CHAPTER III

RELATIVE RURAL POVERTY
The purpose of this chapter is to present the methods of measuring the inequality of household incomes and per capita income in Rural Punjab during the year 1982. The first part of this chapter introduces and comments briefly on the sources of data and the various measures of inequality which are to be presented. In the second section of the chapter, the values of the inequality measures have been presented and, in the third section, a general discussion is made.

Measures of Inequality and Methods of Estimation:

In this chapter, we present numerical values for Gini Coefficient, the Coefficient of Variation and various percentile shares of income. These statistics measure different aspects of inequality. In particular, the first two of these measures are indicators of inequality in the population as a whole while the percentile share enables us to comment directly on the experience of smaller groups of the population. The percentile share may be used to identify some of the points on the Lorenz Curve. This provides partial evidence on whether the Lorenz Curve from different distributions Y and X, intersects or whether one, say from Y, lies wholly or at least in part inside the other, from X. If this holds, then it has been shown that for all groups' welfare functions of a very general class (Symmetric and quasiconcave), group welfare for the distribution

---
1 See Atkinson (1970) or Sen (1973) for a detailed discussion of the properties of these measures.
Y is at least as great as for the distribution $X^2$. The available data are generally in the form of the number of families or individuals (observations) in a series of closed income ranges with an open ended terminal group.

The Gini-Co-efficient, $G$, is most readily calculated from the Lorenz Curve using the relationship between cumulative population proportion and cumulative income share—that is, $G = 1 - 2A$ where $A$ is the area under the Lorenz Curve. The problem of estimating the Co-efficient is essentially that of estimating the area $A$. Using the estimated class means, a set of points on the Lorenz Curve is identified and a trapezoidal approximation to the area under the Lorenz Curve is obtained.\(^3\)

There are various ways of defining the Gini-Co-efficient, and a bit of manipulation, tedious as it is, reveals that it is exactly one-half of the relative mean difference, which is defined as the arithmetic average of the absolute values of differences between all pairs of incomes.

---

2 This result is discussed and proved in Sen (1973) *Op. cit.*, Ch. III.

3 If there are $K$ classes with given number and (estimated) class mean then $K+1$ points, including $(0,0)$ and $(1,1)$ on the continuous Lorenz Curve are identified. The trapezoidal approximation to the area $A$ is the area lying under the $K+1$ points—this is an overestimate of the area and gives an underestimate of the Gini-Co-efficient. As the number of points, classes, increases so does the accuracy of the approximation.
The coefficient of variation is defined as the ratio of the standard deviation to the mean of the distribution.

\[ C.V. = \frac{\sigma}{\bar{X}} \]

Where,

\( \sigma \) = Standard Deviation

and \( \bar{X} \) = Mean

The formula for

\[ S.D. = \sigma = \left[ \frac{\sum n_i (y_i - \bar{Y})^2}{\sum n_i} \right]^{1/2} \]

Where \( i=1,2,\ldots,k \)

Where \( n_i \) is the number in class \( i \), \( y_i \) is the mean income for class \( i \), \( \bar{Y} \) the mean of the distribution and \( k \) is the number of class intervals.

The order to estimate income shares for selected subgroups (percentages) of the population, it is generally necessary to interpolate within an income class, or equivalently, between points on the Lorenz Curve for single distributions, the lower and upper bounds (except for the terminal group) and where estimated means of classes are known. This information is used to provide

the basis for quadratic interpolation within classes. For the combined distributions, estimated class means are used with linear interpolation between implied points on the Lorenz Curve to estimate the income shares.

**Income Concept:** The following factors contributed to family income:

1. Crops
2. Dairying
3. Non-Farm income
4. Ad-hoc income
5. Miscellaneous.

**Income From Crops:** This source of family income consisted of the imputed value of the main products on the farm. That value, the by-products of which were actually sold in the market was accounted towards income. It included cash and non-cash income.

**Income from Dairying:** It consisted of the imputed value of total milk produced on the farm. It also included cash as well as non-cash income.

**Non-Farm Income:** This is the third major component of the farm family income. These were off-farm incomes consisting of the cash income received by way of rendering services to a particular profession as well as the amount received as pension by the family members plus the remittances by other family members.
TABLE 1: MEAN GROSS ANNUAL INCOME FROM ALL SOURCES IN DIFFERENT DISTRICTS OF RURAL PUNJAB; 1982-83.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of District</th>
<th>Mean Annual Income per Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LUDHIANA</td>
<td>26,936.00</td>
</tr>
<tr>
<td>2</td>
<td>PATIALA</td>
<td>29,243.00</td>
</tr>
<tr>
<td>3</td>
<td>SANGRUR</td>
<td>21,884.15</td>
</tr>
<tr>
<td>4</td>
<td>BHALINDA</td>
<td>21,627.50</td>
</tr>
<tr>
<td>5</td>
<td>PUNJAB</td>
<td>24,922.66</td>
</tr>
</tbody>
</table>
or less at regular intervals) serving off the farm.

Ad-hoc Income:- This component of the farm family income consisted of the amount received by way of disposing of farm machinery and equipment, land, livestock, building and remittances received as gifts.

Miscellaneous:- This source of the farm family income consisted of the amount received by renting out a piece of land, building, amount received by hiring out labour/machinery and income received from any non-farm business such as flour mill, truck/taxi, poultry farm, etc.

Mean Annual Income from All Sources:

The relative contribution of different components of a gross farm family income in different districts in the Punjab State for the year 1982-83 has been shown in Table 1. It shows that the mean gross annual income is the highest in district Patiala and is the lowest in Bhatinda district. Ludhiana ranks second from the top in the mean annual income. The income is higher in these districts owing to the adoption of advanced technology which includes better seeds, irrigation, agricultural implements, etc. The overall annual income per family for Punjab State as a whole works to Rs. 24,922.66.

Concentration of Family Income

In order to know the share of various segments of the population in the total income during the year under study, the Co-efficient
<table>
<thead>
<tr>
<th>Fractile Groups</th>
<th>Ludhiana</th>
<th>Patiala</th>
<th>Sangrur</th>
<th>Bhatinda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom 5%</td>
<td>0.56</td>
<td>0.70</td>
<td>0.53</td>
<td>0.73</td>
</tr>
<tr>
<td>0-10</td>
<td>1.33</td>
<td>1.53</td>
<td>1.25</td>
<td>1.81</td>
</tr>
<tr>
<td>10-20</td>
<td>2.27</td>
<td>2.06</td>
<td>1.94</td>
<td>2.49</td>
</tr>
<tr>
<td>20-30</td>
<td>3.94</td>
<td>2.53</td>
<td>2.48</td>
<td>3.68</td>
</tr>
<tr>
<td>30-40</td>
<td>4.74</td>
<td>3.61</td>
<td>3.21</td>
<td>5.32</td>
</tr>
<tr>
<td>40-50</td>
<td>6.94</td>
<td>4.87</td>
<td>4.46</td>
<td>5.84</td>
</tr>
<tr>
<td>50-60</td>
<td>10.23</td>
<td>5.86</td>
<td>7.31</td>
<td>8.10</td>
</tr>
<tr>
<td>60-70</td>
<td>11.96</td>
<td>7.46</td>
<td>10.52</td>
<td>9.88</td>
</tr>
<tr>
<td>70-80</td>
<td>14.73</td>
<td>11.07</td>
<td>12.49</td>
<td>12.59</td>
</tr>
<tr>
<td>80-90</td>
<td>17.88</td>
<td>15.57</td>
<td>17.42</td>
<td>16.34</td>
</tr>
<tr>
<td>90-100</td>
<td>25.98</td>
<td>45.44</td>
<td>38.92</td>
<td>33.95</td>
</tr>
<tr>
<td>Top 5%</td>
<td>14.66</td>
<td>32.62</td>
<td>23.50</td>
<td>20.50</td>
</tr>
</tbody>
</table>

TABLE 2: PERCENTAGE SHARE OF TOTAL FAMILY INCOME BY FRACTILE GROUPS IN RURAL PUNJAB, 1982-83.
of Variation and Gini-Co-efficient of income were studied by working out the shares of deciles in different districts of Punjab State and the same have been shown in Table 2 and 3.

An examination of Table 2 reveals that the share in family income increases corresponding to the deciles from a lower level to a higher level in all the districts of the State. The lower 10 percent of the total families shared 1.33, 1.53, 1.25 and 1.81 percent of the total income in Ludhiana, Patiala, Sangrur and Bhatinda district respectively during the year under study. It clearly shows that the district which has a lower family income (mean) has the highest share among the poorest 10 percent of people. Thus, the poor families of Bhatinda district are better off as compared to their counterparts in other districts. To have a closer look, if we compare the share of the bottom 5 percent of the people in the total income, then again Bhatinda district has a share of 0.73. The share of the bottom 5 percent families in other districts are 0.70, 0.56 and 0.50. The lower 50 percent of the families were having 19.22, 14.6, 13.33 and 19.14 percent of the total income as their share in districts Ludhiana, Patiala, Sangrur and Bhatinda while the upper 50 percent of the families have as their share 80.78, 85.4, 86.67 and 80.86 percent of the total income. Thus, a great variability in the distribution of income between the lowest 50 percent and the upper 50 percent of the families has been seen. The top 10 percent of the population was enjoying a large chunk of the total income with 25.98, 45.44, 38.92 and 33.95 percent in districts Ludhiana, Patiala, Sangrur and Bhatinda respectively.
Fig. 1  LORENZ CURVES OF INCOME DISTRIBUTION ACCORDING TO HOUSEHOLDS IN DIFFERENT DISTRICTS OF PUNJAB, 1982.
<table>
<thead>
<tr>
<th>Fractile Groups</th>
<th>Punjab State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom 5%</td>
<td>0.63</td>
</tr>
<tr>
<td>0-10</td>
<td>1.48</td>
</tr>
<tr>
<td>10-20</td>
<td>2.19</td>
</tr>
<tr>
<td>20-30</td>
<td>3.16</td>
</tr>
<tr>
<td>30-40</td>
<td>4.32</td>
</tr>
<tr>
<td>40-50</td>
<td>5.53</td>
</tr>
<tr>
<td>50-60</td>
<td>7.88</td>
</tr>
<tr>
<td>60-70</td>
<td>9.95</td>
</tr>
<tr>
<td>70-80</td>
<td>12.72</td>
</tr>
<tr>
<td>80-90</td>
<td>16.80</td>
</tr>
<tr>
<td>90-100</td>
<td>36.07</td>
</tr>
<tr>
<td>Top 5%</td>
<td>22.82</td>
</tr>
</tbody>
</table>
On the whole, the pattern of distribution was quite consistent in Punjab State, as has been observed in the individual districts. A great variation has been seen in the distribution of income at the lower and upper ends. The lower 10 percent of the population had as its share 1.48 percent while the upper 10 percent made a contribution of 36.07 percent. Similarly, the lowest 50 percent of the population shared 16.58 percent as compared to the upper 50 percent with 83.42 percent.

Also, the share of the bottom 5 percent of the families in income distribution was only 0.63 as compared to the top 5 percent of the families which had a share of 22.62 percent. Thus, there is a wide range of disparities in the income distribution between the top 5 percent and the bottom 5 percent of the families.

Concentration of per Capita Income:

Since the concentration of income according to families is a somewhat crude measure of distribution, the concentration of per capita income has been worked out for various districts. This information has been presented in Table 4.

Table 4 reflects that the lower 10 percent of the population has a share 2.64, 1.41, 1.14 and 2.49 percent of the income in Ludhiana, Patiala, Sangrur and Bhatinda districts respectively, while the upper 10 percent had as their share 21.45, 43.98, 36.97 and 35.80 percent respectively, thus indicating a great
Fig. 2  LORENZ CURVE OF INCOME DISTRIBUTION ACCORDING TO HOUSEHOLDS IN PUNJAB STATE, 1982.
## TABLE 4: PERCENTAGE SHARE OF PER CAPITA ANNUAL INCOME BY FRAC T ILE GROUPS IN RURAL PUNJAB; 1982-83

<table>
<thead>
<tr>
<th>Frac tile groups</th>
<th>Districts</th>
<th>Districts</th>
<th>Districts</th>
<th>Districts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1) Ludhiana</td>
<td>(2) Patiala</td>
<td>(3) Sangrur</td>
<td>(4) Bhatinda</td>
</tr>
<tr>
<td>Poorest 5%</td>
<td>0.81</td>
<td>0.64</td>
<td>0.51</td>
<td>1.18</td>
</tr>
<tr>
<td>0-10</td>
<td>2.64</td>
<td>1.41</td>
<td>1.14</td>
<td>2.49</td>
</tr>
<tr>
<td>10-20</td>
<td>3.82</td>
<td>2.03</td>
<td>1.84</td>
<td>2.97</td>
</tr>
<tr>
<td>20-30</td>
<td>5.64</td>
<td>2.61</td>
<td>2.56</td>
<td>3.55</td>
</tr>
<tr>
<td>30-40</td>
<td>7.00</td>
<td>3.26</td>
<td>3.85</td>
<td>4.56</td>
</tr>
<tr>
<td>40-50</td>
<td>8.06</td>
<td>4.11</td>
<td>5.32</td>
<td>6.43</td>
</tr>
<tr>
<td>50-60</td>
<td>9.37</td>
<td>5.49</td>
<td>7.76</td>
<td>7.57</td>
</tr>
<tr>
<td>60-70</td>
<td>10.70</td>
<td>8.24</td>
<td>9.98</td>
<td>9.18</td>
</tr>
<tr>
<td>70-80</td>
<td>15.32</td>
<td>10.36</td>
<td>12.58</td>
<td>11.49</td>
</tr>
<tr>
<td>80-90</td>
<td>16.00</td>
<td>18.51</td>
<td>18.00</td>
<td>15.96</td>
</tr>
<tr>
<td>90-100</td>
<td>21.45</td>
<td>43.98</td>
<td>36.97</td>
<td>35.80</td>
</tr>
<tr>
<td>Top 5%</td>
<td>12.00</td>
<td>27.05</td>
<td>25.35</td>
<td>23.98</td>
</tr>
</tbody>
</table>
variation between the lower and the upper segments of the population. To have a closer look at the distribution of income, the bottom 5 percent of the population has a per capita income of 0.81, 0.64, 0.51 and 1.18 while the top 5 percent share 12.00, 27.05, 25.35 and 23.98 in the districts of Ludhiana, Patiala, Sangrur and Bhatinda respectively. Similarly, the bottom 50 percent of the population has a share of 27.16, 13.42, 14.7 and 20.00 percent of income as compared to that of the upper 50 percent with 72.84, 86.58, 85.30 and 80.0 percent as their share in the districts of Ludhiana, Patiala, Sangrur and Bhatinda respectively. It is obvious from the above analysis that the distribution of per capita income according to population is to a large extent relatively fair in district Ludhiana as compared to other districts of the State.

Pooled analysis of data indicates that the lower 10 percent of the population in the State of Punjab has a share in the income to the extent of 1.92 percent while the upper 10 percent share 34.55 percent, as shown in Table 5. Similarly, the share of the lower 50 percent is 18.82 percent as compared to that of the upper 50 percent whose share is 81.18 percent. Thus, a great variation was observed in the distribution of income at the extreme ends of the population during the year under study. Also the, bottom 5 percent of the population has a share of 0.79 in income as compared to the top 5 percent whose share is 22.09 percent. Thus, there is a great variation in income
Fig. 3  LORENZ CURVE OF PER CAPITA INCOME DISTRIBUTION IN DIFFERENT DISTRICTS OF PUNJAB, 1982.
TABLE 5: PERCENTAGE SHARE OF PER-CAPITA INCOME BY
FRACITILE GROUPS IN RURAL PUNJAB; 1982-83

<table>
<thead>
<tr>
<th>Fractile Groups</th>
<th>Punjab State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom 5%</td>
<td>0.79</td>
</tr>
<tr>
<td>0-10</td>
<td>1.92</td>
</tr>
<tr>
<td>10-20</td>
<td>2.68</td>
</tr>
<tr>
<td>20-30</td>
<td>3.59</td>
</tr>
<tr>
<td>30-40</td>
<td>4.66</td>
</tr>
<tr>
<td>40-50</td>
<td>5.97</td>
</tr>
<tr>
<td>50-60</td>
<td>7.55</td>
</tr>
<tr>
<td>60-70</td>
<td>9.52</td>
</tr>
<tr>
<td>70-80</td>
<td>12.44</td>
</tr>
<tr>
<td>80-90</td>
<td>17.12</td>
</tr>
<tr>
<td>90-100</td>
<td>34.55</td>
</tr>
<tr>
<td>Top 5%</td>
<td>22.09</td>
</tr>
</tbody>
</table>
Fig. 4  LORENZ CURVE OF PER CAPITA INCOME DISTRIBUTION IN PUNJAB, 1982.
Gini-Ratios and Co-efficient of Variation of Family Income

Gini-Ratios as given in Table 6 were derived from the following formula:

\[ G = 1 + \frac{1}{n} - \frac{2}{n^2} \sum_{i=1}^{n} Y_i \]

Also, the Lorenz Curves were drawn both for districts individually as well as for all the districts (combined). These curves were obtained by plotting the cumulative percent of income receiving units on the X-axis against the cumulative percentage of total income received by these units on the Y-axis.

It can be seen from table 6 that the concentration ratio of the income varied from 0.429 in Ludhiana district to 0.565 in Patiala district. It may be mentioned here that a value of '0' for the Gini-Ratio indicates a perfectly equal distribution while a value of '1' indicates the worst possible distribution. Hence, the higher the estimate of the Gini-Ratio, the more is the inequality and vice-versa. Therefore, the estimates of Gini-Ratios in table 6 indicate that Ludhiana district had the best distribution followed by Bhatinda, Sangrur and Patiala districts.

Gini-Ratios worked out from per capita income in different districts of the State indicate a different pattern of income distribution. The value of Gini-Ratio in this case varied from 0.314 to 0.563 in Ludhiana and Patiala districts respectively.
<table>
<thead>
<tr>
<th>Type of Income</th>
<th>Ludhiana</th>
<th>Patiala</th>
<th>Sangrur</th>
<th>Bhatinda</th>
<th>(Combined) PUNJAB STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 GINI-CO-EFFICIENT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Family Income</td>
<td>0.429</td>
<td>0.565</td>
<td>0.536</td>
<td>0.466</td>
<td>0.499</td>
</tr>
<tr>
<td>(b) Per Capita Income</td>
<td>0.314</td>
<td>0.563</td>
<td>0.523</td>
<td>0.470</td>
<td>0.467</td>
</tr>
<tr>
<td>2 CO-EFFICIENT OF VARIATION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Family Income</td>
<td>0.769</td>
<td>0.910</td>
<td>0.881</td>
<td>0.823</td>
<td>0.845</td>
</tr>
<tr>
<td>(b) Per Capita Income</td>
<td>0.593</td>
<td>0.750</td>
<td>0.728</td>
<td>0.699</td>
<td>0.692</td>
</tr>
</tbody>
</table>
This trend of the value reflected that Ludhiana had the best distribution of income while Patiala district appeared to be the worst in this respect.

Gini-Ratios were also worked out by pooling the data for all the districts in respect of family income and per capita income. It is clear from Table 6 that the distribution of per capita income showed a relatively fair distribution as compared to that of family income. Gini-Ratio for the State as a whole worked out to be 0.466 in the case of per capita income and was 0.499 in the case of family income during the year under study. To conclude from the above discussion, it is obvious that there were wide income disparities among the families as well as the population.

The Co-efficients of variation also depict that there were greater inequalities in the distribution of income. From Table 6 it is clear that income distribution is more consistent in district Ludhiana and it is worst in district Patiala. To generalise this, it can be said that the higher the Co-efficient of Variation, the worse will be the income distribution i.e. inequalities will be greater there, and vice-versa.

Thus, from the above results (Gini-Co-efficient as well as Co-efficient of Variation) it is clear that inequalities were highest in Patiala district and lowest in Ludhiana district during the year under study. However, inequalities in per capita income were relatively fair in Ludhiana district as compared to the family income distribution. This is so
because the Gini-Co-efficient and Co-efficient of Variation had a very low value.

Pooled analysis also shows that income distribution in the case of per capita income is relatively fairer than that of the family income: the Gini-Co-efficient is 0.499 and 0.467 as compared to the value of the Co-efficients of Variation which are 0.845 and 0.692 in the case of family income and per capita income respectively.

Factors behind Inequalities:

As we have seen from the above discussion, there were wide income disparities among the population as well as the families. Inequalities in Patiala district were the highest and were lowest in Ludhiana district. These were largely due to the fact that landless labourers, agricultural labourers, and marginal farmers had a very small share of income as compared to that of landlords and medium farmers. Landless labourers and agricultural labourers took advances from their landlords at higher interest, and they always remained in debt. These were the two main classes which suffered heavily. The second factor behind the greater inequalities was that the poorer families had a larger number of dependents as compared to the richer families. That is, landlords had smaller families and higher per capita incomes. On the other hand, agricultural labourers and cultivators had small incomes but their family size was larger. Among the
sociological factors, casteism is very crucial. The Jats, having land, dominate the villages and the cultivators and agricultural labourers were mainly from the scheduled Castes and tribes, who had less economic freedom and a weak financial position.

Another factor behind these inequalities is that agricultural labourers, cultivators and even marginal farmers (having less than 2.5 acres of land) are illiterate. Due to illiteracy, they have to work at lower wages in the case of labourers. Moreover, they are not in a position to leave the villages because of their illiteracy. They are ready to leave only if they get higher wages. In the case of cultivators, they have to pay higher rent against rented-in land. According to our survey, rent was highest in Sangrur district, and lowest in Bhatinda district. Patiala district ranks second from top and Ludhiana second from the bottom.

To have a look district-wise, Ludhiana district has the lowest inequalities in income distribution, owing largely to the adoption of HYV, irrigation facilities, better seeds, tractorisation etc. On the other hand, small farmers as well as marginal farmers work during off-season as workers and, by working hard on their land by utilising their family labour, eke out a better living. Also, family members are doing some other work in industries etc. Therefore, the inequalities in that district are reduced.
In the case of Patiala district, inequalities were highest among all the districts. This largely due to the fact that the land holding in Patiala district, particularly in Dakala and Lalyan villages surveyed*, was highest in the case of landlords. On the other hand, labourers were getting less wages and in the case of permanent labourers—money in advance was available at fairly reasonable rate of interest. Also, the number of dependents was large, so the per capita income decreased. Another factor in this district (the Jogipur village which we had surveyed) is that the irrigation facilities were not good enough to ensure a higher growth rate of income.

Suggestions and Conclusion:

To conclude from the above discussion in this chapter, we have seen that income distribution was relatively fairer in the case of Ludhiana district and the worst district in this respect was Patiala. The percentage share in income distribution of the bottom 10 percent of the families was 1.33, 1.53, 1.25 and 1.81 as against the top 10 percent of the families having as their share 25.98, 45.44, 38.92 and 33.95. Also, the value of the Gini-Co-efficient and the Co-efficient of Variation works out to be 0.429, 0.565, 0.536 and 0.466; and 0.769, 0.910, 0.810 and 0.823 in the case of Ludhiana, Patiala, Sangur and Bhatinda respectively. As a result, income distribution was relatively fair in Ludhiana

* See Data Collection & Methodology.
Inequalities can be decreased to some extent if the cultivators can get land of their own, so that they will not have to pay the rent which is very high. By increasing the annual remuneration of permanent agricultural labourers and, in case they are getting advance, it should not be given at a high rate of interest. Inequalities can also be decreased by providing more irrigation facilities to those farmers whose land is unirrigated so that they can make the best use of their land and can increase their income. Limiting the family size is equally important to increase the per capita income. If these measures are implemented properly, the magnitude of inequalities may be considerably lessened.