{n_p Z}, \quad I_p = \frac{\bar{A}}{n_p Z}, \quad I^{pc} = \frac{\bar{A}}{n} $$

where $\bar{A}$ = poverty gap, $n_p$ population below the poverty line,
$Z$ = poverty line and $n$ = total population, $\bar{S}$ = average income
of the region as a whole.

Sen's Poverty Index: The earlier measure focussed only on
the aggregate shortfall in the incomes or expenditures of the
poor from the poverty threshold without going into the
implications of the shortfalls by attaching weights to them.
It is reasonable to think that a unit nearer the poverty
line would suffer less compared to a unit farther below the
line. This could be accounted for by a mechanism of weighing.

Many systems of weighing are possible. One characteristic
the weights may be required to satisfy is that a poorer
person's income shortfall should receive a higher weight than
the income shortfall of a person who is richer than the first
despite being below the poverty line. One simple way of doing
this is to take the rank values of the poor in the income
ranking as the weights to be put on the income shortfalls of

\[31/\] For a detailed discussion see Appendix.
the different persons within the category of the poor. If there are \( n \) people with incomes below the poverty line, then the income shortfall of the richest among the poor gets a weight of 1, the second richest a weight of 2 and so on ending up with a weight of \( n \) on the income shortfall of the poorest poor. This yields a measure \( p \) of poverty after appropriate choice of units, etc.: this has the characteristic of being sensitive to the exact pattern of the income shortfalls of the poor from the poverty line.\textsuperscript{32}

Hence this measure reflects a more realistic picture of the incidence of poverty. Operationally,\textsuperscript{33}

\[
P = \frac{2}{(q+1)n^2} \sum_{i=1}^{q} \left( z - y_i \right) (q + 1 - i)
\]

where \( y \) is the income or expenditure of the \( i \)th unit arranged in ascending order of magnitude, \( q \) the number of units below the poverty line, \( z \) the minimum acceptable level of income or expenditure or the poverty line.


This measure is clearly a superior one as it overcomes the limitations of the earlier crude measures, the head count ratio and the poverty gap through a more demanding axiomatic structure. From a policy angle the head count ratio leads to perverse results as it is insensitive to the sufferings of the poor farther away from the poverty line. "This 'gross category' approach tends to lead to absurd policy implications ignoring the claims of the needier people in favour of those who are less needy. The measurement questions are integrally related to the policy issues and the grossness of the former leads to perversity in the latter." If policy makers are concerned not merely with the number of poor but also with the distribution of poverty, clearly the p measure is called for. The complementarity of both these measures is obvious as Sen's \( p \) measure is more realistic in capturing the intensity of poverty in ranking regions while head count helps in concretizing the the commitments needed for poverty eradication.

The poverty index can be expressed alternatively thus. Sen shows that for large numbers of the poor \((q)\), \( p \) can be written as

\[ p = \frac{\sum_{i=1}^{n} x_i}{q} \]

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24/ Amartya Sen "Poverty and Economic Development", op.cit.

* This approach is valid for only ungrouped observations.
\[ P = \pi \left[ I + (1-I) G \right] \]  
(1)

where \( I = \frac{\sum_{i=1}^{q} (z - q_i)}{q f(z)} \), \( N = q/n \) and \( G \) the Gini coefficient of the income distribution of the poor.

I can be written (or expansion and simplification) as

\[ I = \frac{\rho(z \frac{z^2}{z} - \frac{1}{z^2})}{\sqrt{z}} = 1 - \frac{\gamma}{z} \]

where \( \gamma \) is the mean income of the poor.

Substituting \( I \) in (1)

\[ P = \pi \left[ 1 - \frac{\gamma}{z} + (1-1 + \frac{\gamma}{z}) G \right] \]

\[ P = \pi \left[ 1 - \frac{\gamma}{z} + \frac{\gamma}{z} G \right] \]  
(2)

from (2) it is clear that \( P \) depends on the parameters \( I \), the head count, \( \gamma \) and \( G \).

\[ P = \pi \left[ 1 - \frac{\gamma}{z} (1 - G) \right] \]

we know \( \gamma/z < 1 \) and \((1-G) > 0 \)

so \( \gamma/z (1-G) < 1 \).

\[ P = \pi \lambda \]  where \( \lambda \) is a fraction of 1. Hence the value of \( P \) is a fraction of head count. Further

\[ \frac{dP}{dG} = \pi \frac{\gamma}{z} > 0 \]

\[ \frac{dP}{d\gamma} = \pi \frac{H (G-1)}{z} < 0 \]
these inequalities imply that as $c$ increases $P$ must rise and as $\frac{e}{d}$ increases $P$ must decline.

Section III: "Issues in Comparing Incidence of Poverty:"

Problems involved in comparing poverty estimates may be examined under two situations: one, when comparisons are made across space or interspatial and two, when they are effected over time or intertemporal.

Confining ourselves to interspatial comparisons, the problems arising may be understood in terms of differentials in the structure of prices and tastes. Assuming away the socio-economic groups under comparison as homogeneous the problem boils down to correcting for variations in the above parameters. For instance, comparisons of poverty incidence between rural and urban areas may be examined under two situations; one, when comparisons are made across space or interspatial and two, when they are effected over time or intertemporal.

Assuming away the socio-economic groups under comparison as homogeneous the problem boils down to correcting for variations in the above parameters. For instance, comparisons of poverty incidence between rural and urban areas may be examined under two situations; one, when comparisons are made across space or interspatial and two, when they are effected over time or intertemporal.

35/ A puritan may argue for the incomparability on the grounds that urbanites enjoy certain amorphous amenities which are entirely absent in the rural areas making the rural poverty qualitatively more unrealized and monotonous. Likewise urban poverty may be more irksome when congestion, noise, pollution etc. are included in the costs of living. The word 'amorphous' needs a bit of elaboration. The presence of amenities like tap water, hospitals and glittering lights in urban areas creates a euphoria of enjoyment irrespective of their accessibility to the majority outside elite socio-economic sectors; while the picture may be totally dark in the rural areas.

36/ The practice in general is to assume away prices in cross section studies and focus on price variations in time series studies.
areas would be vitiated unless price impact is eliminated. The urban costs of living would be higher because of the P.P.D. component, to borrow Kuznets' phrase, which is inconsequential in rural areas even when our focus is an identical bundle of goods and services. There is the further problem of the choice of the price deflator even when the need for price correction is agreed upon. This raises the issues involved in the availability of relevant price data and handling. Further if the consumption baskets are entirely dissimilar in their composition because of taste differentials, the commodities may have to be reduced to a common denominator, the nutrient characteristics, like calories and proteins before comparisons are effected. Even this is circumscribed by limitations of climatic variations which impose different demands on energy intake. These requirements could be examined, of course, within agreed upon ranges if the regions under comparison are not entirely dissimilar in climatic and geographical setting.

When we turn to intertemporal comparisons, corrections for price variations gains precedence over other limitations. This is because "when... prices have undergone large changes, a mere comparison of money incomes does not tell us much. We instinctively try to penetrate
the money facades and discover what has happened to the real incomes behind them." 37/ While adjusting for price changes the peculiarity of relevant data and the choice of price deflator are not easy to agree upon. To illustrate, Panditkar and Rath 38/ and Mirnas 39/ adopted the national income deflator to measure changes in prices in their studies on poverty due to lack of appropriate retail prices. But this choice is objectionable 40/ when it comes to measuring price changes for the rural poor. National income includes both consumption and investment goods and there is no reason why consumption should be deflated by wholesale price index. Further the expenditure pattern of the rural poor need not correspond to the commodity composition of the national product. Also as the poor is not a homogeneous group, the choice of a particular price index like the consumer price index for agricultural

37/ A.C. Pigou: Royal Economic Society Memorandum No. 60 quoted in Colin Clark, National Income and Outlay.


labourers will not absolve us of the difficulties. Moreover as the consumption patterns of different expenditure classes are bound to differ, the choice of a fractile specific index becomes imminent from a scientific angle.

Moreover as these patterns of different expenditure classes are bound to differ, the choice of a fractile specific index becomes imminent from a scientific angle.

There are other kinds of problems too, to be faced in these studies when the temporal span is markedly wide. For instance, the bundle of commodities under comparison may not be the same. If the bundle of commodities has entirely vanished from one period to another, which of course happens over long periods of time, some common characteristic of the commodities may have to be examined for purposes of comparison. Further, with development, when it is very rapid, the very concept of minimum requirements and the corresponding basket of goods and services may undergo change; it may be enlarged to include other commodities and services in which case a strict comparison over time lacks validity. Luxuries of yesterday slip into necessities of today. For instance, tea, a luxury in Marxian epoch has become 'necessity of life' and a psychological need of the present.

Comparison over short periods of time among the groups under more or less similar set of circumstances

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(geographic, climatic, socio-economic and political) is more meaningful than comparison over long periods and diverse sets of human groups subjected to entirely different sets of circumstances. To juxtapose the incidence of poverty among the Inuit of Canada against its incidence among an aboriginal tribe in central Africa is as meaningful as the comparison of the phenomena across continents.

Likewise comparison among countries is not as meaningful as comparison across regions within a country. Here also the relevance is relative because even under a single political system a country could be as big as a subcontinent with extreme diversities in relevant factors vitiating comparison. These are cited only to highlight the difficulties involved in comparisons across space and time.

On the top of these difficulties there is a more fundamental one. When comparisons are undertaken at the aggregate level, the aggregate figure will conceal the wide variations within the region. For instance "the average consumption basket in a region is rather deceptive as a guide to the living standard of the region since much depends on how that income is distributed. Just as the average food availability... is a bad guide to starvation and famines, so is the average national income per capita a bad guide to prosperity and poverty." 12/ Two regions

having the same per capita income may be attended by wide
differences in the incidence of income inequalities in
which case some groups may be more poor than others.
This happens because the burdens and benefits of development
will in general be unequally shared by different groups
in the society. Hence a more discriminating measure of
living standard which explicitly accounts for distribution
correction in evaluating the real income of the community
is called for.\textsuperscript{13/}

\textsuperscript{13/} See Amartya Sen: 'Real National Income', Review of
Appendix

Poverty in Fractile Graphical Frame

Consider a community of n persons having $y_1, y_2, \ldots, y_n$ incomes. Arrange the incomes in an ascending order of magnitude such that

$$y_1 < y_2 < \cdots < y_n$$

Divide the range into fractile classes of equal size and find out the average income of each fractile. The resulting distribution would give us the average incomes of each fractile class going up successively from the poorest to the topmost fractile class. Fix an income level as the poverty level ($z$) and calculate the income gap ($z - y_i$) for running over fractiles from the lowest to the highest; plot the income gap curve against the fractile classes and the resulting graph would be: The downward sloping curve (income gap curve)
portrays the behaviour of income gap \( (2-Y_i) \) over fractiles, i.e., for each fractile class the graph shows the difference between poverty income \( Z \) and the average income of each fractile class \( Y_i \). Broadly the point where the income gap curve crosses the X-axis gives the percentage of people below the poverty line (CP), the Head count ratio (H); and the point of intersection with the Y-axis shows the poverty income level (C2) assuming the average income of the lowest fractile to be negligible. The area under the curve OZP indicates the poverty gap normalised to 100 persons. It is "the aggregate shortfall in the income of all the poor taken together from the poverty line", and it is the income needed to wipe out poverty by lifting the poor to the poverty level. The poverty gap when weighed by giving progressively higher weightage to the poor as we move towards the origin and normalising it by a scalar we get Sen's poverty measure \( T \). The normalisation is done in order that Sen's measure takes the value unity.

The four variants of the poverty gap are obtained by normalising the gap with respect to (1) total income of the poor, (2) total income of the community, (3) size of the poor and (4) the size of the community respectively.

1. Income gap ratio \( (I) \) is obtained by normalising the poverty gap with the total income of the poor.
where \( n_p \) = Prop. of people below poverty line.
\( Z \) = Poverty line
\( L \) = length of the fractile class
\( O \beta \) = the average income of the community.

2. The second measure \( I^* \) is obtained by normalising the poverty gap to the total income of the community.

\[
I^* = \frac{O\gamma P}{O\gamma STF} \frac{A}{n_p \cdot Z}
\]

where \( n \) = total size
\( y \) = the average income of the community (O\( \xi \)).

3. The third measure gives the average height of the income gap curve normalised to the proportion of people below poverty line.
The fourth variant gives the average height of the income gap with respect to total size $n$.

$$I_p = \frac{GEP/GE'}{n}$$

**Poverty Gap and Redistribution:**

Let us consider the gap between the average income of the community and the poverty level income and the implications of redistribution in bridging the gap. The foregoing figure delineates these relationships in detail:

- $y_2$: poverty level income
- $\bar{y}_2$: average income of the community at $i = 1, 2, 3$ levels.
- $\text{CP}$: proportion of people in poverty.
The figure represents three cases where the average income of the community is:

(i) greater than the prevailing poverty income level \( C_y > 0z \)

(ii) equal to the poverty income level \( C_y = 0z \)

and (iii) less than the poverty income level

\[ i.e. \ C_y < 0z \]

\( GP(\text{A}) \) represents the aggregate income gap or the poverty gap of the community. In (i) the total income of the community \( C_y T' \) is greater than \( 0z LP \), the aggregate income needed to wipe out poverty, so

\[ \frac{0zP}{0zLP} > \frac{0zP}{C_y T'} \]

\[ i.e. \ T > T' \]

By redistribution of income in the community, poverty can be eliminated and the average income of the region would be higher than previous poverty income level after redistribution. In case (ii) though the average income of the community is equal to the poverty income level, the total income of the region \( C_y T' \) is greater than \( 0zLP \), the total income needed to eradicate poverty. So
Redistribution of income is possible and helps in eliminating poverty but every one would enjoy the same average income ($\bar{y}$) in this case after redistribution. In case (iii) the average income of the community is less than the poverty level income and the total income of the community $0 \leq \frac{\bar{y}}{3} = \frac{\sum_3}{3} > 0 \frac{y_2}{2}$ if the total deficit to be bridged is in eliminating poverty. Hence

$$\frac{GDP}{GDP} > \frac{\sum_3}{3}$$

1.e., $I > I''$

Redistribution will not help in combating poverty and the solution must be sought elsewhere.

**Poverty gap and Regional Comparisons**. When comparisons are to be effected in the magnitude of poverty across regions, the Head count ratio ($H$), Sen's measure ($P$) and the poverty gap ($G$) with its variants can be worked out and the estimates compared, but they must be normalized for variations in the size of populations before comparison. As long as poverty gaps of regions under study do not overlap, unambiguous judgements on the magnitudes of poverty can be made.
Difficulties of interpretation will have to be encountered when the income gap curves intersect and poverty gaps overlap, as in the cases cited below.

(a) Consider two regions A and B with populations normalised to 100, for comparison of the extent of poverty with the help of Head count ratio (H), Sen measure (P) and poverty gap (G).

\[ Y_1 \leq Y_2 \leq Y_3 \]

\[ (z - y_1) > 0 \quad \text{for those below the poverty line} \]

\[ (z - y_1) < 0 \quad \text{for those above.} \]

Let the income gap curves of the regions A and B (as indicated in the diagram) start at different point S and S' respectively on Y axis, intersect at L and meet X axis at the common point P. Assuming that the area SS'L and LT'B are identical
the case boils down to one where head count ratios and poverty gaps in the two regions are the same. But Sen's measure indicates a greater incidence of poverty in region A than in region B as $CS > 0S'$ and weightage is given to these distances in the formula. In this case

$$H_a = H_b, G_a = G_b \text{ and } p_a > p_b$$

A variant of the above case can be constructed when both the income gap curves leave Y axis from the same point intersect and meet the X axis at the same point. This would occur when the income gap is the same in the two regions at the lowest fractile level. Same conclusions as above hold good in this case too i.e.

A variant of the above case can be constructed when both the income gap curves leave Y axis from the same point intersect and meet the X axis at the same point. This would occur when the income gap is the same in the two regions at the lowest fractile level. Same conclusions as above hold good in this case too i.e.
In this case (with the assumptions as in (a)) poverty gaps are identical while head count ratios and Sen's measures differ, i.e.

\[ H_a < H_b \text{ as } OP < OP' \]

\[ G_a = G_b \text{ as } SS\text{AL} = PP\text{EL} \]

\[ P_a > P_b \text{ as } OS' > OS \]