TECHNICAL NOTE :

The commonest measure of over-all poverty is the head-count measure H, given by the proportion of the total population that happens to be identified as poor, e.g. as falling below the specified poverty line income. If q be the number of people who are identified as being poor and n the total number of people in the community, then the head- count measure H is simply q/n.

Another measure that has had a fair amount of currency is the so-called 'poverty-gap', which is the aggregate shortfall of income of all the poor from the specified poverty line. The index can be normalized by being expressed as the percentage short fall of the average income of the poor from the poverty line.

This measure denoted by - I will be called the 'Income gap ratio'.

The income gap ratio - I is completely insensitive to transfers of income among the poor so long as nobody crosses the poverty line by such transfers. It also pays no attention whatever be the number or proportion of poor people below the poverty line, concentrating only on the aggregate short fall, no matter how it is distributed and among how many. These are damaging limitations.

The head-count measure H is, of course, not insensitive to the number below the poverty line; indeed, for a given society it is the only thing to which H is sensitive. But H pays no attention whatever to the extent of income short fall of those who lie below the poverty line. It matters not to all whether someone is just below the line or very far from it in acute misery and hunger.

Furthermore, a transfer of income from a poor person to one who is richer can never increase the poverty measure H surely is perverse feature. The poor person from whom the transfer takes place is, in any case, counted in the value of H, and no reduction of his income will make him count any more than he does already. On the other hand, the person who receives the income transfer cannot, of course, move below the poverty line as a consequence of this. Either he was rich and stays so or was poor and stays so, in both of which cases the measure H remains unaffected; or he was below the line but is pulled above it by the transfer, and this makes the measure H fall rather than rise. So a transfer from a poor person to one who is richer can never increase poverty as represented by H.

The head-count measure H ignores the extent of income short falls, while the income gap ratio I ignores the numbers involved : why not a combination of the two ? This is, alas, still inadequate, If a unit of income is transferred from a person below the poverty line to some one who is richer but who still is (and remains) below the poverty line, then both the measures H and I will remain completely unaffected. Hence any 'combined' measure based only on these two must also show no response whatsoever to such a change, despite the obvious increase in aggregate poverty as a consequence of this transfer in terms of relative deprivation.

There is, however, a special case in which a combination of H and I might just about be adequate. If we were, to confine ourselves to cases in which all the poor have precisely the same income, it may be reasonable to expect that H and I together may do the job. Transfers of the kind that have been considered above to show the insensitivity of the combination of H and I will not then be in the domain of our discourse.

Amartya Sen gave an alternative poverty index to overcome the limitations of H & I. He took the poverty measure being a weighted sum of income gaps. When G is the Ginni coefficient of the distribution of income among the poor, this measure is given by $P = H \{I + (1-I)G\}$. When all the poor have the same income, then the Ginni coefficient G of income distribution among the poor equals zero, and P equals HI. Given the same average poverty gap and the same proportion of poor population in total population, the poverty measure P increases with greater inequity of income below the poverty line, as measured by the Ginni co-efficient. Thus, the measure P is a function of H (reflecting the number of poor), I (reflecting the aggregate poverty gap), and G (reflecting the inequality of income distribution below the poverty line). The last captures the aspect of 'relative deprivation', and its inclusion is indeed a direct consequence of the axiom of Ranked Relative Deprivation which focuses on the distribution of income among the poor.

(d) Calculation of Poverty Indices:

Head-count ratio (H)

$H = \frac{q}{n}$, where q = No. of beneficiaries below poverty line

n = Total number of beneficiaries.

Income-gap ratio (I)

$$I = \frac{g}{\pi . q},$$

where $g = \sum_{i=1}^{n} g_i$ (the aggregate poverty gap)

where $g_i = p - y_i$

p = Poverty line income (Rs. 21,000 at current prices)

Y_i = Income of the i^{th} beneficiary.

Ginni Co-efficient (G)

$$G = \frac{\text{Area of the shaded region (see graph)}}{\text{Area of the triangle above poverty line}}$$

Area of the shaded region is calculated by using the formula for the calculation of area of a polygon

Area of a polygon whose vertices taken in order are $(x_1, y_1), (x_2, y_2), (x_3, y_3) \ldots (x_n, y_n)$ is given by -

$$\Rightarrow = \frac{1}{2} \left[\begin{vmatrix} x_1 & y_1 \\ x_2 & y_2 \end{vmatrix} + \begin{vmatrix} x_2 & y_2 \\ x_3 & y_3 \end{vmatrix} + \ldots\ldots + \begin{vmatrix} x_n & y_n \\ x_1 & y_1 \end{vmatrix} \right]$$

After calculation of area the modulus values are taken.

The calculation of Ginni co-efficient has been made by drawing the Lorenz Curve showing income inequality between the cumulative percentage of beneficiaries on the horizontal axis and the cumulative percentage of income at/below poverty line on the vertical axis.

The percentage figure for income has been calculated by assuming poverty line income, at Rs. 21000 at current prices, as 100. The different percentage figures were calculated by taking the upper limits of the different income slabs under which the beneficiaries are identified and then the percentage data are cumulated. Similarly, the number of beneficiaries under different income slabs were put into percentage figure by taking the total number of beneficiaries as 100 and then the data are cumulated.

Sen-Index (P)

$P = H \{ I + (1-I)G \}$