IV
RESEARCH METHODOLOGY

This chapter is concerned with the description on research methods and techniques followed for carrying out the study. It also describes design of research, methods of data collection, the empirical measures developed and techniques used to measures the variables and concepts, and finally the statistical procedures employed in the analysis of data.

The study has been conducted based on primary as well as secondary data. To examine the changes in income, employment and level of living secondary has been used.

4.1 Design of Research

The study is based on the survey method. In this method, the investigator sampled a group of individuals, and their responses to the questions they were asked were recorded. This was done through interviewing method. The investigator used structured scheduled to collect the relevant information from the individuals about their own families. More especially in this method, the interviewer contacted the respondents, asked questions in their language using local dialects, as far as possible, and filled in scheduled accordingly to the responses.

4.2 Selection of District

There are 19 districts in West Bengal including Kolkata and Birbhum is one of the important districts in sub-humid lateritic belt of West Bengal. Birbhum has been purposively selected for the present study. The basic considerations for the selection of the district are: (i) as per the population Census, 2001, majority of the population (91.42 per cent) live in rural areas, (ii) the intra-district imbalances with respect to the agro-technological (cropping intensity, productivity, irrigational status,
mechanization) and developmental parameters (rural roads, marketing infrastructure, cold storages) are very prominent in this district and (iii) even in spite of 59.9 per cent literacy rate (Census, 2001), the incidence of poverty is still quite high in this district.

4.3 Selection of Blocks

Birbhum district comprises of 19 blocks in three sub-divisions namely Suri (Sadar), Rampurhat and Bolpur. Out of 19 blocks, three blocks i.e. one block from each sub-division has been chosen randomly. Finally Sainthia Block from Suri Sub-division, Rampurhat–I Block from Rampurhat Sub-division and Bolpur-Sriniketan

Table 4.1: Inhabited villages in blocks of Birbhum

<table>
<thead>
<tr>
<th>Sub-division/ District</th>
<th>Name/Number of Block</th>
<th>No. of inhabited villages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suri (Sadar)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Md. Bazar</td>
<td></td>
<td>138</td>
</tr>
<tr>
<td>2. Sainthia</td>
<td></td>
<td>216</td>
</tr>
<tr>
<td>3. Rajnagar</td>
<td></td>
<td>89</td>
</tr>
<tr>
<td>4. Dubrajpur</td>
<td></td>
<td>193</td>
</tr>
<tr>
<td>5. Suri-I</td>
<td></td>
<td>105</td>
</tr>
<tr>
<td>6. Suri-II</td>
<td></td>
<td>85</td>
</tr>
<tr>
<td>7. Khoyrasole</td>
<td></td>
<td>126</td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>952</td>
</tr>
<tr>
<td><strong>Rampurhat</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Rampurhat-I</td>
<td></td>
<td>113</td>
</tr>
<tr>
<td>2. Rampurhat-II</td>
<td></td>
<td>91</td>
</tr>
<tr>
<td>3. Murarai-I</td>
<td></td>
<td>80</td>
</tr>
<tr>
<td>4. Murarai-II</td>
<td></td>
<td>66</td>
</tr>
<tr>
<td>5. Nalhati-I</td>
<td></td>
<td>94</td>
</tr>
<tr>
<td>6. Nalhati-II</td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>7. Mayureswar-I</td>
<td></td>
<td>108</td>
</tr>
<tr>
<td>8. Mayureswar-II</td>
<td></td>
<td>125</td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>725</td>
</tr>
<tr>
<td><strong>Bolpur</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Bolpur-Sriniketan</td>
<td></td>
<td>159</td>
</tr>
<tr>
<td>2. Ilambazar</td>
<td></td>
<td>128</td>
</tr>
<tr>
<td>3. Nanoor</td>
<td></td>
<td>131</td>
</tr>
<tr>
<td>4. Labpur</td>
<td></td>
<td>161</td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>579</td>
</tr>
</tbody>
</table>

Birbhum 19 2256

Source: District Statistical Hand Book-Birbhum, 2007.BAES, Government of West Bengal
Block from Bolpur Sub-division has been selected for the present study (Table- 4.1). The physical administrative structure of Birbhum district is as follows:

4.4 Selection of Households

The primary data for the study have been collected through a multi-stage stratified random sampling method. There are three sub-divisions in the district. In the first stage, all three sub-divisions namely Bolpur-Sriniketan, Rampurhat and Suri have been selected purposively to cover the entire district. In the second stage, one block from each sub-division has been selected randomly. From each block 4 villages have been selected randomly. In the fourth stage, the list of households of these selected villages has been collected and ultimately 25 per cent of the households of these villages belonging to different size-classes have been selected randomly. In total 300 households have been selected from 12 villages as sample unit of the study (Table - 4.2). The selected households have been sub-divided into various categories based on size of land holdings. These are Marginal (below 1.0 ha), Small (1.0-2.0 ha), Medium (2.0 - 10.0 ha), Large (above 10.0 ha) and landless households.

Table 4.2: Number of sample households by different size classes

<table>
<thead>
<tr>
<th>Block</th>
<th>Marginal</th>
<th>Small</th>
<th>Medium</th>
<th>Landless</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolpur-Sriniketan</td>
<td>33</td>
<td>10</td>
<td>3</td>
<td>62</td>
<td>108</td>
</tr>
<tr>
<td>Rampurhat-I</td>
<td>28</td>
<td>8</td>
<td>2</td>
<td>51</td>
<td>89</td>
</tr>
<tr>
<td>Sainthia</td>
<td>33</td>
<td>9</td>
<td>3</td>
<td>58</td>
<td>103</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>94</strong></td>
<td><strong>27</strong></td>
<td><strong>8</strong></td>
<td><strong>171</strong></td>
<td><strong>300</strong></td>
</tr>
</tbody>
</table>

4.5 Tools and Techniques of Data Collection

4.5.1 Development and pre-testing of the survey schedule

The primary data have been collected with the help of a survey schedule especially constructed for the purpose of the study keeping in view the focus, objectives and variables. The entire draft schedule has been pre-tested with ten per
cent non-sample respondents before administering into the actual respondents. Pre-
testing has been done to ensure the validity of the survey schedule under local
condition. Accordingly, after the completion of the pre-testing, the final survey
schedule has been revised and improved with appropriate wording and contents.

4.5.2 Interviewing and data collection

The primary data have been collected by personal interview of the households.
The pre-tested final household schedule included different sub-sections. The sub-
sections comprising of general information, family particulars, land inventory,
cropping pattern, cost of cultivation, income profile, expenditure pattern on (a) food
and (b) non-food, assistance from governmental programmes during the last five
years, credit profile and observation of the investigator.

This study also uses secondary data on several aspects from various published
sources. Secondary data on specific variables are collected from various issues of
Statistical Abstract (Bureau of Applied Economics & Statistics, Government of West
Bengal), District Statistical Hand Book- Birbhum (Bureau of Applied Economics &
Statistics, Government of West Bengal), Agricultural Census (Government of West
Bengal), Population Census (Government of India), and Economic Census
(Government of West Bengal), Human Development Report (UNO) and other
published sources of the State Government and Central Government.

4.6 The Survey Schedule

The household survey schedule has ten parts which are as follows:

4.6.1 General information

This includes some basic data for identifying the respondents such as name,
address, caste.

4.6.2 Family particulars

Family particulars include family size including sex and age, education and
occupation. Educational status of the respondents has been measured as illiterate,
literate, up to class-IX, school final, higher secondary, under-graduate, post-graduate and technical. Occupation has been sub-divided into two ways i.e. primary and secondary. 50 per cent or more income comes from those occupations of the households, in a reference year, are considered as primary occupations and the rests are considered as secondary occupations.

4.6.3 Land inventory

The size of the holding separately for owned land, leased in land, leased out land and assigned land had been recorded. The irrigational status by seasons had also been collected separately for owned, leased-in and leased-out land.

4.6.4 Cropping pattern

In this section area and production of major crops had been recorded by season (pre-kharif, kharif, summer, rabi) to see the productivities of major crops.

4.6.5 Cost of production

The cost of production that is the cost of human and bullock labour and tractor/machinery along with the cost of seed, manure, fertilizer, pesticides, irrigation charges etc. has also been recorded crop wise by season.

4.6.6 Income profile

This section has dealt with the per household monthly/yearly income by source and status that is main and secondary occupation in order to measure the inequality as well as the poverty of the households in the district.

4.6.7 Expenditure pattern

Item and month/year wise expenditure on food and non-food were collected to assess the inequality in expenditure and to measure the food security and the level of living of the households.

4.6.8 Assets formation during the last five years

From this section name and value of the household assets which were formed during last five years can be known to examine the change in capital formation.
4.6.9 Assistance from governmental programmes during the last five years

In order to know the role of Governmental programmes in changing the level of living and poverty of the rural households, government assistance during the last five years were recorded in this section.

4.6.10 Credit profile

The role of public and private credit in capital formation and to meet family expenses cannot be denied. Therefore, the credit information is collected here.

4.7 Analytical Techniques

The overview of the procedure applied in this study is presented under this section in order to fulfil the various objectives.

To analyse the level of living of rural households, the per capita consumption expenditure on food and non-food items (the quantitative aspects) as well as the housing condition of households that is material used in making the house, electrification, sanitation i.e. having latrine or not, sources of drinking water within the premises, number of health centre in the village and educational amenities (the qualitative aspects) have been considered in this study. The change in per capita consumption expenditure on food and non-food items in between 1991 and 2008 has been analysed by using the secondary data relating to National Sample Survey (various rounds) for the State and the primary data collected through field survey. On the other hand to know the change in housing condition, sanitation sources of drinking water, number of health centre in the village and educational amenities census data (1991 and 2001) has been used. Therefore, the decadal change in the level of living of rural households in the district of Birbhum in West Bengal has been captured by the help of tabular analysis.

To fulfil the objective of change in employment, work participation rate has been calculated among different categories (marginal and main workers) and sub-categories (cultivators, agricultural labourers) over the census decade 1991 to 2001.
In order to examine the changes in income in the district for the period from 1999-2000 to 2007-08 has been considered. The former year is the decade after the New Economic Policy-1991 and later is the year under review. The per capita income of the household for 1999-2000 has been estimated by per capita income in the district as per the methodology guidance of the National Accounts Division of the Central Statistics Organisation, Government of India which is followed to estimate Net District Domestic Product and the Net State Domestic Product by the Government of West Bengal. The brief guidance of the estimating methodology is as follows:

To estimate Net District Domestic Product (NDDP) by industry origin both at current and constant (1999-00) prices, in accordance with the methodology guidance of the National Accounts Division of the Central Statistics Organisation, Government of India, the entire economy is classified in three broad sectors, namely, Agriculture and Allied, Industry and Services. The estimates of NDDP have been obtained by product approach for commodity producing sectors like Agriculture, Forestry, Fishery, Mining and Manufacturing (registered) and by a blend of income approach and expenditure approach for the remaining sector of the economy. In conformity with the production approach followed at Agriculture Sector, the estimates for value of output at district level for different crops have been prepared. In Forestry the estimates have been allocated amongst the districts using suitable indicators like district-wise forest area and district-wise rural population. For the Fishery Sector the district-wise estimates have been prepared on the basis of district-wise production of fish. In Manufacturing Registered Sector, the State level GVA has been allocated amongst the districts in proportion of the district level GVA prepared by ASI. In the sectors like Manufacturing (un-registered), Construction, Electricity, Gas & Water Supply, Transport, Storage & Communication, Real Estate, Public Administration and Other Services, the working force engaged in respective activities is used as the main indicator. The state level estimates for the sector Trade, Hotel and Restaurants have been allocated to districts in proportion to the gross value of output of commodity producing sectors by districts. In case of Banking and Insurance the State estimates are allocated to the districts on the basis of district-wise number of banks. The per
capita income for the districts has been estimated by dividing the Net District Domestic Product (NDDP) by estimated mid-year population of the districts.

Price-deflator with respect to the year 2000-01 was considered to examine the change in income in the year 2007-08 and was discussed with the help of simple tabular analysis.

Income inequalities among the different size-class households in the district were estimated by calculating Gini Coefficients (the range of Gini is zero—perfect equality—and one—complete inequality) using primary data. The inequalities in food security have been measured in terms of per capita household expenditure on food items and here also Gini Coefficients have been used.

To fulfill the third objective, poverty gap has been estimated along with the poverty line in rural West Bengal which is Rs. 382.82 per capita per month (2004-05) as estimated in NSS 61st Round from Mixed Recall Period (MRP) consumption expenditure distribution of households.

4.8 Econometric and Statistical Tools Used

The following statistical and econometric tools had been employed in the study for precise and better analysis and interpretation of the data collected. These are briefly discussed as follows:

4.8.1 Cost of cultivation

The cost of cultivation of a particular crop ‘a’ can be expressed through the following identity.

\[ c_a = r_1x_1 + r_2x_2 + r_3x_3 + r_4x_4 + r_5x_5 + r_6x_6 + r_7x_7 + r_8x_8 \]

Where, \( c_a \) = cost of cultivation of a particular crop ‘a’ (in Rs./ha)

\( x_1 \) = Human labour requirement

\( x_2 \) = Bullock labour requirement

\( x_3 \) = Tractor/Machinery requirement
\[ x_4 = \text{Seed requirement} \]
\[ x_5 = \text{Manure requirement} \]
\[ x_6 = \text{Fertilizer requirement} \]
\[ x_7 = \text{Plant protection requirement} \]
\[ x_8 = \text{Irrigation charges} \]
\[ r_i = \text{Respective prices} \]

### 4.8.2 Gini coefficient

To access the present status of inequality in terms of household income and food security in the district the Gini Coefficient, as used by Lerman and Yitzhaki (1985) was estimated that has a score of 1 indicating perfect inequality and a score of 0 indicating perfect equality by different size-class. And to access the sources as well as the nature of income inequality among the different size-class households the Gini Coefficient has been decomposed the income sources (agriculture and non-agriculture) and by size-class sub-groups. The formula is:

\[
G = 2 \frac{\text{Cov}(y, F(y))}{y}
\]

Where \( y \) is the income, \( F(y) \) is the cumulative distribution function of income and \( \text{Cov} \) is covariance. Assuming an income distribution and \( m \) different income sources (e.g. agricultural income, non-agricultural income, etc.), we can write:

\[
G = 2 \frac{\text{Cov}(y, F(y))}{y} = \sum_{k=1}^{m} \frac{2}{y} \text{Cov}(y_k, F(y_k))
\]

Where \( y_k \) is the \( k^{th} \) source of income, \( F(y_k) \) is the cumulative distribution function of income. That is the Gini Index of the distribution of total income is equal to the sum (over \( m \) income sources) of the Gini coefficients calculated by using the covariance between the \( k^{th} \) income source and the cumulative distribution function of
**total income.** This is a very simple way of decomposing inequality by income sources. Furthermore, the Gini Index is in this case perfectly decomposable.

To split overall inequality among different groups of population its decomposability of inequality measures requires a consistent relation between overall inequality and its parts. More specifically, while dealing with decomposability by sub-groups, two types of inequality arises viz. WITHIN INEQUALITY (WIT) and BETWEEN INEQUALITY (BET). The WITHIN INEQUALITY element captures the inequality due to the variability of income within each group, while the BETWEEN INEQUALITY captures the inequality due to the variability of income across different groups.

It is worth noting that Gini Index by sub-groups, in our study, is not perfectly decomposable as it has a non-zero residual $K$ besides the within and between inequality. Assuming four sub-groups i.e. marginal, small, medium and landless - the within element of the Gini Index ($G_{WIT}$) is given by the following formula:

$$G_{WIT} = \sum_i \left( \frac{N_i}{N} \times \frac{Y_i}{Y} \right) G_i$$

Where $G_i$ is the Gini Index measured on sub-group and the figures within the bracket is the weights given to each group. This weight is the product of the population share ($N_i/N$) and the income ($Y_i/Y$) share of each group. This WITHIN INEQUALITY captures the inequality due to variation of income within each group. On the other hand, the BETWEEN INEQUALITY captures the inequality due to variation of income across the different groups. The between element of Gini Index is calculated by the formula:

$$G_{BET} = \frac{2}{\bar{y}} \text{Cov}(\bar{y}, F(\bar{y}))$$
Where \( \tilde{y} \) is the distribution of income obtained by replacing actual incomes with sub-group mean. The Gini from the original distribution \( G_{org} \) is decomposed as:

\[
G_{org} = G_{BIT} + G_{BET} + K
\]

In general, the Gini Index is perfectly decomposable (i.e. \( K=0 \)) when ranking by subgroup incomes from the poorest to the richest do not overlap, i.e. the relative position of each individual is the same as in the total income distribution. The residual \( K \) is positive, instead, when ranking by subgroup incomes overlaps, i.e. when the relative position of a given individual in the subgroup income distribution differ from its position in the total income distribution.

**4.8.3 Head count ratio**

The most widely-used measure of incidence of poverty is the headcount ratio, which simply measures the proportion of the population that is counted as poor, often denoted by \( P_0 \). Formally,

\[
P_0 = \frac{N_p}{N} \times 100
\]

Where, \( N_p \) = the total number of the poor in the population

\( N \) = total population (or sample)

It may be rewrite as

\[
P_0 = \frac{1}{N} \sum I(y_i < z)
\]

Here, \( I(-) \) is an indicator function that takes on a value of 1 if the bracketed expression is true, and 0 otherwise. So if income \( (y_i) \) is less than the poverty line \( (z) \), then \( I(-) \) equal to 1 and the household would be counted as poor.

**4.8.4 Poverty gap**

To estimate the depth of poverty as well as its incidence in rural areas in the district, the poverty gap along with the poverty line was calculated with the following formula as used by Datt and Ravallion (1990).
\[ G_i = (z - y_i) \cdot I(y_i < z). \]

Where, \( G_i \) = poverty gap

\( z \) = poverty line

\( y_i \) = income of the \( i^{th} \) poor individuals

Then the poverty gap index \( (P_1) \) may be written as

\[
P_1 = \frac{1}{N} \sum_{i=1}^{N} \frac{G_i}{z} \]

It was conventionally considered that the gap is zero for the households whose income level is above the poverty line. The value of ‘\( z \)’ is Rs. 382.82 per capita per month (2004-05) as estimated in NSS 61st Round from Mixed Recall Period (MRP) consumption expenditure distribution of households.

4.8.5 **Squared poverty gap index (SPG)**

As a measure of the severity of poverty SPG was used by the formula

\[
P_2 = \frac{1}{N} \sum_{i=1}^{N} \left( \frac{G_i}{z} \right)^2 \]

Where, \( i \) stands for either marginal, Small, medium farmers or landless households