DISTRIBUTION OF LAND HOLDINGS IN WEST BENGAL IN POST-INDEPENDENCE YEARS AND ITS IMPACTS

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C E R T I F I C A T E

This is to certify that the work recorded in the thesis entitled "DISTRIBUTION OF LAND HOLDINGS IN WEST BENGAL IN POST-INDEPENDENCE YEARS AND ITS IMPACTS" submitted by Shri Arun Kumar Sadhu for the award of the Degree of Doctor of Philosophy in Agriculture (Agricultural Economics) of the Bidhan Chandra Krishi Viswavidyalaya is the faithful presentation of bonafide research work carried out under my personal supervision and guidance.

The results of the investigation reported in the thesis have not so far been submitted for any other Degree or Diploma. The assistance and help received during the course of investigation have been duly acknowledged.

Dated :
The 30th. March, 1983.

K. Sain.
Signature of the Guide

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The 30th March, 1983.

Arun Kumar Sadhu
(ARUN KUMAR SADHU)

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CHAPTER - I

I N T R O D U C T I O N

The question of distribution of land holdings is a problem of yore. Land is the basic supporting asset for humanity at large. From the primitive age to the modern era man has depended on land for his subsistence and welfare. It is well known that periodic redistribution of land holdings among the inhabitants was done in such ancient communities as the Chinese and the other people in South-East Asian countries. They had to redistribute their land holdings to measure farm size to the need of food for the farm families. In the more recent era, there has been wide-spread redistribution of farm land in the countries of Asia, Middle-East, Latin American countries, African countries and even in Europe, particularly during the last two hundred years.

India has been striving hard for achieving rational allocation of farm lands among the ever-increasing number of farm families for a long time, specially, since the beginning of her independence. All the constituent states of India have enacted legislations for reorganisation of holdings in rational manner. The state of West Bengal initiated the task by enacting the West Bengal Estates Acquisition Act, 1953 and West Bengal Land Reform Act, 1955. These acts have since been amended several times. The concepts of ceilings on holdings have been in a state of flusk. The upper limits on both present and future holdings in West Bengal have been success-

ively reduced. The basis of ceilings has been shifted from individual to family. Different motives operated behind such moves. Desire to grant some minimum means of support in economic life and to afford a sense of social equality is at the top of such motives. Different non-economic motives might also have played a part in the matter of distribution of lands in West Bengal and in the other states of India.

With the basic aim of examining the effects of distribution of land holdings and of income in the post-independence years at least in a small segment of the economy in particular and to obtain a clear idea of overall impact of redistribution of land holdings in the state of West Bengal in particular and in India in general, relevant reports, other publications and literatures on this subject have been consulted. On the basis of knowledge acquired therefrom an idea could be obtained that rational redistribution of farm land and income will have substantial positive effects on agricultural production and rural welfare, specially, when combined with such supplementary measures as provision for supply of modern farm imputs and dissemination of latest farm technologies in an economy primarily depending on land for maintenance and improvement of the standard of life of its inhabitants. Proceeding with this hypothesis data have been collected both through primary investigation in the rural areas and also from secondary sources to establish or disprove its validity. Farm

land distribution patterns, particularly, in the post-reform period has been examined. Three different agro-climatic zones, viz., Zone-I, Zone-IV and Zone-V of West Bengal have been included in the scheme of field investigation. Changes in the pattern of land distribution outside West Bengal have also been examined. Reviews of earlier research works in this field are represented in Chapter-2. The next chapter deals with methodologies of research adopted for this exercise. Results of analysis of primary and secondary data are presented in the next few chapters. The last portion of this monograph summarises the findings, suggests some courses for action, and reviews the future scope of research in this field. The monograph winds up with a bibliography of relevant references.

CHAPTER - II

REVIEW OF LITERATURE

A brief but critical review of the literatures on effects of redistribution of land and income on farm production and rural welfare is attempted in the following paragraphs.

Raj (1970) said that leasing of land was conducive to a more rational use of land especially in labour surplus economies with skewed distribution of land holdings (36)*.

Berry (1971) said that while land distribution might be expected to raise agricultural output in many cases, it might well worsen the distribution of income by lowering the demand for hired labour. The conditions under which this would occur were traced. It was suggested that certain types of reform might lead to a worsening of distribution (6).

Singh and Sandhu (1971) found that the Gini ratio for income per holding was the highest for large holdings and the lowest for small holdings in the years 1968-69 and 1969-70, resulting in uneven income distribution. The concentration ratio for per caput income was the highest for the medium-sized holdings in 1967-68 and 1969-70 (44).

Singh (1973) said that new agricultural technology could be made to yield the desirable income distribution effect

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* These figures indicate serial numbers of references in bibliography at the end of this monograph.

by backing it up with the needed infra-structure facilities such as irrigation, extension and education, marketing and storage, and distribution system of new inputs (45).

Dovering (1973) showed that distributive equality of incomes was on a level similar to some of the more egalitarian European countries. The main disparities within the United States were the contrasts between the south and the rest of the country and between whites and blacks. The regional dichotomy within the United States directed attention to the farm size system as one of the original steering agents for income distribution in society at large, and provided one of the important arguments for land reform (15).

Raju and Singh (1974) observed that the increasing level of farm income associated with the declining farm income inequality in the district over the period 1967-68 to 1970-71 represented a step towards the achievement of a higher level of economic well-being of the farmers. The introduction of new technology might have reduced the early inequality in the rates of adoption of new technology between the small and the big farmers and also the income inequality. Because of the divisible nature of the new farm technology, farm income of small farmers might have increased, although those of the big farmers were rising faster (37).

Herring and Chaudhury (1974) said that aggregate impact of land reform would still be limited by the relatively high

ceiling, the causes which effectively enhanced the ceiling, and inevitable faulty implementation of ceiling provisions. Likewise, the redistribution of income to tenants through new tenancy regulations was seriously jeoparadized by the massive administrative difficulties (23).

Joshi (1975) said that in a traditionally hierachical society which was founded on the principle of inequality, the introduction of the concept of equality was a revolutionary force challenging the entire ideological and institutional framework of social existance. It was creator of new urges and aspirations among the have-nots and, therefore, the generator of social force necessitating far reaching innovations in the institutional patterns and paths of modernization (26).

Kahlon and Bal (1975) found that farm size contributed most towards inequality and income of small farms increased over time but income of large farms increased at a faster rate (27).

Sidhu (1976) explained that redistribution of land among peasant families, given Indian agrarian structure, could not serve an useful economic social purpose. Depending on regional needs, subsistence farming must give way either to fair-sized family farms working on the principle of profit or to cooperative farming societies in which selective extension of scale was made possible for some of the farming operators (43).

Tewary (1977) explained inequality of income distribution in India in terms of variables such as the share of income of the middle and top income groups as influenced by the abundence of natural resources and extent of Governmental activity. The inequality in the ownership of land in India was revealed by the fact that while the marginal and the small cultivators in India accounted for 70 per cent of the total cultivating households, they possessed only 21 per cent of the total cultivable land, whereas 15 per cent of the large landholders possessed 61 per cent of the cultivable land. Another factor causing unequal distribution of income was the growing impact of indirect or commodity taxation, resulting in an increased upsurge of prices, which adversely effected those with low purchasing power. Concession and relaxation in the field of agricultural taxation combined with a rise in the limit of land ceiling were necessary as incentives in Indian agriculture (46).

Pandey and Singh (1977) observed that the agrarian scense was characterized by the incidence of tenancy and landlessness and high degree of fragmentation and skewed ownership distribution of holdings which had a direct effect on agricultural production and income (34).

Lakdawala (1977) observed that the improvement in the standard of living and generation of additional employment opportunities at the required level of productivity would have

to be obtained through the expansion of irrigation and spread of new technology (31).

Sain (1977) explained the changes in distribution of ownership and operational holdings since independence using the tools of Gini concentration ratio and Relative Mean Inequality. He concluded that the distribution of ownership and operational holdings in the State of West Bengal remained skewed and that there was enough scope for increasing aggregate social welfare through redistribution of holdings regardless of value judgement of a society on inequality in the distribution of holdings (39).

Yu (1977) stated that a large portion of farm family income inequality was attributable to inter-regional variation in farm family income. He concluded that regional development programmes could contribute towards improving income distribution within the agricultural sector through the strengthening of employment opportunities (52).

Chatterjee and Mukheerjee (1977) stated that medium and large farmers decreased steadily in importance, primarily due to the ceiling on land holdings. Increase in the proportion of total area operated by marginal and small holdings indicated concentration of land holdings, and this indication was confirmed by the use of the Lorenz curves and Gini coefficients. There was a substantial reduction in equality in the distribution of land holdings. There had, however, also been an

increase in the proportion of land in the category of uneconomic holdings (8).

In the paper by Todd and Brierley (1977) farm size was presumed to represent the equilibrium outcome of internal and external forces that influenced the agricultural system. Internal forces included various physical and cultural factors as well as local marketing patterns. External forces operated through the aegis of inter-regional comperative advantage(48).

Chandra Shekhar (1977) stated that of the various invisible inputs, reduction in concentration of operational holdings and ownership assets would be expected to have a significant impact on agricultural productivity. The paper measured the impact on cereal yields in its own right and also in relation to other impacts such as rainfall, irrigation and use of fertilizers (7).

Dantwala (1978) argued that a reasonable approach was for the Government to bring about agricultural growth with social justice by giving priority to infrastructural investment and scientific research in areas with deficient endowments and to institutional reforms in technologically advanced areas(10).

Csete (1979) said that increased productivity of crop land was important to Hungary because of the competing demands for land from urbanization and industrialization, limited materials and energy resources, and the rising demand for food.

For these reasons the economic utilization of crop land and the preservation and improvement of its productive capacity were particularly important. In addition, more rational land use allowed an improved balance of payments, higher productivity and increased profitability. In order to achieve this, the withdrawal of land from production should be influenced by the compensatory payments to encourage the use of poorer sites and crop pattern should be adjusted to suit such sites (9).

Sampath and Gopinath (1979) showed that the size of holdings had a negative effect on cropping intensity while the proportion of area irrigated had a positive effect on the cropping intensity. With higher inequality in the operational distribution of land, there was higher inefficiency in total land use (41).

Kainth (1979) showed that the size of the operational holdings in Punjab was rather small. No less than 25.40 per cent of the total area and 68.89 per cent of the total holdings were in farms of less than 3 ha. The ownership form of tenures was dominant occupying about 82 per cent of the total area. Share-cropping as a mode of payment of rent was popular constituting 56.78 per cent of the total rented area. Three-fourths of the total area in the State was irrigated (28).

Farbman (1979) found that income of agricultural labourers in India was low. That the cultivators possessed

wide disparities in distribution of income which reflected varying returns to varying enterprises (17).

Vyas (1979) stated that the relative importance of technical factors in enhancing levels of productivity was great. Presumably a more equitable distribution of lands cleared the deck for the application of superior technology (50).

Ghosh (1979) argued that the inverse relationship between farm size and land productivity did not reflect a superiority of peasant production over wage-labour-based production as was often supposed. It existed independently of production relations and thus reflected a static superiority of small-scale over large-scale production. An essential precondition for this superiority, however, was a backwardness of technology. With the technological progress involving the introduction of chemical fertilizer, labour-saving machinery and modern irrigation equipment, the inverse relationship was, therefore, likely to disappear (19).

Saini (1980) stated that in the 1950's there was an inverse relationship between farm size and income per acre. The inequality of income arising from an unequal distribution of land was to some extent reduced by productivity differences between small and large farms. Since the Green Revolution this relationship had undergone a significant change. As farm size increased the income increased more than proportionately.

It was suggested that changes might have taken place during the seventies which might negate the conclusions of the evidence from earlier years (40).

According to Fones-Sundell (1980), agrarian reform meant a broad range of measures designed to distribute production inputs more evenly among the farming population. It began with land reform and then went one step further, insuring that access to the necessary production inputs was as equitable as the land tenure system. This supported the efforts of those settled on new, redistributed holdings and helped to prevent the return of an inequitable tenure system (18).

Schultz (1980) stated that extreme poverty existed in many countries where one or all these factors were absent. Potentially the developing countries had a critical factor in failure to provide the opportunity for development to the human resources. Modern research had shown that small peasant farmers made exceedingly intelligent use of such resources as were available but they needed more information, education and incentives if they were to produce the additional food which was a key to general progress and development (42).

Villarejo (1980) found that in California the largest 37 per cent of the state's farms conducted operations on 59 per cent of the state's crop land. The degree of concentration was significantly greater than previous studies indicated. Leasing was a major factor in the process of farm expansion(49).

Herring (1980) stated that the primary beneficiaries of the Kerala land reforms were the richer peasants. The reason for poor peasants and agricultural labourers not benefiting lay in the conceptualization of the reforms - not in their implementation. Two important conceptual problems were homogeneous type of production relation and the relatively high ceiling level. The privilege of obtaining income from land ownership independently of labouring on the land had been transferred but not abolished. The rents of rentiers had been abolished but not the profits of capitalist landlords who were not necessarily functionally absent (22).

Kislev and Peterson (1980) found that the growth in the size of farms in the United States occurred because of the increase in the opportunity cost of family labour relative to the cost of mechine services. As non-farm income increased, farm people attempted to achieve income parity by increasing the size of their farms. The growth of the farm size was made possible by farmers who left agriculture to take advantage of higher earnings in the non-farm sectors. The land which they released was incorporated into fewer but larger farms. Moreover, the paper explained the growth in farm size without relying on the "catch-all" phrases of economics of scale and technological change (30).

Jannuzi and Peach (1980) said that the economic problems of rural Bangladesh were not any agronomic impediment to

production of sufficient food for internal consumption but the traditional relationship of the people to the land in which ownership of land was divorced from the personal labour on the land. It was recommended that agrarian reform must precede reliance on new agricultural technology (25).

Rudra and Sen (1980) stated that the size-productivity inverse relation could be used as an argument against large-scale farming of both capitalist and cooperative sorts. But it was argued that assessments of the cooperative mode of production would require information someting as remote as the general relations between size and productivity obtaining in Indian agriculture whether they are past or present, inverse or otherwise (38).

Bandyopadhyay (1981) said that in order to achieve higher degrees of utilization of family labour on the farm, it was necessary that the area of the operational holdings and levels of their utilization should be increased. With the existing land holdings the selected farms could not generate sufficient employment for their existing work force even though they introduced new farm technologies in a greater measure (5).

Pant (1981) stated that the agrarian structure was pretty stable in most of the states of India. Hence left to the laws of inheritance and economic forces the structural changes were only marginal. An exception to this fact was the

high rate of disintegration of the largest size group. Despite this, the regional disparities in the agrarian structure would continue. Bihar, Tamil Nadu and Uttar Pradesh would have more than 78 per cent of the holdings in the marginal category. Haryana, Gujrat, Rajasthan and Madhya Pradesh would have over 18 per cent of the holdings in the medium and large size groups (35).

Deolalikar (1981) said that the small farm sector being more productive than the large farm sector could not be rejected at low levels of agricultural technology but could be rejected at higher levels. This suggested that the inverse relationship between yields and farm size, although valid for a traditional agriculture, could not be assumed to exist in an agriculture experiencing technical change (11).

Michalski (1981) observed that in the countries of Asia, Africa, and Latin America that pursued a capitalist way of development, revolutionary agrarian reform movements were suppressed by force and were substituted by bouregois land reforms and development programmes aimed at establishing capitalist agrarian conditions. In the developing countries with a socialist orientation, the land reform constituted the basis of anti-capitalist transformations aimed at establishing socialist agrarian systems. In these countries the central task was to link the socio-economic changes with an increase in agricultural production. A particularly difficult problem

was encountered in those areas where suitable agrarian reforms had to be carried out on customary tenures and nomadic pasture farming (32).

Hayami (1981) expressed his confidence in an improved agricultural growth performance. Poverty and inequality which had been mitigated in other parts of Asia might in fact be aggravated in India by the technocratic approach to intensifying agricultural production through irrigation, land savings and labour technologies. The reason offered was that there are sharp class conflicts in India and high labour transaction costs. The reformist approach to redistribution of income and assets was rated with little chance of success except in some eastern states (21).

Guichaoua and Majeres (1981) showed that the benefits of growth tended to be concentrated among a small number of farmers and to elude the broad mass of peasants. The findings suggested that despite the adoption by some producers of "progressive" technologies a policy of growth was hard to reconcile in a market economy with a policy aimed at creating employment and increasing the labour productivity of the peasants (20).

The above review shows that while the earlier researchers in the field did something valuable to serve their specific objects, there was no coherent and deep probe in this sphere.

This exercise, on the contrary, makes a sincere and scientific analysis of the effects of rational redistribution of land and income on farm production and aggregate rural welfare and arrives at some novel and confirmed conclusions.

CHAPTER -III

RESEARCH METHODOLOGY

The investigation for varifying the hypothesis underlying this study involves collection, analysis and appraisal of data from the field as well as from secondary sources.

The field investigation was carried out by the researcher personally in certain selected areas in 3 districts of West Bengal in 3 different agro-climatic zones. These districts are : Birbhum, an irrigated district in zone IV, Bankura, partly irrigated district in zone V and Cooch Behar, an unirrigated district in zone I. One Police Station in each of these 3 districts were then randomly selected. One village in each of these 3 Police Stations was then selected randomly. Two other villages adjacent to the first village in each Police Station was then selected. All households operating some land in the year of the investigation were listed. The total of these operating households constituted the sample frame in each Police Station in each district. These Operating households were divided into 4 economic groups : (i) The marginal farmers with 0.01 - 1.00 ha, (ii) the small farmers with 1.01 - 2.00 ha, (iii) the medium farmers with 2.01 - 3.00 ha and (iv) the big farmers with 3.01 ha and above of operational lands. A total of 50 sample farms was drawn randomly from each district. Samples from each of the 4 economic groups of farmers were drawn in such a manner that they bore

the same proportion to their respective populations as the total sample bore to the total population. For example, in Birbhum the ratio of the total sample (n) to total population (N) was $\frac{50}{124} = (\frac{n}{N}) = 0.40$. This ratio was maintained in drawing sample from each economic group of farmers. Thus, out of 59 operating households in the marginal farmers' group a sample of 59 x 0.40 = 24 (approximate) was drawn randomly. In this way a total of 150 sample farms were drawn out of a total of 566 operating households in 3 districts of West Bengal by the method of stratified random sampling without replacement. The reference period for this investigation was 1.6.79 to 31.5.80. The investigation was done during 1.7.80 - 31.1.81.

Distribution of Sample Households :

Table-1 shows the distribution of farm households selected on the basis of the method of stratified random sampling without replacement for investigation by personal interview during the period of 1.6.79 to 31.5.80 in 9 villages of 3 districts of West Bengal. These fall in four operational size groups of holdings. Out of a total of 59 farms 24 farms were selected from the smallest size group of 0.01 to 1.00 ha in Birbhum district. These are marginal farmers. Out of the total of 46 farms, 19 farm households were selected from the operational size group of 1.01 - 2.00 ha. These are small farmers. Four out of 11 households were selected from the next operational size group of 2.01 - 3.00 ha. These are

Table—1

Distribution of the Sample Households According to Operational Size Groupsof Holdings During the Period of 1.6.79 to 31.5.80 in the Districts of Birbhum, Bankura and Cooch Behar Seperately and Combined.

Sl. No.	Operational size groupsof holdings (ha.)	Birbhum		Bankura		Cooch Behar		Grand Total	
		Total no.of farms	Sample farms	Total no.of farms	Sample farms	Total no. of farms	Sample farms	Total no. of farms	Sample farms
1	0.01 – 1.00	59	24	49	23	220	33	328	80
2	1.01 – 2.00	46	19	34	16	82	12	162	47
3	2.01 – 3.00	11	4	15	7	20	3	46	14
4	3.01 & above	8	3	9	4	13	2	30	9
	Total :	124	50	107	50	335	50	566	150

medium farmers. Three out of the total of 8 farm households were selected from the operational size group of 3.01 and above ha. These are big farmers. Altogether out of a total of 124 farm households, 50 farms were selected as sample for this study in Birbhum district.

In the same way as above, 23, 16, 7 and 4 households out of 49, 34, 15 and 9 farm households belonging respectively to the marginal, the small, the medium and the big farmers were selected as samples in Bankura district for this study. These made a total of 50 farm households from the aggregate of 107 farm households in 3 villages covered in this study.

In the district of Cooch Behar by following the same procedure as above, 33, 12, 3 and 2 farm households out of 220, 82, 20 and 13 farm households were selected from the marginal, the small, the medium and the big farmers respectively. Thus out of a total of 335 farm households, 50 farm households were selected from 3 villages covered in this study.

Of the nine villages covered under this investigation in the 3 districts of West Bengal, 80, 47, 14 and 9 farm households were selected respectively from 328 marginal farms, 162 small farms, 46 medium farms and 30 big farms. Three districts taken together, 150 farms belonging to the 4 operational size groups were selected out of a total of 566 farms.

Data were collected from All India Agricultural Censuses

1970-71 and 1976-77, National Sample Survey Reports, Reserve Bank of India Reports, District Gazetter and other official and non-official reports and publications also on the subject.

Analysis and interpretation of data were done through simple tabular presentations. The tools of Gini Concentration ratio, Atkinson Inequality Indices and Theil's Entropy measures were utilised to ascertain the extents of inequality in distribution of land and income. Observations from primary data were varified and strengthened through interpretation of secondary data.

The regions covered by field investigation are now briefly introduced :

B I R B H U M

Location and Boundary :-

The district of Birbhum is a frontier district of the State of West Bengal. This district looks like an isosceles triangle. The district is bounded on the West by the district of Santal Parganas of State of Bihar, on the North and East respectively by the districts of Murshidabad and Burdwan. On the South, the river Ajoy makes a border line between Burdwan and Birbhum districts. The district extends over an area of 4514.4 sq.km.

S o i l :

The soil is mostly classified as red and lateritic soil in the south-western part of this district. Certain areas in the Western part of this district is covered by Gondwana colluvial soil. Most of the areas of Rajnagar and Khairasole thana, eastern part of Bolepur, Nanur and Lovepur as a whole and western part of Mayureswar is composed of Damoder high land. East and southern parts of Murarai thana are composed of the Ganga riverine high land soil. Soil reaction varies around slight acidic to acidic. Crops give good response to N,P and K fertilizers.

Climate :

The climate of the district is hot and dry but it is conducive to health. It is too hot in the summer and likewise it is too cold in winter seasons in this district. Temperature is high between March to May. The average rainfall under normal condition is 1276.30 mm and the monsoon arrives in June and stays still September. The cold weather lasts from November to February and the temperature can be as low as 9^{o}c in December.

Land Resource and Land Utilization :

Total area of the district is 455000 ha out of which the area available for cultivation is 321221 ha. The area under cultivation comes to 60.48 per cent of total area.

Human Resources :

Between 1961 and 1971, Birbhum recorded a 22.80 per cent population growth rate which is slightly lower than that of 26.87 per cent observed for the State of West Bengal. In 1971 Census, 1775909 persons were counted in the district, of which 902441 were males and 873468 were females. The rural and urban break up of this total population were 1651137 (92.97 per cent) and 124772 (7.03 per cent) respectively.

Birbhum's density of population at 390 per sq.km was lower than the state average of 504. This district occupies 5.18 per cent of the total area of West Bengal and accounts for 4.01 per cent of the State's population.

Working Population :

Despite the increase in total population of the district, the percentage of the work force to total population declined by 4.56 per cent from 31.21 per cent to 26.65 per cent during the decade 1961-71. The total strength of the district's working force is 473231 out of which 434780 are males. The total numbers of cultivators and agricultural labours counted in the district in 1971 were 175257 and 200002 respectively and the two groups together constituted 21.13 per cent of the district's total population. Workers in tertiary occupations like trade, commerce, transport, storage and communications constituted the second major group amongst the employed.

Literacy and Education :

The percentage of literates in the district was 26.57 according to 1971 Census. Again the percentage of female literates (17.40) was much lower than the male literates. Literacy percentages for urban and rural areas of the district were 47.25 and 25.01 respectively.

Agriculture :

The net area available for cultivation was 275219 ha which was 60.46 per cent of the geographical area. Principal crop of this district is paddy. Recently wheat occupies the second position. The third and the fourth positions are occupied by potato and sugarcane respectively.

B A N K U R A

Location and Boundary :

The district is bounded on the south-east by the district of Hooghly, on the south-west by Midnapore and Purulia and on the north and north-east by Burdwan district. According to geographic situation this district is classified into 3 categories : (i) western hilly region, (ii) undulating land in the central region and (iii) plane in the eastern part.

S o i l :

The soil is classified as sandy loam and lateritic soil. Most of the soil is acidic in nature and does not possess much fertilizer property. In certain areas in the eastern part of Sonamukhi thana, and in the whole of the Indus, Kutulpur and Patrasayar thanas, the soil is fertile and is composed of red, loamy and clay soil.

Climate :

The climate of the district is dry and hot. The summer is hot and humid and the heat cannot be oppressive. Temperature is high between March to May. The average rainfall under normal condition is 1303.7 mm and monsoon arrives during June to September. The cold weather lasts from November to February.

Land Resource and Land Utilization :

Total area of the district is 688100 ha out of which area available for cultivation is 321221 ha. The area under cultivation comes to 46.68 per cent of total area.

Human Resources :

Between 1961 and 1971, Bankura recorded a 22.02 per cent population growth rate which is lower than that of 26.87 per cent observed for the State of West Bengal. In 1971

Census, 2031039 persons were counted in the district of which 1037267 were males and 993772 were females. The rural and urban break-up of this total population were 92.53 per cent and 7.47 per cent respectively.

Bankura's density of population at 295 per sq.km was lower as compared to the State average of 504 and its population accounted for 3.19 per cent of the state population.

Working Population :

The total strength of the district's working force was 574935 out of which 496717 were males. The total numbers of cultivators and agricultural labourers counted in the district in 1971 were 239282 and 228519 respectively and the two groups together constituted 23.03 per cent of the district's total population. Workers in the tertiary occupation like trade, commerce, storage, etc., constituted the second major group amongst the employed.

Literacy and Education :

The percentage of literates in the district was 26.30 according to 1971 Census. Among the total literate persons, the male constituted 37.63 per cent and the females constituted 14.47 per cent. Literacy percentages for urban and rural areas of the district were 45.50 and 24.75 respectively.

Agrioulture :

The net area available for cultivation is 321221 ha which was 46.68 per cent of the geographical area. There is scope for improvement of irrigation facilities. The use of inputs like fertilizers and high yielding seeds is increasing but there is need for further stepping up of their application and also for adoption of better farm management techniques.

COOCH BEHAR

Location and Boundary :

The geographic area of this district is 1313.9 sq. miles. This district is bounded on the north by the Jalpaiguri district, on the south and west by Bangladesh and on the east by the State of Assam.

S o i l :

The soil of this district is mostly sandy and alluvium. Besides this, existence of coarse sand is found in soil. Certain parts of this district are covered by clay loam soil. Most of the land is unfertile and acidic in nature. Use of fertilizer is not reasonable.

Climate :

The two main seasons of this district are summer and winter. Duration of the summer and the winter seasons are

March to September and October to February respectively. Annual average rainfall of this district was 2938.30 mm during 1970. The monsoon arrives in January and stays still September.

Land Resource and Land Utilization :

Total area of the district was 338600 ha out of which the area available for cultivation was 208239 ha.

Human Resources :

Between 1961 and 1971, Cooch Behar recorded a 38.67 per cent population growth rate which is higher than 26.87 per cent observed for the State of West Bengal. According to 1971 Census, 1414183 persons were counted in the district of which 737931 were males and 676252 were females. The rural and urban break-up of this total population were 93.17 per cent and 6.83 per cent respectively.

Cooch Behar's density of population at 418 per sq.km was lower as compared to the State average of 504 and its population accounted for 3.19 per cent of the state's population.

Working Population :

The percentage of the work force of the total population declined by 4.19 per cent from 31.80 per cent to 27.61

per cent during the decade : 1961-71. The total strength of the district's working force was 390502 out of which 379064 were males. The total numbers of cultivators and agricultural labourers counted in the district in 1971 were 265358 and 60897 and the two groups together constituted 23.07 per cent of the district's total population. Workers in the tertiary occupation like trade, commerce, storage, etc., constituted the second major group amongst the employed.

Literacy and Education :

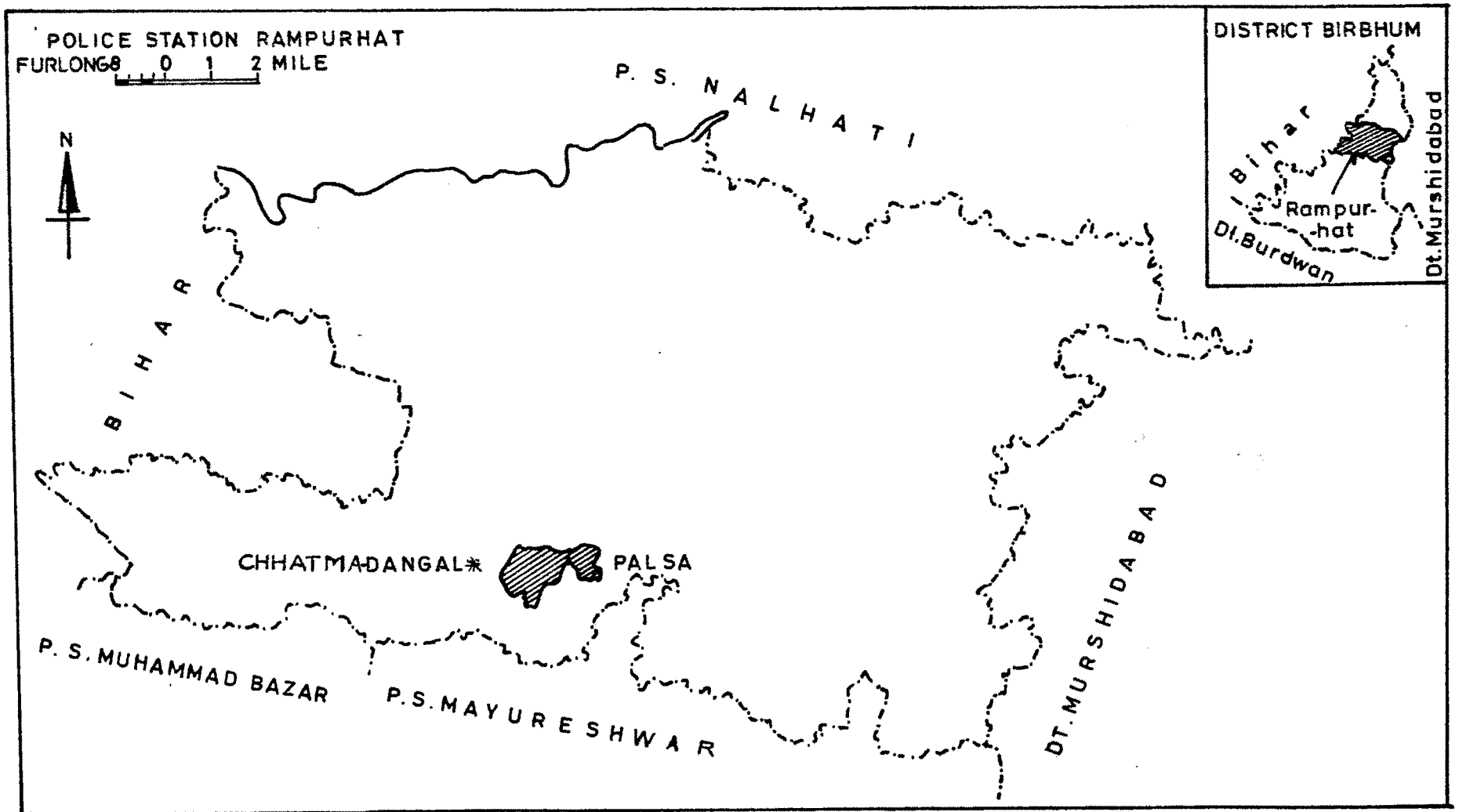
The percentage of literates in the district was 21.92 according to 1971 Census. Among the total literate persons, the males constituted 31.08 per cent and females constituted 11.93 per cent. Literacy percentages for urban and rural areas of the district were 58.55 and 19.23 respectively.

Agriculture :

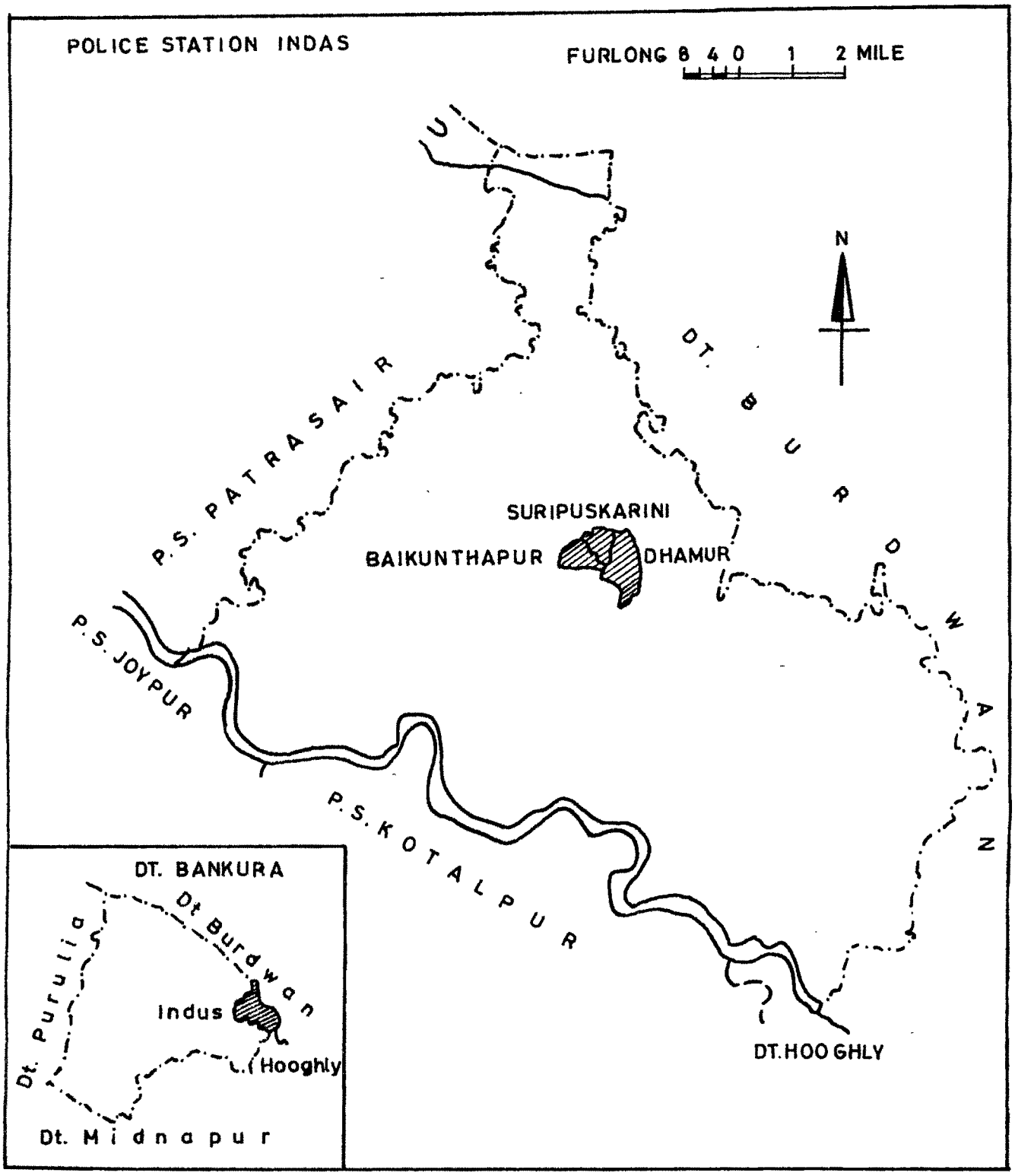
The net area available for cultivation was 208239 ha which was 61.50 per cent of the geographical area. Irrigation facilities were limited and the area under irrigation was 17619 ha.

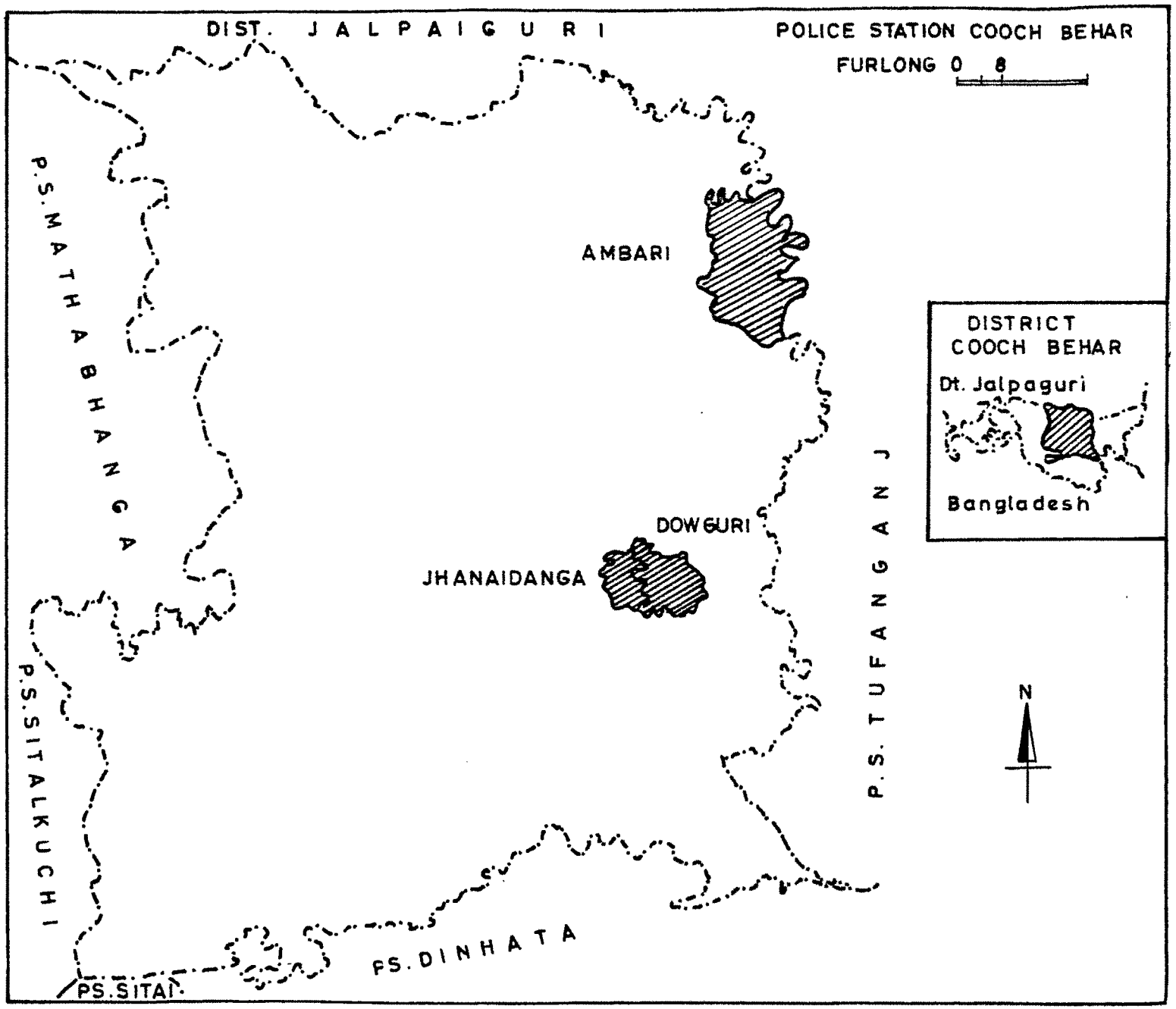
Location of the Villages Surveyed :

The location of the villages covered by field investigation may be ascertained from the following maps :



* These are locally known as two seperate villages: (i) CHHATMA and (ii) DANGAL although in the Birbhum District Census Hand-Book these are shown as single village. Dangal is to the west of Palsa. Chhatma is to the west of Dangal.


POLICE STATION INDAS
FURLONG 8 4 0 1 2 MILE
N
P.S. PATRASAIR
DT. BURDWAN
SURIPUSKARINI
BAIKUNTHAPUR
DHAMUR
P.S. JOYPUR
P.S. KOTALPUR
DT. HOOGHLY
DT. BANKURA
Dt Burdwan
Dt. Purulia
Indus
Hooghly
Dt. Midnapur


DIST. J A L P A I G U R I
POLICE STATION COOCH BEHAR
FURLONG 0 8
P.S. M A T H A B H A N G A
AMBARI
DOWGURI
JHANAIDANGA
DISTRICT
COOCH BEHAR
Dt. Jalpaguri
Bangladesh
P.S. T U F A N G A N J
N
P.S. SITALKUCHI
P.S. DINHATA
PS. SITAI

RESULTS AND DISCUSSION

CHAPTER - IV

Discussed below some aspects of the structure of the farm economy of the sample households covered under field investigation in this study. This is done with a view to have direct knowledge and definite idea about the existing conditions of the farms and the level of the living of the people concerned. This is also intended to offer a glimpse about the prospect of improving the welfare of the farm people through improvement in distribution of operated land and farm income and also otherwise.

Occupation, Sex and Literary Status in Birbhum :

Table-2 indicates the distribution of members of sample households in the district of Birbhum with respect to their occupation, sex, and literacy status. It was observed from the table that a major portion of total members of households were occupied in crop husbandry. They constituted 27.36 per cent of the total. Their primary occupation was agriculture.

In the marginal size group of holdings 23.29 per cent of total population had agriculture as their primary occupation and 4.11 per cent of total population were engaged in services, business, etc. as their primary occupation. In the same way for the small farmers, 23.30 per cent were engaged

Table–2

Occupation, Sex and Literacy Status for the Sample Households According to Operational Size Groups of Holdings During the year 1.6.79 to 31.5.80 in the District of Birbhum

Sl. No.	Operational size groups of holdings (ha.)	Total population	Primary Occupation*		Sex		Literacy Status					Total literate (Percentage)
			Cultivation	Other than cultivation	Male	Female	Able to read and write	Primary	Secondary	Degree	P.G.	
1	0.01 – 1.00	146 (44.38)	34 (23.29)	6 (4.11)	76 (52.05)	70 (47.95)	24 (16.44)	23 (15.75)	7 (4.75)	–	–	36.94
2	1.01 – 2.00	125 (37.99)	29 (23.20)	4 (3.20)	64 (51.20)	61 (48.80)	35 (28.00)	22 (17.60)	12 (9.60)	1 (0.80)	–	55.20
3	2.01 – 3.00	32 (9.72)	14 (43.75)	2 (6.25)	18 (56.25)	14 (43.75)	2 (6.25)	15 (46.88)	4 (12.50)	4 (12.50)	–	65.63
4	3.01 & above	26 (7.90)	13 (50.00)	3 (11.55)	14 (53.85)	12 (46.15)	3 (11.54)	7 (26.92)	1 (3.85)	2 (7.65)	–	49.96
	Total :	329 (100.00)	90 (27.36)	15 (4.56)	172 (52.28)	157 (47.72)	64 (19.45)	67 (20.36)	24 (7.29)	7 (2.13)	–	49.23

Figures within the parentheses indicate percentages.

* Primary occupation is one from which above 50 per cent of annual income is earned.

in cultivation as their primary occupation and 3.20 per cent were engaged in non-farm jobs as their primary occupation. Of the medium farmers, 43.75 per cent of total population was engaged in cultivation as their primary occupation and 6.25 per cent of total population was engaged in business, services, etc. as their primary occupation. In the case of the big farmers, 50.00 per cent of total population were mainly cultivators and 11.55 per cent were engaged mainly in non-farm jobs.

Of the total population of the sample farms in the four economic categories, males outnumbered the females. Percentages to the total population constituted by the males were 47.95, 48.80, 43.75 and 46.15 and those constituted by the females were 47.95, 48.80, 43.75 and 46.15 respectively in the marginal, the small, the medium and the big farmers. On the whole, 52.28 per cent of total population were males and 47.72 per cent were females.

Literacy percentage is the highest at 65.63 in the medium farmers' group followed by 36.94, 55.20 and 49.23 per cent respectively for the marginal, the small and the big farmers' groups.

Occupation, Sex and Literary Status in Bankura :

Table-3 shows the distribution of members of sample households in the district of Bankura with respect to their

Table-3

Occupation, Sex and Literacy Status for the Sample Households According to Operational Size Groups of Holdings During the year 1.6.79 to 31.5.80 in the District of Bankura

Sl. No.	Operational size groups of holdings (ha.)	Total population	Primary Occupation*		Sex			Literacy Status				Total literate (Percentage)
			Cultivation	Other than cultivation	Male	Female	Able to read and write	Primary	Secondary	Degree	P.G.	
1	0.01 - 1.00	195 (48.39)	43 (22.05)	9 (4.62)	102 (52.31)	93 (47.69)	12 (6.15)	25 (12.82)	11 (5.64)	—	—	24.61
2	1.01 — 2.00	109 (27.05)	26 (23.85)	4 (3.67)	58 (53.21)	51 (46.79)	15 (13.76)	23 (21.10)	12 (11.01)	1 (0.92)	—	46.79
3	2.01 — 3.00	61 (15.14)	17 (27.87)	3 (4.92)	32 (52.46)	29 (47.54)	6 (9.84)	13 (21.31)	10 (16.39)	3 (4.92)	—	52.46
4	3.01 & above	38 (9.43)	14 (36.84)	3 (7.89)	21 (55.26)	17 (44.74)	4 (10.53)	12 (31.58)	10 (26.32)	1 (2.63)	1 (2.63)	68.43
	Total :	403 (100.00)	100 (24.81)	19 (4.71)	213 (52.85)	190 (47.15)	37 (9.18)	73 (18.11)	43 (10.67)	5 (1.24)	1 (0.25)	39.20

Figures within the parentheses indicate percentages.

* Primary occupation is one from which above 50 per cent of annual income is earned.

occupation, sex and literacy status. The major portion of total earning members of the sample households were engaged in agriculture as primary occupation. Of the total population only 24.81 per cent were engaged in agriculture as their primary occupation and 4.71 per cent of total population were occupied in secondary and tertiary jobs. There were 52.85 per cent males and 47.15 per cent females. In case of male percentages to the total population are 52.31, 53.21, 52.46 and 55.26 and in the case of female these were 47.69, 46.79, 47.54 and 44.74 in the 4 respective economic size groups of holdings.

Among the 4 operational size groups, 22.05, 23.85, 27.87 and 36.84 per cent respectively of the marginal, the small, the medium and the big farms were engaged in cultivation as their primay occupation. The corresponding percentages of the persons engaged in non-farm jobs as their primary occupation in these 4 operational size groups were 4.62, 3.67, 4.92 and 7.89.

Of 403 members in the sample households, 213 or 52.85 per cent were males and 190 or 47.15 per cent were females. Operational groupwise percentages of males and females were respectively 52.31, and 47.69 for the marginal farms, 51.21 and 46.79 the small farms, 52.46 and 47.54 for the medium farms and 55.26 and 49.74 for the big farms.

Of 403 members in the sample farm households, 39.12

per cent were literates. The majority of these literates could not attain academic achievement above primary standard. However, 10.42 per cent received secondary education. Those obtaining degrees constituted 1.29 per cent. Only 1 person in the sample households received post-graduate degree. Operational groupwise, percentages of literates were 24.61, 46.79, 52.46 and 68.43 respectively for the marginal, the small, the medium and the big farmers.

Occupation, Sex and Literary Status in Cooch Behar :

The table-4 shows the distribution of members of sample households in the district of Cooch Behar with respect to their occupation, sex and literacy status according to the size of operational holdings. It is observed that a major portion of total population was engaged in agriculture as primary occupation. In terms of percentage, this was 31.88. Those having non-farm jobs as their primary occupation constituted 4.37 per cent.

Of the four operational size groups of holdings, viz., the marginal, the small, the medium and the big farmers, 27.51, 37.84, 40.63 and 35.29 per cent practised cultivation as primary occupation and 3.49, 37.84, 9.38 and 5.88 per cent had non-farm jobs as secondary occupation.

In the 4 operational size groups, 52.19 per cent were males and 47.81 per cent were females. The percentages of

Table—4

Occupation, Sex and Literacy Status for the Sample Households According to Operational Size Groups of Holdings During the year 1.6.79 to 31.5.80 in the District of Cooch Behar

Sl. No.	Operational size groups of holdings (ha)	Total population	Primary Occupation*		Sex		Literacy Status					Total literate (Percentage)
			Cultivation	Other than cultivation	Male	Female	Able to read and write	Primary	Secondary	Degree	P.G.	
1	0.01 – 1.00	229 (58.87)	63 (27.51)	8 (3.49)	120 (52.40)	109 (47.60)	25 (10.92)	28 (12.23)	13 (5.68)	–	–	28.83
2	1.01 – 2.00	111 (28.53)	42 (37.84)	5 (4.50)	56 (50.45)	55 (49.55)	15 (13.51)	18 (16.22)	10 (9.01)	2 (1.80)	–	40.54
3	2.01 – 3.00	32 (8.23)	13 (40.63)	3 (9.38)	17 (53.13)	15 (46.88)	3 (9.38)	5 (15.63)	4 (12.50)	2 (6.25)	–	43.76
4	3.01 & above	17 (4.37)	6 (35.29)	1 (5.88)	10 (58.82)	7 (41.18)	2 (11.76)	4 (23.53)	3 (17.65)	1 (5.88)	1 (5.88)	64.70
	Total :	389 (100.00)	124 (31.88)	17 (4.37)	203 (52.19)	186 (47.81)	45 (11.57)	55 (14.14)	30 (7.71)	5 (1.29)	1 (0.26)	34.97

Figures within the parentheses indicate percentages.

* Primary occupation is one from which above 50 per cent of annual income is earned.

males in the 4 operational size groups were 52.40, 50.45, 53.13 and 58.82 and the same of females were 47.60, 49.55, 46.88 and 41.18 respectively for the marginal, the small, the medium and the big farms.

Literacy percentage increased with the increase of size of holdings. It was the highest at 68.43 per cent for the big farmers and the lowest at 28.83 per cent for the marginal farmers. Literacy percentages were 40.54 and 43.76 respectively for the small and the medium farmers' groups.

Occupation, Sex and Literary Status in Birbhum, Bankura and Cooch Behar Combined :

Table-5 displays the distribution of members of sample households in the 3 districts, viz., Birbhum, Bankura and Cooch Behar combined with respect to their occupation, sex and literacy status according to the size of operational holdings. It is found from the table-5 that a major portion of total population depended on agriculture. Out of the total population, 28.01 per cent had agriculture as their primary occupation and 4.37 per cent had non-farm jobs as their primary occupation. Of the 4 operational size groups of holdings, 24.56, 28.12, 35.20 and 40.74 per cent had cultivation as primary occupation and 4.04, 3.77, 6.40 and 8.64 per cent had business, services, etc. as their primary occupation respectively in the marginal, the small, the medium and the big farmers' groups.

Table—5

Occupation, Sex and Literacy Status for the Sample Households According to Operational Size Groups of Holdings During the year 1.6.79 to 31.5.80 in the Districts of Birbhum, Bankura & Cooch Behar Combined

Sl. No.	Operational size group of holding (ha)	Total population	Primary Occupation*		Sex		Literacy Status					Total literate (Percentage)
			Cultivation	Other than cultivation	Male	Female	Able to read and write	Primary	Secondary	Degree	P.G.	
1	0.01 – 1.00	570 (50.85)	140 (24.56)	23 (4.04)	298 (52.28)	272 (47.72)	61 (10.70)	76 (13.33)	31 (5.44)	–	–	29.47
2	1.01 – 2.00	345 (30.78)	97 (28.12)	13 (3.77)	178 (51.59)	167 (48.41)	65 (18.84)	63 (18.26)	34 (9.86)	4 (1.16)	–	48.12
3	2.01 – 3.00	125 (11.15)	44 (35.20)	8 (6.40)	67 (53.60)	58 (46.40)	11 (8.80)	33 (26.40)	18 (14.40)	9 (7.20)	–	56.80
4	3.01 & above	81 (7.23)	33 (40.74)	7 (8.64)	45 (55.56)	36 (44.44)	9 (11.11)	23 (28.40)	14 (17.28)	4 (4.94)	2 (2.47)	61.73
	Total :	1121 (100.00)	314 (28.01)	51 (4.55)	588 (52.45)	533 (47.55)	146 (13.02)	195 (17.40)	97 (8.65)	17 (1.52)	2 (0.18)	40.68

Figures within the parentheses indicate percentages.

* Primary occupation is one from which above 50 per cent of annual income is earned.

Males were larger in number than females in each category of the 4 operational size groups. The males constituted 52.45 per cent and females 47.55 per cent in the total population. For the operational size groups of holdings, 52.28, 51.59, 53.60 and 55.56 per cent were males and 47.72, 48.41, 46.40 and 44.44 per cent were females respectively in the marginal, the small, the medium and the big farmers.

Literacy percentages were found to increase with the increase in size of holdings. It was the highest at 61.73 per cent for the big farmers and the lowest at 29.47 per cent for the marginal farmers. These were 48.12 and 56.80 per cent respectively for the small and the medium farmers' groups. Of the total population, 40.68 per cent were literates.

Land Utilization and Cropping Pattern :

Table-6 shows the cropping intensity for the sample farmers according to operational size groups of holdings during the period : 1.6.79 to 31.5.80 in the district of Birbhum, Bankura and Cooch Behar seperately and combined.

For the district of Birbhum, the maximum cropping intensity at 129.19 per cent was estimated for the marginal farms. The same for the small, the medium and the big farms were respectively 124.84, 129.01 and 125.82 per cent. The cropping intensity was the minimum for small farms. For all the sample farms taken together, the cropping intensity stood at 126.84 per cent.

Table-6

Cropping Intensity for the Sample Farmers According to Operational Size Groups of Holdings During the Period 16.79 to 31.5.80 in the District of Birbhum, Bankura and Cooch Behar Seperately and Combined

Sl. No.	Operational size groups of holdings (ha.)	Birbhum			Bankura			Cooch Behar			3 districts combined		
		Net cropped area (ha.)	Gross cropped area (ha.)	Cropping intensity*	Net cropped area (ha.)	Gross cropped area (ha.)	Cropping intensity	Net cropped area (ha.)	Gross cropped area (ha.)	Cropping intensity	Net cropped area (ha.)	Gross cropped area (ha.)	Cropping intensity
1	0.01 - 1.00	17.23 (27.86)	22.26 (28.37)	129.19	12.80 (17.97)	15.94 (18.73)	124.53	20.29 (34.37)	29.03 (46.56)	143.08	50.32 (26.19)	67.23 (29.76)	133.60
2	1.												
2	1.01 - 2.00	25.48 (41.20)	31.81 (40.55)	124.84	23.46 (32.94)	27.78 (32.64)	11841	17.45 (29.56)	19.07 (30.59)	109.28	66.39 (34.56)	78.66 (34.82)	118.48
3	2.01 - 3.00	9.34 (15.10)	12.05 (15.36)	129.01	18.55 (26.05)	21.53 (25.29)	116.06	7.32 (12.40)	7.59 (12.17)	103.69	35.21 (18.33)	41.17 (18.22)	116.93
4	3.01 and above	9.80 (15.84)	12.33 (15.72)	125.82	16.41 (23.04)	19.87 (23.34)	121.08	13.98 (23.68)	6.66 (10.68)	47.64	40.19 (20.92)	38.86 (17.20)	96.69
	Total :	61.85 (100.00)	78.45 (100.00)	126.84	71.22 (100.00)	85.12 (100.00)	119.57	59.04 (100.00)	62.35 (100.00)	105.61	192.11 (100.00)	225.92 (100.00)	117.60

Figures within the parentheses indicate percentages.

* Cropping intensity = $\frac{\text{Grossed cropped area (ha.) x 100}}{\text{Net sown area (ha.)}}$

In the district of Bankura, the cropping intensity ranged from 116.06 per cent for the medium farms to 124.53 for the small farms. For the 4 operational size groups of farms taken together the cropping intensity stood at 119.57 per cent.

Among the 4 operational size groups in Cooch Behar the maximum cropping intensity at 143.08 per cent was recorded by the small farms and the minimum cropping intensity at 47.64 per cent was observed for the big farms. The overall cropping intensity for sample farms as a whole was 105.61 per cent.

The combined sample for this study of 150 farms recorded the cropping intensity of 117.64 per cent ranging from 96.69 per cent for the big farms to 133.60 per cent for the marginal farms.

An inverse relation between operational size of farms and cropping intensity could be observed for the combined sample, indicating higher intensity of cultivation for the smaller farms and lower intensity of cultivation for the bigger farms. This showed greater efforts and care in farming on the part of the smaller farm operators. The same indirect relation was noticed in the district of Cooch Behar also. The other two districts, viz., Birbhum and Bankura could not show any precise relation between farm size and cropping intensity.

Cropping intensity was the highest at 126.84 per cent for the district of Birbhum and the lowest at 105.61 per cent

for the district of Cooch Behar.

Compared to cropping intensity for the state of West Bengal for the year 1976-77 at 123.40 and for India for the year 1976-77 at 119.14, the above estimates of cropping intensity for the sample farmers was low.

Area Under Crops :

Table-7 shows the distribution of area under cultivation of different crops in ha for the sample farmers belonging to different operational size groups of holdings during the period : 1.6.79 - 31.5.80.

Aman paddy covered the maximum cropped area for all the farms in the district of Birbhum. It ranged from 8.54 ha for the medium farmers to 22.54 ha for the small farmers. Total cropped ha under different groups has to be considered with reference to varying numbers of sample farms in each group. Total cropped ha under aman for all the 4 farm size groups was 53.45 ha.

Aus paddy covered 8.59 ha for all the 4 operational groups taken together. The marginal farms raised aus paddy on the maximum total area of 3.51 ha. The medium farms together grew aus paddy on a total area of 0.80 ha.

Wheat occupied the third position in respect of share of the total cropped area of the farms. It covered 5.99 ha.

Table-7

Distribution of Area Under Cultivation of Different Crops (Cropped Area) in Hectare for the Sample Farmers Belonging to Different Operational Size Groups of Holdings During the Period of 1.6.79 to 31.5.80 in the District of Birbhum

Sl. No.	Operational size groups of holdings (ha.)	Aus (ha.)	Aman (ha.)	Boro (ha.)	Wheat (ha.)	Oil-seeds (ha.)	Pulses (ha.)	Total (ha.)
1	0.01 - 1.00	3.51	13.70	0.54	1.96	2.14	0.41	22.26
2	1.01 - 2.00	3.21	22.54	0.53	2.44	1.76	1.33	31.81
3	2.01 - 3.00	0.80	8.54	1.08	0.66	0.63	0.34	12.05
4	3.01 & above	1.07	8.67	0.80	0.93	0.47	0.39	12.33
	Total :	8.59	53.45	2.95	5.99	5.00	2.47	78.45

The maximum area under wheat was for the small farms at 2.44 ha. The minimum cropped area was for the medium farms at 0.66 ha.

Oilseeds were cultivated on 5.00 ha. These have the 4th place in respect of area under the crops. The marginal and the small farms raised oilseeds on 2.14 ha and 1.76 ha respectively. The medium and the big farms had 0.63 ha and 0.47 ha respectively under this crop.

Boro paddy which is a H.Y.V. crop in this area was cultivated on 2.95 ha. The medium farms only could cultivate it on an area of more than one ha. The other 3 operational groups cultivated boro paddy on less than 1 ha each.

Pulses were grown on a total cropped ha of 2.47. Only the small farms cultivated pulses on an area of more than 1 ha.

The total cropped ha of all the farms was 78.45 ha in this district of Birbhum.

Table-8 represents the distribution of area under cultivation of different crops in ha for the sample farmers belonging to different operational size groups of holdings during the period 1.6.79 to 31.5.80 in the district of Bankura.

Among the 4 crops, viz., aus, aman, wheat and oilseeds, aman paddy occupied the maximum cropped area for all the farms in the district. It ranged from 11.33 ha for the marginal

Table-8

Distribution of Area Under Cultivation of Different Crops (Cropped Area) in Hectare for the Sample farmers Belonging to Different Operational Size Groups of Holdings During the Period of 1.6.79 to 31.5.80 in the District of Bankura

Sl. No.	Operational size groups of holdings (ha.)	Aus (ha.)	Aman (ha.)	Wheat (ha.)	Oil-seeds (ha.)	Total (ha.)
1	0.01 - 1.00	1.47	11.33	1.85	1.29	15.94
2	1.01 - 2.00	3.74	19.73	2.06	2.25	27.78
3	2.01 - 3.00	2.40	15.87	1.99	1.27	21.53
4	3.01 & above	0.27	16.14	1.86	1.60	19.87
	Total :	7.88	63.07	7.76	6.41	85.12

farmers to 19.73 ha for the small farmers. Total cropped ha under aman for all the 4 farm size groups was 63.07 ha.

Aus paddy covered 7.88 ha for all the 4 operational groups taken together. The small farmers occupied aus paddy on the maximum total area of 3.74 ha. The big farms together grew aus paddy on a total area of 0.27 ha.

Wheat occupied the third position and total cropped area for all the farms under wheat was estimated at 7.76 ha. Cropped area under wheat ranged from 2.06 ha for the small farmers to 1.85 ha for the marginal farmers.

Oilseeds were cultivated on 6.41 ha. These have the fourth place in respect of area under the crops. The cropped area under oilseeds ranged from 2.25 ha for the small farmers to 1.29 ha for the marginal farmers. Total cropped area under this crop for all the sample farms taken together was estimated at 6.41 ha.

The total cropped ha of all the farms was 85.12 ha in the district of Bankura.

Table-9 depicts the distribution of area under cultivation of different crops in ha in the district of Cooch Behar.

Aman occupied the maximum area in respect of total cropped area of all the four operational size groups. Total cropped area under aman was recorded at 43.43 ha. Cropped area under aman among the 4 operational size groups ranged

Table-9

Distribution of Area Under Cultivation of Different Crops (Cropped Area) in Hectare for the Sample Farmers Belonging to Different Operational Size Groups of Holdings During the Period of 1.6.79 to 31.5.80 in the District of Cooch Behar

Sl. No.	Operational size groups of holdings (ha.)	Aman (ha.)	Jute (ha.)	Total (ha.)
1	0.01 - 1.00	20.29	8.74	29.03
2	1.01 - 2.00	12.61	6.46	19.07
3	2.01 - 3.00	5.06	2.53	7.59
4	3.01 & above	5.47	1.19	6.66
	Total :	62.35	43.43	62.35

from 20.29 ha for the marginal farmers to 5.06 ha for the medium farmers.

In this district jute occupied the 2nd position. Cropped area under jute ranged from 8.74 ha for the marginal farmers to 1.19 ha for the big farmers. Total cropped area under jute of 4 operational size groups taken together was estimated at 18.92 ha.

The total cropped area in ha of all the farms was 62.35 ha in the district of Cooch Behar.

Table-10 represents the distribution of area under cultivation of different crops in ha in the three districts, viz., Birbhum, Bankura and Cooch Behar.

Aman occupied the maximum area for all the farms in the 3 districts combined. Cropped area under aman ranged from 54.88 ha for the small farmers to 29.47 ha for the medium farmers. Total cropped area for all the 150 farmers of these 3 districts was 159.95 ha.

Jute, aus, wheat, oilseeds, boro and pulses may be arranged in a descending order with respect to area covered by these crops in these 3 districts. Their total cropped areas were 18.92 ha, 16.47 ha, 13.75 ha, 11.41 ha, 2.95 ha and 2.47 ha respectively.

Total cropped area in ha of all the 150 farms of these 3 districts taken together was 225.92 ha.

Table-10

Distribution of Area Under Cultivation of Different Crops (Cropped area) in Hectare for the Sample Farmers Belonging to Different Operational Size Groups of Holdings During the Period of 1.6.79 to 31.5.80 in Districts of Birbhum, Bankura and Cooch Behar
Combined

Sl. No.	Operational size groups of holdings (ha.)	Aus (H.Y.V.) (ha.)	Aman (ha.)	Boro (ha.)	Wheat (ha.)	Oil-seeds (ha.)	Pulses (ha.)	Jute (ha.)	Total (ha.)
1	0.01 - 1.00	4.98	45.32	0.54	3.81	3.43	0.41	8.74	67.23
2	1.01 - 2.00	6.95	54.88	0.53	4.50	4.01	1.33	6.46	78.66
3	2.01 - 3.00	3.20	29.47	1.08	2.65	1.90	0.34	2.53	41.17
4	3.01 & above	1.34	30.28	0.80	2.79	2.07	0.39	1.19	38.86
	Total :	16.47	159.95	2.95	13.75	11.41	2.47	18.92	225.92

Resume :

Majority of the farms were concentrated in the marginal and the small farmers' groups in all the 3 districts covered under this study. Samples have been drawn from each size class in proportion to the total number of operated holdings in each size class. Percentage of literate people in the sample households ranged from 34.97 to 49.23 per cent in the 3 districts of Birbhum, Bankura and Cooch Behar. Percentage of people having agriculture as their primary occupation ranged from 24.81 to 31.88 in these districts. Aman paddy occupied the first position in the districts seperately and combined. The next position in this respect was occupied by jute in the 3 districts combined. The farmers also grew other crops like boro-paddy, aus paddy, wheat, oilseeds, and pulses. Cropping intensity was the highest at 126.84 per cent for Birbhum district and the lowest at 105.61 per cent for the Cooch Behar district. Cropping intensity exhibited an inverse relationship with farm size for the 3 districts taken together. Compared to the cropping intensity for India as a whole at 119.14 per cent during 1976-77 and at 123.40 per cent for West Bengal during 1976-77 the cropping intensity in the surveyed regions combined at 117.60 per cent was low.

CHAPTER - V

In the following paragraphs, an idea may be had of the proportions of the land leased-in, leased-out, area under irrigation, use of human labour and use of fertilizer in terms of their nutrient contents. This is done with a view to having an idea about security of tenures, average farm size, extent of application of fertilizer and human labour in land. This would also indicate the degree of dependence of farming on the traditional factor of human labour and the extent of adaptation of the farmers to at least one modern farm input, viz., fertilizer.

Land Tenure and Irrigation :

Table-11 reveals the distribution of land holdings in the district of Birbhum for the sample farmers belonging to the four operational size groups. This shows extents of land utilised for cultivation, lands leased-in, land under irrigation according to source and total operational area on the basis of different operational size groups.

It was observed that the farmers in the marginal group in the district of Birbhum owned 16.03 ha of land and leased in 1.20 ha. Of this, 15 ha were under Govt. canal served under the Mayurakshi project and 2.73 ha under ponds. The major source of irrigation is Government canal. Cent per cent of the operated area of this group received irrigation

Table-11

Distribution of Land Holdings and Irrigated Area of Sample Farmers on the Basis of Operational Size Groups During the Period 1.6.79 to 31.5.80 in the Districts of Birbhum

Sl. No.	Operational size groups of holdings (ha.)	No.of farm	Land owned (ha.)	Land leased-in (ha.)	Total operated area (ha.)	Land leased-out (ha)	Area under Govt. canal (ha.)	Area under ponds (ha.)	Total irrigated area (ha.)	Un-irrigated area (ha.)	Operated in area in ha per farm
1	0.01 - 1.00	24	16.03 (26.43)	1.20	17.23 (27.86)	-	15.00 (87.06)	2.73 (15.84)	17.73 (100.00)	-	0.72
2	1.01 - 2.00	19	25.48 (42.01)	-	25.48 (41.20)	-	20.80 (81.63)	4.68 (18.37)	25.48 (100.00)	-	1.34
3	2.01 - 3.00	4	9.34 (15.40)	-	9.34 (15.10)	-	8.07 (86.40)	1.27 (13.60)	9.34 (100.00)	-	2.34
4	3.01 & above	3	9.80 (16.16)	-	9.80 (15.84)	-	8.00 (81.63)	1.80 (18.37)	9.80 (100.00)	-	3.27
	Total :	50	60.65 (100.00)	1.20	61.85 (100.00)	-	51.87 (83.86)	10.48 (16.94)	61.85 (100.00)	-	1.24

Figures in the parentheses indicate percentages.

facilities from Govt. canal and ponds. Except the marginal farmers, nobody else leased in any land. The total operated area was the highest at 25.48 ha for the small farmers. Total operated areas were 17.23 ha, 9.34 ha and 9.80 ha respectively for the marginal farmers, the medium farmers and the big farmers. Operated areas per farm were 0.72, 1.34, 2.34 and 3.27 ha for the marginal, the small, the medium and the big farmers. Out of 25.48 ha of cultivated land of the small farmers, 20.80 ha (81.63 per cent) were under Govt. canal and 4.68 ha (19.37 per cent) were under ponds. An area of 8.07 ha (86.40 per cent) were under Govt. canal and 1.27 ha were under ponds for the medium farmers. Out of 9.80 ha of operated land of the big farmers, 8.00 ha (81.63 per cent) were under Govt. canal and 1.80 ha (18.37 per cent) were under ponds. For the sample farms as a whole, 83.86 per cent of total operated land of 61.85 ha were under Govt. canal and 16.24 per cent were under tank irrigation.

It is observed from the table-12 that the farmers belonging to marginal size groups in the district of Bankura owned 10.87 ha of land and leased in 1.93 ha. Of this, 3.46 ha (27.03 per cent) were under Govt. canal and 1.60 ha (12.50 per cent) were under ponds. An area of 5.06 ha of cultivated land was under Govt. canal and 1.60 ha was under tank irrigation. The rest of the operated land of 7.74 ha constituting 60.47 per cent was unirrigated. No land was leased in by the 3 other operational groups of farms. Per farm operated area

Table-12

Distribution of Land Holdings and Irrigated Area of Sample Farmers on the Basis of Operational Size Groups During the Period 1.6.79 to 31.5.80 in the District of Bankura

Sl. No.	Operational size groups of holdings (ha.)	No.of farm	Land owned (ha.)	Land leased-in (ha.)	Total operated area (ha.)	Land leased-out (ha)	Area under Govt. canal (ha.)	Area under ponds (ha.)	Total irrigated area (ha.)	Un-irrigated area (ha.)	Operated area in ha per farm
1	0.01 - 1.00	23	10.87 (15.69)	1.93	12.80 (17.97)	-	3.46 (27.03)	1.60 (12.50)	5.06 (39.53)	7.74 (60.47)	0.56
2	1.01 - 2.00	16	23.46 (33.86)	-	23.46 (32.94)	-	11.28 (48.08)	4.14 (17.65)	15.42 (65.73)	8.04 (34.27)	1.47
3	2.01 - 3.00	7	18.55 (26.77)	-	18.55 (26.05)	-	10.26 (55.31)	3.60 (19.41)	13.86 (74.72)	4.69 (25.28)	2.65
4	3.01 & above	4	16.41 (23.68)	-	16.41 (23.04)	-	7.08 (43.14)	2.00 (12.19)	9.08 (55.33)	7.33 (44.67)	4.10
	Total :	50	69.29 (100.00)	1.93	71.22 (100.00)	-	32.08 (54.11)	11.34 (15.04)	43.42 (61.05)	27.80 (39.09)	1.42

Figures in the parentheses indicate percentages.

were estimated to be 0.56, 1.47, 2.65 and 4.10 ha for the marginal, the small, themedium and the big farms respectively in this district.

Of the total operated land of the sample farms in this district, 45.11 per cent were under Govt. canal under the Damodar Valley Corporation Project, 15.04 per cent were under tank irrigation and the remaining 39.01 per cent were un-irrigated. Proportion of irrigated land in the total operated land was the maximum at 74.72 per cent for the medium farms and the minimum at 39.53 per cent for the marginal farm in this district.

It is observed from the table-13 that for the sample farms in the district of Cooch Behar, the total operated land was estimated to be 59.04 ha. Operated areas per farm for the marginal, the small, the medium and the big farms were respectively 0.61, 1.45, 2.44 and 6.99 ha. Average size of operational holdings for all the sample farms in this district was 1.18 ha.

The entire area of cultivated land in this district was unirrigated.

Table-14 displays the distribution of owned and operated land along with facilities for irrigation and extent of lease for all the sample farms in the 3 districts together according to operational size groups of holdings.

Table-13

Distribution of Land Holdings and Irrigated Area of Sample Farmers on the Basis of Operational Size Groups During the Period 1.6.79 to 31.5.80 in the District of Cooch Behar

Sl. No.	Operational size groups of holdings (ha,)	No.of farm	Land owned (ha,)	Land leased-in (ha.)	Total operated area (ha.)	Land leased-out (ha)	Area under Govt. canal (ha.)	Area under ponds (ha.)	Total irrigated area (ha.)	Un-irrigated area (ha.)	Operated area in ha per farm
1	0.01 - 1.00	33	20.29 (34.37)	-	20.29 (34.37)	-	-	-	-	20.29 (34.37)	0.61
2	1.01 - 2.00	12	17.45 (29.56)	-	17.45 (29.56)	-	-	-	-	17.45 (29.56)	1.45
3	2.01 - 3.00	3	7.32 (12.40)	-	7.32 (12.40)	-	-	-	-	7.32 (12.40)	2.44
4	3.01 & above	2	13.98 (23.68)	-	13.98 (23.68)	-	-	-	-	13.98 (23.68)	6.99
	Total :	50	59.04 (100.00)	-	59.04 (100.00)	-	-	-	-	59.04 (100.00)	1.18

Figure in the parentheses indicate percentages.

Table-14

Distribution of Land Holdings and Irrigated Area of Sample Farmers on the Basis of Operational Size Groups During the Period 1.6.79 to 31.5.80 in the Districts of Bankura, Birbhum and Cooch Behar Combined

Sl. No.	Operational size groups of holdings (ha.)	No.of farm	Land owned (ha.)	Land leased-in (ha.)	Total operated area (ha.)	Land leased-out (ha)	Area under Govt. canal (ha.)	Area under ponds (ha.)	Total irrigated area (ha.)	Unirrigated area (ha.)	Operated in area in ha. per farm
1	0.01 - 1.00	80	47.19 (24.97)	3.13	50.32 (26.19)	-	18.46 (36.09)	4.33 (8.60)	22.79 (45.29)	27.53 (54.71)	0.63
2	1.01 - 2.00	47	66.39 (35.13)	-	66.39 (34.56)	-	32.08 (48.32)	8.82 (13.29)	40.90 (61.61)	25.49 (38.39)	1.41
3	2.01 - 3.00	14	35.21 (18.63)	-	35.21 (18.33)	-	18.33 (52.06)	4.87 (13.83)	23.20 (65.89)	12.01 (34.11)	2.52
4	3.01 & above	9	40.19 (21.27)	-	40.19 (20.92)	-	15.08 (37.52)	3.80 (9.46)	18.88 (46.98)	21.31 (53.02)	4.47
	Total :	150	188.98 (100.00)	3.13	192.11 (100.00)		83.95 (43.70)	21.82 (11.36)	105.77 (55.06)	86.34 (44.94)	1.28

Figures in the parentheses indicate percentages.

The total owned area of the 150 farms was 188.98 ha. They leased in 3.13 ha but leased out no land at all. Hence, their total operated area was 192.11 ha. Of this, 43.70 per cent was under Govt. canal, 11.36 per cent was under tank irrigation and the rest 44.49 per cent was unirrigated. Per farm operated areas were 0.63, 1.41, 2.52 and 4.47 ha respectively for the marginal, the small, the medium and the big farms.

Average size of operational holdings was found to be 1.29 ha. Proportions of irrigated land in total operated land ranged from 45.29 per cent for the marginal farms to 65.89 per cent for the medium farms.

Out of 35.21 ha of medium farmers, 18.33 ha (52.06 per cent) was canal irrigated and 4.87 ha (13.83 per cent) under ponds. In this size group thus 23.20 ha (65.89 per cent) was irrigated and 12.01 ha (34.11 per cent) was unirrigated.

Out of 40.19 ha of big farmers, 15.08 ha (37.52 per cent) was canal irrigated and 3.80 ha (9.46 per cent) was under ponds. Total irrigated land of this size group was 18.88 ha (46.98 per cent) and 21.31 ha (53.02 per cent) was unirrigated.

Finally, out of the 192.11 ha of all farmers of 3 districts, 83.95 ha (43.70 per cent) area was under Govt.

canal and 21.82 ha (11.36 per cent) was under ponds. Total irrigated area of 3 districts was 105.77 ha and 44.94 ha is unirrigated.

The above observations regarding size of owned and operational holding, tenancy, and irrigation facilities turn out to be in tune with the same for the districts concerned. For example, average size of operated holdings was 1.24 ha for Birbhum, 1.07 ha for Bankura and 1.14 for Cooch Behar during the year 1976-77. Proportion of irrigated area in the total operated area was 59.38 per cent in Birbhum, 44.41 per cent in Bankura and 7.59 per cent in Cooch Behar during the year 1976-77. Average size of operated holding for the State of West Bengal was 0.99 ha in 1976-77 and 20.81 per cent of total operated land was irrigated during 1976-77.

Input Use :

Many inputs are used in farms. Of these human labour, fertilizer and manures, and irrigation are more important inputs with respect to percentage shares in value of total inputs used in farms. Variation in per ha use are also prominent in these respects. While an account of all farm inputs has been taken in examining the economics of the sample farms, distribution of fertilizer and manures in terms of nutrients, viz., N.P.K. and human labour used in sample farms are shown in details as illustrations in the matter of

differences in input use per ha among the different operational size groups as well as in the different districts.

Distribution of human labour in hours and in rupees per ha used in farms during the period 1.6.79 to 31.5.80 in the district of Birbhum is shown in table-15.

The marginal farms used 1404.95 hours of human labour valued at Rs.1300.27 per cropped ha. Hired labour constituted 31.64 per cent and family labour constituted 68.36 per cent. The percentages turned out to be the same for human labour per ha in hours as well as in rupees since family labour hours were evaluated at the average wage rate for hired labour.

The small farms used 1453.72 hours of human labour valued at Rs.1332.74 per cropped ha. Hired labour and family labour constituted 66.14 per cent and 33.86 per cent of the total human labour used per cropped ha. Per cropped ha, use of human labour was estimated at 1460.89 hours worth Rs.1368.97 for the medium farms. Hired labour constituted 72.89 per cent of the total and family labour accounted for the rest.

The big farms used human labour of 1477.92 hours worth Rs.1377.27 per cropped ha. Hired labour accounted for 78.33 per cent and the rest was accounted for by family labour.

For the 4 operational size groups of farms together, per ha use of human labour was estimated at 1444.79 hours

Table-15

Distribution of Human Labour in Hours and in Rupees Per Cropped Hectare Used in Farms According to Operational Size Groups of Holdings During the Period of 1.6.79 to 31.5.80 in the District of Birbhum

Sl. No.	Operational size groups of holdings (ha.)	Hired labour		Family labour		Total hours	Total value (Rs.)
		Hrs.	Value (Rs.)	Hrs.	Value (Rs.)		
1	0.01 - 1.00	444.50	411.38	960.45	888.89	1404.95	1300.27
		(31.64)	(31.64)	(68.36)	(68.36)	(100.00)	(100.00)
2	1.01 - 2.00	961.49	881.50	492.23	451.24	1453.72	1332.74
		(66.14)	(66.14)	(33.86)	(33.86)	(100.00)	(100.00)
3	2.01 - 3.00	1064.84	997.80	396.05	371.17	1460.89	1368.97
		(72.89)	(72.89)	(27.11)	(27.11)	(100.00)	(100.00)
4	3.01 and above	1157.65	1078.81	320.27	298.46	1477.92	1377.27
		(78.33)	(78.33)	(21.67)	(21.67)	(100.00)	(100.00)
	Total :	861.50	796.98	583.29	539.11	1444.79	1336.09
		(59.63)	(59.65)	(40.37)	(40.35)	(100.00)	(100.00)

Figures in the parentheses indicate percentages.

worth Rs.1336.09. Share of hired labour was 59.65 per cent and share of family labour was 40.35 per cent in the total.

A direct relation could be observed between operational size of farms and use of hired human labour per cropped ha. The relation was inverse between per ha use of family labour and operational size of farms. Bigger size of farms required more hired labour to operate them. Only family labour was not sufficient for this purpose.

Table-16 shows the distribution of human labour in hours and in rupees used in farms in the district of Bankura.

The marginal farms used 1446.37 hours of human labour valued at Rs.1338.27 per cropped ha. Hired labour constituted 32.35 per cent and family labour constituted 67.35 per cent.

The small farmers used 1440.12 hours valued at Rs.1327.94 per cropped ha. Hired labour and family labour constituted 70.76 per cent and 29.24 per cent respectively of the total human labour used per cropped ha.

The medium farmers used 1436.37 hours worth Rs.1319.27. Hired labour and family labour constituted 76.82 per cent and 23.18 per cent respectively of the total human labour used per cropped ha.

The big farms used human labour of 1470.12 hours worth Rs.1343.83. Hired labour accounted for 80.60 per cent and the rest was accounted for by family labours.

Table-16

Distribution of Human Labour in Hours and in Rupees Per Cropped Hectare Used in Farms According to Operational Size Groups of Holdings During the Period of 1.6.79 to 31.5.80 in the District of Bankura

Sl. No.	Operational size groups of holdings (ha.)	Hired labour		Family labour		Total hours	Total value (Rs.)
		Hrs.	Value (Rs.)	Hrs.	Value (Rs.)		
1	0.01 - 1.00	467.94	432.96	978.43	905.31	1446.37	1338.27
		(32.35)	(32.35)	(67.65)	(67.65)	(100.00)	(100.00)
2	1.01 - 2.00	1018.98	939.60	421.14	388.34	1440.12	1327.94
		(70.76)	(70.76)	(29.24)	(29.24)	(100.00)	(100.00)
3	2.01 - 3.00	1103.47	1013.51	332.90	305.76	1436.37	1319.27
		(76.82)	(76.82)	(23.18)	(23.18)	(100.00)	(100.00)
4	3.01 & above	1184.90	1083.12	285.22	260.71	1470.12	1343.83
		(80.60)	(80.60)	(21.22)	(21.22)	(100.00)	(100.00)
	Total :	975.89	896.92	471.45	437.47	1447.34	1331.39
		(67.43)	(67.37)	(32.57)	(32.63)	(100.00	(100.00)

Figures in the parentheses indicate percentages.

For the 4 operational size groups of farms together, per ha use of human labour was estimated at 1447.34 hours worth Rs.1331.39. Share of hired labour was 67.37 per cent and share of family labour was 32.63 per cent in the total.

A direct relationship was observed between operational size of farms and use of hired human labour per cropped ha. The relation was inverse between per ha use of family labour and operational size of farms. Bigger size of farms required more hired labour to operate them. Only family labour was not sufficient for this purpose.

Table-17 shows the distribution of human labour in hours and in rupees per ha used in farms in the district of Cooch Behar.

Use of human labour per cropped ha for the 4 operational size groups seperately was 1466.67 hours worth Rs.1290.46 for the marginal farmers, 1477.22 hours worth Rs.1287.68 for the small farmers, 1527.83 hours worth Rs.1320.97 for the medium farmers and 1549.57 hours worth Rs.1331.99 for the big farmers.

Hired human labour constituted 23.68 per cent, 60.48 per cent, 70.22 per cent and 74.59 per cent respectively in order of size groups. Family labour accounted for 76.32 per cent, 39.32 per cent, 29.78 per cent and 25.41 per cent of the total for the marginal, the small, the medium and the big farmers.

Table-17

Distribution of Human Labour in Hours and in Rupees Per Cropped Hectare Used in Farms According to Operational Size Groups of Holdings During the Period of 1.6.79 to 31.5.80 in the District of Cooch Behar

Sl. No.	Operational size groups of holdings (ha.)	Hired labour		Family labour		Total hours	Total value (Rs.)
		Hrs.	Value (Rs.)	Hrs.	Value (Rs.)		
1	0.01 - 1.00	347.28	305.56	119.39	984.90	1466.67	1290.46
		(23.68)	(23.68)	(76.32)	(76.32)	(100.00)	(100.00)
2	1.01 - 2.00	893.45	778.82	583.77	508.86	1477.22	1287.68
		(60.48)	(60.48)	(39.52)	(39.52)	(100.00)	(100.00)
3	2.01 - 3.00	1072.89	927.63	454.94	393.34	1527.83	1320.97
		(70.22)	(70.22)	(29.78)	(29.78)	(100.00)	(100.00)
4	3.01 & above	1155.78	993.49	393.79	338.50	1549.57	1331.99
		(74.59)	(74.59)	(25.41)	(25.41)	(100.00)	(100.00)
	Total :	689.02	599.52	797.18	698.24	1486.20	1297.76
		(46.36)	(46.20)	(53.64)	(53.80)	(100.00)	(100.00)

Figures in the parentheses indicate percentages.

For the 4 operational size groups of farms together, per ha use of human labour was estimated at 1486.20 hours worth Rs.1297.76. Share of hired labour was 46.20 per cent and share of family labour was 53.80 per cent in the total.

A direct relationship was observed between operational size groups of farms and use of hired human labour. An inverse relationship was found between operational size of farms and family labour. The bigger farms used more hired labour to operate them as family labour was not sufficient for this purpose.

A direct relationship was observed between operational size groups of farms and use of hired labour whereas an inverse relationship was found between operational size of farms and family labour in the 3 districts seperately and combined.

Table-18 represents the distribution of human labour in hours and in rupees per ha used in farms in the three districts, viz., Birbhum, Bankura and Cooch Behar combined.

Use of hired labour was 28.31 per cent, 66.37 per cent, 74.40 per cent and 79.23 per cent respectively in order of farm size. Family labour constituted 71.69 per cent, 33.63 per cent, 25.60 per cent and 20.27 per cent respectively for the marginal, the small, the medium and the big farmers.

Table-18

Distribution of Human Labour in Hours and in Rupees Per Cropped Hectare Used in Farms According to Operational Size Groups of Holdings During the Period of 1.6.79 to 31.5.80 in the Districts of Birbhum, Bankura and Cooch Behar Combined

Sl. No.	Operational size groups of holdings (ha.)	Hired labour		Family labour		Total hours	Total value (Rs.)
		Hrs.	Value (Rs.)	Hrs.	Value (Rs.)		
1	0.01 - 1.00	408.08	370.80	1033.34	934.24	1441.42	1305.04
		(28.31)	(28.41)	(71.69)	(71.59)	(100.00)	(100.00)
2	1.01 - 2.00	965.75	877.13	489.32	443.00	1455.07	1320.13
		(66.37)	(66.44)	(33.63)	(33.56)	(100.00)	(100.00)
3	2.01 - 3.00	1086.53	993.08	373.88	341.05	1460.41	1334.13
		(74.40)	(74.44)	(25.60)	(25.56)	(100.00)	(100.00)
4	3.01 & above	1178.12	1066.39	308.77	286.02	1486.89	1352.41
		(79.23)	(78.87)	(20.77)	(21.53)	(100.00)	(100.00)
	Total :	858.34	780.14	599.12	543.60	1457.45	1323.74
		(58.89)	(58.93)	(41.11)	(41.07)	(100.00)	(100.00)

Figures in the parentheses indicate percentages.

Use of human labour per cropped ha was estimated at 1441.42 hours worth Rs.1305.04, 1455.07 hours worth Rs.1320.13, 1460.00 hours worth Rs.1334.13 and 1486.89 hours worth Rs.1352.41 respectively for the marginal, the small, the medium and the big farmers.

For the 4 operational size groups of farms together, per cropped ha use of human labour was estimated at 1457.45 hours worth Rs.1323.74. Share of hired labour was 58.93 per cent and share of family labour was 41.07 per cent in the total.

A direct relationship was observed between operational size of farms and use of hired human labour. Inverse relationship was found between operational size of farms and use of family labour. The bigger size groups of farms required more hired labour to operate them. Only family labour was not sufficient for this purpose.

Distribution of N.P.K. :

The 50 sample farms in the district of Birbhum (Table-19) used N.P.K. worth Rs.435.16 per ha in the year of the investigation. A direct relation between value of N.P.K. used per ha and operational size of farms could be observed in this district. Per ha use of N.P.K. increased from Rs.405.09 for the marginal farms to Rs.499.72 for the big farms.

Table-19

Distribution of Nitrogen(N), Phosphate(P) and Potash(K) in Kgs and in Rs Per Cropped Hectare for the Sample Households Belong to Different Operational Size Groups During the Period of 1.6.79 to 30.5.80 in the District of Birbhum

Sl. No.	Operational size groups of holdings (ha.)	N Per ha. (kg.)	P Per ha. (kg.)	K Per ha. (kg.)	Total value per ha. (Rs.)
1	0.01 - 1.00	55.17	30.60	43.72	405.09
2	1.01 - 2.00	60.55	28.93	40.90	418.82
3	2.01 - 3.00	66.47	32.70	48.97	467.76
4	3.01 and above	69.98	34.24	51.41	499.72
	Total :	61.41	30.82	44.59	435.16

The marginal farms used 55.17 kgs of N, 30.60 kgs of P, and 43.72 kgs of K per cropped ha in Birbhum. The corresponding figures were 60.55 kgs, 28.93 kgs and 40.90 kgs for the small farms, 66.47 kgs, 32.70 kgs and 48.97 kgs for the medium farms and 69.98 kgs, 34.24 kgs and 51.41 kgs for the big farms.

For the 4 operational groups combined, quantities of N, P and K in kgs used per ha in this district were 61.41, 30.82 and 44.59.

The 50 sample farms in the district of Bankura (Table-20) used N, P, and K worth Rs.526.02 per ha in the year of the investigation. A direct relationship between value of N, P and K used per ha and operational size of farms could be observed in this district. Per ha use of N.P.K. ranged from Rs.447.61 for the marginal farmers to Rs.573.36 for the big farmers.

The marginal farms used 63.49 kgs of N, 31.40 kgs of P and 46.82 kgs of K per cropped ha. The corresponding figures were 69.19 kgs, 35.91 kgs and 47.19 kgs for the small farmers, 75.88 kgs, 38.18 kgs and 48.21 kgs for the medium farms and 78.59 kgs, 39.43 kgs and 41.16 kgs for the big farms.

For the 4 operational size groups combined quantities of N, P and K in kgs used per ha in this district were 72.01, 36.46 and 45.97.

Table-20

Distribution of Nitrogen(N), Phosphate(P) and Potash(K) in Kgs and in Rs. Per Cropped Hectare for the Sample Households Belong to Different Operational Size Groups During the Period of 1.6.79 to 31.5.80 in the District of Bankura

Sl. No.	Operational size groups of holdings (ha.)	N Per ha. (kg.)	P Per ha. (kg.)	K Per ha. (kg.)	Total value per ha. (Rs.)
1	0.01 - 1.00	63.49	31.40	46.82	447.61
2	1.01 - 2.00	69.19	35.91	47.19	504.94
3	2.01 - 3.00	75.88	38.18	48.21	567.57
4	3.01 and above	78.59	39.43	41.16	573.36
	Total :	72.01	36.46	45.97	526.02

The 50 sample farms in the district of Cooch Behar (Table-21) used N, P and K worth Rs.254.49 per ha in the year of investigation. Per ha use of N, P and K ranged from Rs.233.96 for the marginal farmers to Rs.302.74 for the big farmers. A direct relationship was found between value of per ha use of N, P and K and operational size of farms.

The marginal farmers used 28.23 kgs of N, 20.63 kgs of P and 47.85 kgs of K per cropped ha. The analogous figures were 32.33 kgs, 19.85 kgs and 46.31 kgs for the small farmers, 40.28 kgs, 24.04 kgs and 53.09 kgs for the medium farmers and 41.84 kgs, 23.63 kgs and 55.00 kgs for the big farmers.

For the 4 operational groups combined quantities of N, P and K used per ha in this district were 32.59, 21.13 and 48.80 kgs.

The 150 sample farms in the districts of Birbhum, Bankura and Cooch Behar (Table-22) combined used N, P and K worth Rs.419.53 per ha in the year of investigation. Per ha use of N, P and K ranged from Rs.341.28 for the marginal farmers to Rs.503.61 for the big farmers.

The marginal farmers used 45.68 kgs of N, 26.48 kgs of P and 46.67 kgs of K per cropped ha. The corresponding figures were 56.76 kgs, 29.19 kgs and 44.43 kgs of the small farmers, 66.56 kgs, 33.97 kgs and 49.33 kgs for the medium farmers and 69.56 kgs, 35.08 kgs and 46.81 kgs for the big farmers.

Table-21

Distribution of Nitrogen(N), Phosphate(P) and Potash(K) in Kgs and in Rs. per Cropped Hectare for the Sample Households Belong to Different Operational Size Groups During the Period of 1.6.79 to 31.5.80 in the District of Coooh Behar

Sl. No.	Operational size groups of holdings (ha.)	N Per ha. (kg.)	P Per ha. (kg.)	K Per ha. (kg.)	Total value per ha. (Rs.)
1	0.01 - 1.00	28.63	20.63	47.85	233.96
2	1.01 - 2.00	32.33	19.85	46.31	253.72
3	2.01 - 3.00	40.28	24.04	53.09	292.64
4	3.01 and above	41.84	23.63	55.14	302.74
	Total :	32.59	21.13	48.80	254.49

Table-22

Distribution of Nitrogen(N), Phosphate(P) and Potash(K) in Kgs and in Rs. Per Cropped Hectare for the Sample Households Belong to Different Operational Size Groups During the Period of 1.6.79 to 31.5.80 in the Districts of Birbhum, Bankura and Cooch Behar Combined

Sl. No.	Operational size groups of holdings (ha.)	N Per ha. (kg.)	P Per ha. (kg.)	K Per ha. (kg.)	Total value per ha. (Rs.)
1	0.01 - 1.00	45.68	26.48	46.67	341.28
2	1.01 - 2.00	56.76	29.19	44.43	409.21
3	2.01 - 3.00	66.56	33.97	49.33	487.67
4	3.01 and above	69.56	35.08	46.81	503.61
	Total :	57.45	30.27	46.40	419.53

For the 4 operational groups combined quantities of N, P and K used per ha in this district were 57.45, 30.27 and 46.40.

R e s u m e :

In all the 3 districts the sample farmers cultivated mainly owned land. Leased in land constituted a very small fraction of the total operated land. There was reportedly no leased in land for the sample farmers in Cooch Behar. Irrigated area was 100 per cent and 60.05 per cent of the total operated area in Birbhum and Bankura respectively. There was no irrigated land for the sample farmers in Cooch Behar. Govt. canal constituted the main source of irrigation in Birbhum and Bankura. There was a great dependence of farming on human labour in all the districts. Per cropped ha use of human labour hours was the maximum at Rs.1336.09 for Birbhum district and the minimum at Rs.1297.16 for Cooch Behar district. A direct relationship was found between operational size groups of farms and use of hired labour whereas an inverse relationship was found between operational size of farms and family labour in the 3 districts seperately and combined. N.P.K. used per cropped ha ranged from Rs.526.02 in Bankura district to Rs.254.49 in Cooch Behar district. For the 3 districts combined, Rs.419.53 of N.P.K. was used per cropped ha. A direct relation was observed between N.P.K. used in Rs. per cropped ha and operational size of farms in all

the 3 districts seperately and combined. Compared to use of N.P.K. at Rs.87.92 per cropped ha in India during 1978-79 and at Rs.86.84 per cropped ha in West Bengal during 1978-79 the use of N.P.K. in the surveyed region is satisfactory. It was thus observed that the farm economy of the sample farmers depended greatly on traditional inputs like human labour.

It is suggested that the farmers used more modern inputs like N.P.K. and depended less on human and other natural factors for success of agriculture.

CHAPTER - VI

FARM ASSETS AND FARM INCOME

A view of principal farm assets excluding land, estimates of depreciation of farm assets, cost of production, yield and income and benefit cost ratios may be obtained from the facts and discussions contained in this chapter.

Farm Assets :

Table-23 represents the assets structure excluding land of sample farmers in the district of Birbhum. Assets structure of farm households in this table comprised of milch animals, cowsheds, draught animals, plough, bullock-carts, ladders, sickles, spades, local irrigation impliments, etc.

The highest assets value was recorded by the draught animals in the case of the farmers in the marginal size group. Their current value was Rs.24383.00. The lowest value was accounted for by ladders at Rs.96.00.

In the size group of the small farmers, the draught animals claimed the highest current value at Rs.35100.00 and the ladders claimed the lowest current value at Rs.76.00. Draught animals recorded the maximum values in all size groups. The milch animals had the second position in this respect. The medium farmers had the highest values of Rs.11000.00 for the draught animals and the lowest value at Rs.28.00 for ladders.

Table—23

Asset Structure Excluding Land on the Basis of Operational Size Groups of Holdings in Rupees During the Period 1.6.79 to 31.5.80 in the District of Birbhum

Sl. No.	Operational size groups of holdings (ha.)	Milch animal		Draught animal		Cowshed		Wooden plough		Bullock cart	
		No	C.V.*	No	C.V.	No	C.V.	No	C.V.	No	C.V.
1	2	3	4	5	6	7	8	9	10	11	12
1	0.01 – 1.00	27	20800.00	38	24383.00	24	13775.00	24	1020.00	15	11250.00
2	1.01 – 2.00	31	27400.00	38	35100.00	19	19400.00	19	790.00	19	14750.00
3	2.01 – 3.00	8	7600.00	10	11000.00	4	5775.00	7	280.00	5	4000.00
4	3.01 & above	6	5800.00	14	13000.00	3	4650.00	6	300.00	5	4000.00
	Total :	72	61600.00	100	83483.00	50	43600.00	56	2390.00	44	34000.00

* C.V. = Current value.

Continued :

Table–23 Continued :

Sl.No.	Ladder		Sickle		Spade		Done		Total		Total C.V.	
	No	C.V.	No	C.V.	No	C.V.	No	C.V.	No	C.V.	Per farm	Per cropped ha
	13	14	15	16	17	18	19	20	21	22	23	24
1	24	96.00	93	294.00	24	561.00	20	3265.00	289	75444.00	3143.50	3389.22
2	19	76.00	84	252.00	22	371.00	19	2645.00	270	100784.00	5304.42	3168.31
3	7	28.00	16	48.00	7	175.00	4	565.00	68	29471.00	7367.75	2445.73
4	6	24.00	12	36.00	6	150.00	3	450.00	61	28410.00	9470.00	2304.14
Total :	56	224.00	205	630.00	59	1257.00	46	6925.00	688	234109.00	4682.18	2984.18

Concluded,

values observed were for ladders for the small farmers at Rs.64.00, for the medium farmers at Rs.48.00 and for the big farmers at Rs.32.00.

The total current values of all assets taken together were Rs.53253.00, Rs.78893.00, Rs.55672.00 and Rs.34470.00 respectively for the four operational groups in order of farm size. The total value of assets of all farms was Rs.222293.00.

Table-25 indicates that the value of assets for the sample farms in the district of Cooch Behar according to operational size groups of farms.

Draught animals recorded the highest values of Rs.36500.00, Rs.16500.00, Rs.6900.00 and Rs.5600.00 respectively for the four operational groups of holdings in order of farm size and the lowest values were accounted for by sickles at Rs.414.00, Rs.153.00, Rs.36.00 and Rs.24.00 respectively for the farm size groups. The milch animals had the second position in this respect.

The total current values of all assets were Rs.97527.00, Rs.48015.00, Rs.16310.00 and Rs.12634 respectively in order of farm size for the 4 operational size groups. Total aggregate value of all farm assets was Rs.174486.00.

Table-26 represents the assets structure excluding land in the 3 districts, viz., Birbhum, Bankura and Cooch Behar taken together.

Table-24

Asset Structure Excluding Land on the Basis of Operational Size Groups of Holdings in Rupees During the Period 1.6.79 to 31.5.80 in the District of Bankura

Sl. No.	Operational size groups of holdings (ha.)	Milch animal		Draught animal		Cowshed		Wooden plough		Bullock cart	
		No	C.V.*	No	C.V.	No	C.V.	No	C.V.	No	C.V.
1	2	3	4	5	6	7	8	9	10	11	12
1	0.01 – 1.00	19	14600.00	19	11400.00	23	12000.00	23	920.00	15	11250.00
2	1.01 – 2.00	22	20800.00	32	26300.00	16	16182.00	16	700.00	16	12000.00
3	2.01 – 3.00	14	12800.00	20	23500.00	7	9450.00	12	510.00	10	8000.00
4	3.01 & above	8	7600.00	14	15000.00	4	5850.00	8	350.00	6	4800.00
	Total :	63	55800.00	85	76200.00	50	43482.00	59	2480.00	47	36050.00

* C.V. = Current value.

Continued :

Table–24 Continued :

Sl. No.	Ladder		Sickle		Spade		Done		Total		Total C.V.	
	No	C.V.	No	C.V.	No	C.V.	No	C.V.	No	C.V.	Per farm	Per cropped ha
	13	14	15	16	17	18	19	20	21	22	23	24
1	23	92.00	96	288.00	23	458.00	14	2250.00	255	53258.00	2315.57	3341.15
2	16	64.00	68	204.00	16	348.00	16	2295.00	218	78893.00	4930.81	2839.92
3	12	48.00	28	84.00	12	300.00	7	980.00	122	55672.00	7953.14	2585.79
4	8	32.00	16	48.00	8	200.00	4	590.00	76	34470.00	8617.50	1734.78
Total :	59	236.00	208	624.00	59	1306.00	41	6115.00	671	222293.00	4445.86	2611.52

Concluded.

For the big farmers, the maximum and the minimum values of Rs.1300.00 and Rs.24.00 were observed for draught animals and ladders respectively.

The total current value of all assets taken together in the district of Birbhum was noted at Rs.75444.00 for the marginal farmers, Rs.100784.00 for the small farmers, Rs.29471.00 for the medium farmers and Rs.28410.00 for the big farmers. The aggregate assets value of all farms taken together was Rs.234109.00.

Assets value per farm amounted to Rs.3143.50, Rs.5304.42, Rs.7367.75 and Rs.9470.00 respectively for the marginal, the small, the medium and the big farms. Average assets value for the sample farm in this district was Rs.4682.18.

Table-24 shows the assets structure excluding land of the sample farmers in the district of Bankura.

The highest value was recorded for milch animals in the case of the farmers in the marginal size group at Rs.14600. The lowest was accounted for by ladders at Rs.92.00. In this size group draught animals occupied the second position with Rs.11400.00. Values of draught animals were the highest at Rs.26300.00, Rs.23500.00 and Rs.15000.00 for the small, the medium and the large farmers respectively. The value of milch animals had the second position in each of the 4 operational groups except the marginal farmers. The lowest

Table–25

Asset Structure Excluding Land on the Basis of Operational Size Groups of Holdings in Rupees During the Period 1.6.79 to 31.5.80 in the District of Cooch Behar

Sl. No.	Operational size groups of holdings (ha.)	Milch animal		Draught animal		Cowshed		Wooden plough		Bullock cart	
		No	C.V.*	No	C.V.	No	C.V.	No	C.V.	No	C.V.
1	2	3	4	5	6	7	8	9	10	11	12
1	0.01 – 1.00	29	28400.00	66	36500.00	33	14800.00	33	1320.00	22	14984.00
2	1.01 – 2.00	19	13500.00	28	16500.00	12	8650.00	12	480.00	12	8400.00
3	2.01 – 3.00	6	4200.00	12	6900.00	3	2825.00	3	135.00	3	2100.00
4	3.01 & above	4	3200.00	8	5600.00	2	2100.00	2	110.00	2	1500.00
	Total :	58	49300.00	114	65500.00	50	28375.00	50	2045.00	39	26984.00

* C.V. = Current value.

Continued :

Table-25 Continued :

Sl.No.	Ladder		Sickle		Spade		Total		Total C.V.	
	No	C.V.	No	C.V.	No	C.V.	No	C.V.	Per farm	Per cropped ha
	13	14	15	16	17	18	19	20	21	22
1	33	505.00	134	414.00	33	604.00	383	97527.00	2955.36	3359.52
2	12	175.00	51	153.00	12	157.00	158	48015.00	4001.25	2517.83
3	3	65.00	12	36.00	3	49.00	45	16310.00	5436.67	2148.88
4	2	50.00	8	24.00	2	50.00	30	12634.00	6317.00	1897.00
Total :	50	795.00	205	627.00	50	860.00	616	174486.00	3489.72	2798.49

Concluded.

Table–26

Asset Structure Excluding Land on the Basis of Operational Size Groups of Holdings in Rupees During the Period 1.6.79 to 31.5.80 in the Districts of Birbhum, Bankura and Cooch Behar Combined

Sl. No.	Operational size groups of holdings (ha.)	Milch animal		Draught animal		Cowshed		Wooden plough		Bullock cart	
		No	C.V. *	No	C.V.	No	C.V.	No	C.V.	No	C.V.
1	2	3	4	5	6	7	8	9	10	11	12
1	0.01 – 1.00	75	63800.00	123	72283.00	80	40575.00	80	3260.00	52	37484.00
2	1.01 – 2.00	72	61700.00	98	77900.00	47	44232.00	47	1970.00	47	35150.00
3	2.01 – 3.00	28	24600.00	42	41400.00	14	18050.00	22	925.00	18	14100.00
4	3.00 & above	18	16600.00	36	33600.00	9	12600.00	16	760.00	13	10300.00
	Total :	193	166700.00	299	225183.00	150	115457.00	165	6915.00	130	97034.00

* C.V. = Current value.

Continued :

Table 26 Continued :

Sl. No.	Ladder		Sickle		Spade		Done		Total		Total C.V.	
	No	C.V.	No	C.V.	No	C.V.	No	C.V.	No	C.V.	Per farm	Per cropped ha
	13	14	15	16	17	18	19	20	21	22	23	24
1	80	693.00	323	996.00	80	1623.00	34	5515.00	927	226229.00	2827.86	3365.00
2	47	315.00	203	609.00	50	876.00	35	4940.00	646	227692.00	4844.51	2894.64
3	22	141.00	56	168.00	22	524.00	11	1545.00	235	101453.00	7246.64	2464.25
4	16	106.00	36	108.00	16	400.00	7	1040.00	167	75514.00	8390.44	1943.23
To-tal	165	1255.00	618	1881.00	168	3423.00	87	13040.00	1975	630888.00	4205.92	2792.53

Concluded.

Current value of draught animals was the highest in each category of the operational holdings. These were Rs.72283.00, Rs.77900.00, Rs.41400.00 and Rs.33600.00. Value of milch animals occupied the second position in each of the 4 operational size groups of holdings. The lowest value was observed for ladders at Rs.693.00, Rs.315.00, Rs.141.00 and Rs.106.00 for the marginal, the small, the medium and the large farmers respectively.

The total current values of all assets were Rs.226229.00, Rs.227692.00, Rs.101453.00 and Rs.75514.00 respectively in order of the four operational size groups of holdings. The total aggregate value of all farm assets of the 3 districts taken together was Rs.630888.00.

Depreciation :

Depreciation cost is calculated by the following formula for straight line method :

$$\text{Depreciation costs} = \frac{\text{Original price of the asset - Junk value}}{\text{Years of active life}}$$

Original price refers to the price for which the particular asset had been acquired. Years of active life signify the life of the asset upto which it would render service. In some cases, acquisition prices were not found. Sometimes, it so happened that the milch/draught animals were

donated. Depreciation cost was calculated there on the basis of market prices of the assets prevailing in the region on the date of investigation thus :

$$\text{Depreciation cost} = \frac{\text{Present market value of asset} - \text{Junk value}}{\text{Years of remaining life}}$$

Years of remaining life mean the period still left for the asset for service.

Depreciation costs of milch animal, draught animal, cowshed, implements like wooden plough, bullock-carts, ladder, etc. were calculated in this way. Junk value was observed to be negligible in most cases.

Table-27 explains annual depreciation costs of animals, cowshed and implements, etc. of sample farms in the districts of Birbhum. Annual depreciation cost was the highest for cowshed for the marginal farmers' group at Rs.2479.50. The lowest depreciation value for this group was estimated for spade at Rs.76.72. Annual depreciation values of Rs.1733.42, Rs.2438.00, Rs.456.32, Rs.2137.50, Rs.89.00, Rs.134.80 and Rs.305.13 were recorded respectively for milch animals, draught animals, wooden ploughs, bullock-carts, ladders, sickles and local irrigation implements for the marginal farmers.

In the small size group of farmers, the highest and the lowest depreciation values of Rs.3687.50 and Rs.50.74 were

Table–27

Depreciation Cost of Assets on the Basis of Operational Size Groups of Holdings in Rupees During 1.6.79 to 31.5.80 in the District of Birbhum

Sl. No.	Operational size groups of holdings (ha.)	Milch animal		Draught animal		Cowshed		Wooden plough		Bullock cart		Ladder		Sickle		Spade		Done		Total		Total D.C.*	
		No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	Per farm	Per cropped ha
1	0.01 – 1.00	27	1733.42	38	2438.30	24	2479.50	24	456.32	15	2137.50	24	89.00	93	134.80	24	76.72	20	305.13	289	9850.69	410.45	442.53
2	1.01 – 2.00	31	2283.45	38	3410.00	19	3686.00	19	353.42	19	3687.50	19	70.00	84	115.55	22	50.74	19	24719	270	13903.85	731.78	437.09
3	2.01 – 3.00	8	633.37	10	1100.00	4	1443.75	7	125.26	5	1240.54	7	22.00	16	22.01	7	23.93	4	52.80	68	4663.66	1165.92	387.03
4	3.01 & above	6	483.36	14	1300.00	3	1162.50	6	134.21	5	1240.54	6	19.00	12	16.51	6	20.51	3	42.05	61	4418.68	1472.89	222.38
	Total :	72	5133.60	100	8248.30	50	8771.75	56	1669.21	44	8306.08	56	200.00	205	288.87	59	171.90	46	647.17	688	32836.88	656.74	497.02

accounted for by bullock-carts and spades respectively. Annual depreciation costs for milch animals, draught animals, wooden ploughs, cowsheds, ladders, sickles and local irrigation implements were Rs.2283.45, Rs.3410.00, Rs.3686.00, Rs.353.42, Rs.70.00, Rs.115.55, Rs.50.74 and Rs.247.19 respectively.

The maximum depreciation value for the medium farmers was recorded at Rs.1443.75 for cowshed and the minimum for ladders at Rs.22.00. Depreciation costs of Rs.633.37, Rs.1100.00, Rs.125.26, Rs.1240.54, Rs.22.01, Rs.23.93 and Rs.52.80 were recorded respectively by milch animals, draught animals, wooden ploughs, bullock carts, sickles, spade and local irrigation implements.

The highest depreciation value was at Rs.1300.00 for draught animals and Rs.16.51 was the lowest for sickles. Annual depreciation values were Rs.483.36, Rs.1162.50, Rs. 134.21, Rs.1240.54, Rs.19.00, Rs.20.51 and Rs.42.05 respectively for milch animals, cowsheds, wooden ploughs, bullock-carts, ladders, spades and local irrigation implements in this operational size group.

The total annual depreciation cost was noted at Rs.9850.69, Rs.13903.85, Rs.4663.66 and Rs.4418.68 respectively for the marginal, the small, the medium and the big farmers' group.

The depreciation value of all assets per family was

found to be Rs.410.45, Rs.731.78, Rs.1165.92 and Rs.1472.89 respectively in order of farm sizes. The highest value in this respect was accounted for by the big farmers' group. Similarly, depreciation costs per ha of cropped area was the lowest at Rs.222.38 for the big farmers. Per ha of cropped area, depreciation costs per annum turned out at Rs.442.53, Rs.437.09 and Rs.387.03 respectively for the marginal, the small and the medium farms. The per ha depreciation costs for the sample farmers as a whole was found to be Rs.446.74.

Table-28 represents the annual depreciation costs of all assets including milch and draught animals, cowsheds, wooden ploughs, ladders, sickles, spades and local irrigation implements in the district of Bankura.

For the marginal farmers, annual depreciation costs were the maximum at Rs.3489.03 for bullock carts and the minimum at Rs.62.63 for spades.

For the small farmers' group the annual depreciation costs was Rs.3721.63 for bullock carts and the minimum was at Rs.47.59 for spades.

For the medium farms, the maximum annual depreciation cost was Rs.2481.09 for bullock carts and the minimum was for ladders at Rs.37.00.

For the big farms, the highest annual depreciation cost

Table-28

Depreciation Cost of Assets on the Basis of Operational Size Groupsof Holdings in Rupees During 1.6.79 to 31.5.80 in the District of Bankura

Sl. No.	Operational size groups of holdings (ha.)	Milch animal		Draught animal		Cowshed		Wooden plough		Bullock cart		Ladder		Sickle		Spade		Done		Total		Total D.C.*	
		No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	Per farm	Per cropped ha
1	0.01 – 1.00	19	1216.73	19	1140.00	23	2660.87	23	411.58	15	3489.03	23	82.00	96	132.05	23	62.63	14	210.27	255	9405.16	408.92	590.04
2	1.01 – 2.00	22	1733.42	32	2630.00	16	4025.27	16	313.16	16	3721.63	16	57.00	68	93.54	16	47.59	16	214.48	218	12836.09	802.26	462.06
3	2.01 – 3.00	14	1066.72	20	2350.00	7	2365.34	12	228.16	10	2481.09	12	37.00	28	38.52	12	41.03	7	91.59	122	8699.45	1242.78	404.06
4	3.01 & above	8	633.37	14	1500.00	4	1462.50	8	156.58	6	1488.65	8	28.00	16	22.01	8	27.35	4	55.14	76	5373.60	1343.40	270.44
	Total :	63	4650.24	85	7620.00	50	10513.98	59	1109.48	47	11180.40	59	204.00	208	286.12	59	178.60	41	571.48	671	36314.30	726.29	426.12

* D.C. = Depreciation cost.

was Rs.1500.00 for draught animals and the lowest was Rs.22.01 for sickles.

The depreciation values of all assets per farm were found to be Rs.408.92, Rs.802.26, Rs.1242.78 and Rs.1343.40 in the 4 operational groups in order of farm size. Annual depreciation for all assets and for all the sample farms was Rs.726.29 per farm. Annual depreciation costs per cropped ha were the lowest at Rs.270.44 in case of the big farmers. The depreciation costs per cropped ha were Rs.590.04, Rs.462.06 and Rs.407.00 for the marginal, the small and the medium farmers' groups respectively.

Table-29 represents annual depreciation of all farm assets including milch animals, draught animals, cowsheds, wooden ploughs, ladders, sickles, spades and local irrigation implements for the district of Cooch Behar. Annual depreciation cost was the highest for draught animals for the marginal, the medium and the big farmers' size groups respectively at Rs.3650.00, Rs.690.00 and Rs.560.00. The lowest value was noted for spades at Rs.82.60, Rs.21.47 and Rs.6.84 for the marginal, the medium and the big farmers' size groups respectively. In case of the small farmers' group, the maximum and the minimum depreciation costs were recorded at Rs.1816.50 for cowsheds and Rs.6.84 for spades.

The total depreciation costs of all assets were Rs.11542.12, Rs.5818.18, Rs.2034.79 and Rs.1595.23 respectively

Table-29

Depreciation Cost of Assets on the Basis of Operational Size Groupsof Holdings in Rupees During 1.6.79 to 31.5.80 in the District of Cooch Behar

Sl. No.	Operational size groups of holdings (ha.)	Milch animal		Draught animal		Cowshed		Wooden plough		Bullock cart		Ladder		Sickle		Spade		Total		Total D.C.*	
		No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	No	D.C.	Per farm	Per cropped ha
1	0.01 – 1.00	29	2366.79	66	3650.00	33	2812.00	33	577.50	22	1498.40	33	365.00	134	189.83	33	82.60	383	11542.12	349.76	397.59
2	1.01 – 2.00	19	1125.06	28	1650.00	12	1816.50	12	210.00	12	840.00	12	85.00	51	70.15	12	21.47	158	5818.18	484.85	305.10
3	2.01 – 3.00	6	350.02	12	690.00	3	632.50	3	59.06	3	233.00	3	45.00	12	16.51	3	6.70	45	2034.79	678.26	268.09
4	3.01 & above	4	266.68	8	560.00	2	506.58	2	48.13	2	164.00	2	32.00	8	11.00	2	6.84	30	1595.23	797.62	239.52
	Total :	58	4108.55	114	6550.00	50	5767.58	50	894.69	39	2737.40	50	527.00	205	287.49	50	117.61	616	20990.32	419.81	336.65

* D.C. = Depreciation cost.

in order of farm size for the four different operational size groups. Annual depreciation of all assets per farm were Rs.349.76, Rs.484.85, Rs.678.26 and Rs.797.62 respectively for the 4 operational size groups of holdings in order of farm size. Total annual depreciation costs per cropped ha were found to be Rs.397.59, Rs.305.10, Rs.268.09 and Rs.239.52 for the marginal, the small, the medium and the big farmers' size groups. The lowest depreciation costs per cropped ha was observed at Rs.239.52 in the big farmers' size group.

Table-30 represents annual depreciation costs of all assets together for the 150 sample farms in the 3 districts, viz., Birbhum, Bankura and Cooch Behar. Annual depreciation costs were the highest for draught animals for the marginal, the small and the medium farmers' size groups of Rs.7952.37, Rs.9527.77 and Rs.4441.59.

Annual depreciation cost for the marginal farms ranged from Rs.221.95 for spades to Rs.7952.37 for cowsheds. Per farm and per cropped ha annual depreciation costs were Rs.384.97 and Rs.458.10 respectively. For the 3 other operational groups of farms also, cowshed recorded the highest annual depreciation costs. The lowest depreciation charges were recorded for this group by spades excepting for the big farms. Per cropped ha annual depreciation costs were Rs.413.91 for the small farms, Rs.374.01 for the medium farms and Rs.293.04 for the big farms. A direct relation could be

observed for annual depreciation costs per farm and farm size.

Total annual depreciation for all the 150 sample farms were Rs.600.94 per farm and Rs.399.00 per cropped ha.

Farm Yield :

Table-31 shows yield per cropped ha of different crops seperately as well as combined for the 4 different operational size groups of holdings as well as for all the sample farms combined for the district of Birbhum.

The performance of the bigger farms with respect to yield per ha for all the major crops grown by the sample farms appeared to be better than that for the smaller farms. This was true if these crops are considered together and also if these are considered seperately. For example, yields of aus paddy were 25.63 qtls. worth Rs.2947.75 for the marginal farms, 29.46 qtls worth Rs.3387.33 for the small farms, 33.24 qtls worth Rs.3823.04 for the medium farms and 38.05 qtls worth Rs.4376.06 for the big farms. For oilseeds, which is a cash crop, the corresponding figures were 5.77 qtls worth Rs.1730.73, 7.34 qtls worth Rs.2202.39, 11.71 qtls worth Rs.3513.73 and 14.12 qtls worth Rs.4236.93 respectively. Thus, per ha yield for aus, aman, boro, wheat, oilseeds and pulses exhibited a direct relation with operational size of farms.

Yields per cropped ha for aus, aman, boro, wheat, oilseeds and pulses combined were estimated on the average at

Table–31

Per Hectare Yield of Sample Farms According to Operational Size Groups of Farms During 1.6.79 to 31.5.80 in the District of Birbhum

Sl. No.	Operational size groups of holdings (ha.)	Aus		Aman		Boro		Wheat		Oilseeds		Pulses		Total per ha yield of crops in Rs. = Total yield ÷ Total cropped area in ha.
		Yield (Qtl.)	Value (Rs.)	Yield (Qtl.)	Value (Rs.)	Yield (Qtl.)	Value (Rs.)	Yield (Qtl.)	Value (Rs.)	Yield (Qtl.)	Value (Rs.)	Yield (Qtl.)	Value (Rs.)	
1	0.01 – 1.00	25.63	2947.75	18.73	2248.03	35.63	4275.00	19.78	3263.38	5.77	1730.73	3.97	1191.74	2427.75
2	1.01 – 2.00	29.46	3387.33	22.33	2679.87	41.63	4995.85	23.16	3820.76	7.34	2202.39	6.48	1944.36	2820.19
3	2.01 – 3.00	33.24	3823.04	25.92	3110.59	46.88	5625.22	27.35	4513.57	11.71	3513.73	7.52	2257.35	3457.11
4	3.01 and above	38.05	4376.06	29.70	3564.08	51.00	6120.00	31.59	5212.55	14.12	4236.93	9.22	2765.76	3925.11
	Total :	29.32	3371.45	23.18	2781.43	44.99	5399.17	23.82	3930.80	7.86	2357.00	6.64	1992.21	2980.33

Rs.2427.75, Rs.2820.19, Rs.3457.11 and Rs.3925.11 respectively for the marginal, the small, the medium and the big farms.

Overall total average yield per cropped ha for the crops and for the farm size groups was estimated at Rs.2980.33.

Table-32 represents yield per cropped ha of different crops seperately and combined for the 4 operational size groups of holdings as well as for all the sample farms combined for the district of Bankura.

A direct relationship was found with respect to farm size for the yields in quintals per ha and as well as in rupees for all the crops, viz., aus, aman, wheat, oilseeds and the 4 crops combined.

Yields of aus paddy were 26.18 qtls worth Rs.3011.14, 30.79 qtls worth Rs.3541.33, 33.58 qtls worth Rs.3861.85 and 37.50 qtls worth Rs.4312.52 respectively in order of farm size. In case of oilseeds, the corresponding figures were 5.48 qtls worth Rs.1643.92 for the marginal, 7.88 qtls worth Rs.2365.00 for the small, 10.97 qtls worth Rs.3291.73 for the medium and 13.00 qtls worth Rs.3900.94 for the big farmers.

Yields per cropped ha for all the 4 crops together were recorded at 2383.15, 2847.07, 3348.61 and 3669.81 rupees respectively for the marginal, the small, the medium and the big farmers.

Table–32

Per Hectare Yield of Sample Farms According to Operational Size Groups of Farms During 1.6.79 to 31.5.80 in the District of Bankura

Sl. No.	Operational size groups of holdings (ha.)	Aus		Aman		Wheat		Oilseeds		Total per ha yield of crops in Rs.= Total yield ÷ Total cropped area
		Yield (Qtl.)	Value (Rs.)	Yield (Qtl.)	Value (Rs.)	Yield (Qtl.)	Value (Rs.)	Yield (Qtl.)	Value (Rs.)	
1	0.01 – 1.00	26.18	3011.14	18.87	2264.98	18.93	3123.33	5.48	1643.92	2383.15
2	1.01 – 2.00	30.79	3541.33	22.37	2684.22	22.26	3672.87	7.88	2365.00	2847.07
3	2.01 – 3.00	33.58	3861.85	26.38	3165.82	25.60	4223.67	10.97	3291.73	3348.61
4	3.01 & above	37.50	4312.52	29.16	3498.74	29.47	4862.18	13.00	3900.94	3669.81
	Total :	31.01	3566.47	24.49	2938.53	24.05	3968.17	9.29	2786.88	3079.11

Overall total average yield per cropped ha for the crops combined was estimated at Rs.3079.11.

Table-33 represents yields per cropped ha of aman and jute seperately and combined for the 4 operational size groups of holdings as well as for all the sample farms combined for the district of Cooch Behar.

Yields of aman paddy per cropped ha increased with the increase of size of holdings and these were estimated at 11.87 qtls worth Rs.1305.89, 15.27 qtls worth Rs.1680.03, 18.75 qtls worth Rs.2062.92 and 20.27 qtls worth Rs.2229.46 respectively in order of farm size.

In case of jute, similar relationship between yield per cropped ha and operational size of farms was found. It ranged from Rs.1540.47 for the marginal farmers to Rs.2883.98 for the big farmers.

Yield per cropped ha for aman and jute together was estimated at Rs.1376.51, Rs.1814.52, Rs.2194.94 and Rs.2346.41 respectively for the marginal, the small, the medium and the big farmers.

Overall total average yield per cropped ha for the crops was estimated at Rs.1713.71 for all the sample farms.

Table-34 shows yields per cropped ha for different crops seperately as well as combined for the 4 different

Table-33

Per Hectare Yield of Sample Farms According to Operational Size Groups of Farms During 1.6.79 to 31.5.80 in the District of Cooch Behar

Sl. No.	Operational size groups of holdings (ha.)	A m a n		J u t e		Total per ha yield of crops in Rs.= Total yield ÷ Total cropped area
		Yield (Qtls.)	Value (Rs.)	Yield (Qtls.)	Value (Rs.)	
1	0.01 – 1.00	11.87	1305.89	8.80	1540.47	1376.51
2	1.01 – 2.00	15.27	1680.03	11.87	2077.04	1814.52
3	2.01 – 3.00	18.75	2062.92	14.05	2458.99	2194.94
4	3.01 and above	20.27	2229.46	16.48	2883.98	2346.41
	Total :	14.72	1619.05	11.03	1931.00	1713.71

Table–34

Per Hectare Yield of Sample Farms According to Operational Size Groups of Farms During 1.6.79 to 31.5.80 in the Districts of Birbhum, Bankura and Cooch Behar Combined

Sl. No.	Operational size groups of holdings (ha.)	Aus		Aman		Wheat		Oilseeds		Jute		Pulses		Boro		Total per ha yield in Rs.= Total yield ÷ Total cropped ha
		Yield (Qtl.)	Value (Rs.)	Yield (Qtl.)	Value (Rs.)	Yield (Qtl.)	Value (Rs.)	Yield (Qtl.)	Value (Rs.)	Yield (Qtl.)	Value (Rs.)	Yield (Qtl.)	Value (Rs.)	Yield (Qtl.)	Value (Rs.)	
1	0.01 – 1.00	25.79	2966.46	15.69	1820.47	19.37	3195.38	5.66	1698.08	8.80	1540.47	3.97	1191.74	35.63	4275.00	1963.25
2	1.01 – 2.00	30.18	3470.20	20.72	2451.70	22.75	3753.06	7.65	2293.63	11.87	2077.04	6.48	1944.36	41.63	4995.85	2585.87
3	2.01 – 3.00	33.50	3852.15	24.94	2960.45	26.04	4295.97	11.34	3403.36	14.05	2458.99	7.52	2257.35	46.88	5625.22	3167.68
4	3.01 & above	37.94	4363.26	27.71	3288.16	30.18	4978.97	13.26	3977.23	16.48	2883.98	9.22	2765.76	51.00	6120.00	3524.00
	Total :	30.13	3464.76	21.40	2527.76	23.95	3951.89	8.66	2598.50	11.03	1931.00	6.64	1992.21	44.99	5399.17	2667.98

operational size groups of holdings as well as for all the sample farms combined for the 3 districts, viz., Birbhum, Bankura and Cooch Behar.

Yields per cropped ha of aus, aman, boro, wheat, oil-seeds, pulses and jute increased with increase in the size of holdings.

Yields per cropped ha for all the crops taken together were estimated at Rs.1963.25, Rs.2585.87, Rs.3167.68 and Rs.3524.00 respectively for the marginal, the small, the medium and the big farmers.

Overall total average yield per cropped ha for the crops was estimated at Rs.2667.98 for all the sample farms in the three districts.

Farm and Non-farm Income :

Table-35 represents the distribution of sample farm households according to farm income and non-farm income and on the basis of their cultivated areas in the district of Birbhum. Farm income, here, includes return from crop husbandry comprising main product, by-product, income from dairy enterprise of farm households and income from hiring out of labour.

Farm income per household for the marginal size group of farmers was Rs.4316.33. The total farm income of this

Table-35

Distribution of Income – from Farm, from Non-farm Sources and Both Sources Combined According to Operational Size Groups of Holdings During the Period of 1.6.79 to 31.5.80 in the District of Birbhum

Sl. No.	Operational size groups of holdings (ha.)	No. of farm	Farm income				Total farm income (Rs.)	Total farm income per	
			Main product (Rs.)	By-product (Rs.)	Dairy (Rs.)	Wage labour (Rs.)		Family (Rs.)	Hectare (Rs.)
1	2	3	4	5	6	7	8	9	10
1	0.01 – 1.00	24	54342.38	10679.56	29120.00	9450.00	103591.94	4316.33	4653.73
2	1.01 – 2.00	19	89999.25	16273.98	60880.06	4050.00	171203.29	9010.70	5382.06
3	2.01 – 3.00	4	41733.83	6824.76	17664.30	1350.00	67572.89	16893.22	5607.71
4	3.01 & above	3	49326.60	7229.77	14500.00	–	71056.37	23685.46	5762.88
	Total :	50	235402.06	41008.07	122164.36	14850.00	413424.49	8268.49	5269.91

Continued

Table–35 Continued :

Sl.No.	Non–farm income		Total non–farm income	Total non–farm income per		Total income (farm + non–farm combined)	Total per farm income	Total per hectare income
	Service (Rs.)	Business (Rs.)	(Rs.)	Family (Rs.)	Hectare (Rs.)	(Rs.)	(Rs.)	(Rs.)
	11	12	13	14	15	16	17	18
1	13620.00	15262.50	28882.50	1203.44	1297.51	132474.44	5519.77	5951.23
2	13476.00	19500.00	32976.00	1735.58	1036.66	204179.29	10746.28	6418.71
3	10200.00	5700.00	15900.00	3975.00	1319.50	83472.89	20868.22	6927.21
4	13764.00	4800.00	18564.00	6188.00	1505.60	89620.37	29873.46	7268.48
Total	51060.00	45262.50	96322.50	1926.45	1227.82	509746.99	10194.94	6497.73

Concluded.

group was estimated at Rs.103591.94. A substantial portion of the total farm income was contributed by dairy enterprise of this size group. This was Rs.29120.00. Wage labour accounted for Rs.9450.00. Farm income per ha was Rs.4653.73.

The farm income per household was noted at Rs.9010.70 for the small size group of holdings. Their total farm income was Rs.171203.29. Milch animals in this groups accounted for Rs.60880.06. Wage labour in this group accounted for Rs.4050.00. Farm income per ha of this size group was calculated at Rs.5382.06.

In the medium farmers' group, per family farm income was estimated at Rs.16893.22 and the total farm income for the same group was Rs.67572.89. Contribution of dairy was Rs.17664.30 and of wage labour Rs.1350.00. Total farm income per ha in this size group was Rs.5607.71.

The highest per farm income in the big size group was Rs.23685.46. Their total farm income was noted at Rs.23685.37. Dairy enterprise accounted for Rs.14500.00 in the big size group. There was no earning from wage labour in this group. Total farm income per ha was Rs.71056.37.

The non-farm income of the sample farm households was earned from service, business, etc. The non-farm income per household was estimated at Rs.1203.44 for the marginal farmers' group. The contributions of service and business in

this size group were Rs.13620.00 and Rs.15262.50 respectively. The total non-farm income was noted at Rs.28882.50. Non-farm income per ha of cropped area for this operational size group was Rs.1297.51.

In the small size group of farmers, the non-farm income per family was Rs.1735.58.

Service and business contributed Rs.13476.00 and Rs.19500.00 respectively. The total non-farm income for this size group was Rs.32976.00. Non-farm income per ha in this size group was Rs.1036.66.

The non-farm income per farm was estimated at Rs.3976.00 in the medium size group of farmers. The contributions of service and business were Rs.10200.00 and Rs.5700.00 respectively. The total non-farm income was noted at Rs.15900.00. Non-farm income per ha of cropped area was Rs.1313.50.

In the big farmers' group, the non-farm income per farm was recorded at Rs.6188.00 and it was the highest among the 4 economic size groups. Their total non-farm income was Rs.18564.00. Incomes from service and business were Rs.13764.00 and Rs.4800.00 respectively. Non-farm income per ha of cropped area was Rs.1505.60.

The overall aggregates of farm income and non-farm income combined were Rs.132474.44, Rs.204179.29, Rs.83472.89

and Rs.89620.37 for the marginal, the small, the medium and the big farmers respectively. Aggregate incomes from farm and non-farm sources per household were Rs.5519.77, Rs.10746.28, Rs.20868.22 and Rs.29873.46 respectively in order of farm size. Average aggregate income per household for all the the sample farms taken together was Rs.10194.94. Total incomes per ha of cropped area were Rs.5951.23, Rs.6418.71, Rs.6927.21 and Rs.7268.48 respectively for the marginal, the small, the medium and the big farmers. The overall aggregate income per ha for all the farms taken together was Rs.6497.73.

Table-36 shows the farm and non-farm incomes per household and per ha for the sample farms in the district of Bankura.

Total farm incomes per farm were estimated at Rs.2994.93, Rs.8795.58, Rs.16243.75 and Rs.25813.62 respectively for the marginal, the small, the medium and the big farms. Their total farm incomes were Rs.68883.47, Rs.140729.35, Rs.113706.27 and Rs.103254.49 respectively. Dairy enterprise contributed a significant portion of total farm income in each of the 4 economic categories of operational holdings. It's contributions to the total farm income were Rs.20440.00 for the marginal farmers, Rs.46163.52 for the small farmers, Rs.29750.40 for the medium farmers and Rs.19000.00 for the big farmers respectively. Wage labour contributed Rs.2400.00 and Rs.1012.00 for the marginal farmers and the small farmers

Table-36

Distribution of Income – from Farm, from Non-farm Sources and Both Sources Combined According to Operational Size Groups of Holdings During the Period of 1.6.79 to 31.5.80 in the District of Bankura

Sl. No.	Operational size groups of holdings (ha.)	No. of farm	Farm income				Total farm income (Rs.)	Total farm income per	
			Main product (Rs.)	By-product (Rs.)	Dairy (Rs.)	Wage labour (Rs.)		Family (Rs.)	Hectare (Rs.)
1	2	3	4	5	6	7	8	9	10
1	0.01 – 1.00	23	36348.86	9694.61	20440.00	2400.00	68883.47	2994.93	4321.42
2	1.01 – 2.00	16	76460.84	17092.99	46163.52	1012.00	140729.35	8795.58	5065.85
3	2.01 – 3.00	7	70108.93	13846.94	29750.40	–	113706.27	16243.75	5280.29
4	3.01 & above	4	71497.22	12757.27	19000.00	–	103254.49	25813.62	5196.50
	Total :	50	254415.85	53391.81	115353.92	3412.00	426573.58	8531.47	5011.44

Continued

Table–36 Continued :

Sl. No.	Non–farm income		Total non–farm income	Total non–farm income per		Total income (farm + non–farm combined)	Total per farm income	Total per hectare income
	Service (Rs.)	Business (Rs.)	(Rs.)	Family (Rs.)	Hectare (Rs.)	(Rs.)	(Rs.)	(Rs.)
	11	12	13	14	15	16	17	18
1	14400.00	9000.00	23400.00	1017.39	1468.01	92283.47	4012.32	5789.43
2	16800.00	14700.00	31500.00	1968.75	1133.91	172229.35	10764.33	6199.76
3	9600.00	14400.00	24000.00	3428.57	1114.72	137706.27	19672.32	6396.02
4	16500.00	6000.00	22500.00	5625.00	1132.36	125754.49	31438.62	6328.86
Total	57300.00	44100.00	101400.00	2028.00	1191.26	527973.58	10559.47	6202.70

Concluded.

respectively. Farm incomes per cropped ha in the 4 respectives operational size groups were estimated at Rs.2949.93, Rs.8795.58, Rs.16243.75 and Rs.25813.62.

Non-farm income of the sample households was earned from service and business. Non-farm income per household was estimated at Rs.1017.39 for the marginal farmers, Rs.1968.75 for the small farmers, Rs.3428.47 for the medium farmers and Rs.5625.00 for the big farmers. Non-farm incomes per ha were Rs.1468.01, Rs.1133.91, Rs.1114.72 and Rs.1132.36 respectively. Contributions of service to non-farm income were Rs.14400.00, Rs.16800.00, Rs.9600.00 and Rs.16500.00 whereas business contributed Rs.9000.00, Rs.14700.00, Rs.14400.00 and Rs. 6000.00 respectively for the marginal, the small, the medium and the big farmers.

Total farm incomes (both farm and non-farm incomes combined) from the farm and outside the farm were estimated at Rs.92283.47, Rs.172229.35, Rs.137706.27 and Rs.125754.49 for the four operational size groups of holdings in order of farm size. Aggregate farm incomes per household was found to be Rs.1017.39, Rs.1968.75, Rs.3428.57 and Rs.5625.00 respectively for the sample farms in order of farm size. Average aggregate income per household for all the farms taken together was Rs.10559.47. Aggregate incomes per ha were Rs.5789.43, Rs.6199.76, Rs.6396.02 and Rs.6328.86 respectively for the sample farms in order of farm size. The overall

aggregate per ha income for all farms taken together was Rs.6202.70.

Table-37 reveals the distribution of farm income in the district of Cooch Behar.

Farm incomes per farm were Rs.3137.11, Rs.6109.32, Rs.10120.00 and Rs.13124.87 respectively for the marginal, the small, the medium and the big farmers. Dairy enterprise contributed a substantial portion to the total farm income of each operational group. The contributions of income to the total income by dairy enterprise were Rs.39760.00 for the marginal farmers, Rs.29995.65 for the small farmers, Rs.9761.85 for the medium farmers and Rs.8000.00 for the big farmers. In this district incomes from wage labour were Rs.14490.00, Rs.1890.00 and Rs.945.00 for the marginal, the small and the medium farmers respectively. Income from wage labour was not found in the size group of the big farmers. Total farm incomes per ha for the four size groups of operational holdings in order of farm size were Rs.3563.13, Rs.6109.32, Rs.4000.18 and Rs.3941.40.

The non-farm incomes of the sample households per farm were estimated at Rs.729.17, Rs.1288.54, Rs.3000.00 and Rs.3600.00 for the marginal, the small, the medium and the big farmers respectively. Service contributed Rs.9262.50, Rs.3844.36 and Rs.4800.00 for the marginal, the small and the

Table–37

Distribution of Income – from Farm, from Non–farm Sources and Both Sources Combined According to Operational Size Groupsof Holdings During the Period of 1.6.79 to 31.5.80 in the District of Cooch Behar

Sl. No.	Operational size groups of holdings (ha.)	No. of farm	Farm income				Total farm income (Rs.)	Total farm income per	
			Main product (Rs.)	By–product (Rs.)	Dairy (Rs.)	Wage labour (Rs.)		Family (Rs.)	Hectare (Rs.)
1	2	3	4	5	6	7	8	9	10
1	0.01 – 1.00	33	42194.40	7080.25	39760.00	14490.00	103524.65	3566.13	3566.13
2	1.01 – 2.00	12	35283.79	6142.41	29995.65	1890.00	73311.85	6109.32	3844.36
3	2.01 – 3.00	3	16274.40	3380.12	9761.85	945.00	30361.37	10120.46	4000.18
4	3.01 & above	2	14763.42	3486.31	8000.00	–	26249.73	13124.87	3941.40
	Total :	50	108516.01	20089.09	87517.50	17325.00	233447.60	4668.95	3744.15

Continued

Table–37 Continued :

Sl.No.	Non–farm income		Total non–farm income	Total non–farm income per		Total income (farm + non–farm combined)	Total per farm income	Total per hectare income
	Service (Rs.)	Business (Rs.)	(Rs.)	Family (Rs.)	Hectare (Rs.)	(Rs.)	(Rs.)	(Rs.)
1	12	12	13	14	15	16	17	18
1	9262.50	14800.00	24062.50	729.17	828.88	127587.15	3866.28	4395.01
2	2000.00	13462.50	15462.50	1288.54	810.83	88774.35	7397.86	4644.18
3	4800.00	4200.00	9000.00	3000.00	1185.77	39361.37	13120.46	5185.95
4	–	7200.00	7200.00	3600.00	1081.08	33449.73	16724.87	5022.48
Total	16062.50	39662.50	55725.00	1114.50	893.74	289172.60	5783.45	4637.89

Concluded.

medium farmers, whereas business contributed Rs.24062.50, Rs.15462.50, Rs.9000.00 and Rs.7200.00 to their total incomes.

Aggregate farm incomes from the farm and outside the farm combined were Rs.127587.15, Rs.88774.35, Rs.39361.37 and Rs.33449.73 for the four operational size groups of holdings in order of farm size. Their aggregate incomes per farm were found to be Rs.3866.28, Rs.7397.86, Rs.13120.46 and Rs.16724.87 respectively. Their aggregate farm incomes per ha of cropped area were Rs.4395.01, Rs.4655.18, Rs.5185.95 and Rs.5022.48. Average aggregate incomes per household and per ha of cropped area for all the sample farms taken together were Rs.5783.45 and Rs.4637.89 respectively.

Table-38 shows distribution of income according to operational size groups of farms in the 3 districts combined, viz., Birbhum, Bankura and Cooch Behar.

Farm income per household were Rs.3450.00, Rs.8196.69, Rs.15117.18 and Rs.22284.51 respectively for the marginal, the small, the medium and the big farmers. Contributions of income to the total income by the dairy enterprises were Rs.89320.00, Rs.137039.23, Rs.57176.55 and Rs.41500.00 respectively in order of farm size for the four operational size groups. Wage labour contributed Rs.26340.00, Rs.6952.00 and Rs.2295.00 for the marginal, the small and the medium farmers. Total incomes per cropped ha in the 4 respective operational size groups of holdings were in order of farm size estimated

Table-38

Distribution of Income from Farm, from Non-farm Sources and Both Sources Combined According to Operational Size Groupsof Holdings During the Period of 1.6.79 to 31.5.80 in the Districts of Birbhum, Bankura and Cooch Behar
Combined

Sl. No.	Operational size groups of holdings (ha.)	No. of farm	Farm income				Total farm income (Rs.)	Total farm income per	
			Main product (Rs.)	By-product (Rs.)	Dairy (Rs.)	Wage labour (Rs.)		Family (Rs.)	Hectare (Rs.)
1	2	3	4	5	6	7	8	9	10
1	0.01 - 1.00	80	132885.64	27454.42	89320.00	26340.00	276000.06	3450.00	4105.31
2	1.01 - 2.00	47	201743.88	39509.38	137039.23	6952.00	385244.49	8196.69	4897.59
3	2.01 - 3.00	14	128117.16	24051.82	57176.55	2295.00	211640.53	15117.18	5140.65
4	3.01 & above	9	135587.24	23473.35	41500.00	-	200560.59	22284.51	5161.11
	Total :	150	598333.92	114488.97	325035.78	35587.00	1073445.67	7156.30	4751.44

Continued

Table–38 Continued :

Sl. No.	Non–farm income		Total non–farm income	Total non–farm income per		Total income (farm + non–farm combined)	Total per farm income	Total per hectare income
	Service	Business		Family	Hectare			
	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)
	11	12	13	14	15	16	17	18
1	37282.50	39062.50	76345.00	954.31	1135.58	352345.06	4404.31	5240.89
2	32276.00	47662.50	79938.50	1700.82	1016.25	465182.99	9897.51	5913.84
3	24600.00	24300.00	48900.00	3492.86	1187.76	260540.53	18610.04	6328.41
4	30264.00	18000.00	48264.00	5362.67	1242.00	248824.59	27647.18	6403.10
Total	124422.50	129025.00	253447.50	1689.65	1121.85	1326893.17	8845.95	5873.29

Concluded.

at Rs.4105.31, Rs.4897.59, Rs.5140.65 and Rs.5161.11. Their total farm incomes were Rs.27600.06, Rs.385244.49, Rs.211640.53 and Rs.200560.59 respectively.

Non-farm incomes of the sample households per household were Rs.954.31, Rs.1700.82, Rs.3492.86 and Rs.5362.67 respectively in order of farm size. Incomes from service were Rs.37282.50, Rs.32276.00, Rs.24600.00 and Rs.30264.00, whereas incomes earned from business were Rs.39062.50, Rs.47662.50, Rs.24300.00 and Rs.18000.00 for the 4 operational size groups in order of farm size.

Combined income from the farm and from outside the farm were Rs.352345.06, Rs.465182.99, Rs.260540.53 and Rs.248824.59 for the 4 operational size groups of holdings in order of farm size. Aggregate farm incomes per household were Rs.4404.31, Rs.9897.51, Rs.18610.04 and Rs.27647.18 whereas aggregate farm incomes per cropped ha were Rs.5240.89, Rs.5913.84, Rs.6328.41 and Rs.6403.10 for the marginal, the small, the medium and the big farmers respectively. Overall aggregate incomes for all the sample farms taken together per household and per ha were Rs.8845.95 and Rs.5873.29 respectively.

Costs and Returns :

Table-39 shows returns and costs of farmers belonging to different operational size groups of holdings in the district of Birbhum during the period : 1.6.1979 - 31.5.1980.

Cost A_1, cost A_2, cost B, cost C - the different components of cost are calculated for different economic size groups as well as for all the farms after the Directorate of Economics and Statistics, Government of India.

Cost A_1 was the maximum at Rs.3429.43 per ha for the farmers in the medium size group. The minimum cost A_1 was recorded at Rs.2824.45 per ha for the marginal farmers' group. The small and the large households accounted for Rs.3331.31 and Rs.3215.03 as costs A_1 per cropped ha. Cost A_1 on an average for the 50 sample farmers was estimated at Rs.3184.29.

Cost A_2 per cropped ha was estimated at Rs.2888.77 for the farmers belonging to the marginal size group. Except for the marginal farmers, cost A_1 and cost A_2 per cropped ha were the same because leasing-in of land was not found in the rest 3 categories of size groups.

Cost B per cropped ha was recorded at Rs.4331.84, Rs.4946.96, Rs.5327.01 and Rs.5311.32 respectively in order of farm size. The cost B on an average for all the farms was observed Rs.4888.06 per ha.

Cost C which is the full cost of production was worked out at Rs.5220.78, Rs.5398.20, Rs.5698.18 and Rs.5609.78 per cropped ha respectively for the marginal, the small, the medium and the large farms. Cost C on an average for the all farms taken together was noted at Rs.5427.19 per cropped ha.

Table-39

Return and Cost for Farmers Belonging to Different Operational Size Groups of Holdings During the Period 1.6.79 to 31.5.80 in the District of Birbhum : Return and Cost Relate to both Farm and Non-farm Operations

Sl. No.	Operational size groups of holdings (ha.)	No. of farms	Return (Total per ha income : farm & non-farm income combined (Rs.)	Cost per ha in Rs.				Rate of return : Percent			
				A_1	A_2	B	C	$\frac{R - A_1}{A_1} \times 100$	$\frac{R - A_2}{A_2} \times 100$	$\frac{R - B}{B} \times 100$	$\frac{R - C}{C} \times 100$
1	0.01 – 1.00	24	5951.23	2824.45	2888.77	4331.84	5220.78	110.70	106.01	37.38	13.99
2	1.01 – 2.00	19	6418.71	3331.31	3331.31	4946.96	5398.20	92.68	92.68	29.75	18.90
3	2.01 – 3.00	4	6927.21	3429.43	3429.43	5327.01	5698.18	101.99	101.99	30.04	21.57
4	3.01 and above	3	7268.48	3215.03	3215.03	5311.32	5609.78	126.08	126.08	36.85	29.57
	T o t a l :	50	6497.73	3184.29	3202.54	4888.06	5427.19	104.06	102.89	32.93	19.73

The highest rate of return with respect to cost A_1 was accounted for by the big farmers at 126.08 per cent. The lowest rate of return was estimated at 92.68 per cent for the small farmers. Rates of return with respect to cost A_1 were 110.70 per cent and 101.99 per cent for the marginal and the medium farms. On an average, for all the households, the rate of return with respect to cost A_1 was estimated at 104.06 per cent.

Rate of return with respect to cost A_2 was estimated at 106.01 per cent for the marginal farmers. Except for the marginal farmers it was the same as the rate of return with respect to cost A_1. The rate of return with respect to Cost A_1 on an average for all the sample farms was worked out at 102.89 per cent.

The highest rate of return with respect to Cost B was estimated at 37.38 per cent for the marginal farms and the lowest rate of return was estimated at 29.75 per cent for the small farms. For the medium farms and the big farms these were 30.04 per cent and 36.85 per cent respectively. For all the sample farms taken together, it was 32.93 per cent.

The rate of return with respect to cost C was 13.99, 18.90, 21.57 and 29.57 per cent respectively for the four operational groups of farms in order of farm size. Average rate of return for all the sample farms taken together was 19.73 per cent.

Table-40 shows costs per cropped ha and rates of return on the basis of operational size groups of holdings for the sample farms in the district of Bankura.

Cost A_1 was the highest at Rs.3430.14 for the medium size group of farmers whereas it was the lowest at Rs. 2653.98 for the marginal farmers. Costs A_1 were Rs.3341.47 and Rs.3140.00 respectively for the small and the big farmers. On an average for the 50 sample farmers, cost A_1 was estimated at Rs.3188.12 per cropped ha.

Cost A_2 was observed at Rs.2800.00 for the size group of marginal farmers. Except the marginal farmers, costs A_2 were the same as costs A_1 because leasing-in of land was absent there. Average cost A_2 for all the sample farms was estimated at Rs.3215.47.

Cost B was recorded at Rs.4180.00, Rs.4963.68, Rs.5125.12 and Rs.5147.30 per cropped ha respectively for the sample holdings in order of farm size. Average cost B for all the sample farm was Rs.4900.62.

Cost C was worked out at Rs.5085.31, Rs.5352.02, Rs.5430.88 and Rs.5408.01 per cropped ha respectively for the marginal, the small, the medium and the big farmers. Average cost C for all the sample farms was Rs.5335.09.

The highest rate of return with respect to Cost A_1 was 118.14 per cent for the marginal farmers. It was the lowest

Table—40

Return and Cost for Farmers Belonging to Different Operational Size Groups of Holdings During the Period 1.6.79 to 31.5.80 in the District of Bankura : Return and Cost Relate to Both Farm and Non-farm Operations

Sl. No.	Operational size groups of holdings (ha.)	No. of farms	Return (Total per ha income : farm & non-farm income combined (Rs.)	Cost per ha in Rs.				Rate of return : Percent			
				A_1	A_2	B	C	$\frac{R - A_1}{A_1} \times 100$	$\frac{R - A_2}{A_2} \times 100$	$\frac{R - B}{B} \times 100$	$\frac{R - C}{C} \times 100$
1	0.01 – 1.00	23	5789.43	2653.98	2800.00	4180.00	5085.31	118.14	106.77	38.50	13.85
2	1.01 – 2.00	16	6199.76	3341.47	3341.47	4963.68	5352.02	85.54	85.54	24.90	15.84
3	2.01 – 3.00	7	6396.02	3430.14	3430.14	5125.12	5430.88	86.47	86.47	24.80	17.77
4	3.01 & above	4	6328.86	3140.00	3140.00	5147.30	5408.01	101.56	101.56	22.95	17.03
	Total :	50	6202.70	3188.12	3215.47	4900.62	5335.09	94.56	92.90	26.57	16.26

at 85.54 per cent for the small farmers. Rates of return with respect to costs A_1 were 86.47 per cent and 101.56 per cent respectively for the medium and the big farmers. Average return for all the sample farms was 94.56 per cent.

Rate of return with respect to cost A_2 was 106.77 per cent for the marginal farmers. Except for the marginal farmers it was the same as the rate of return with respect to cost A_1 for the other three operational groups of farms. Average rate of return with respect to cost A_2 for all the sample farms was 92.90 per cent.

The highest and the lowest rates of return with respect to cost B were 38.50 per cent and 22.95 per cent respectively for the marginal and the big farms. These rates were 24.90 per cent and 24.80 per cent respectively for the small farmers and the medium farmers. The overall average rate of return with respect to cost B for all the sample farms was 26.57 per cent.

The rate of return with respect to cost C was the highest at 17.77 per cent for the medium farmers and the lowest at 13.85 per cent for the marginal farmers. These rates were 15.84 and 17.03 per cent for the small and the big farmers respectively. Average rate of return for all the sample farms was 16.26 per cent.

Table-41 displays data regarding returns and costs per cropped ha for the sample farms according to operational size

for the year under investigation in the district of Cooch Behar.

Cost A_1 was the maximum at Rs.2897.87 for the medium farmers. The minimum cost A_1 was recorded at Rs.2233.37 for the marginal farmers. The small and the large farmers accounted for Rs.2766.03 and Rs.2794.57 as costs A_1 per cropped ha. Average cost A_1 per cropped ha for all the farms taken together was Rs.2537.12.

Cost A_2 was the same as cost A_1 because leasing-in of land was absent.

Cost B was recorded at Rs.3152.88, Rs.3867.42, Rs.4030.41 and Rs.4038.52 per cropped ha respectively for the four operational holding groups in order of farm size. Average cost B per cropped ha for all the farms was recorded at Rs.3572.85.

Costs C were Rs.4137.78, Rs.4376.28, Rs.4423.75 and Rs.4377.02 respectively per cropped ha for the marginal, the small, the medium and the big farmers. Average cost C per cropped ha for all the farms was estimated at Rs.4271.09.

The highest rate of return with respect to cost A_1 was 96.79 per cent for the marginal farmers. It was the minimum at 68.30 per cent for the small farmers. Rates of return with respect to cost A_1 were 78.96 and 79.72 per cent respectively for the medium and the big farmers. Average

Table—41

Return and Cost for Farmers Belonging to Different Operational Size Groups of Holdings During the Period 1.6.79 to 31.5.80 in the District of Cooch Behar : Return and Cost Relate to Both Farm and Non—farm Operations

Sl. No.	Operational size group of holdings (ha.)	No. of farms	Return(Total per ha income : farm & non—farm income combined (Rs.)	Cost per ha in Rs.				Rate of return : Percent			
				A_1	A_2	B	C	$\frac{R - A_1}{A_1} \times 100$	$\frac{R - A_2}{A_2} \times 100$	$\frac{R - B}{B} \times 100$	$\frac{R - C}{C} \times 100$
1	0.01 — 1.00	33	4395.01	2233.37	2233.37	3152.88	4137.78	96.79	96.79	39.40	6.22
2	1.01 — 2.00	12	4655.18	2766.03	2766.03	3867.42	4376.28	68.30	68.30	20.37	6.37
3	2.01 — 3.00	3	5185.95	2897.87	2897.87	4030.41	4423.75	78.96	78.96	28.67	17.23
4	3.01 & above	2	5022.48	2794.57	2794.57	4038.52	4377.02	79.72	79.72	24.36	14.75
	Total :	50	4637.89	2537.12	2537.12	3572.85	4271.09	82.80	82.80	29.81	8.59

rate of return with respect to cost A_1 for all the sample farms was 82.80 per cent.

Rate of return with respect to cost A_2 was the same as the rate of return with respect to cost A_1.

The maximum and the minimum rates of return with respect to cost B were 39.40 per cent and 20.37 per cent respectively for the marginal and the small farmers. The medium and the big farmers accounted for 28.67 per cent and 24.36 per cent respectively as rates of return with respect to cost B. Average rate of return for all the farms was 29.81 per cent.

The rate of return with respect to cost C was the highest at 17.23 per cent for the medium farmers' group. It was the lowest at 6.22 per cent for the marginal farmers.

Rates of return with respect to cost C were 6.37 per cent and 14.75 per cent respectively for the small and the big farmers. Average rate of return of all the farms was 8.59 per cent.

Table-42 shows the cost per cropped ha and rates of return on the basis of operational size groups of holdings in the 3 districts, viz., Birbhum, Bankura and Cooch Behar together.

Cost A_1 was the maximum at Rs.3331.80 per cropped ha for the farmers in the medium size group. The minimum cost A_1

Table-42

Return and Cost for Farmers Belonging to Different Operational Size Groups of Holdings During the Period 1.6.79 to 31.5.80 in the Districts of Birbhum, Bankura and Cooch Behar Combined : Return and Cost Relate to both Farm and Non-farm Operations

Sl. No.	Operational size groups of holdings (ha.)	No. of farms	Return (Total per ha income : farm & non-farm income combined (Rs.)	Cost per ha in Rs.				Rate of return : Percent			
				A_1	A_2	B	C	$\frac{R - A_1}{A_1} \times 100$	$\frac{R - A_2}{A_2} \times 100$	$\frac{R - B}{B} \times 100$	$\frac{R - C}{C} \times 100$
1	0.01 – 1.00	80	5240.89	2528.80	2584.72	3786.76	4721.02	107.25	102.76	38.40	11.01
2	1.01 – 2.00	47	5913.84	3197.85	3197.85	4691.15	5134.14	84.93	84.93	26.06	15.19
3	2.01 – 3.00	14	6328.41	3331.80	3331.80	4982.39	5323.44	89.94	89.94	27.02	18.88
4	3.01 & above	9	6403.10	3104.61	3140.61	5009.31	5295.33	106.24	106.24	27.82	20.92
	Total :	150	5873.29	3007.12	3029.96	4529.82	5073.42	95.31	93.84	29.66	15.77

was recorded at Rs.2528.80 for the marginal farmers. The small and the large households accounted for Rs.3197.85 and Rs.3104.61 per cropped ha as cost A_1. Average cost A_1 per cropped ha for all the 150 farms taken together was estimated at Rs.3007.12.

The cost A_2 was estimated at Rs.2584.72 per cropped ha for the marginal farmers. Costs A_2 and costs A_1 for the small, the medium and the big farmers were the same. Average cost A_2 for all the farms of the 3 districts was Rs.3029.96.

Costs B per cropped ha were recorded at Rs.3786.76, Rs.4691.15, Rs.4982.39 and Rs.5009.31 respectively for the four groups of operational holdings in order of farm size. Average cost B per cropped for all the farms was Rs.4529.82.

The maximum and the minimum costs C per cropped ha were estimated at Rs.5323.44 and Rs.4721.02 for the medium and the marginal farmers. The small and the big farmers accounted for Rs.5134.14 and Rs.5295.33 as costs C per cropped ha. Average cost C per cropped ha for all the farms was estimated at Rs.5073.42.

The highest rate of return with respect to cost A_1 was accounted for by the marginal farmers at 107.25 per cent. The lowest rate of return was estimated at 84.93 per cent for the small farmers. Average rate of return with respect to cost A_1 for all the farms taken together was 95.31 per cent.

Rate of return with respect to A_1 was estimated at 102.76 per cent for the marginal farmers. Except for the marginal farmers, the rate of return with respect to cost A_2 was the same as the rate of return with respect to cost A_1 for the other farm size groups. Average rate of return with respect to cost A_2 for all the 150 farms taken together was 93.84 per cent.

The rate of return with respect to cost B was estimated at 38.40 per cent, 26.06 per cent, 27.02 per cent and 27.82 per cent respectively for the four holding groups in order of farm size. Average rate of return for all the farms taken together was 29.66 per cent.

The rate of return with respect to cost C was recorded at 11.01, 15.19, 18.88 and 20.92 per cent respectively for the marginal, the small, the medium and the big farmers. Average rate of return for the 150 sample farms taken together was 15.77 per cent.

R e s u m e :

Value of farm assets for the 3 districts, viz., Birbhum, Bankura and Cooch Behar taken together was estimated at around Rs.3000.00 per cropped ha. It was the highest in Birbhum and the lowest in Bankura. Depreciation cost of farm assets for the 3 districts combined stood at about 15 per cent

of the value of farm assets per cropped ha. The marginal farmers' groups recorded the highest depreciation cost per cropped ha and the big farmers' group recorded the lowest depreciation cost per cropped ha in these 3 districts considered seperately as well as combined. Yield per cropped ha increased with increase in operational size of farms in all the 3 districts seperately and combined. Yield per cropped ha was the maximum around Rs.3000.00 in Birbhum and Bankura and only two-thirds of this in Cooch Behar. Total farm income per cropped ha was estimated at around Rs.5000.00 per cropped ha, total non-farm income per cropped ha was estimated at around Rs.1100.00 and total income - farm and non-farm combined was estimated at around Rs.6000.00 per cropped ha for the 3 districts combined. A direct relation could be observed between income per cropped ha - farm income, non-farm income and combined total income - and operational size of farms when these 3 districts are considered together. Income per cropped ha was the highest in Birbhum and the lowest in Cooch Behar. Net income per farm in none of these districts was sufficient enough to afford a reasonable level of living to the farmers concerned, viewed from any standard measure adopted in this context.

Rate of return with reference to cost C was estimated at around 16 per cent for the sample farms in the 3 districts of Birbhum, Bankura and Cooch Behar combined. There was a

direct relation between operational size of farms and rate of return for these districts. The highest rate of return was recorded by Birbhum at about 20 per cent and the lowest rate of return was recorded by Cooch Behar at about 9 per cent. Cost C per cropped ha was round about Rs.5000.00 in these districts. Total return per cropped ha was estimated at around Rs.6000.00.

It may be suggested that increasing attention be paid towards creation of income generating assets and developing infra-structures including surface and under-ground irrigation systems in the villages for enhancement of farm income and for increasing the rates of return in farming.

CHAPTER - VII

ESTIMATES OF INEQUALITY : LORENZ ANALYSIS

With a view to finding how far the distribution of operated land and income of the rural people are evenly or unevenly distributed, the Gini Concentration ratio and relative mean inequality are estimated on the basis of observed data in the field as well as on the basis of data collected from secondary sources : All India Agricultural Census and National Sample Survey Data.

Gini Concentration Ratio :

The tool of Lorenz ratio or the Gini coefficient is applied to both primary and secondary data collected in course of this research work to have an idea about the extent of deviation in actual distribution of land holdings in different states of India and in the area covered by field investigation in this study. The Lorenz ratio is the ratio between the area within the line of equal distribution and the Lorenz curve to the area of the entire lower triangle below the line of equal distribution in a two-dimentional diagram, its horizontal axis representing cumulative percentages of households and its vertical axis representing cumulative percentages of area, here operated area. The higher the ratio the greater the concentration of holdings and the greater the inequality in distribution of holdings. The lower the ratio the smaller the

concentration of holdings. The estimates of L (Lorenz ratio) or of Gini coefficient in connection with observed distribution of cultivated holdings under this study along with measures of relative mean inequality (RMI) for different groups of holdings are presented in tables to The RMI shows the extent of deviation of actual distribution from equal or ideal distribution upto certain individual .

Gini : Operated Land : 1979-80 :

Nature of distribution of operational holdings in the districts of Birbhum, Bankura and Cooch Behar seperately and in these three districts combined on the basis of data collected through field investigation during the period 1.6.79 to 31.5.80 may be examined from estimates presented in table-43. The estimates of L or Gini coefficients were 0.2934, 0.3974 and 0.4198 respectively for the districts of Birbhum, Bankura and Cooch Behar. These indicate that there was significant skewness in distribution of operational holdings. The RMI was the maximum at 0.2203 for the size class of 0.81 - 1.20 ha in the district of Birbhum. This shows that concentration of operated area was the maximum for the size class 0.81 - 1.20 ha. The maximum RMI were at 0.2994 and 0.3182 respectively for the size classes of 1.21 - 1.60 ha and 0.81 - 1.20 ha in the districts of Bankura and Cooch Behar. An examination of cumulative percentage figures of operational holdings and

Table-43

Distribution of Operational Holdings in the Districts of Birbhum, Bankura and Cooch Behar Seperately and Combined During the Period 1.6.79 to 31.5.80 : Lorenz Coefficients

Sl. No.	Operational size of holdings (ha.)	Birbhum			Bankura			Cooch Behar			3 Districts combined		
		Cumulative percentage of		RMI**	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI
		Households	Operated area		Households	Operated area		Households	Operated area		Households	Operated area	
1	0.01 – 0.40	8	2.38	0.0562	18	4.87	0.1313	10	3.39	0.0661	12.00	3.61	0.0833
2	0.41 – 0.80	38	20.11	0.1789	44	16.66	0.2134	50	22.07	0.2793	44.00	19.43	0.2457
3	0.81 – 1.20	76	53.97	0.2203*	52	22.66	0.2934	68	36.18	0.3182*	65.33	36.89	0.2844*
4	1.21 – 1.60	78	56.56	0.2144	70	40.06	0.2994*	84	54.20	0.2980	77.33	49.71	0.2762
5	1.61 – 2.00	86	69.06	0.1694	78	50.91	0.2709	90	63.92	0.2608	84.66	60.75	0.2391
6	2.01 – 3.00	94	84.16	0.0984	92	76.96	0.1504	96	76.32	0.1968	93.99	79.08	0.1491
7	3.01 & above	100	100.00	00.00	100	100.00	00.00	100	100.00	00.00	100.00	100.00	00.00
	Gini		0.2934			0.3974			0.4198			0.3792	

* Highest relative mean inequality.

** Relative Mean Inequality, or, point slope of Lorenz Curve.

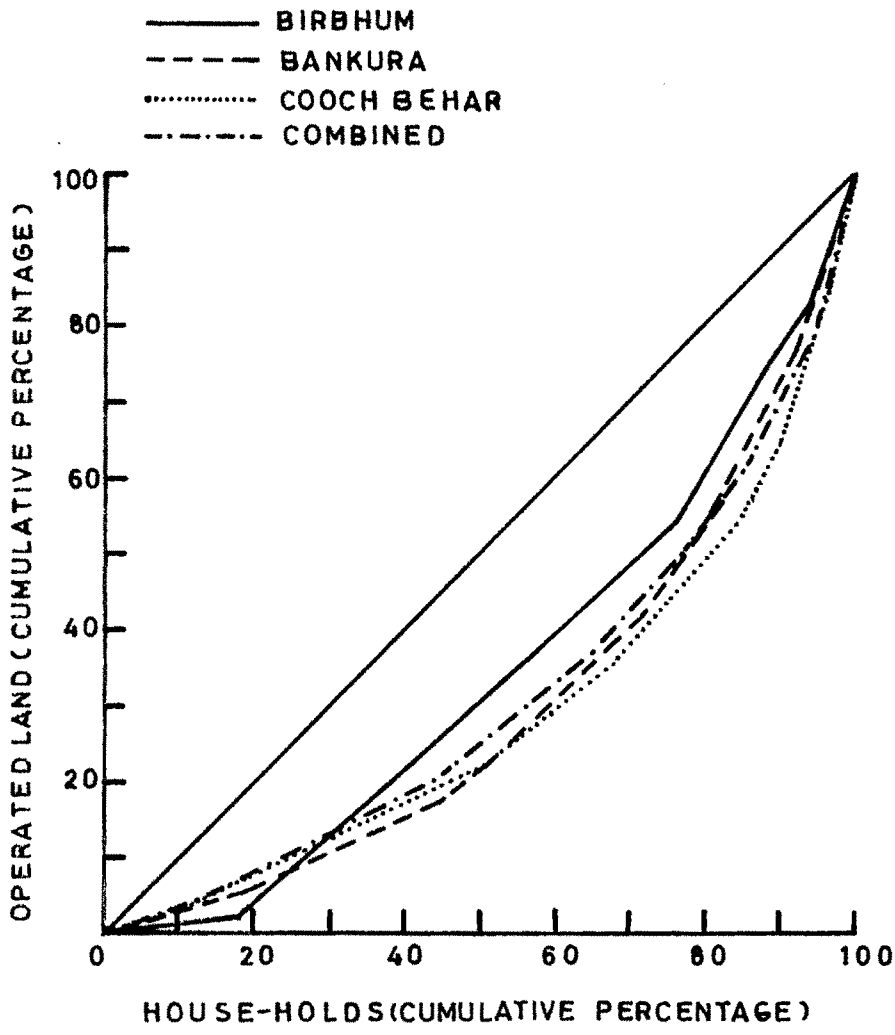


FIG.1. LORENZ CURVE FOR OPERATED LAND.
(1979-80)

corresponding figures of operational area held by them shows that at the lower level a high proportion of households held low proportion of operated area in these 3 districts, viz., Birbhum, Bankura and Cooch Behar. In the district of Birbhum 76 per cent of households held 53.97 per cent of operated land. In the district of Bankura, 70 per cent of households held 40.06 per cent of operated area. In the district of Cooch Behar 68 per cent of households held 36.18 per cent of operated land.

The value of L for the 3 districts of Birbhum, Bankura and Cooch Behar was 0.3792. The maximum RMI was 0.2844. These indicated considerable unevenness in the distribution of operated holdings in the 3 districts combined. No less than 65.33 per cent of the farm households held no more than 36.89 per cent of operated area in these districts.

The Gini coefficients for the districts of Birbhum, Bankura and Cooch Behar seperately as well as combined ranged from 0.2934 to 0.4198. This indicated considerable inequality in distribution of operated holdings. The extent of inequality was the highest in Birbhum and the lowest in Cooch Behar. There was significant concentration of operated lands with the bigger farmers. There was greater concentration of farms with the smaller operational size groups. These demonstrated substantial scope for re-distribution of operated holdings among

the rural people. These data are displayed in Figure-1.

Gini : Income : 1979-80 :

Estimates of L and RMI of gross income, farm-business income and net income in the districts of Birbhum, Bankura, Cooch Behar seperately and combined during the period 1.6.79 to 31.5.80 are presented in table-44. The estimates of L (Lorenz ratio) of the distribution of gross income were 0.3153, 0.4038 and 0.2916 respectively for the districts of Birbhum, Bankura and Cooch Behar. These indicate that there was considerable skewness in distribution of gross income. The maximum RMI were 0.2383 and 0.2162 respectively for the size class of 0.81 - 1.20 ha in the districts of Birbhum and Cooch Behar. The maximum RMI was at 0.3020 for the size class of 1.21 - 1.60 ha in the district of Birbhum. These estimates indicate that concentration of households was higher at lower size classes. They held lower proportions of gross income in these 3 districts. For farm business income, the estimates of L were 0.3192, 0.3897 and 0.2582 respectively for the districts of Birbhum, Bankura and Cooch Behar. These indicate that the distribution of farm business income was relatively skewed in these 3 districts. The maximum RMI was 0.2452 for the size class of 0.81 - 1.20 ha in the district of Birbhum. For the districts of Bankura and Cooch Behar, the maximum RMI were 0.2929 and 0.1918 for the size class of 1.21 - 1.60 ha. These

Table—44

Distribution of Operational Holdings on the Basis of Gross Income (G.I.), Farm Business Income (F.B.I.) and Net Income (N.I.) in the Districts of Birbhum, Bankura and Cooch Behar Seperately and Combined During the Period 1.6.79 to 31.5.80 : Lorenz Coefficients

Sl. No.	Operational size groups of holdings (ha.)	Birbhum			Bankura			Cooch Behar			Birbhum			Bankura			Cooch Behar		
		Cumulative percentage of		RMI**	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI
		Households	G.I.		Households	G.I.		Households	G.I.		Households	F.B.I		Households	F.B.I.		Households	F.B.I.	
1	0.01 – 0.40	8	2.71	0.0529	18	5.18	0.1282	10	4.47	0.0553	8	2.80	0.0520	18	5.80	0.1220	10	4.85	0.0515
2	0.41 – 0.80	38	19.15	0.1885	44	16.17	0.2783	50	29.55	0.2045	38	19.74	0.1826	44	17.67	0.2613	50	32.07	0.1793
3	0.81 – 1.20	76	52.17	0.2383*	52	21.96	0.3004	68	46.38	0.2162*	76	51.48	0.2452*	52	23.72	0.2828	68	49.92	0.1808
4	1.21 – 1.60	78	54.49	0.2351	70	39.80	0.3020*	84	63.01	0.2099	78	53.67	0.2433	70	40.71	0.2929*	84	64.82	0.1918*
5	1.61 – 2.00	86	66.04	0.1996	78	50.11	0.2789	90	74.83	0.1517	86	64.56	0.2144	78	50.42	0.2758	90	75.41	0.1459
6	2.01 – 3.00	94	82.04	0.1158	92	76.19	0.1581	96	88.44	0.0756	94	80.77	0.1323	92	75.31	0.1669	96	88.67	0.0733
7	3.01 & above	100	100.00	00.00	100	100.00	00.00	100	100.00	00.00	100	100.00	00.00	100	100.00	00.00	100	100.00	00.00
	Gini		0.3153			0.4038			0.2916			0.3192			0.3897			0.2582	

* Highest relative mean inequality.

** Relative Mean Inequality, or, point slope of Lorenz Curve.

Continued :

Table—44 Continued :

Sl. No.	Birbhum			Bankura			Cooch Behar			3 Districts Combined								
	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI
	House-holds	N.I.		House-holds	N.I.		House-holds	N.I.		House-holds	G.I.		House-holds	F.B.I.		House-holds	N.I.	
1	8	1.89	0.0611	18	4.40	0.1360	10	3.31	0.0669	12	4.08	0.0792	12	4.85	0.0715	12	3.09	0.0991
2	38	14.27	0.2373	44	14.05	0.2995	50	21.87	0.2813	44	20.23	0.2377	44	32.07	0.1193	44	15.14	0.2886
3	76	44.63	0.3137*	52	19.57	0.3243	68	34.35	0.3365	65.33	38.89	0.2644	65.33	49.92	0.1541*	65.33	83.08	0.3225
4	78	46.76	0.3124	70	36.83	0.3317*	84	46.95	0.3705*	77.33	50.50	0.2709*	77.33	64.82	0.1251	77.33	42.72	0.3461*
5	86	58.02	0.2798	78	47.08	0.3092	90	55.90	0.3410	34.66	61.61	0.2305	84.66	75.41	0.0925	84.66	53.28	0.3138
6	94	75.65	0.1835	92	75.22	0.1678	96	81.20	0.1480	93.99	81.85	0.1274	93.99	88.67	0.0532	93.99	76.18	0.1781
7	100	100.00	00.00	100	100.00	00.00	100	100.00	00.00	99.99	99.99	00.00	99.99	99.99	00.00	99.99	99.99	00.00
Gini		0.4118			0.4372			0.4482			0.3596			0.1944			0.4472	

Concluded.

show that farm business income was concentrated with the bigger holdings in the districts.

For net income, the estimates of L were 0.4118, 0.4372 and 0.4482 respectively in the districts of Birbhum, Bankura and Cooch Behar. These indicate that the distribution of net income was skewed in these 3 districts. The estimates of maximum RMI was at 0.3137 for the size class of 0.81-1.20 ha in the district of Birbhum. In the districts of Bankura and Cooch Behar, the maximum RMI were 0.3317 and 0.3705 for the size class of 1.21 - 1.60 ha. As high as 76 per cent of households possessed no more than 44.63 per cent of net income in the district of Birbhum. No less than 70 per cent of households had no more than 36.83 per cent of net income in the district of Bankura. No less than 84 per cent of households held no more than 46.95 per cent of net income in the district of Cooch Behar.

The L for gross income, farm business income and net income in the 3 districts of Birbhum, Bankura and Cooch Behar combined were respectively 0.3596, 0.1944, 0.4472. Their corresponding RMI were 0.2709, 0.1541 and 0.3461. These showed that there was considerable inequality in distribution of gross income, farm business income and net income in these 3 districts taken together.

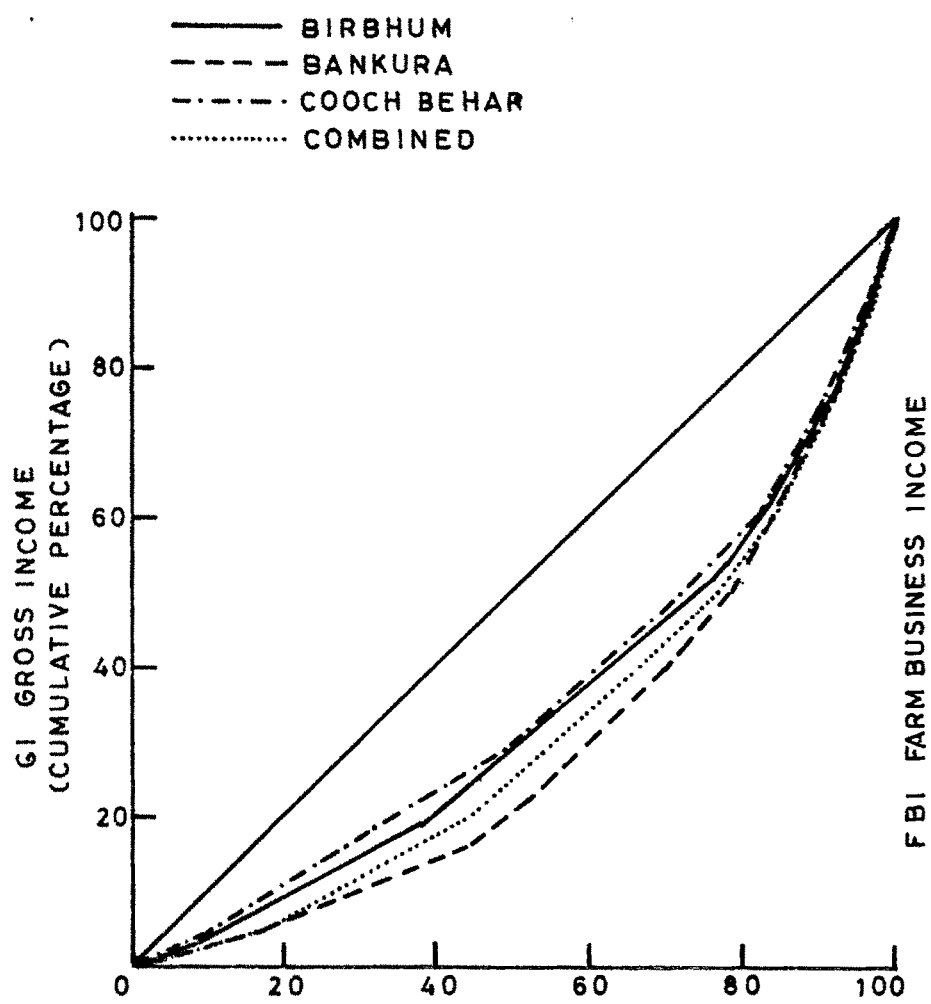


FIG. 2. LORENZ CURVE FOR GROSS INCOME. (1979-80)

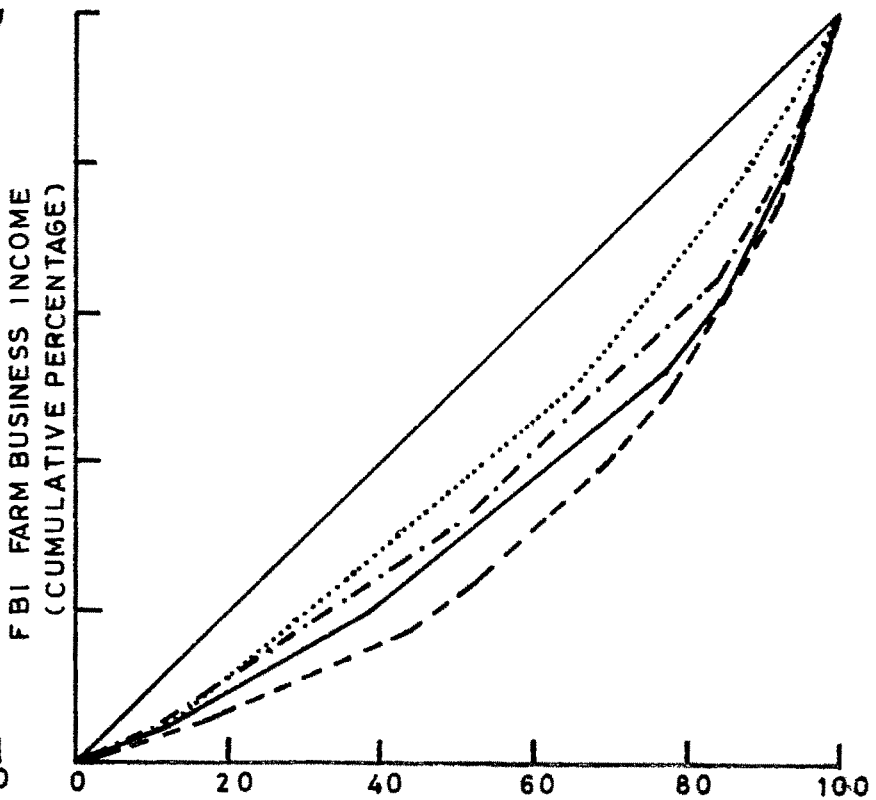


FIG. 3. LORENZ CURVE FOR FARM BUSINESS INCOME. (1979-80)

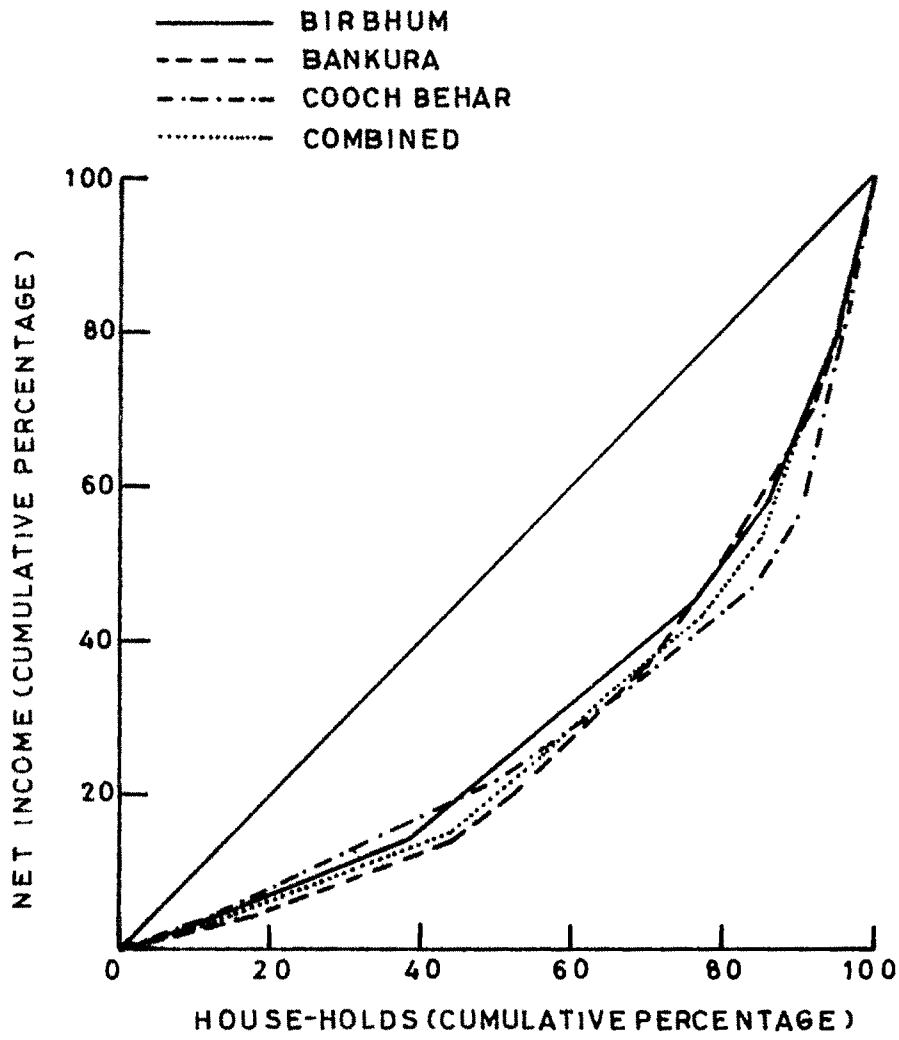


FIG. 4. LORENZ CURVE FOR NET INCOME. (1979-80)

Estimates of L and RMI for gross income, farm business income and net income for the districts of Birbhum, Bankura and Cooch Behar seperately and combined demonstrated substantial unevenness in distribution in these spheres. There was considerable concentration of gross income, farm business income and net income among the bigger operational holdings. There was the maximum inequality in Bankura and the minimum inequality in Cooch Behar in respects of gross income and farm business income. For net income the concentration was the highest in Cooch Behar and the lowest in Birbhum. However, difference in concentration in net income is not much as between these 3 districts. These indicate appreciable scope for redistribution of income in the areas covered under investigation. These data are displayed in Figures 2, 3 and 4.

Distribution of Operated Holdings in the Districts : Census Data 1970-71 & 1976-77 :

Nature of distribution in operational holdings in the district of Birbhum during 1970-71 and 1976-77 may be ascertained from the estimates of L or Gini coefficient and RMI given in table-45. During 1970-71 the value of L was 0.4861 while in 1976-77 it was 0.4698 for the district of Birbhum. This indicates that there was considerable skewness in distribution of operational holdings in both the years. There was, however, a tendency towards decline in concentration

Table–45

Distribution of Operational Holdings in the Districts of Birbhum, Bankura and Cooch Behar During 1970–71 and 1976–77 on the Basis of Census Data : Lorenz Coefficients

Sl. No.	Operational size classes (ha)	Birbhum						Bankura						Cooch Behar					
		1970–71			1976–77			1970–71			1976–77			1970–71			1976–77		
		Cumulative percentage of		RMI**	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI
		House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area	
1	Below 0.05	29.33	4.90	0.2443	33.73	6.80	0.2693	27.77	5.40	0.2237	35.66	8.10	0.2756	29.64	6.26	0.2338	28.82	6.71	0.2211
2	0.5 – 1.00	49.57	14.91	0.3466	53.50	18.74	0.3476*	50.02	17.26	0.3276*	60.01	24.89	0.3512*	56.47	23.52	0.3295*	57.63	25.60	0.3203*
3	1.00 – 2.00	73.82	38.06	0.3576*	79.66	48.33	0.3133	77.28	44.63	0.3265	84.74	56.85	0.2789	83.08	55.20	0.2788	83.73	56.98	0.2675
4	2.00 – 3.00	87.01	59.18	0.2783	92.09	71.91	0.2018	89.77	66.02	0.2375	94.77	79.24	0.1553	93.72	76.98	0.1674	94.13	78.30	0.1583
5	3.00 – 4.00	92.65	71.90	0.2066	95.81	82.03	0.1378	94.01	76.29	0.1772	97.33	86.51	0.1082	96.72	85.76	0.1096	96.86	86.46	0.1040
6	4.00 – 5.00	96.06	81.88	0.1418	98.26	90.60	0.0766	97.10	86.09	0.1101	98.77	92.35	0.0107	98.79	93.51	0.0528	99.11	95.08	0.0403
7	5.00 – 7.50	99.80	97.83	0.0197	99.68	97.59	0.0209	99.90	99.05	0.0085	99.75	97.96	0.0179	99.98	99.83	0.0015	99.88	99.04	0.0084
8	7.50 – 10.00	–	–	–	99.96	99.43	0.0053	–	–	–	99.97	99.64	0.0100	–	–	–	99.99	99.86	0.0013
9	10.00 – 20.00	99.98	99.21	0.0077	100.00	99.81	0.0019	100.00	99.84	0.0016	100.00	99.95	0.0005	100.00	100.00	00.00	100.00	99.96	0.0004
10	20.00 – 30.00	100.00	99.49	0.0051	–	–	–	100.00	99.89	0.0011	100.00	100.00	00.00	–	–	–	–	–	–
11	30.00 – 40.00	100.00	99.54	0.0046	100.00	99.88	0.0012	100.00	99.93	0.0007	–	–	–	–	–	–	–	–	–
12	40.00 – 50.00	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	100.00	100.00	00.00
13	50.00 & above	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00	–	–	–	–	–	–	–	–	–
	Gini		0.4861			0.4698			0.4652			0.4604			0.4413			0.4283	

* Highest relative mean inequality.

** Relative Mean Inequality.

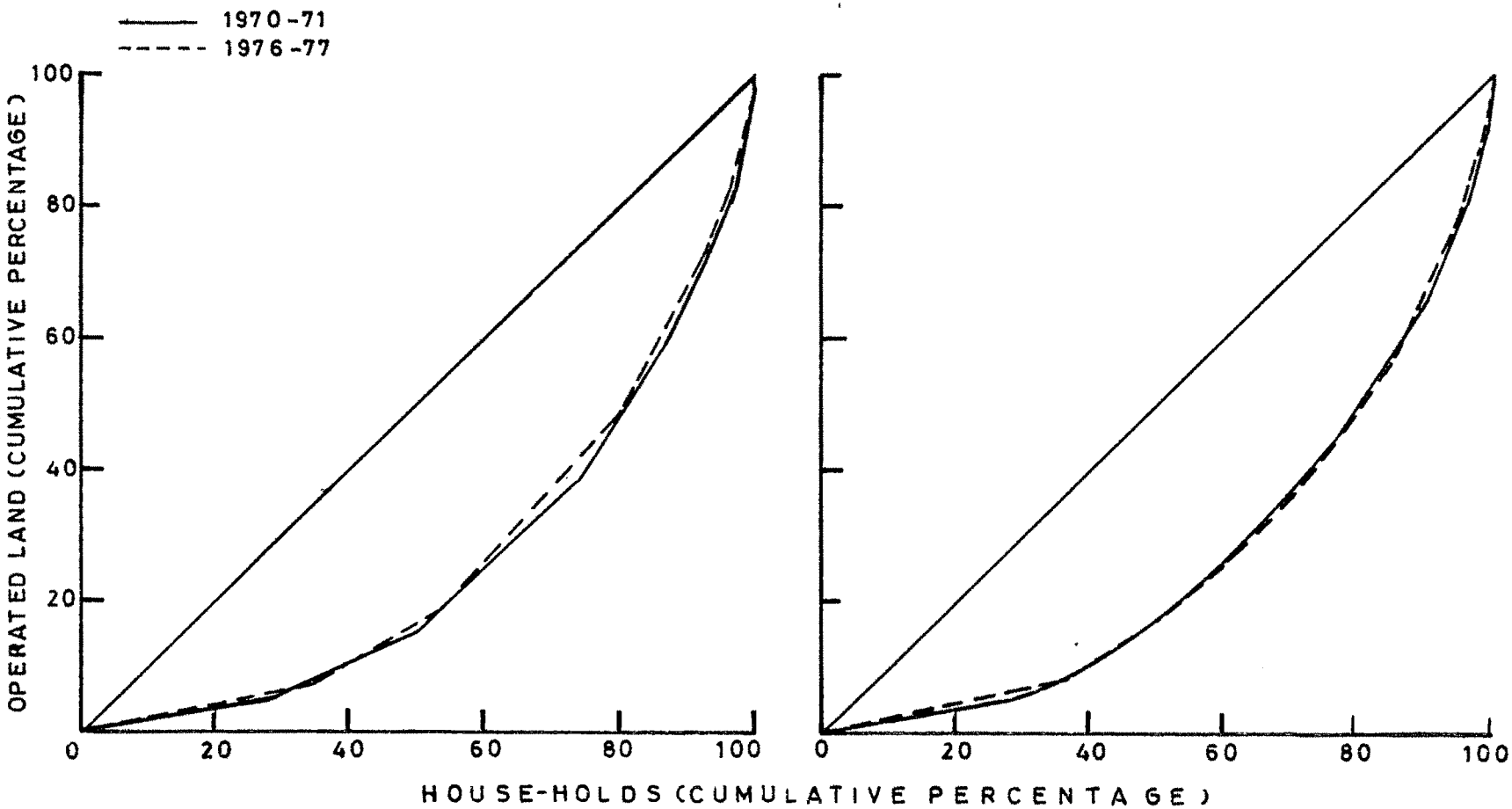


FIG. 5. LORENZ CURVE FOR OPERATED LAND. (BIRBHUM)

FIG. 6. LORENZ CURVE FOR OPERATED LAND. (BANKURA)

of holdings as evident from the decrease in L in 1976-77 compared to what it was in 1970-71. The RMI was the maximum for the 3rd size class of 1.00 - 2.00 ha of operational lands during 1970-71 at 0.3576. The RMI was the maximum for the 2nd operational size class of 0.80 - 1.00 ha during 1976-77 at 0.34 76. There was a decrease in RMI also over these years. An examination of the cumulative percentage figures of households and corresponding operational areas held by them shows that at the lower level a high proportion of the households held low proportion of the operated area in both the years - 73.82 per cent of the households held 38.06 per cent of the operated area in 1970-71 and 79.66 per cent of the households held 48.03 per cent of the operated area in 1976-77. On the other hand, at the upper level no more than 12.99 per cent held no less than (100 - 59.18) or 40.82 per cent of the operated area in 1970-71. The corresponding figures for 1976-77 were (100 - 92.09) or 7.91 per cent and (100 - 71.91) 28.09 per cent. Thus distribution of operational holdings remained considerably skewed in both 1970-71 and 1976-77 despite a slight decrease in concentration during the later year (Figure-5).

In the district of Bankura the estimate of L during 1970-71 was 0.4652 while in 1976-77 it was 0.4604. This indicates that despite decrease in concentration in operational holdings, there was considerable skewness in distribution of

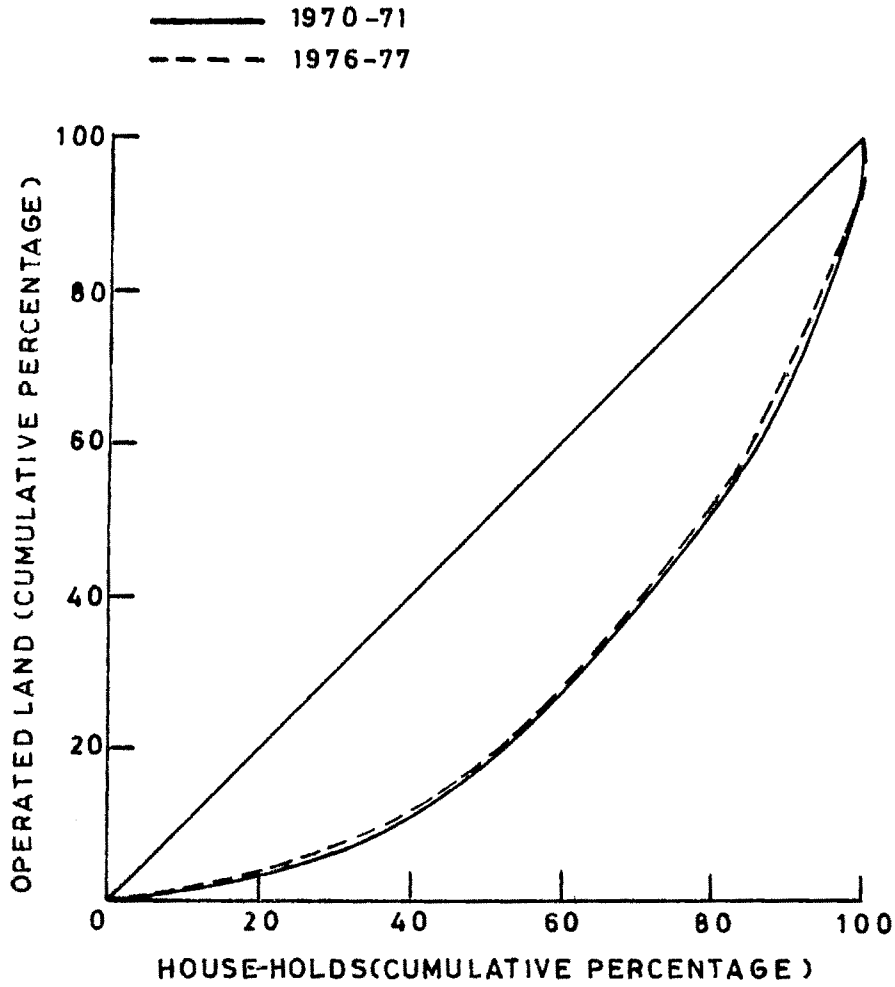


FIG.7. LORENZ CURVE FOR OPERATED LAND.
(COOCH BEHAR)

operational holdings in both the years. The RMI was the maximum at 0.3276 in 1970-71 for the operational size class of 0.50 - 1.00 ha. The RMI was the maximum at 0.3512 in 1976-77 for the operational size class : 0.50 - 1.00 ha. There was an increase in RMI over these years. An examination of cumulative figures of households and corresponding operational areas indicates that 50.02 per cent of households held 17.26 per cent of operational area in 1970-71 and 60.01 per cent of households held 24.89 per cent of operated area in 1976-77 (Figure-6).

In the district of Cooch Behar the estimate of L during 1970-71 was 0.4413 while in 1976-77 it was 0.4283. This indicates that despite slight decrease in the concentration of operational areas, there was considerable skewness in distribution of operational holdings in both the years. The RMI was the maximum in both the years 1970-71 and 1976-77 for the operational size group of 0.50 - 1.00 ha at 0.3295 and 0.3203. There was a decrease in the maximum RMI over these years. At the lower level, 56.47 per cent of households held 23.52 per cent of operated land in 1970-71 and 57.63 per cent of households held 25.60 per cent of operational areas in 1976-77 (Figure-7).

Gini in Some States of India :

Data contained in All India Agricultural Censuses : 1970-71 and 1976-77 and subjected to analysis of Lorenz distribution

to assess the extents of inequality in distribution of operational holdings in 16 principal states of India during 1970-71 and 1976-77 are presented in the Table-46. These estimates are done on the basis of size groups of operational households found in the census reports. For West Bengal, operational holdings were divided into 13 groups. For the remaining 15 States, the operated holdings are divided into 12 groups. Gini coefficients and maximum relative mean inequality are estimated on the basis of these data. It appears from the data on operational holdings collected by Agricultural Censuses 1970-71 and 1976-77 that in the State of West Bengal the estimate of L during 1970-71 was 0.5153. It was reduced to 0.5115 in 1976-77. These indicate that despite decrease in concentration of operational holdings in the later year there was considerable skewness in operational holdings in both these years. The RMI was the maximum at 0.3843 for the operational size group 0.50 - 1.00 ha during 1970-71. The RMI was the maximum at 0.3933 for the operational size group 0.50 - 1.00 ha during 1976-77. There was an increase in RMI over these years. No less than 59.96 per cent of the households held no more than 21.53 per cent of the operational areas in 1970-71. No less than 66.48 per cent of the households held no more than 27.15 per cent of the operational lands during 1976-77 (Figure-8).

In the State of Andhra Pradesh, the estimate of L for operated holdings was 0.6186 in 1970-71. It was reduced to

Table—46

Distribution of Operational Holdings in the States of India During 1970—71 and 1976—77 on the Basis of Census Data : Lorenz Coefficients

Sl. No.	Operational size classes(ha.)	West Bengal					
		1970—71			1976—77		
		Cumulative percentage of		RMI**	Cumulative percentage of		RMI
		Households	Area		Households	Area	
1	0.00 — 0.50	36.94	7.52	0.2942	43.54	10.27	0.3327
2	0.50 — 1.00	59.96	21.53	0.3843*	66.48	27.15	0.3933*
3	1.00 — 2.00	82.30	47.24	0.3506	87.03	55.69	0.3134
4	2.00 — 3.00	92.08	66.38	0.2570	95.08	74.82	0.2026
5	3.00 — 4.00	95.53	76.18	0.1935	97.41	82.78	0.1463
6	4.00 — 5.00	97.85	84.59	0.1326	98.94	89.50	0.0944
7	5.00 — 7.50	99.91	95.42	0.0449	99.79	94.62	0.0517
8	7.50 — 10.00	—	—	—	99.95	96.02	0.0393
9	10.00 — 20.00	99.99	96.12	0.0386	99.98	96.37	0.0361
10	20.00 — 30.00	99.99	96.17	0.0381	99.98	96.41	0.0357
11	30.00 — 40.00	99.99	96.19	0.0379	99.98	96.43	0.0355
12	40.00 — 50.00	—	—	—	99.98	96.43	0.0355
13	50.00 & above	100.00	100.00	00.00	99.99	99.99	00.00
	Gini	0.5153			0.5115		

* Highest relative mean inequality.

** Relative Mean Inequality.

Continued :

Table—46 Continued :

Sl. No	Operational size classes (ha)	Andhra Pradesh						Assam						Bihar					
		1970–71			1976–77			1970–71			1976–77			1970–71			1976–77		
		Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI
		House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area	
1	Below 0.5	28.42	2.85	0.2557	28.00	3.30	0.2470	33.19	5.88	0.2731	36.10	6.67	0.2943	46.55	7.54	0.3901	54.80	12.20	0.4260
2	0.5 – 1.00	45.97	7.99	0.3798	46.60	9.30	0.3730	57.04	17.67	0.3937	59.62	19.29	0.4033	64.33	16.07	0.4826	72.60	23.40	0.4920*
3	1.00 – 2.00	65.61	19.27	0.4634	67.00	22.10	0.4490*	80.80	40.62	0.4018*	82.24	42.65	003959*	78.97	29.68	0.4929*	84.60	37.70	0.4690
4	2.00 – 3.00	76.94	30.11	0.4683*	78.40	34.00	0.4440	90.43	56.56	0.3387	91.28	58.62	0.3266	86.55	41.70	0.4485	90.60	50.20	0.4040
5	3.00 – 4.00	82.99	38.46	0.4453	84.40	42.90	0.4150	94.84	66.89	0.2795	95.38	68.93	0.2645	91.04	51.78	0.3926	94.00	60.20	0.3380
6	4.00 – 5.00	87.29	46.08	0.4121	86.60	50.90	0.3770	97.06	73.59	0.2347	97.42	75.53	0.2189	93.99	60.39	0.3360	96.20	68.60	0.2760
7	5.00 – 10.00	95.70	69.27	0.2643	96.50	75.20	0.2130	99.62	84.94	0.1468	99.66	86.04	0.1362	98.22	79.44	0.1879	99.20	86.80	0.1240
8	10.00– 20.00	98.99	86.96	0.1203	99.20	90.50	0.0870	99.92	87.58	0.1234	99.89	88.22	0.1167	99.61	91.57	0.0804	99.90	94.60	0.0530
9	20.00– 30.00	99.64	93.13	0.0651	99.70	95.40	0.0430	99.95	88.07	0.1188	99.92	88.71	0.1121	99.86	95.46	0.0440	100.00	97.20	0.0280
10	30.00– 40.00	99.85	96.01	0.0384	99.80	97.30	0.0250	99.96	88.29	0.1167	99.93	89.00	0.1093	99.94	97.15	0.0279	100.00	98.30	0.0170
11	40.00– 50.00	99.93	97.39	0.0254	99.90	98.30	0.0160	99.96	88.42	0.1154	99.94	89.26	0.1068	99.97	98.04	0.0193	100.00	98.30	0.0120
12	50.00 & above	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00
	Gini		0.6186			0.5996			0.5595			0.5590			0.6364			0.5869	

Table—46 Continued

Sl. No.	Haryana						Karnataka						Kerala					
	1970–71			1976–77			1970–71			1976–77			1970–71			1976–77		
	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI
	House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area	
1	14.46	1.05	0.1341	17.76	1.24	0.1652	14.84	1.20	0.1364	17.00	1.50	0.1550	65.61	17.64	0.4797*	75.40	22.40	0.5300*
2	27.38	3.53	0.2385	30.83	3.94	0.2689	30.45	4.83	0.2562	33.40	5.60	0.2780	81.58	33.82	0.4776	87.70	40.00	0.4770
3	46.28	10.75	0.3553	49.54	11.39	0.3815	54.09	15.57	0.3852	56.70	17.20	0.3950	93.20	56.75	0.3645	95.70	62.30	0.3340
4	59.40	19.22	0.4018	61.93	19.80	0.4213	67.92	26.00	0.4192*	70.10	28.10	0.4200*	96.99	69.73	0.2726	98.00	74.00	0.2400
5	68.74	27.75	0.4099*	70.60	28.26	0.4234*	76.30	34.97	0.4133	78.20	37.30	0.4090	98.65	78.02	0.2063	98.90	80.20	0.1870
6	75.64	35.87	0.3977	77.14	36.33	0.4081	81.99	42.83	0.3916	83.80	45.60	0.3820	99.18	81.38	0.1780	99.40	84.60	0.1480
7	91.88	65.82	0.2606	92.76	66.39	0.2637	93.84	68.33	0.2551	94.80	71.30	0.2350	99.82	87.41	0.1241	99.90	91.10	0.0880
8	98.62	89.59	0.0903	98.66	88.15	0.1051	98.79	88.95	0.0984	99.10	91.10	0.0800	99.95	89.82	0.1013	100.00	93.20	0.0680
9	99.64	95.97	0.0367	99.58	94.15	0.0543	99.65	95.33	0.0432	99.80	96.20	0.0360	99.97	90.69	0.0928	100.00	93.90	0.0610
10	99.88	98.14	0.0174	99.82	96.38	0.0344	99.88	97.79	0.0209	99.90	97.80	0.0210	99.98	91.10	0.0888	100.00	94.30	0.0570
11	99.96	99.11	0.0085	99.90	97.39	0.0251	99.95	98.72	0.0123	99.95	98.50	0.0145	99.98	91.36	0.0862	100.00	94.50	0.0550
12	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00
	Gini	0.5427		0.3632			0.5552			0.5572			0.6020			0.6085		

Continued :

Table-46 Continued :

Sl. No.	Madhya Pradesh						Maharashtra						Manipur					
	1970-71			1976-77			1970-71			1976-77			1970-71			1976-77		
	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI
	House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area	
1	19.32	1.13	0.1819	19.60	1.40	0.1820	13.82	0.77	0.1305	14.20	0.94	0.1326	11.51	2.77	0.0874	18.30	5.20	0.1310
2	31.76	3.38	0.2838	32.60	4.00	0.2860	25.01	2.73	0.2228	26.12	3.34	0.2278	40.88	18.90	0.2198*	49.30	24.00	0.2550*
3	48.57	9.59	0.3898	50.70	11.40	0.3930	42.77	8.79	0.3398	45.91	11.28	0.3463	83.76	62.90	0.2086	84.30	62.60	0.2170
4	60.39	16.92	0.4347	63.30	20.00	0.4330	54.44	16.05	0.3939	59.62	20.44	0.3918	95.99	86.92	0.0907	95.00	83.80	0.1120
5	68.70	24.15	0.4455*	71.60	28.00	0.4360*	64.76	23.57	0.4119*	69.15	29.44	0.3971*	98.75	94.53	0.0422	98.50	93.40	0.0510
6	75.32	31.54	0.4378	78.10	36.10	0.4200	71.23	31.11	0.4012	76.27	38.11	0.3816	99.57	97.58	0.0199	99.50	97.00	0.0250
7	90.72	58.83	0.3189	92.50	64.10	0.2840	89.61	60.01	0.2960	92.01	68.95	0.2366	99.97	99.58	0.0039	100.00	99.70	0.0030
8	97.85	82.99	0.1486	98.40	86.40	0.1200	98.06	86.60	0.1146	99.02	92.14	0.0688	99.99	99.78	0.0021	100.00	99.90	0.0010
9	99.26	91.37	0.0789	99.50	93.40	0.0610	99.48	94.47	0.0501	99.79	97.02	0.0277	100.00	99.88	0.0012	100.00	100.00	00.00
10	99.67	94.81	0.0486	99.80	96.10	0.0370	99.81	97.08	0.0273	99.92	98.25	0.0167	100.00	100.00	00.00	-	-	-
11	99.82	96.49	0.0333	99.90	97.40	0.0250	99.81	98.13	0.0178	99.96	98.71	0.0125	-	-	-	-	-	-
12	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00	-	-	-	-	-	-
Gini		0.5892			0.5788			0.5463			0.5287			0.3248			0.3506	

Continued :

Table-46 Continued :

Sl. No.	Meghalaya						Nagaland						Orissa					
	1970-71			1976-77			1970-71			1976-77			1970-71			1976-76		
	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI
	House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area	
1	14.03	3.28	0.1075	13.80	2.50	0.1130	2.67	0.20	0.0247	3.70	0.20	0.0350	21.47	3.37	0.1810	24.00	4.50	0.1950
2	36.81	14.91	0.2190	34.60	10.60	0.2400	9.49	1.13	0.0831	9.50	0.80	0.0870	43.30	11.94	0.3136	46.60	14.80	0.3180
3	71.38	45.99	0.2539*	64.70	33.30	0.3140*	27.02	5.13	0.2189	23.50	3.70	0.1980	76.19	38.52	0.3767*	75.70	40.30	0.3540*
4	89.58	72.62	0.1696	82.50	56.00	0.2650	45.32	12.96	0.3236	33.10	6.90	0.2620	83.12	48.04	0.3508	87.70	58.10	0.2960
5	95.49	84.87	0.1062	91.30	72.10	0.1920	54.81	18.88	0.3593	42.90	11.30	0.3160	89.47	69.56	0.2982	92.40	68.10	0.2430
6	98.26	92.10	0.0616	95.60	82.50	0.1310	67.02	28.70	0.3832*	50.00	15.60	0.3440	93.13	68.16	0.2497	95.40	76.40	0.1900
7	99.83	98.73	0.0110	99.40	95.50	0.0390	86.40	53.71	0.3269	75.50	40.40	0.3510*	98.55	87.48	0.1107	99.00	90.80	0.0820
8	100.00	100.00	00.00	99.90	99.00	0.0090	96.65	78.25	0.1838	94.10	75.10	0.1900	99.75	95.75	0.0400	99.90	98.20	0.0170
9	-	-	-	100.00	99.70	0.0030	98.64	86.61	0.2103	97.90	87.60	0.1030	99.91	97.68	0.0223	100.00	99.40	0.0060
10	-	-	-	100.00	99.80	0.0020	99.34	91.01	0.0833	99.10	93.20	0.0590	99.95	98.38	0.0154	100.00	99.70	0.0030
11	-	-	-	100.00	100.00	00.00	99.63	99.30	0.0633	99.30	94.50	0.0480	99.97	98.53	0.0144	100.00	99.80	0.0020
12	-	-	-	-	-	-	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00
Gini	0.3521			0.4197			0.5139			0.4874			0.5065			0.4853		

Continued :

Table 46 Continued :

Sl. No.	Tamil Nadu						Uttar Pradesh						Rajasthan					
	1970-71			1976-77			1970-71			1976-77			1970-71			1976-77		
	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI	Cumulative percentage of		RMI
	House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area		House-holds	Area	
1	37.12	6.31	0.3081	42.60	8.30	0.3430	46.75	8.67	0.3808	49.74	10.43	0.3931	12.90	0.61	0.1229	17.20	0.85	0.1635
2	58.81	17.14	0.4167	64.20	20.70	0.4350*	66.84	21.09	0.4575*	69.37	23.88	0.4549*	25.22	2.26	0.2296	30.20	2.87	0.2733
3	79.68	37.60	0.4208*	82.90	41.50	0.4140	84.03	41.88	0.4215	85.76	45.56	0.4030	43.75	7.20	0.3655	48.50	8.53	0.3997
4	88.51	52.33	0.3618	90.50	56.40	0.3410	91.14	56.66	0.3448	92.22	60.20	0.3202	55.97	12.75	0.4322	60.30	14.74	0.4556
5	92.77	62.43	0.3034	94.20	50.50	0.2770	94.60	66.86	0.2774	95.34	70.31	0.2503	64.48	18.18	0.4630	68.40	20.76	0.4767
6	95.17	69.78	0.2539	96.30	73.90	0.2240	96.53	74.26	0.2227	97.12	77.76	0.1936	70.59	23.19	0.4740*	74.00	26.17	0.4783*
7	98.89	86.98	0.1191	99.20	89.60	0.0960	99.28	90.05	0.0923	99.49	92.60	0.0689	86.02	42.87	0.4315	88.40	47.82	0.4038
8	99.82	95.39	0.0443	99.90	96.10	0.0380	99.89	96.84	0.0305	99.93	97.94	0.0199	94.93	64.38	0.3055	96.20	70.84	0.2536
9	99.94	97.44	0.0250	100.00	97.60	0.0240	99.96	98337	0.0159	99.98	98.95	0.0003	97.51	74.90	0.2261	98.30	81.54	0.1679
10	99.98	98.30	0.0168	100.00	98.10	0.0190	99.98	98.97	0.0101	99.99	99.32	0.0067	98.58	82.06	0.1652	99.10	87.51	0.1159
11	99.99	98.64	0.0135	100.00	98.40	0.0160	99.99	99.23	0.0076	99.99	99.48	0.0051	99.07	86.13	0.1294	99.50	91.04	0.0846
12	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00	100.00	100.00	00.00
Gini		0.5727			0.5740			0.5927			0.5815			0.6269			0.6285	

Concluded.

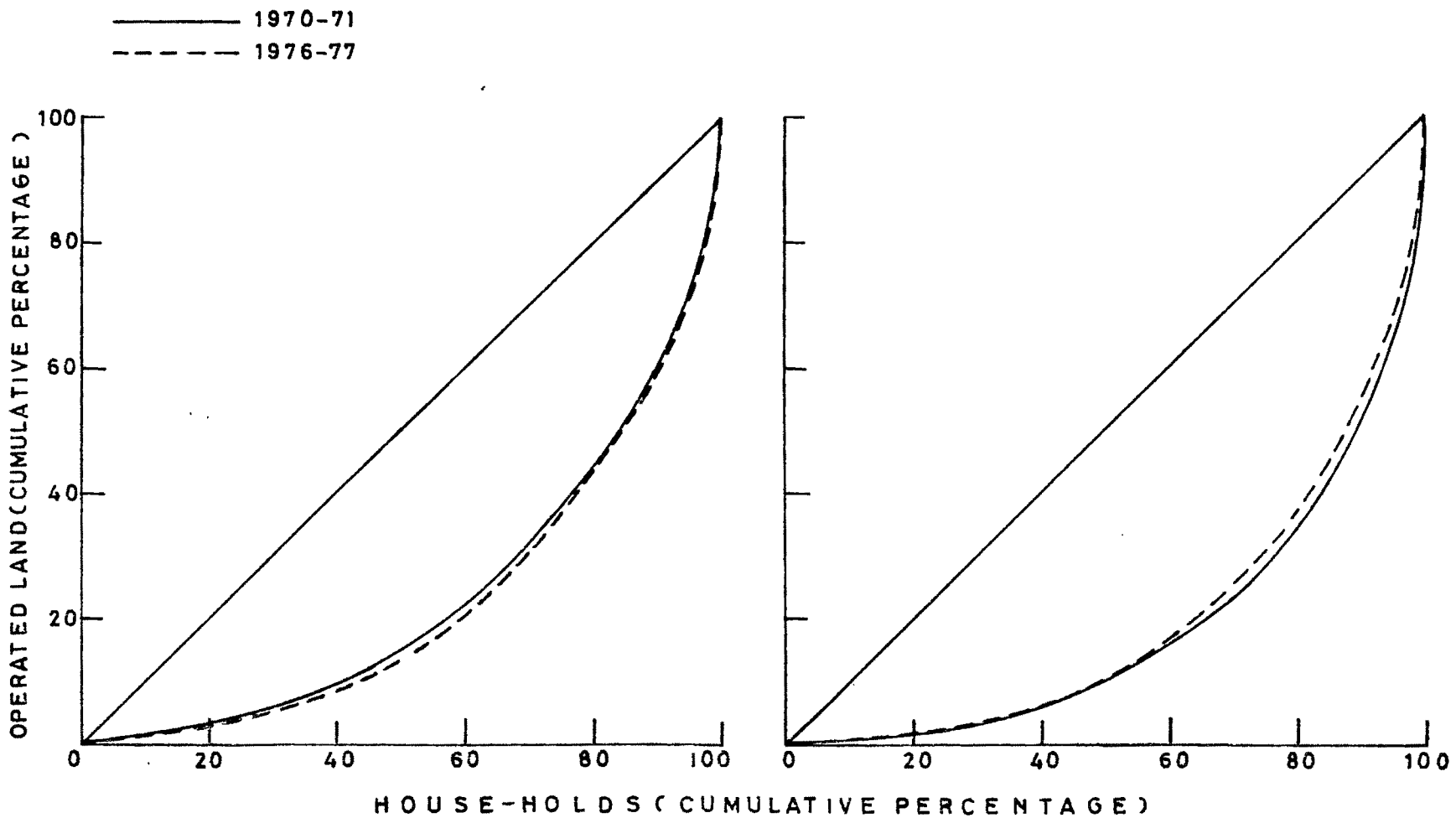


FIG. 8. LORENZ CURVE FOR OPERATED LAND. (WEST BENGAL)

FIG. 9. LORENZ CURVE FOR OPERATED LAND. (ANDHRA PRADESH)

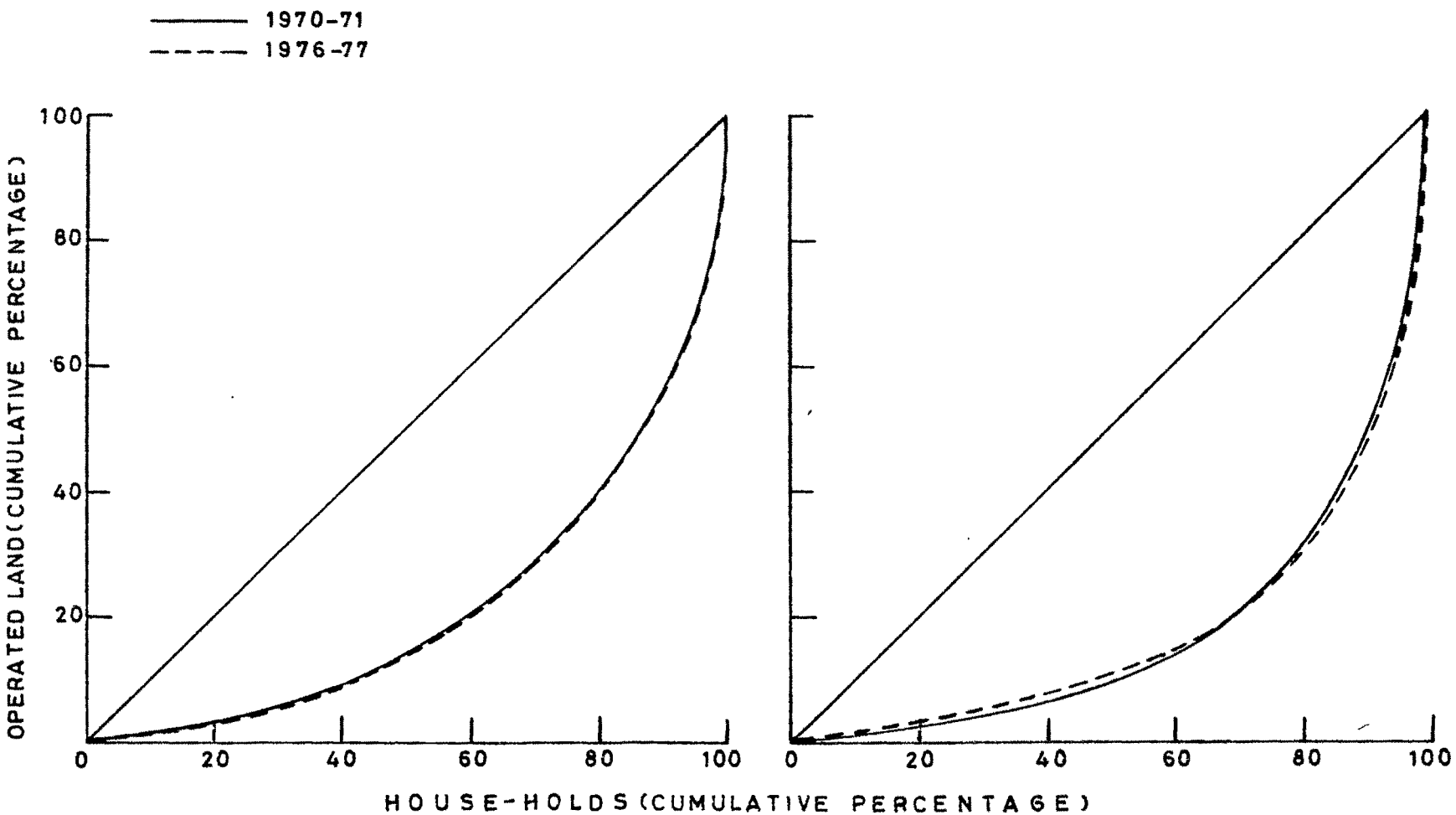


FIG. 10. LORENZ CURVE FOR OPERATED LAND. (ASSAM)

FIG. 11. LORENZ CURVE FOR OPERATED LAND. (BIHAR)

0.5996 in 1976-77. The relative mean inequality in 1970-71 was the maximum at 0.4683 in the operational size class of 2.00 - 3.00 ha and it was reduced to 0.4490 for the size class of 1.00 - 2.00 ha in 1976-77. During the year 1970-71, no less than 76.94 per cent of households claimed no more than 30.11 per cent of operated lands. Similarly, 67.00 per cent of households held only 22.10 per cent of operated area in 1976-77 (Figure-9).

In the State of Assam, the estimates of L for operated land were 0.5595 and 0.5590 respectively for 1970-71 and 1976-77. The corresponding RMI were 0.4018 and 0.3959 for the size class of 1.00 - 2.00 ha. There was a slight decrease in both L and RMI over these years. No less than 80.80 per cent of the total households claimed no more than 40.62 per cent of operated lands in 1970.71. In 1976-77, no less than 82.24 per cent of households held no more than 42.65 per cent of operated lands (Figure-10).

In the State of Bihar, the estimates of L were 0.6364 and 0.5869 respectively for 1970-71 and 1976-77. The RMI of operational holdings in this State was 0.4929 and 0.4920 respectively in 1970-71 and 1976-77 for the size group of 1.00 - 2.00 ha and 0.50 - 1.00 ha. There was a decrease in both L and RMI IN 1976-77 as compared with the earlier year 1970-71. During the year 1970-71, 78.97 per cent of house-

holds claimed 29.68 per cent of operated lands and in 1976-77, 72.60 per cent of households occupied 23.40 per cent of operated lands (Firure-11).

In the State of Haryana, the estimate of L was 0.5427 in 1970-71 and 0.5632 in 1976-77. The RMI was 0.4099 in 1970-71 and 0.4234 in 1976-77 for the size class of 3.00 - 4.00 ha. This indicates that no less than 68.74 per cent of households held no less than 27.75 per cent of operated areas in 1970-71 and 70.61 per cent of households 28.26 per cent of operated land in 1976-77. (Figure-12)

In the State of Karnataka, the estimates of L were 0.5552 in 1970-71 and 0.5572 in 1976-77. The RMI was the maximum at 0.4192 in 1970-71 and 0.4200 in 1976-77 for the size class of 2.00 - 3.00 ha. No less than 67.92 per cent of households held no more than 26.00 per cent of operated lands in 1970-71 and 70.10 per cent of households 28.10 per cent of operated lands (Figure-13).

In the State of Kerala, the estimates of L was 0.6020 in 1970-71 and 0.6085 in 1976-77. The estimate of RMI was the maximum at 0.4797 in 1970-71 and 0.5300 in 1976-77 for the size class of 0.00 - 0.50 ha (Figure-14).

In the State of Madhya Pradesh, the estimated L was 0.5892 in 1970-71. In 1976-77 it decreased to 0.5788. The maximum RMI was 0.4455 in 1970-71. It decreased to 0.4360 in

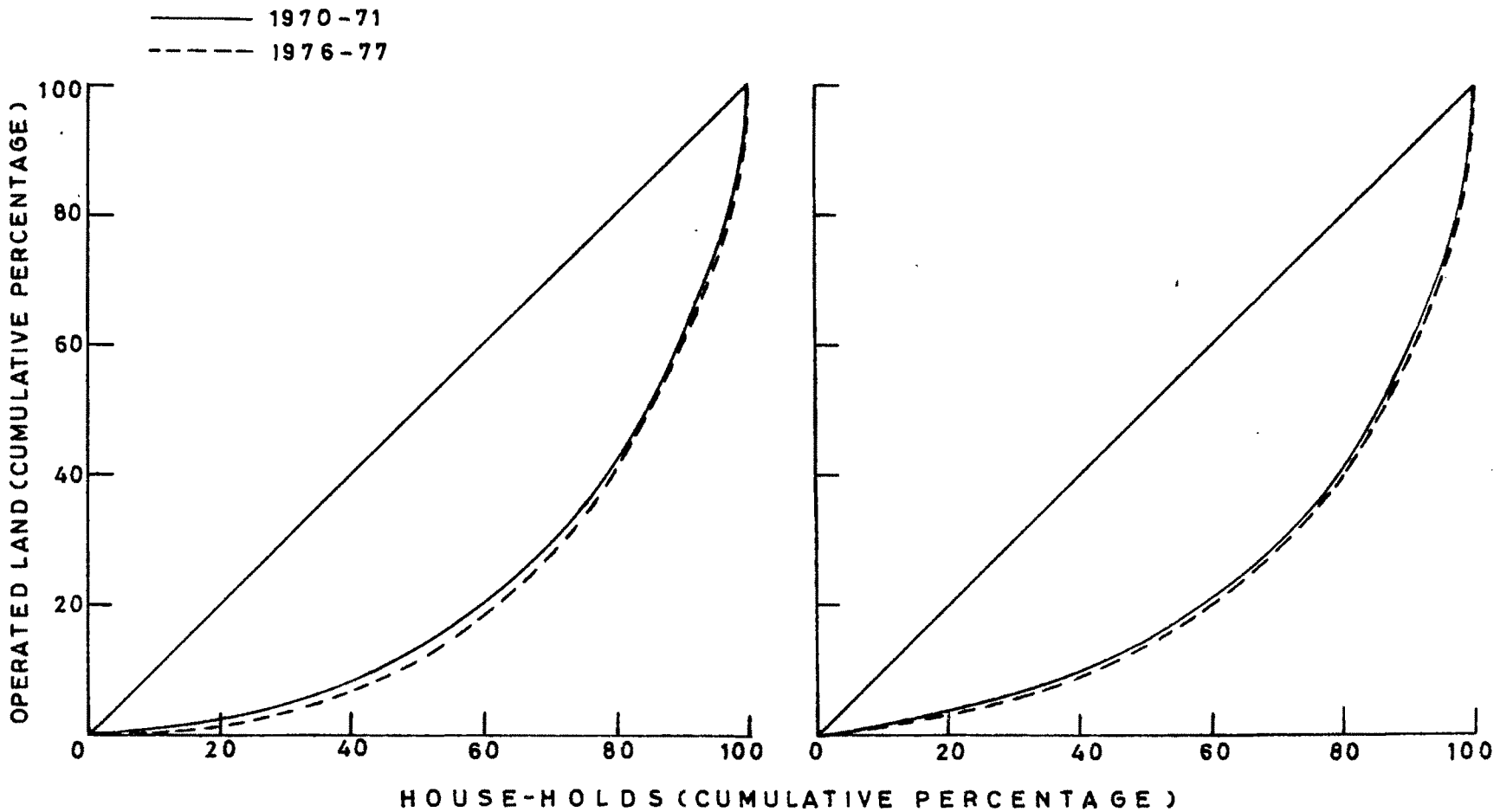


FIG. 12. LORENZ CURVE FOR OPERATED LAND (HARYANA)

FIG.13. LORENZ CURVE FOR OPERATED LAND. (KARNATAKA)

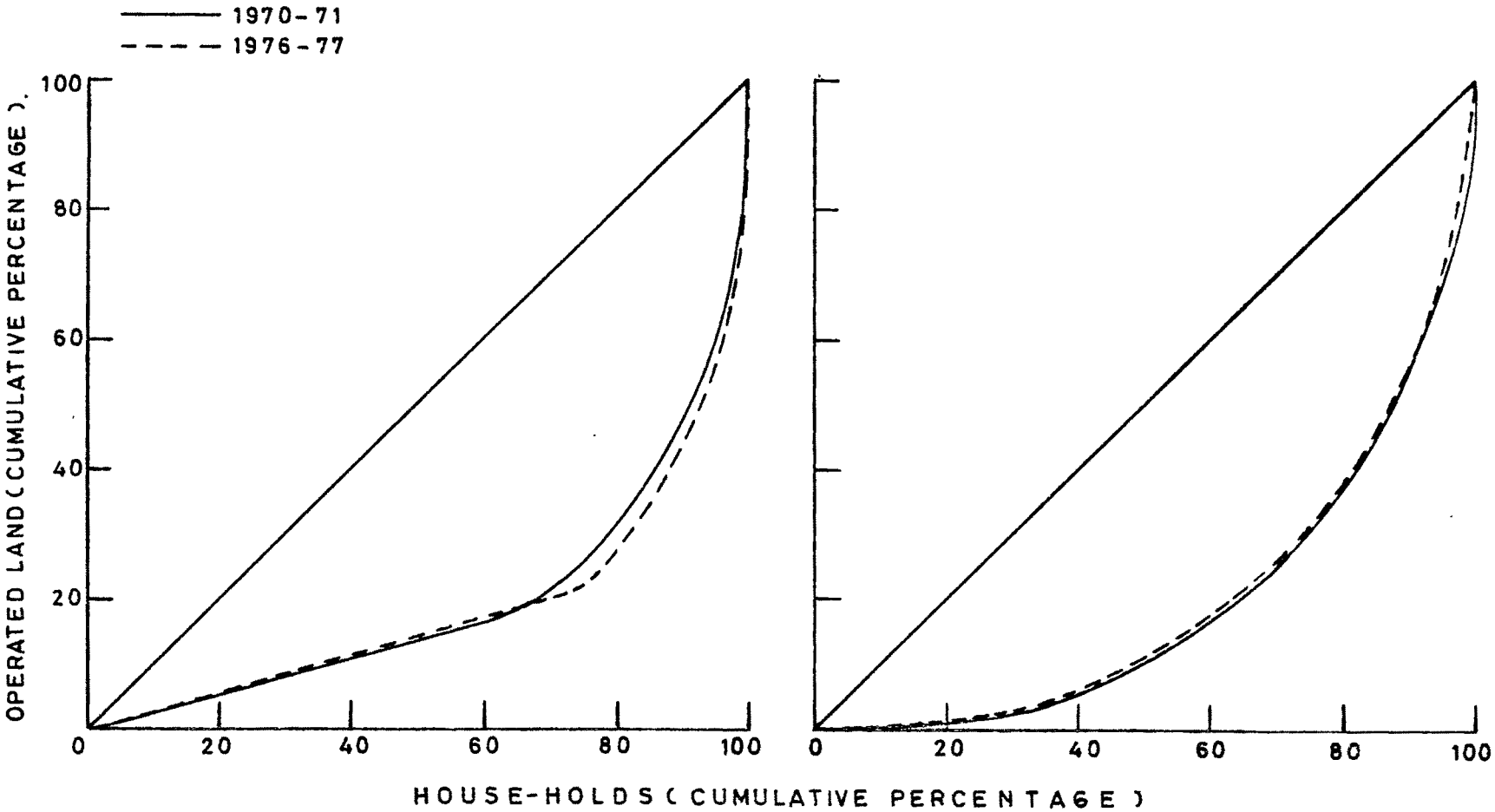


FIG. 14. LORENZ CURVE FOR OPERATED LAND. (KERALA)

FIG. 15. LORENZ CURVE FOR OPERATED LAND. (MADHYA PRADESH)

1976-77 (Figure-15).

In the State of Maharashtra, the estimated L was 0.5463 in 1970-71 which decreased to 0.5287 in 1976-77. The maximum RMI was 0.4119 in 1970-71. It decreased to 0.3971 in 1976-77 (Figure-16).

In the State of Manipur, the estimates of L and the maximum RMI increased in 1976-77 as compared to 1970-71. The estimates of L were 0.3248 and 0.3506 respectively in 1970-71 and 1976-77. The maximum RMI were 0.2198 and 0.2550 respectively in 1970-71 and 1976-77 (Figure-17).

In the State of Meghalaya, the estimate of L increased in 1976-77 as compared to 1970-71. The estimates of L were 0.3521 and 0.4197 respectively in 1970-71 and 1976-77. The maximum RMI was 0.2550 in the size class of 0.50 - 1.00 ha in 1970-71. It decreased to 0.2539 in the size class of 1.00 - 2.00 ha.(Figure-18)

The estimate of L in the State of Nagaland was 0.5139 in 1970-71. In 1976-77 it decreased to 0.4874. The maximum RMI was 0.3832 in the size class of 4.00 - 5.00 ha in 1970-71 and was 0.3510 in 1976-77 in the size class of 5.00 - 10.00 ha (Figure-19).

In the State of Orissa, the estimates of L and maximum RMI decreased in 1976-77 as compared to 1970-71. The estimates

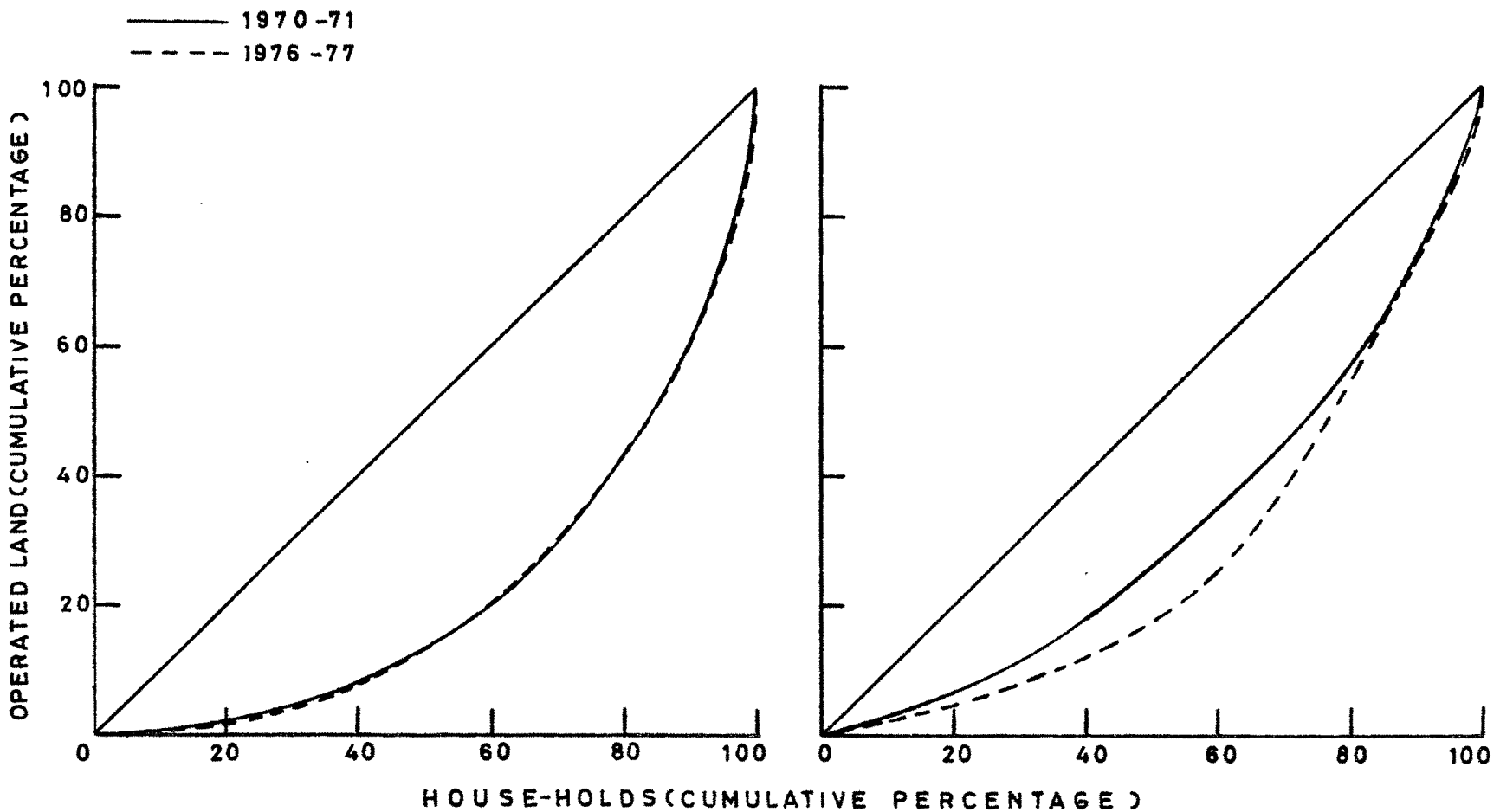


FIG.16. LORENZ CURVE. FOR OPERATED LAND. (MAHARASHTRA)

FIG.17. LORENZ CURVE FOR OPERATED LAND. (MANIPUR)

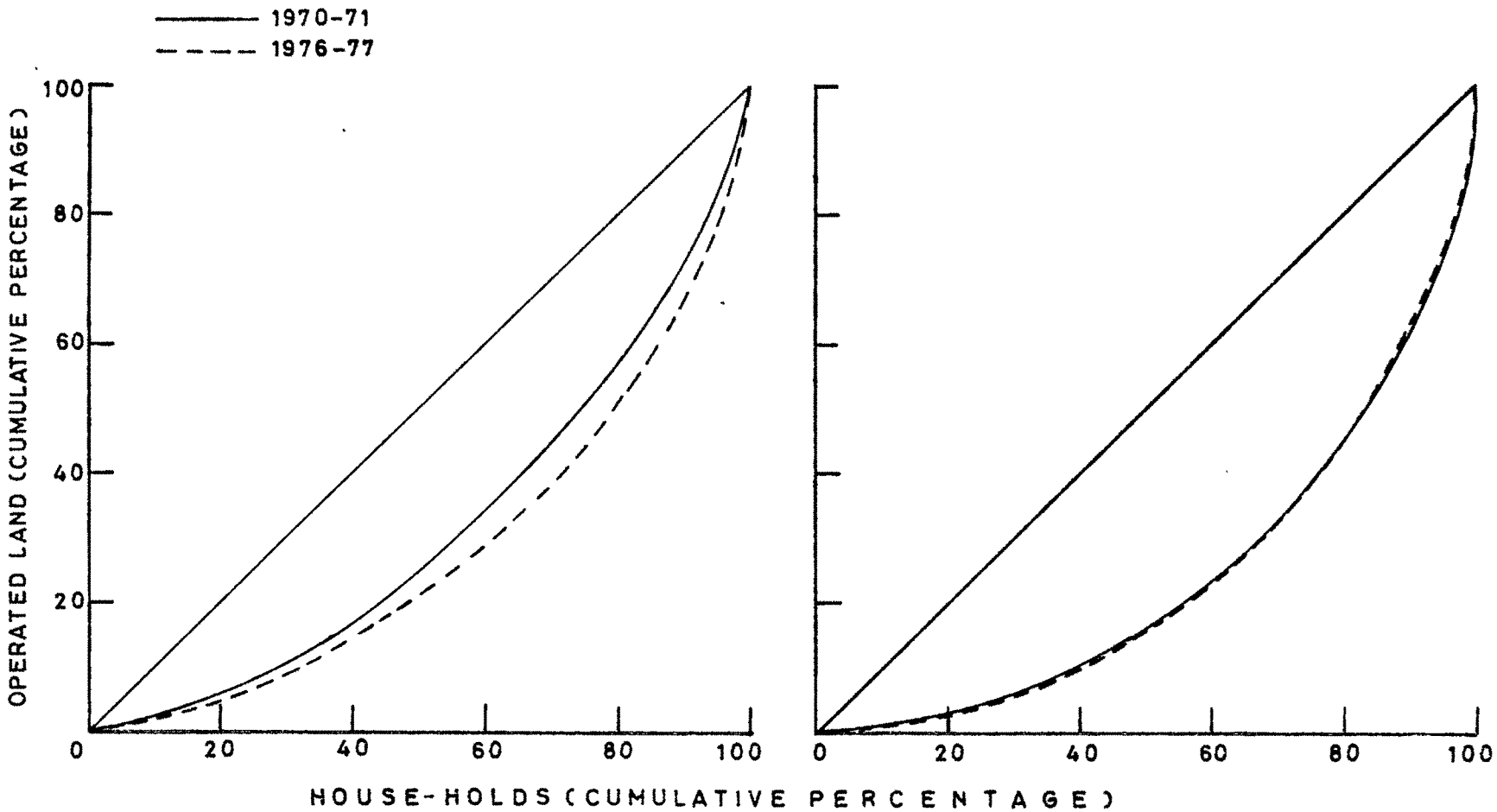


FIG.18. LORENZ CURVE FOR OPERATED LAND. (MEGHALAYA)

FIG.19. LORENZ CURVE FOR OPERATED LAND. (NAGALAND)

of L were 0.5065 and 0.4853 respectively in 1970-71 and 1976-77 and the estimates of maximum RMI were 0.3767 and 0.3540 respectively in 1970-71 and 1976-77 for the size class 1.00 - 2.00 ha (Figure-20).

In the State of Tamil Nadu, the estimate of L was 0.5727 in 1970-71 and 0.5740 in 1976-77. The estimates of the maximum RMI was 0.4208 in 1970-71 in the size class 1.00-2.00 ha. It increased to 0.4350 in 1976-77 in the size class of 0.50 - 1.00 ha (Figure-21).

In the State of Uttar Pradesh, the estimate of L and the maximum RMI decreased in 1976-77 as compared to 1970-71. The estimates of L were 0.5927 and 0.5815 respectively in 1970-71 and 1976-77. The RMI were the maxima at 0.4575 and 0.4549 in 1970-71 and 1976-77 for the size class of 0.50 - 1.00 ha (Figure-22).

In the State of Rajasthan, the estimate of L was 0.6269 in 1970-71. It increased to 0.6285 in 1976-77. The estimates of RMI were the maxima at 0.4740 and 0.4783 respectively in 1970-71 and 1976-77 in the size class of 3.00 - 4.00 ha (Figure-23).

All the 16 States demonstrated substantial unevenness in distribution of operational holdings in both 1970-71 and 1976-77. There were 14 States for which L was above 0.50 in 1970-71 and 12 States for which L was above 0.50 in 1976-77.

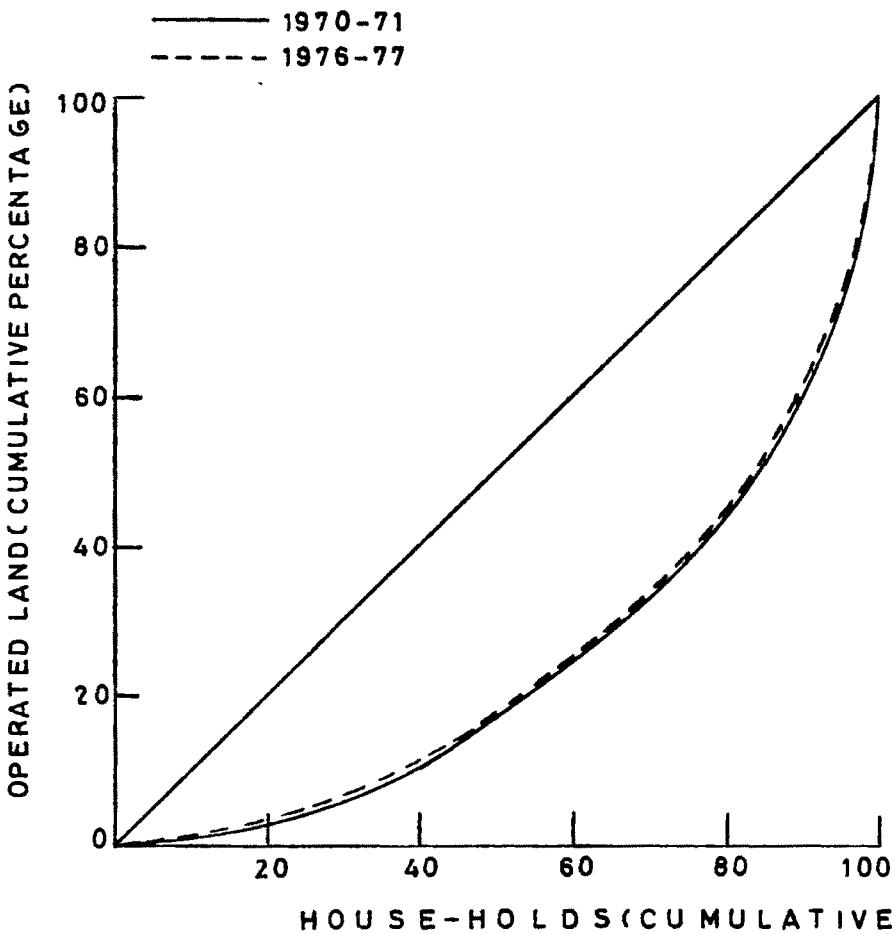


FIG. 20. LORENZ CURVE FOR OPERATED LAND. (ORISSA)

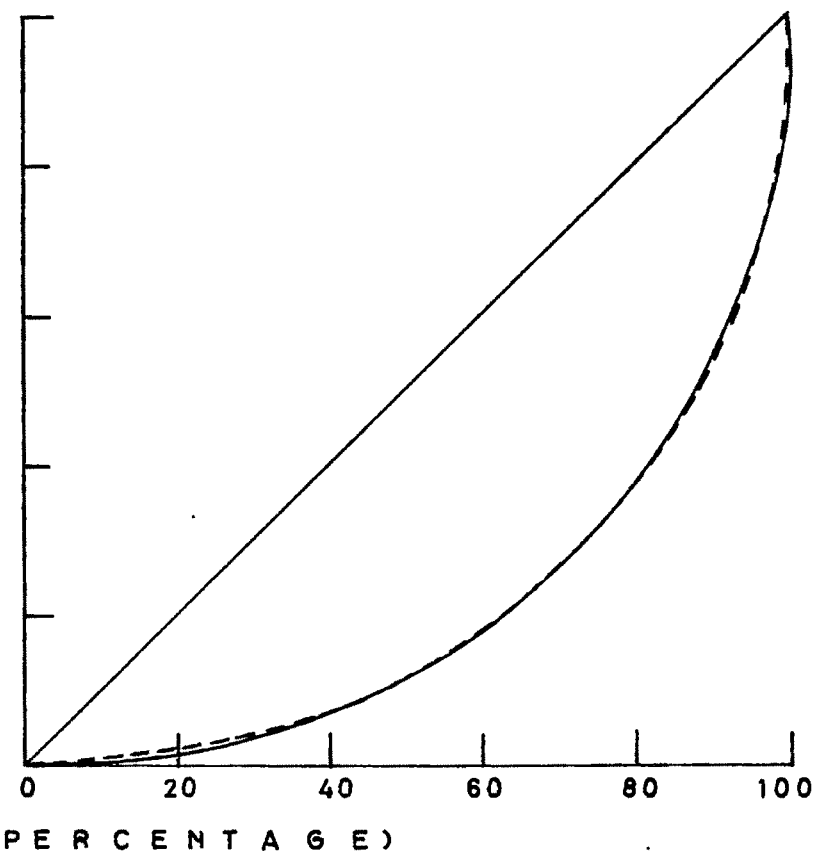


FIG. 21. LORENZ CURVE FOR OPERATED LAND. (TAMIL NADU)

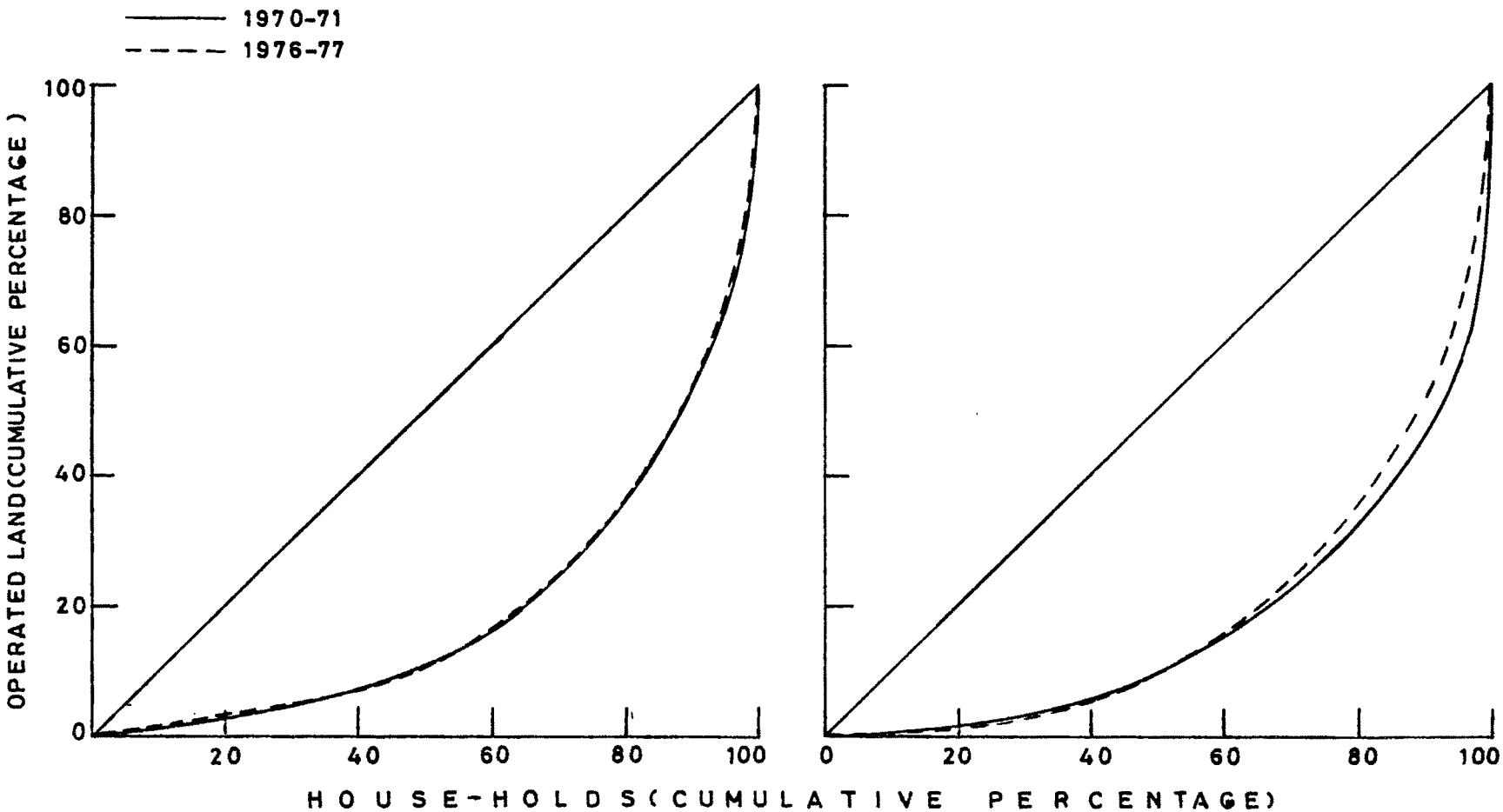


FIG.22. LORENZ CURVE FOR OPERATED LAND (UTTAR PRADESH)

FIG. 23. LORENZ CURVE FOR OPERATED LAND (RAJASTHAN)

Number of States for which the value of L decreased in 1976-77 over that in 1970-71 was 9. The value of L ranged from 0.3248 in Manipur to 0.6364 in Bihar during 1970-71 and from 0.3506 in Manipur to 0.6285 in Rajasthan during 1976-77. The overall findings is that notwithstanding decrease in inequality in some states, distribution of operational holdings remained considerably skewed in all the 16 states subjected to this analysis.

Gini : N.S.S. Data :

Data contained in N.S.S. : 16th Round (1960-61) and 26th Round (1970-71) of West Bengal are subjected to analysis of Lorenz distribution to measure the extent of inequality in distribution of operational holdings. Operational holdings are divided into 13 size groups and 14 size groups respectively in the 16th and in the 26th rounds. Gini coefficients and extents of maximum relative mean inequality are estimated on the basis of these data. These estimates are given in Table-47.

It appears from the above table-47 that during 1960-61 the L-ratio was 0.4543 and in 1970-71 it was 0.4905. These indicate that despite increase in concentration of operational holdings in the later year there was considerable skewness in distribution of operational holdings in both the years.

Table–47

Distribution of Operational Holdings in the State of West Bengal During 1960–61 and 1970–71 on the Basis of the National Sample Survey Data : Lorenz Coefficient

N.S.S. 16 Round (1960–61)				N.S.S. 26th Round (1970–71)			
Size class of operational holdings(ha.)	Cumulative percentage of		RMI**	Size class of operational holdings(ha.)	Cumulative percentage of		RMI
	House–holds	Operated area			House–holds	Operated area	
0.00 – 0.20	11.66	0.72	0.1094	0.002 – 0.20	16.67	1.29	0.1538
0.20 – 0.40	18.38	1.95	0.1643	0.21 – 0.40	28.68	4.33	0.2435
0.40 – 1.00	44.27	13.43	0.3084	0.41 – 0.50	34.68	6.65	0.2803
1.00 – 2.00	74.04	41.21	0.3283*	0.51 – 1.00	61.15	24.74	0.3641*
2.00 – 3.00	87.33	62.08	0.2525	1.01 – 2.02	83.98	53.63	0.3035
3.00 – 4.00	92.93	74.47	0.1846	2.03 – 3.03	93.36	73.63	0.1973
4.00 – 5.00	96.53	84.58	0.1195	3.04 – 4.04	96.94	84.80	0.1214
5.00 – 6.00	98.25	90.59	0.0766	4.05 – 5.05	98.55	91.13	0.0742
6.00 – 8.00	99.38	95.56	0.0382	5.06 – 6.07	99.06	93.57	0.0549
8.00 – 10.00	99.75	97.84	0.0191	6.08 – 8.09	99.65	97.11	0.0254
10.00 –12.00	99.91	98.92	0.0099	8.10 – 10.12	99.93	99.37	0.0056
12.00 –20.00	99.97	99.61	0.0036	10.13 – 12.14	100.00	100.00	00.00
20.00 & above	100.00	100.00	00.00	12.15 – 20.24	–	–	
				20.25 & above	–	–	
Gini		0.4543				0.4905	

* Highest relative mean inequality.

** Relative Mean Inequality.

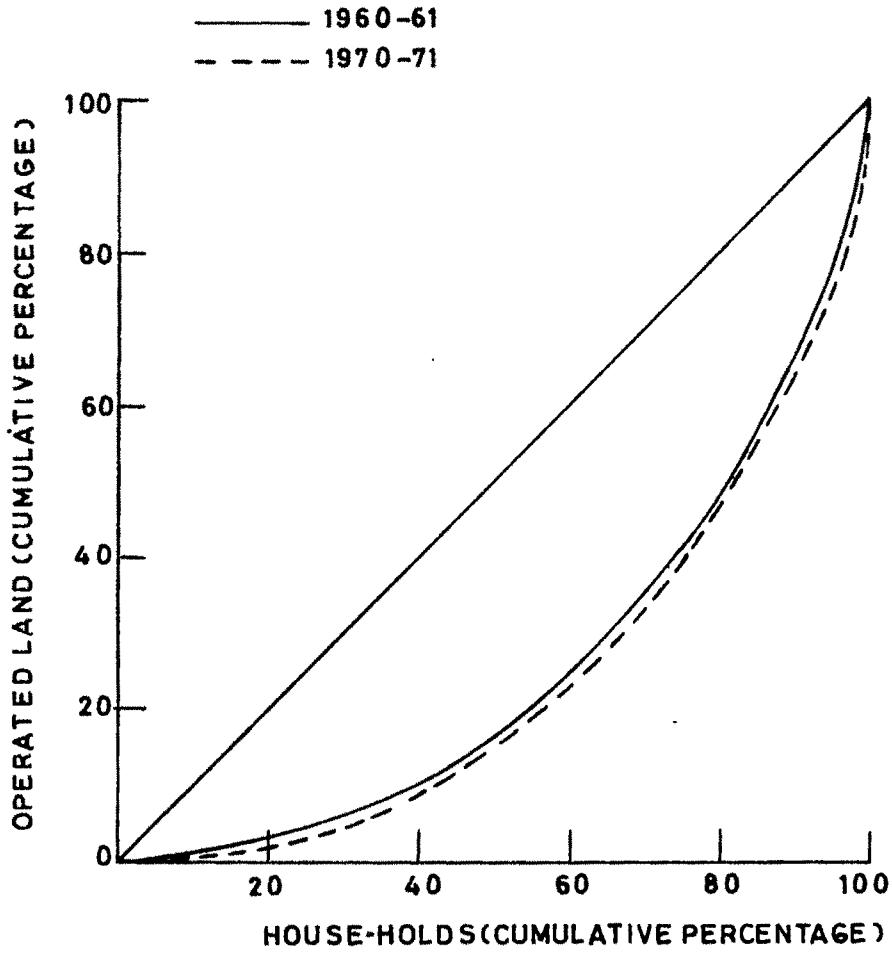


FIG. 24. LORENZ CURVE FOR OPERATED LAND (WEST BENGAL)

The RMI was the maximum at 0.3283 for the size group 1.00 - 2.00 ha during 1960-61. The RMI was the maximum at 0.3604 for the size class of 0.51 - 1.00 ha during 1970-71. There was an increase in maximum RMI over these years. No less than 74.04 per cent of the households held no more than 41.21 per cent of operational area in 1960-61. No less than 61.15 per cent of households held no more than 27.15 per cent of the operational area during 1970-71.

Compared to needs, operated land and income derived therefrom are low in the regions covered in this study as well as in the regions outside in the countries. There is sufficient scope for redistribution of operated lands and rural incomes in the areas under study as well as in India as a whole (Figure-24).

CHAPTER - VIII

ESTIMATES OF INEQUALITY : ATKINSON INEQUALITY INDEX

The inequality in distribution of operational holdings may also be ascertained by estimating what is known as Atkinson's Inequality Index on the basis of data collected through field investigation as well as from secondary sources. The formula* used for estimating I (Index of inequality in distribution) is :

$$I = 1 - \left[\sum_{i=1}^{n} \left(\frac{Y_i}{\bar{Y}} \right)^{1-E} f_i \right]^{\frac{1}{1-E}}$$

where Y_i = income of those in the ith income range (n ranges altogether), f_i = proportion of population with incomes in the ith range, and $\bar{Y}$ = mean income.

The parameter E represents weights given to inequality in distribution by the society. Its value ranges from zero indicating total indifference of the society about distribution to infinity implying that the society is concerned only with the condition of the poorest groups of the people. This alternative measure of inequality is used because Gini Coefficients do not give unambiguous interpretation of inequality in distribution where Lorenz curves intersect and also because these give greater weight to middle range. Another reason for using this Atkinson Inequality Index is that it measures the gain accruing to the society from rational redistribution of resources or income.

* Atkinson, A.B. The Economics of Inequality, Oxford : Clarendon Press, 1975, p.-48.

Atkinson Inequality : Operated Area :

The estimates of inequality in distribution of operated holdings in the districts of Birbhum, Bankura and Cooch Behar seperately and combined during the period 1.6.1979 - 31.5.1980 are presented in Table-48. In case the inequality aversion value, say, E = 1.50 is acceptable to the society concerned then only (1.0000 - 0.1975) or 80.25 per cent of total operated area would be required in the district of Birbhum to obtain the existing level of social welfare if lands were equally distributed. This also indicates that the gain from equal distribution of the operational areas would be equivalent to what could be obtained by increasing the total operated area in the district of Birbhum by about 20 per cent.

For the district of Bankura with E at 1.50, the value of I (Atkinson's Inequality Index) was 0.3346 during 1979-80. In the district of Cooch Behar, the value of I was 0.3242. For the 3 districts combined the value of I stood at 0.2868 with E at 1.50. These indicate that only (1 - 0.3346) or 66.54 per cent and (1 - 0.3242) or 67.58 per cent of the existing operated area would be required to enjoy the current level of welfare from land respectively in Bankura and Cooch Behar. For the 3 districts combined, (1 - 0.2868) or 71.32 per cent of current operated land would be required to offer the same level of welfare to the society from land as at present.

Table–48

Estimates of Inequality in Distribution of Operated Holdings in Birbhum, Bankura and Cooch Behar Seperately and Combined During 1.6.79 to 31.5.80 : Atkinson's Index

Sl.No.	Value of ϵ	Value of Index I			
		Operated area			
		Birbhum	Bankura	Cooch Behar	3 districts combined
1	0.5	0.0724	0.1260	0.1523	0.1153
2	1.00	0.1350	0.2303	0.2383	0.2011
3	1.50	0.1975	0.3346	0.3242	0.2868
4	2.00	0.2509	0.4093	0.3734	0.3473
5	3.00	0.3434	0.5090	0.4376	0.4336

With an assumed inequality aversion value of E = 1.50, no more than (1 - 0.2868) or 71.32 per cent of existing operated land would be required to enjoy the present level of social welfare in Birbhum, Bankura and Cooch Behar combined. Alternatively, the gain from equal distribution of land would be no less than what may be obtained by enhancing the total operated area in these districts by about 29 per cent, the other things remaining the same, i.e., at the existing level of farm technologies, etc. The gain from equal distribution would be minimum at about one-fifth of the total area, i.e., what would be obtain by enhancing the total operated area by about 20 per cent in Birbhum to about one-third in Bankura.

Atkinson Inequality : Income :

Table-49 presents estimates of inequality in distribution of gross income, farm business income and net income in the districts of Birbhum, Bankura and Cooch Behar seperately and combined during the period : 1.6.79 - 31.5.80.

Assuming E = 1.50, the value of I for gross income ranged from 0.1795 in Cooch Behar to 0.3398 in Bankura. It ranged from 0.1493 in Cooch Behar to 0.3062 in Bankura for F.B.I. It ranged from 0.2391 in Birbhum to 0.2744 in Bankura in respect of net income. For the 3 districts combined, the value of I was found to be 0.2622 for gross income, 0.2459 for farm business income and 0.3850 for net income.

Table—49

Estimates of Inequality in Distribution of Gross Income, Farm Business Income and Net Income in Birbhum, Bankura and Cooch Behar Seperately and Combined During 1.6.79 to 31.5.80 : Atkinson's Index

Sl. No.	Value of ϵ	Value of Index I											
		Gross Income			Farm Business Income			Net Income			3 Districts Combined		
		Birbhum	Bankura	Cooch Behar	Birbhum	Bankura	Cooch Behar	Birbhum	Bankura	Cooch Behar	Gross income	Farm business income	Net income
1	0.5	0.0828	0.1300	0.0720	0.0869	0.1202	0.0600	0.1418	0.1536	0.1808	0.1043	0.1005	0.1645
2	1.00	0.1474	0.2345	0.1258	0.1304	0.2132	0.1047	0.2391	0.2744	0.2726	0.1833	0.1732	0.2748
3	1.50	0.2119	0.3389	0.1795	0.2139	0.3062	0.1493	0.3364	0.3951	0.3644	0.2622	0.2459	0.3850
4	2.00	0.2609	0.4109	0.2182	0.2598	0.3706	0.1819	0.4010	0.4731	0.4083	0.3184	0.2965	0.4514
5	3.00	0.3375	0.5041	0.2754	0.3302	0.4573	0.2312	0.4924	0.5678	0.4605	0.3984	0.3688	0.5342

Application of Atkinson's Inequality Index demonstrated that there was appreciable scope for enhancement of social welfare in Birbhum, Bankura and Cooch Behar districts seperately as well as combined through rational redistribution of gross income, farm business income and net income. The probable gain from such redistribution would range from what would be gained by increasing the existing income by about 25 per cent for farm business income to about 38 per cent for net income in the regions covered under study in these 3 districts.

Inequitous Distribution of Operational Holdings in Districts : Census Data :

The estimates of inequitous distribution of operated holdings in the districts of Birbhum, Bankura and Cooch Behar of West Bengal during 1970-71 and 1976-77 are presented in Table-50. In case the inequality aversion value, say, E = 1.50 is accepted to the society concerned then only (1.00 - 0.5140) or 48.60 per cent of the total operational area in Birbhum would be required in 1970-71 to have the same level of welfare in the district in that year if operational lands were equally distributed. This also indicates that the gain from equal distribution of the operational area in 1970-71 would be equivalent to what could be obtained by increasing the total operated area in the district by 51.40 per cent.

Table–50

Estimates of Inequitous Distribution of Operational Holdings in Districts of Birbhum, Bankura and Cooch Behar on the Basis of Census Data : 1970–71 and 1976–77 : Atkinson's Index

Sl.No.	Value of ϵ	Value of Index I					
		Birbhum		Bankura		Cooch Behar	
		1970 71	1976 77	1970 71	1976 77	1970 71	1976 77
1	0.5	0.2160	0.1875	0.1797	0.1792	0.1655	0.1544
2	1.00	0.3650	0.3331	0.3197	0.3167	0.3007	0.2791
3	1.50	0.5140	0.4786	0.4597	0.4541	0.4358	0.4038
4	2.00	0.6076	0.5692	0.5506	0.5399	0.5270	0.4907
5	3.00	0.7074	0.6683	0.6563	0.6371	0.6351	0.5984

The estimate of inequality(I) for the same district in 1976-77 was somewhat reduced at 0.4786. This indicated that gain from egalitarian distribution of operated holdings would be equal to enhancing total operated area by 47.86 per cent. In other words, only (1.00 - 0.4786) or 52.14 per cent of the operated area in 1976-77 could offer the same level of social welfare accruing to the district in that year if operated lands were equally distributed.

The estimate of inequality(I) in the Bankura district in 1970-71 was 0.4597. In the same district during the year 1976-77 it was reduced to 0.4541. Similarly in the district of Cooch Behar in 1970-71 the estimate of inequality was 0.4358 and it was reduced to 0.4038 during the year 1976-77.

It could thus be observed that notwithstanding decrease in estimates of inequality(I) during the later year : 1976-77 compared with the same in the earlier year 1970-71 in the district of Birbhum, a high degree of inequality in distribution of cultivated holdings still persisted in Birbhum. The value of I also decreased in Bankura and in Cooch Behar. But it still remained quite high in these two districts too indicating that distribution of operational holdings still remained skewed and much scope existed for enhancing aggregate social welfare through more equal distribution.

Inequality in Distribution of Operational Holdingsin the States : Census Data :

The data for the State of West Bengal for distribution of cultivated holdings gathered through the two Censuses on agricultural holdings during the years 1970-71 and 1976-77 and subjected to estimates of inequality after Atkinson's Inequality Index are presented in Table-51. Whatever value of E is acceptable to the society from 0.50 to 3.00, the estimates of I would reflect skewness in distribution of such holdings. For example, the value of E at 1.50 would give the values of I at 0.5135 for 1970-71 and 0.5003 for 1976-77. This would indicate that (1.00 - 0.5135) or 48.65 per cent and (1.00 - 0.5003) or 49.97 per cent of the operated area of the State of West Bengal would be required respectively during 1970-71 and 1976-77 to have the then level of welfare in this State if cultivated lands were equally distributed. In other words, there would be a net gain of 51.35 per cent and 50.03 per cent respectively from equal distribution of operational area during the year 1970-71 and 1976-77 in terms of operated area, i.e., these gain would be equivalent to what could be obtained by increasing total operated area of this State of West Bengal respectively by 51.35 per cent and 50.03 per cent during 1970-71 and 1976-77.

The estimated values of I on the basis of different values for E reflect that there was a decline in inequality

Table–51

Estimates of Inequitous Distribution of Operational Holdings in Some Component States of India on the Basis of Agricultural Census Data for the Years 1970–71 and 1976–77 : Atkinson's Index.

Sl.No.	Value of ϵ	Value of Index I													
		West Bengal		Andhra Pradesh		Assam		Bihar		Haryana		Karnataka		Kerala	
		1970–71	1976–77	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77
1	0.5	0.2354	0.2276	0.3192	0.2951	0.2906	0.3089	0.3099	0.3194	0.0.2488	0.2712	0.2570	0.2199	0.3328	0.3451
2	1.00	0.3745	0.3640	0.4961	0.4648	0.4228	0.4393	0.4810	0.4603	0.4345	0.4628	0.4316	0.4017	0.4554	0.4645
3	1.50	0.5135	0.5003	0.6730	0.6344	0.5550	0.5697	0.6520	0.6012	0.6201	0.6543	0.6062	0.5835	0.5779	0.5839
4	2.00	0.5935	0.5746	0.7501	0.7140	0.6285	0.6401	0.7134	0.6551	0.7243	0.7540	0.7053	0.6882	0.6258	0.6238
5	3.00	0.6796	0.6545	0.8208	0.8480	0.7377	0.7162	0.7690	0.7067	0.8251	0.8862	0.8075	0.7954	0.7675	0.6592

Table–51 Continued :

Sl. No.	Value of Index I																	
	Madhya Pradesh		Maharashtra		Manipur		Meghalaya		Nagaland		Orissa		Rajasthan		Tamil Nadu		Uttar Pradesh	
	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77
1	0.2977	0.2851	0.2569	0.2430	0.0944	0.1063	0.1064	0.1479	0.2233	0.2042	0.2184	0.1986	0.3327	0.3371	0.2757	0.2746	0.2931	0.2825
2	0.4997	0.4801	0.4537	0.4294	0.1784	0.1940	0.2004	0.2665	0.3692	0.3753	0.3615	0.3328	0.5218	0.4996	0.4293	0.4221	0.4489	0.4321
3	0.7017	0.6750	0.6504	0.6158	0.2623	0.2812	0.2943	0.3850	0.5150	0.5464	0.5045	0.4669	0.7108	0.6621	0.5829	0.5696	0.6046	0.5817
4	0.7955	0.7701	0.7607	0.7279	0.3361	0.3522	0.8742	0.4742	0.6080	0.6666	0.5920	0.5511	0.7993	0.8155	0.6572	0.6409	0.6715	0.6466
5	0.8726	0.8529	0.8587	0.8341	0.4581	0.4590	0.4980	0.5963	0.7251	0.8047	0.6947	0.6530	0.8785	0.8867	0.7324	0.7108	0.7351	0.7094

during 1976-77 compared to the same in 1970-71. But distribution remained appreciably skewed in this State.

For the State of Andhra Pradesh, the inequality in distribution in operated area in 1970-71 was estimated at 0.6730. This indicates that gain from equal distribution of operated holdings would be equal to enhancing total operated area by 67.30 per cent. In other words, only (1.00 - 0.6730) or 32.70 per cent of the operated area in 1970-71 could offer the same level of social welfare to the State in that year if operated lands were equally distributed. The estimate of inequality (I) for the same State in 1976-77 was somewhat reduced at 0.6344. This indicated that gain from equalitarian distribution of operated holdings would be equal to enhancing total operated area by 63.44 per cent. In other words, only (1.00 - 0.6344) or 36.56 per cent of the operated area would be required for the same level of social welfare as obtained in 1976-77 if lands were equally distributed. But distribution of land remained appreciably skewed in this State in 1976-77.

In the State of Bihar, the estimated inequality index (I) in 1970-71 was 0.6520, i.e., (1.00 - 0.6520) or 54.80 per cent of total operated area would be required for the same level of social welfare as that obtained in 1970-71 if lands were equally distributed. In the same State during the year 1976-77, the value of I was reduced to 0.6012. This shows

that distribution of cultivated holdings remained still quite skewed despite decrease in inequality in its distribution in Bihar. The estimate of inequality (I) for the State of Karnataka was 0.6012 in the year 1970-71 and it was reduced to 0.5835 in the year 1976-77.

For the State of Madhya Pradesh, the estimate of inequality was 0.7017 in 1970-71 and it was reduced to 0.6750 in the year 1976-77.

Similarly, for the States of Maharashtra, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh and Karnataka, the estimates of inequality indices were 0.6504, 0.5045, 0.7108, 0.5829, 0.6045 and 0.6062 during 1970-71. This indicates that (1.00 - 0.6504) or 34.96 per cent, (1.00 - 0.5045) or 49.55 per cent, (1.00 - 0.7104) or 28.92 percent, (1.00 - 0.5829) or 41.71 per cent, (1.00 - 0.6045) or 39.55 per cent and (1.00 - 0.6062) or 39.38 per cent of total operated land respectively would be required in these States for the levels of social welfare enjoyed by them if the lands under cultivation in these States in the year in question were equally distributed. For the above-mentioned States the estimates of inequality (I) were reduced to 0.6158, 0.4669, 0.6621, 0.5696, 0.5817 and 0.5835 respectively in the year 1976-77. Distribution of cultivated holdings thus continued to be skewed in the later year too.

For the States of Assam, Haryana, Kerala, Manipur, Meghalaya and Nagaland, the estimates of inequality (I) were 0.5550, 0.6201, 0.5779, 0.2623, 0.2943 and 0.5150 in the year 1970-71. The corresponding values of I in these States were increased to 0.5697, 0.6543, 0.5839, 0.2817, 0.3850 and 0.5464 in 1976-77. This showed that distribution of operational holdings became more skewed in 1976-77 in these six States compared to what it was in 1970-71.

Out of sixteen States covered in the foregoing discussion on equality in distribution of operational holdings between the two years : 1970-71 and 1976-77, the value of I decreased somewhat in ten States. The value of I increased in the remaining six States. Only in two States, viz., Manipur and Meghalaya, the estimates of inequality were found to be moderate both during 1970-71 and 1976-77, the values of I remaining below 0.40 in these two States. In other States, the estimates of inequality continued to remain quite high. The overall position, therefore, is : distribution of operational holdings in the majority of the component States of India remained unfair and much scope existed for enhancing aggregate welfare in these States by more rational distribution of cultivated land.

Atkinson's Indices : N.S.S. Data :

The estimates of Atkinson's Inequality Indices on the

basis of N.S.S. data of operational holdings in West Bengal during 1960-61 and 1970-71 are presented in Table-52.

In case the inequality aversion value, say, E = 1.50 is accepted to the society concerned then only (1.00 - 0.5591) or 44.09 per cent of the total operational area would be required in 1960-61 to have the same level of welfare in that year if operational lands were equally distributed. This also indicates that the gain from equal distribution of the operational area in 1960-61 would be equivalent to what could be obtained by increasing the total operated area in the district by 55.91 per cent.

The estimate of inequality (I) in 1970-71 increased to 0.5963. This indicates that gain from egalitarian distribution of operated holdings would be equal to enhancing total operated land by 59.63 per cent. In other words, only (1.00 - 0.5963) or 40.37 of the operated area in 1970-71 could offer the same level of social welfare accruing to the State in that year if operated lands were equally distributed.

In the con text of ever decreasing surface area of operated land per capita in Indian agriculture and need for improving the standard of life of an ever increasing population of a still industrially backward economy depending cheaply on agriculture for sustaining its inhabitants, there is a dire urgency for augmenting aggregate social welfare by rational

Table-52

Estimates of Inequitous Distribution of Operational Holdings in West Bengal on the Basis of N.S.S. 16th Round and 26th Round : Atkinson's Index.

Sl.No.	Value of ϵ	Value of Index I	
		N.S.S. 16th Round (1960-61)	N.S.S. 26th Round (1970-71)
1	0.5	0.1896	0.2146
2	1.00	0.3744	0.4055
3	1.50	0.5591	0.5963
4	2.00	0.6966	0.7177
5	3.00	0.8299	0.8292

redistribution of its land and income. As application of the Atkinson Index shows, aggregate farm production and social welfare of the agrarian people may be definitely improved through redistribution of land and income along desirable lines.

CHAPTER - IX

ESTIMATES OF INEQUALITY : ENTROPIES*

Entropies of number of operational holdings and of operational areas are calculated on the basis of both primary and secondary data. The objective is to show the degree of equality (or, its inverse, the extent of inequality) in distribution of number of holdings and in distribution of operational areas in the regions covered in this study. This will supplement the findings on the subject from application of the other tools of inequality estimates made in the preceding two chapters.

An example is given below to show how these different entropies are calculated.

The measure of total entropy of number of holdings indicates the extent of equality in distribution of holdings within the size classes studied. Total entropy of areas indicates extent of equality in distribution of areas within these size classes. Between-class entropies indicate extents of equality in distribution of holdings and areas between the broader size classes into which the original size classes are regrouped. Within-class entropies indicate extents of equality in distribution of holdings and areas among the original size classes included in a broader economic group, e.g., the

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* Theil, H. Economics and Information Theory, North-Holland Publishing Co., Amsterdum, 1967.

marginal farmer's group. $I(y) = \log n - H(y)$ shows the extents of inequality of distribution or the extent of concentration.*

The greater the divergence between entropy of number of holdings and entropy of areas of holdings concerning a specific situation and at a point of time the greater the inequality in distribution of areas among the holdings. That is, this divergence will indicate the extent of unfairness in distribution of land among the people concerned. A decline in holding and area entropies over time will mean a decline in degree of equality in distribution and an increase in concentration. This decline in total entropy may bring about a decline in both between-class and within-class entropies or an increase in one but a greater decline in the other.

Entropies : Field Data :

Estimates of entropies of number of operational holdings and operated areas in the districts of Birbhum, Bankura and Cooch Behar seperately and combined during the period 1.6.79 to 31.5.80 on the basis of data collected through field investigation are presented in Table-53. To estimate total entropies holdings and areas are divided into seven size groups. Between-class entropies are computed by regrouping

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* Please vide Appendix-III for details.

Table–53

Entropy of Number of Operational Holdings and Operated Areas in the Districts of Birbhum, Bankura and Cooch Behar Seperately and Combined During the Period 1.6.79 to 31.5.80 on the Basis of Data Collected Through Field Investigation

Sl.No.	Districts	Entropy of number of holdings			Entropy of operated area		
		Total	Between–class	Within–class	Total	Between–class	Within–class
1	Birbhum	1.5821	1.0272	0.5549	1.6943	1.2987	0.3956
2	Bankura	1.8490	1.1992	0.6499	1.8019	1.3629	0.4390
3	Cooch Behar	1.6650	0.9143	0.7507	1.8398	1.3273	0.5125
4	3 districts combined	1.7829	1.0890	0.6939	1.8612	1.3564	0.5048

these seven size classes into four economic categories : the marginal farmers' group (0.01 - 1.00 ha), the small farmers' group (1.01 - 2.00 ha), the medium farmers' group (2.01 - 3.00 ha) and the big farmers' group (3.01 & above). The maximum total entropy for seven size classes is $\log_e 7 = 1.9459$. The maximum between-class entropy for four economic group is $\log_e 4 = 1.3863$.

Actual total entropies of both numbers and areas of operational holdings being estimated at 1.5821, 1.8490, 1.6650, 1.7829 and 1.6943, 1.8019, 1.8398 and 1.8612 respectively for the regions covered in this investigation in Birbhum, Bankura, Cooch Behar and in the 3 districts combined, distribution of both numbers and areas of operational holdings remained uneven for the 3 districts seperately and combined. The fact that total entropies of operational areas in general were higher than total entropies of numbers of operational holdings indicated that there was no correspondence between distribution of operated areas and that of operated holdings.

Between-class entropies ranged from 0.9143 to 1.1991 for operated holdings and from 1.2987 to 1.3629 for operated areas. These were below their maximum possible values indicating unevenness in distribution of operated holdings and operated areas for all the 3 districts. The position is not much different for the 3 districts combined. Between-class entropies of operated areas were higher than those for operated

holdings. This lack of correspondence between these two also suggested that distribution of operated land among the people concerned remained uneven.

As between the 3 districts distribution of operated areas was the most uneven in Birbhum and the least uneven in Bankura, the values of entropies of operated areas being respectively the minimum and the maximum in Birbhum and Bankura.

Within-class entropies of holdings and areas were often found not to be smaller than their maximum possible values. This may, prima facie, indicate a confusing findings and absence of inequality in distribution but this may not be a fact in reality. As within-class entropies are calculated for a very limited number of sub-classes within a broad economic class, the estimates of within-class entropies may not be very much meaningful in all cases.

Actual entropies - total, between-class, within-class - of operated holdings and operated areas in the areas under investigation in the districts of Birbhum, Bankura and Cooch Behar seperately and combined indicated that distribution of operated land remained skewed as a whole and also between the 4 economic groups, viz., the marginal, the small, the medium and the big farmers and that distribution was the most uneven in Birbhum and the least uneven in Bankura among these 3 distric As entropies of areas were higher than entropies of holdings,

too many men had to hold too little land in the smaller size groups. There was, therefore, scope for improvement in distribution of operated lands in these regions.

Table-54 gives the estimates of entropies of number of operational holdings, entropies of gross income, farm business income and net income in the districts of Birbhum, Bankura and Cooch Behar seperately and combined during the period 1.6.79 to 31.5.80 on the basis of data collected through field investigation.

Total entropies of gross income were 1.6990, 1.7950, 1.8573 and 1.8658 respectively in the areas covered under investigation in Birbhum, Bankura, Cooch Behar and in the 3 districts combined. These values are less than their maximum values at $\log_e 7 = 1.9459$ indicating that gross income were not equally distributed. Between the four broad economic classes, viz., the marginal(0.01 - 1.00), the small(1.01 - 2.00 ha), the medium(2.01 - 3.00 ha) and the big (3.01 & above) farmers' groups, entropies ranged from 1.2444 to 1.3625. These values are less than their maximum at $\log_e 4 = 1.3863$ indicating that distribution of gross income was uneven among these 4 economic classes.

Distribution of farm business income was not even in these districts taken seperately and combined, total entropies ranging from 1.7023 to 1.8446 and between-class entropies

Table–54

Entropy of Number of Operational Holdings, Gross Income, Farm Business Income and Net Income in the Districts of Birbhum, Bankura and Cooch Behar Seperately and Combined During 1.6.79 to 31.5.80 on the Basis of Field Investigation

Sl.No.	Districts	Entropy of no. of holdings			Entropy of Gross income			Entropy of farm business income			Entropy of net income		
		Total	Between–class	Within–class	Total	Between–class	Within–class	Total	Between–class	Within–class	Total	Between–class	Within–class
1	Birbhum	1.5821	1.0272	0.5549	1.6990	1.3186	0.3804	1.7023	1.3326	0.3697	1.6734	1.3353	0.3381
2	Bankura	1.8490	1.1991	0.6499	1.7950	1.3625	0.4325	1.8055	1.3731	0.4324	1.7622	1.3533	0.4089
3	Cooch Behar	1.6650	0.9143	0.7507	1.8573	1.2444	0.6129	1.8446	1.2222	0.6224	1.8240	1.3666	0.4574
4	3 districts combined	1.7829	1.0890	0.6939	1.8658	1.3530	0.5128	1.8623	1.3592	0.5031	1.8128	1.3637	0.4491

ranging from 1.2222 to 1.3731, both falling short of their maximum values respectively at $\log_e 7 = 1.9459$ and $\log_e 4 = 1.3863$.

Distribution of net income remained skewed among all the classes and between the 4 economic groups, total entropies and between-class entropies being estimated at below their maximum values.

The estimates of total, between-class and within-class entropies of gross income, farm business income and net income in the districts of Birbhum, Bankura and Cooch Behar seperately and in these three districts combined were found to be less than their maximum values indicating existence of skewness in distribution in these respects in all the regions subjected to field investigation and of considerable scope for improvement of distribution of operated lands.

Entropy : Agriculture Census Data (Districts) :

Estimates of entropies of number of operational holdings and operated areas in the districts of Birbhum, Bankura and Cooch Behar of West Bengal during 1970-71 and 1976-77 are presented in Table-55. Total entropy of number of holdings was 1.7072 in 1970-71 and 1.5898 in 1976-77 for the district of Birbhum. These are much above zero indicating that distribution was far from being perfectly uneven. However, the distribution

Table--55

Entropy of Number of Operational Holdings and Operated Areas in the Districts of Birbhum, Bankura and Cooch Behar of West Bengal During 1970–71 and 1976–77

Sl.No.	Districts	Entropy of number of holdings						Entropy of operated area					
		Total		Between–class		Within–class		Total		Between–class		Within–class	
		1970–71	1976–77	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77
1	Birbhum	1.7072	1.5898	1.2069	1.1148	0.5003	0.4750	1.9343	1.8738	1.4220	1.3744	0.5123	0.4994
2	Bankura	1.6528	1.5040	1.1736	1.0112	0.4792	0.4928	1.8714	1.8112	1.4031	1.3580	0.4683	0.4532
3	Cooch Behar	1.5440	1.5326	1.0600	1.0441	0.4840	0.4885	1.7700	1.7823	1.3536	1.3511	0.4164	0.4312

was not ideal in which case entropy $[H(y)]$ of numbers would be equal to $\log_e 13$, i.e., $\log_e n$ ($\text{Log}_e 13 = 2.5649$). The decline in entropy of numbers between 1970-71 and 1976-77 indicates that distribution of number of holdings has been more uneven in the later year compared to what it was in the earlier year. Between-class entropies of number of holdings at 1.2069 in 1970-71 and 1.1148 in 1976-77 were much less than what these would be in a situation of perfectly even distribution indicating that distribution within the 5 broad economic classes, viz., the marginal(below 1.00 ha), the small(1.00 - 2.00 ha), the semi-medium(2.00 - 4.00 ha), the medium(4.00 - 10.00 ha) and the big (10.00 & above ha) farmers' groups was not perfectly even. The fall in H(y) over these years indicates detoriation in distribution of holdings between these 5 economic groups. Within-class entropies were 0.5003 and 0.4750 during 1970-71 and 1976-77 indicating that distribution of number of holdings among the size classes included in broad economic groups was not perfectly even. The within-class entropy declined over the period 1970-71 - 1976-77. This indicated that distribution of number of holdings among the size-classes included in a broad economic group became more uneven in 1976-77 than in 1970-71.

Total entropies of operated area were 1.9343 and 1.8738, between-class entropies of operated areas were 1.4220 and 1.3744, and within-class entropies 0.5123 and 1.4994 respectively during the years 1970-71 and 1976-77.

These estimates show that distribution of operated areas as a whole (indicated by total entropy) between the broad economic groups of farmers and within each such economic group continued to remained uneven over these years in question. Distribution of operational areas became more uneven in 1976-77 than in 1970-71.

A comparison of entropies of number of holdings with entropies of operated area shown above indicates that distribution of operated area was less uneven than distribution of number of holdings. The divergences between the entropies of numbers and entropies of operated area shows that distribution of operated areas among the persons concerned continued to remain uneven both during 1970-71 and 1976-77. The fact that the divergence between entropy of operated area and entropy of number (1.9343 - 1.7072) in 1970-71 was less than the same at (1.8738 - 1.5898) in 1976-77 indicates that distribution of operated areas among the persons concerned in the district of Birbhum became more uneven in the later year : 1976-77 than in former year : 1970-71.

In the district of Bankura, total entropies of numbers of holdings were 1.6528 and 1.5040, between-class entropies of number of holdings were 1.1736 and 1.0112 and within-class entropies were 0.4792 and 0.4928 respectively during the years : 1970-71 and 1976-77. These estimates show that distribution of number of operational holding as a whole, distribution

between the broad economic classes and distribution within each economic class remained uneven during both these years. The distribution of numbers of holding as a whole and that between the economic classes were more uneven in 1976-77 than in 1970-71. The distribution of operational holdings within each economic group was slightly better in 1976-77 than in the earlier year : 1970-71.

Total entropies of operated areas in the same district were 1.8714 and 1.8112, between-class entropies were 1.4031 and 1.3580 and within-class entropies were 0.4683 and 0.4532 respectively during 1970-71 and 1976-77. Entropy as a whole, between-class entropy and within-class entropy in 1970-71 were greater than in 1976-77. This indicates that distribution of operated area as a whole, distribution between the economic classes and within each such economic class were uneven in both the years. It was, however, more uneven in 1976-77 than in 1970-71.

In the district of Cooch Behar, total, between-class and within-class entropies of numbers of holdings were 1.5440 and 1.5326, 1.0600 and 1.0441, 0.4840 and 0.4885 respectively during the years 1970-71 and 1976-77. Distribution of numbers of holdings were uneven in both years but the distribution of numbers of holdings as a whole and between the economic classes became more uneven in 1976-77 as compared to 1970-71. Distribution of number of holdings within each

economic class became less uneven in 1976-77 as compared with 1970-71

Total entropies of operated areas in the same district were 1.770 and 1.7823, between-class entropies were 1.3636 and 1.3536 and within-class entropies were 0.4164 and 0.4312 respectively during the years 1970-71 and 1976-77. Distribution of operated areas both as a whole and within-class became less uneven in 1976-77 than in 1970-71. Distribution of operated areas between the broad economic groups became more uneven in 1976-77 as compared to 1970-71. It may thus be said that in the two districts of Bankura and Cooch Behar, the distribution of operated areas as a whole and the same between the economic classes were more even than the distribution of number of operational holdings as a whole and between-class. Distribution of numbers of operational holdings within-class was more even than the distribution of operational areas in both these years in the two districts.

On the whole, entropy $[H(y)]$ was found to be higher for operated areas than for number of operational holdings in the districts of Birbhum, Bankura and Cooch Behar. There was a decline in entropies in general. These lead to the observation that distribution of operated areas and distribution of number of operated holdings are not mutually consistent. That distribution of operated lands remained skewed both in 1970-71 and in 1976-77. That distribution of operated holdings worsened on the whole in these 3 districts.

Estimates of inequality in distribution of operated holdings for the 3 districts of Birbhum, Bankura and Cooch Behar, on the basis of Lorenz concentration ratios, Atkinson's inequality indices and Theil's entropy measures - all point to the fact that distribution of operated holdings in these three districts remain far from being even and leaves enough scope for enhancement of aggregate welfare in the areas concerned through more equal distribution of operated area among the people concerned.

Entropies : Agriculture Census Data (States) :

Table-56 presents the estimates of entropies of number of operational holdings and operated areas in some component states of India during 1970-71 and 1976-77.

In the State of West Bengal, total entropies, between-class entropies and within-class entropies of number of holdings were 1.5576 and 1.4335, 1.0518 and 0.9281, and 0.5058 and 0.5054 respectively during the years 1970-71 and 1976-77. These indicate that although the distribution of number of holdings were uneven in both these years, yet the distribution of number of holdings as a whole, between-class and within-class were more uneven in 1976-77 than in 1970-71. Similar results were found in the States of Andhra Pradesh, Bihar, Kerala, Madhya Pradesh, Maharashtra, Rajasthan, Tamil

Table–56

Entropy of Number of Operational Holdings and Operated Areas in Some Component States of India During 1970–71 and 1976–77

Sl.No.	States	Entropy of number of holdings						Entropy of operated area					
		Total		Between–class		Within–class		Total		Between–class		Within–class	
		1970–71	1976–77	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77	1970–71	1976–77
1	West Bengal	1.5576	1.4335	1.0518	0.9281	0.5058	0.5054	2.2427	1.8715	1.4970	1.3973	0.7457	0.4742
2	Andhra Pradesh	1.9126	1.8844	1.3790	1.3561	0.5336	0.5283	2.2181	2.1841	1.4902	1.5211	0.7279	0.3633
3	Assam	1.6147	1.5798	1.1039	1.0653	0.5108	0.5145	2.1055	2.1064	1.5894	1.5843	0.5161	0.5211
4	Bihar	1.6019	1.4103	1.0811	0.9026	0.5208	0.5077	2.2595	2.2114	1.5796	1.5732	0.6799	0.6382
5	Haryana	2.0790	2.0628	1.5477	1.5285	0.5313	0.5343	2.0005	2.0541	1.3436	1.3552	0.6569	0.6989
6	Karnataka	2.0248	1.9989	1.5146	1.4882	0.5102	0.5107	2.1051	2.0970	1.4345	1.4588	0.6706	0.6088
7	Kerala	1.0855	0.8639	0.6387	0.4822	0.4468	0.3817	2.0739	2.0240	1.5166	1.4660	0.5573	0.5580
8	Madhya Pradesh	2.0957	2.0670	1.5405	1.5235	0.5552	0.5435	2.0901	2.0900	1.3003	1.3551	0.7898	0.7349
9	Maharastra	2.1054	2.0605	1.5676	1.5430	0.5378	0.5175	1.9935	1.9663	1.2852	1.3545	0.7083	0.6118
10	Manipur	1.3919	1.4693	1.0694	1.0547	0.3225	0.4146	1.6516	1.6257	1.2140	1.2643	0.4376	0.3641
11	Meghalaya	1.6324	1.7743	1.2833	1.3148	0.3491	0.4595	1.7604	1.9972	1.3436	1.4213	0.4168	0.5759
12	Nagaland	2.0777	2.0881	1.5195	1.5270	0.5582	0.5611	2.0832	1.8791	1.1761	1.0048	0.9071	0.8743
13	Orissa	1.7377	1.7100	1.2752	1.2383	0.4625	0.4717	2.0726	2.0278	1.5505	1.5432	0.5221	0.4846
14	Rajasthan	2.1883	2.1441	1.5918	1.5660	0.5965	0.5781	2.1965	2.1926	1.4120	1.2146	1.0545	0.9780
15	Tamil Nadu	1.6466	1.5581	1.1263	1.0321	0.5203	0.5200	2.1546	2.1414	1.5831	1.5731	0.5715	0.5683
16	Uttar Pradesh	1.5006	1.4384	0.9889	0.9337	0.5117	0.5047	2.1274	2.0882	1.5698	1.5461	0.5576	0.5421

Nadu and Uttar Pradesh. In the State of Assam total, between-class and within-class entropies of numbers of holdings were 1.6147 and 1.5798, 1.1039 and 1.0653, and 0.5108 and 0.5145 respectively during the years 1970-71 and 1976-77. In this State distributions of numbers of operational holdings both as a whole and between-class were more uneven in 1976-77 than in 1970-71. Within-class distribution of numbers of operational holdings was less uneven in 1976-77 than in 1970-71. Similarly, in the States of Haryana, Karnataka and Orissa, the distributions of numbers of operational holdings as a whole and between-class were more uneven in 1976-77 than in 1970-71 but within-class distribution of numbers of holdings was less uneven in 1976-77 than in 1970-71. In the State of Manipur total entropies, between-class and within-class entropies were 1.3919 and 1.4693, 1.0694 and 1.0547, and 0.3225 and 0.4146 respectively during 1970-71 and 1976-77. These indicate that the distributions of numbers of holdings both as a whole and within-class were less uneven in 1976-77 than in 1970-71 but the distribution of numbers of holdings between-class was more uneven in 1976-77 than in 1970-71. In the State of Meghalaya and Nagaland, the distribution of numbers of holdings as a whole, between-class and within-class were less uneven in 1976-77 than in 1970-71.

In the State of West Bengal, for operated areas, total, between-class and within-class entropies were 2.2427

and 1.8715, 1.4970 and 1.3973 and 0.7457 and 0.4742 respectively during the years : 1970-71 and 1976-77. These indicate that the distribution of operational areas as a whole, between-class and within-class were less uneven in 1976-77 than in 1970-71. Similar results were found in the States of Bihar, Manipur, Nagaland, Orissa, Rajasthan, Tamil Nadu and Uttar Pradesh. In the State of Andhra Pradesh, for operational areas, total, between-class and within-class entropies were 2.2181 and 2.1841, 1.4902 and 1.5211,and 0.7279 and 0.3633 respectively during the years : 1970-71 and 1976-77. These estimates indicate that both the distribution of operated areas as a whole and that within-class were more uneven in 1976-77 than in 1970-71 but the distribution of operated areas between-class became more even in 1976-77 than in 1970-71. Similar results were found in the States of Karnataka, Madhya Pradesh and Maharastra. In the States of Haryana and Meghalaya, the distribution of operational areas as a whole, between-class and within-class became more even in 1976-77 as compared to 1970-71. In the State of Kerala, the distributions of operational areas as a whole and between-class became more uneven in 1976-77 than in 1970-71 but within-class distribution of operated areas became less uneven in 1976-77 than in 1970-71.

Estimates of entropy of numbers and areas of operational holdings in the 16 major States of India show that

distribution of operated land among the people concern remained uneven in both 1970-71 and 1976-77. The distribution become more unfair during 1976-77 than in 1970-71. Total entropies of operated holdings and operated areas declined in thirteen States and increased in three States.

Distribution of holdings and areas between broad economic groups worsened in 1976-77 in the majority of States and improved in some States. This reflected through fall in between-class entropies in all but two States for numbers of operational holdings and in all but seven States for operated areas.

Within-class entropies declined in all but seven States for number of holdings and in all but four States indicating detoriation in distribution of holdings and areas in each economic class.

The fact that value of entropies for operated areas was higher than the value of entropies for number of operated holdings for the States in general indicates that concentration of operated areas was less than concentration of number of holdings in these States. This exhibits lack of correspondence between distribution of holdings and distribution of areas and strengthens the suggesion that operated area in general in these States remained skewed in both 1970-71 and 1976-77 and that distribution of operated areas among the

people concerned became more adverse in the later year than in the former year.

Entropies : N.S.S. Data :

Table-57 presents the estimates of entropies of number of operational holdings and operated areas during 1960-61 and 1970-71 in West Bengal.

The N.S.S. data show that in the State of West Bengal, total, between-class and within-class entropies of number of holdings were 1.8503, 1.2446 and 0.6057 respectively during 1960-61. In 1970-71 these were 1.8975, 1.0128 and 0.8847 respectively. This indicates that although distributions of number of holdings were uneven in both these years, yet the distribution of number of holdings as a whole and within-class were more uneven in 1960-61 than in 1970-71.

In the State of West Bengal for operated areas, total, between-class and within-class entropies were 2.0206, 1.4581 and 0.5625 respectively in 1960-61 and 1.9855, 1.3802 and 0.6053 in 1970-71. This indicates that distributions of operational areas as a whole and between-class were less uneven in 1960-61 than in 1970-71.

Suggession :

The findings from the estimates of entropies reinforce

Table–57

Entropy of Number of Operational Holdings and Operated Areas in West Bengal on the Basis of N.S.S. Data During 1960–61 and 1970–71

N.S.S.	Entropy of number of operational holdings			Entropy of operated area		
	Total	Between–class	Within–class	Total	Between–class	Within–class
16th Round (1960–61)	1.8503	1.2446	0.6057	2.0206	1.4581	0.5625
26th Round (1970–71)	1.8975	1.0128	0.8847	1.9855	1.3802	0.6053

the suggestion that there is substantial scope for redistribution of holdings and income among the agrarian people in the areas under investigation in the districts of Birbhum, Bankura and Cooch Behar and in the principal constituent States of India to bring about an improvement in the economic condition and aggregate social welfare of the farm people. In order to be more effective in regenerating the farm economy, the measures of redistribution of land and income have to be boosted up with adequate supplementary provisions for improved farm inputs and farm technologies.

CHAPTER - X

SUMMARY AND CONCLUSIONS

The main points of the analyses and statements of the preceding chapters are :

This monograph started with the hypothesis that rational redistribution of farm land and income will have substantial positive effects on agricultural production and rural welfare, especially, when combined with such supplementary measures as provision for supply of modern farm inputs and dissemination of latest farm technology in an economy primarily depending on land for maintenance and improvement of the standard of life of its inhabitants. Both primary and secondary data were collected and interpreted to varify the hypothesis.

Available literatures on effects of redistribution of farm land and income were reviewed. It was noted that while earlier researchers had precious contribution in their own specific domains, they looked at the problem from definite but sporadic objectives, and their ventures resulted in piece-meal outcomes. This exercise, on the other hand, is an attempt at systemic analysis of the subject of effects of redistribution of farm land and income and ends with some definite and novel findings on more confirmed bases.

Both primary and secondary data were collected from different agro-climatic zones of West Bengal. The method of

stratified random sampling without replacement was used to select the samples. The data were collected by personal investigation by the researcher. Secondary data were collected from different sources and analysed to strengthen the findings from primary data and to verify the soundness of the hypothesis underlying this thesis. The tools of Gini Concentration Ratio, Atkinson's Inequality Indices and Theil's Entropies were, inter alia, used to quantify the results.

The majority of the farms were concentrated in the marginal and the small farmers' groups in all the districts covered under this study. Samples have been drawn from each size class in proportion to the total number of operated holdings in each size class. Percentage of literate people in the sample households ranged from 34.97 to 49.23 in the 3 districts of Birbhum, Bankura and Cooch Behar. Percentage of people having agriculture as their primary occupation ranged from 24.81 to 31.88 in these districts. Aman paddy occupied the first position in the districts seperately and combined. The next position in this respect was occupied by jute in the 3 district combined. The farmers also grew other crops like boro-paddy, aus-paddy, wheat, oilseeds and pulses. Cropping intensity was the highest at 126.84 per cent for Birbhum district and the lowest at 105.61 per cent for the Cooch Behar district. Cropping intensity exhibited an inverse relationship with farm size for the 3 districts taken together.

Compared to the cropping intensity for India as a whole at 119.14 per cent during 1976-77 and at 123.40 per cent for West Bengal during 1976-77, the cropping intensity in the surveyed regions observed at 117.60 per cent was low.

In all the 3 districts the sample farmers cultivated mainly owned land. Leased-in land constituted a very small fraction of the total operated land. There was reportedly no leased-in land for the sample farmers in Cooch Behar. Irrigated area was 100 per cent and 60.05 per cent of the total operated area in Birbhum and Bankura respectively. There was no irrigated land for the sample farmers in Coooh Behar. Government canal constituted the main source of irrigation in Birbhum and Bankura. There was a great dependence of farming on human labour in all the districts. Per cropped ha use of human labour was the maximum at Rs.1336.09 for Birbhum district and the minimum at Rs.1297.76 for Cooch Behar district. A direct relationship was found between operational size groups of farms and use of hired labour whereas an inverse relationship was found between operational size of farms and family labour in the 3 districts seperately and combined. N.P.K. used per cropped ha ranged from Rs.526.02 in Bankura district to Rs.254.49 in Cooch Behar district. For the 3 districts combined, Rs.419.53 worth of N.P.K. was used per cropped ha. A direct relation was found between value of N.P.K. used per ha and operational size of farms in all the

3 districts seperately and combined. Compared to use of N.P.K. at Rs.87.92 per cropped ha in India during 1978-79 and at Rs.86.84 per cropped ha in West Bengal during 1978-79, the use of N.P.K. in the surveyed region is satisfactory. It was thus observed that the farm economy of the sample farmers depends greatly on traditional inputs like human labour.

Value of farm assets for the 3 districts - Birbhum, Bankura and Cooch Behar taken together - was estimated at around Rs.3000 per cropped ha. It was the highest in Birbhum and the lowest in Bankura. Depreciation cost of farm assets for the 3 districts combined stood at about 15 per cent of the value of farm assets per cropped ha. The marginal farmers' group recorded the highest depreciation cost per cropped ha and the big farmers' group recorded the lowest depreciation cost per cropped ha in these 3 districts considered seperately as well as combined. Yield per cropped ha increased with increase in operational size of farms in all the 3 districts seperately and combined. Yield per cropped ha was the maximum at about Rs.3000.00 in Birbhum and Bankura and only two-thirds of this in Cooch Behar. Total farm income per cropped ha was estimated at around Rs.5000.00 per cropped ha, total non-farm income per cropped ha was estimated at around Rs.1100.00 and total income - farm and non-farm combined - was estimated at around Rs.6000.00 per cropped ha for the 3 districts combined. A direct relation could be observed between income per cropped

ha - both farm income, non-farm income and combined total income - and operational size of farms when these 3 districts are considered together. Income per cropped ha was the highest in Birbhum and the lowest in Cooch Behar. Net income per farm in neither of these districts was sufficient enough to afford a reasonable level of living to the farmers concerned, viewed from any standard measure adopted in these contexts. Rate of return with reference to cost C was estimated at around 16 per cent for the sample farms in the 3 district of Birbhum, Bankura and Cooch Behar combined. There was a direct relation between operational size of farms and rate of return for these districts. The highest rate of return was recorded by Birbhum at about 20 per cent and the lowest rate of return was recorded by Cooch Behar at about 9 per cent. Cost C per cropped ha was round about Rs.5000.00 in these districts. Total return per cropped ha was estimated at around Rs.6000.00.

The Gini Coefficients for the districts of Birbhum, Bankura and Cooch Behar seperately and combined ranged from 0.2934 to 0.4198. This indicated considerable inequality in distribution of operated holdings. The extent of inequality was the highest in Birbhum and the lowest in Cooch Behar. There was significant concentration of operated lands with the bigger farmers. There was greater concentration of farms with the smaller operational size groups. These demonstrated substantial scope for redistribution of operated holdings among

the rural people. Estimate of L and RMI for gross income, farm business income and net income for the district of Birbhum, Bankura and Cooch Behar seperately and combined demonstrated substantial unevenness in distribution in these spheres. There was considerable concentration of gross income, farm-business income and net income among the bigger operational holdings. There was the maximum inequality in Bankura and the minimum inequality in Cooch Behar in respects of gross income and farm business income. For net income the concentration was the highest in Cooch Behar and the lowest in Birbhum. However, difference in concentration in net income is not much as between these 3 districts. These indicate appreciable scope for redistribution of income in the areas covered under investigation. The all India Agricultural Census data revealed that there was considerable skewness in distribution of operated holdings in Birbhum, Bankura and Cooch Behar during 1970-71 and 1976-77. There was tendency towards a decline in Gini concentration ratio in the later year in these districts.

All the sixteen states demonstrated substantial unevenness in distribution of operational holdings in both 1970-71 and 1976-77. There were 14 states for which L was above 0.50 in 1970-71 and 12 states for which L was above 0.50 in 1976-77. Number of states for which the value of L decreased in 1976-77 over that in 1970-71 was 9. The value of L ranged from 0.3248 in Manipur to 0.6364 in Bihar during 1970-71 and

from 0.3506 in Manipur to 0.6285 in Rajasthan during 1976-77. The overall finding was that notwithstanding decrease in inequality in some states, distribution of operational holdings remained considerably skewed in all the sixteen states subjected to this analysis. With an assumed inequality aversion value of E = 1.50, no more than 71 per cent of existing operated land would be required to enjoy the present level of social welfare in Birbhum, Bankura and Cooch Behar combined. Alternatively, the gain from equal distribution of land would be no less than what might be obtained by enhancing the total operated area in these districts by about 29 per cent, the other things remaining the same, i.e., at existing level of farm technologies, etc. The gain from equal distribution would be the minimum at about one-fifth of the total area, i.e., what could be obtained by enhancing the total operated area by about 20 per cent, in Birbhum to about one-third in Bankura.

Application of Atkinson's Inequality Index demonstrated that there was appreciable scope for enhancement of social welfare in Birbhum, Bankura and Cooch Behar districts seperately as well as combined through rational redistribution of gross income, farm business income and net income. The probable gain from such redistribution would range from what would be gained by increasing the existing income by about 25 per cent for farm business income to about 38 per cent for net

income in the regions covered under study in these 3 districts.

The tool of Atkinson inequality index to census data: 1970-71 and 1976-77 revealed that much scope existed for enhancing aggregate social welfare in the districts of Birbhum, Bankura and Cooch Behar notwithstanding some decrease in the value of I in 1976-77 over those in 1970-71.

Out of the sixteen states covered in the foregoing discussion on equality in distribution of operational holdings between the two years : 1970-71 and 1976-77, the value of I decreased somewhat in ten states. The value of I increased in the remaining six states. Only in two states, viz., Manipur and Meghalaya, the estimate of inequality were found to be moderate both during 1970-71 and 1976-77, the values of I remaining below 0.40 in this two states. In other states, the estimate of inequality continued to remain quite high. The overall position, therefore, is : Distribution of operational holdings in the majority of the component states of India remained unfair and much scope existed for enhancing aggregate welfare in these states by more rational distribution of cultivated land.

Actual entropies - total, between-class and within-class-of operated holdings and operated areas under investigation in the district of Birbhum, Bankura and Cooch Behar seperately and combined indicated that distribution of operated

land remained skewed as a whole and also between the 4 economic groups, viz., the marginal, the small, the medium and the big farmers. That distribution was the most uneven in Birbhum and the least uneven in Bankura among these 3 districts. As entropies of areas were higher than entropies of holdings, too many men had to hold too little land in the smaller size groups. There was, therefore, scope for improvement in distribution of operated lands in these regions. The estimates of total, between-class and within-class entropies of gross income, farm business income and net income in the district of Birbhum, Bankura and Cooch Behar seperately and combined were found to be less than their maximum values indicating existence of skewness in distribution in these respects in all the regions subjected to field investigation and considerable scope for improvement of distribution of operated lands. Estimate of inequality in distribution of operated holdings for the 3 districts of Birbhum, Bankura and Cooch Behar, on the basis of Lorenz Concentration Ratios, Atkinson's Inequality Indices and Theil's entropy measures all pointed to the fact that distribution of operated holdings in these 3 districts remained far from being even and left enough scope for enhancement of aggregate welfare in the areas concerned through more equal distribution of operated area among the people concerned.

Estimates of entropy of numbers and areas of operational holdings in the sixteen major states of India showed that

distribution of operated land among the people concerned remained uneven in both 1970-71 and 1976-77. The distribution became more unfair during 1976-77 than in 1970-71. Total entropies of operated holdings and operated areas declined in thirteen states and increased in three states. Distribution of holdings and areas between broad economic groups worsened in 1976-77 in the majority of states and improved in some states. This was reflected through fall in between-class entropies in two states for numbers of operational holdings and in six states for operated area. Within-class entropies declined in all but six states for number of holdings and in all but four states for operated area indicating detoriation in distribution of holdings and areas in each economic class. The fact that value of entropies for operated area was higher than the value of entropies for number of operated holdings for the states in general indicated that concentration of operated areas was less than concentration of numbers of holdings in these states. This exhibited lack of correspondence between distribution of holdings and distribution of areas and strengthened the suggestion that operated area in general in these states remained skewed in both 1970-71 and 1976-77 and that distribution of operated areas among the people concerned became more adverse in the later year than in the former year.

Findings from analysis of N.S.S. data through the application of the tools of the Gini Concentration Ratio,

Atkinson's Inequality Index and Entropies strengthen the above suggestions regarding inequality in distribution of operated areas.

The foregoing observations based on analysis of the proceding chapters show that the hypothesis, viz., rational redistribution of farm land and income will have substantial positive effects on agricultural production combined with such supplementary measures as provision for supply of modern farm inputs and dissemination of latest farm technology in an economy primarily depending on lands for maintenance and improvement of the standard of life of its inhabitants, stands reasonably varified for a developing agricultural economy like that of West Bengal.

A few suggestions may be warranted in this context for quicker development of farm economy through rational redistribution of land and income in the agrarian economy.

It is suggested that the farmers used more modern inputs like NPK and depended less on human and other natural factors for success of agriculture.

That increasing attention be paid towards creation of income generating assets and developing infra-structure including surface and underground irrigation in the villages for enhancement of farm income and for increasing the rates of return in farming.

Compared to needs, operated lands and income derived therefrom are low in the regions covered in this study as well as in the regions outside in this country. There is sufficient scope for redistribution of operated lands and rural income in the areas under study as well as in India as a whole.

In the context of ever-decreasing surface area of operated land per capita in Indian agriculture and need for improving the standard of life of an ever-increasing population of a still industrially backward economy depending cheaply on agriculture for sustaining its inhabitants, there is dire urgency for augmenting aggregate social welfare by rational redistribution of its land and income. As application of the Atkinson Indices show, aggregate farm production and social welfare of the agrarian people may be definitely improved through redistribution of land and income along desirable lines.

The findings from the estimates of entropies reinforce the suggestion that there is substantial scope for redistribution of holdings and income among the agrarian people in the areas under investigation in the districts of Birbhum, Bankura and Cooch Behar and in the principal constituent states of India to bring about an improvement in the economic condition and aggregate social welfare of the farm people. It is suggested, inter alia, that in order to be more effective in regenerating the farm economy, the measures of redistribution of land and income have to be boosted up with adequate supplementary provisions for improved farm inputs and farm technology.

CHAPTER - XI

FUTURE SCOPE OF RESEARCH

On the light of experiences gained in course of studies of the subject of effects of distribution of land and income in the post-independence years in India, it was felt that more concrete results might be obtained through efforts along the following lines.

Re-allocation of operated land is only one of the means to the end of achieving higher standard of life for the agrarian masses. Complementary and supplementary measures such as amelioration in the field of farm markets, farm finance, farm pricing, agricultural taxation and subsidies, extention education for the farmers, power supply, enhanced provision for fertilizer, H.Y.V. seeds, irrigation and other modern farm inputs are necessary for quick development of the farm economy and increase in aggregate welfare of the farm people.

A broader base of research covering a wider area and a larger sample than what could be studied through the personal efforts of this researcher with limited means at his disposal would give more confirm results regarding effects of redistribution of operated land and allied assets on income and welfare of the farm people.

A persistent problem of research and realisation of truth in a backward economy is the absence of systematic farm records with the rural people. It is expected that with spread of literacy and extension education in the near future, investi-

gator would find it easier to have better access to more accurate farm data in the villages.

There is an interesting job for the future researcher in this subject to collect and compile similar data from several neighbouring countries for a specific period. This would enable him to make a comparative study of relative effects of reallocation of land and other farm assets on income and welfare of the farm people in these countries with their different levels of reforms of their land systems. This requires an adequate grant of funds for the investigator concerned, among other things.

Terms of reference for a researcher in this field may also include the extent of political intervention into the farm economy of a developing country. How far such political intervention distorts proper allocation of land and other farm resources among the rural people may also be studied to be more precise about the impact of distributiom of operated land and other farm assets on welfare of the rural masses.

Finally, such a study may also encompass in its scope the question of improvement of lot of the agrarian people through reorganisation of agro-industries such as handloom, powerloom, oilseeds crushing, cane crushing, bee keeping, sericulture, etc. The local materials are used mainly for such industries. These have a good potential for generating employment and income for the farm people.

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* Original not seen.

APPENDIX-I

A NOTE ON COMPONENTS OF COSTS

A number of cost concepts such as cost A_1, A_2, cost B and C have been followed in the analysis. The input items included under each category of cost are indicated below :

I. Cost A_1 = i) Value of hired human labour,
ii) Value of hired bullock labour,
iii) Value of owned bullock labour,
iv) Hired machinery charges,
v) Value of owned machine labour,
vi) Value of seeds (both farm produced & purchased)
vii) Value of insecticides and pesticides,
viii) Value of manure (owned and purchased),
ix) Depreciation of implements and farm buildings,
x) Value of fertilisers,
xi) Irrigation charges,
xii) Land revenue, cesses and other taxes,
xiii) Interest on working capital,
xiv) Miscellaneous expenses (Artisans, etc.).

Cost A_2 = Cost A_1 + rent paid for leased in land.

Cost B = Cost A_2 + imputed rental value of owned land(less land revenue paid thereon) + imputed interest on owned fixed capital (excluding land)

Cost C = Cost B + imputed value of family labour.

II. Procedure for imputation of values of owned inputs :

Some of the inputs used in the production process come from family resources. In computing the cost of cultivation it is necessary to impute value of these owned inputs. The procedure used for the imputation of values for such inputs are indicated below :

1. Family labour :

On the basis of prevailing wage rate for casual labour.

2. Owned bullock labour :

On the basis of cost of maintenance of bullocks which includes the following items :

i) Cost of green and dry fodder,

ii) Cost of concentrates,

iii) Depreciation on animals and cattle sheds,

iv) Upkeep labour charges,

v) Other expenses, if any.

From the total of the above, the value of dung produced, and receipts, if any, against hiring out of the bullocks, are deducted to get the net maintenance cost.

3. Owned machinery charges :

The rate of expenditure per hour of machinery

utilisation has been estimated by relating total maintenance expenditure (including depreciation) to the number of hours of use. The rate has been applied to the hours of utilisation of the concerned machinery on the individual crop.

4. Implements :

Depreciation and charges on account of minor repairs.

5. Owned Seed :

Farm produced seed has been evaluated at the village prices prevalent at the time of sowing.

6. Farm produced manures :

Evaluated at rates prevalent in the village.

7. Rent on owned land :

Assessed on the basis of prevailing rent for leased in land.

8. Interest on owned fixed capital :

Interest on the present value of fixed assets (excluding land) such as farm buildings, implements and machinery, irrigation structure and equipment, livestock(only draught animals) has been charged at the rate of ten per cent per annum.

9. Interest on working capital :

Interest has been charged at the rate of 12.5 per cent per annum for a period of three months on the working capital, i.e., cash or kind expenses (excluding items in respect

of which payments are generally made after harvest, i.e., rent, land revenue etc.) incurred during the period of cultivation.

10. Kind payment and perquisites :

The kind payments have been evaluated at prices prevalent in the villages at the time of payments. Perquisites have been included in kind payments and evaluated at market prices.

III. Procedure for imputation of value of the main-product and by-product :

The value of the main and by-product are imputed at the post-harvest prices prevailing in the villages.

IV. Allocation of Joint costs to different crop enterprises :

The procedure followed are indicated below :

a) Depreciation on farm buildings :

In proportion to the hectarage under the crops. In case buildings are used only for particular crops, the whole amount has been charged to that crop.

b) Depreciation on implements :

Normally, the depreciation is allocated in proportion to the human/bullock labour input in each crop. However, since necessary data in this regard were not available for the entire years, allocation has been done in proportion to the area under the crops.

c) Rent on leased-in land and rental value of owned land :

In proportion to the area under the crop.

d) Land revenue, cesses and taxes :

Same as in (c).

e) Interest on owned fixed capital :

Same as in (c).

Allocation of cost between main product(grain) and by-product (bhusa) :

The value of by-product has been deducted from the gross cost of cultivation to get the cost of cultivation of the main product.

APPENDIX-II

Some of the concepts used in this monograph are :

I. Gross Income = Gross farm income + Gross non-farm income.

Gross farm income = Sale proceeds of farm output + imputed value of farm output used in the family and in the farm.

II. Net income = Gross income - Gross expense (Cost C).

Net farm income = Gross farm income - total expenses of productions on account of seed, manures, irrigation, wages of hired and family labour, depreciations, rent, interest on working capital and marketing cost.

III. Farm Business Income = Gross farm income - expenses of production excluding wages of the family labour and interest on working capital and net profit of the farm. In other words, this is : Farm output x market price - cost A_1. Cost A_1 is explained in Appendix-I*

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* W.Y.Yang : Method of Farm Management Investigations, Rome : F.A.O., United Nations, 1965. Chap.III.

A NOTE ON MEASURES OF ENTROPY IN DISTRIBUTION OF HOLDINGS

Following Theil*, extents of inequality in distribution of holdings may be ascertained by computing value of entropy $\overline{H(y)}$ in distribution. Entropy of distribution means "expected informations" which takes maximum value when all events have chance. This H(y) is a measure of equality in distribution. The equation : $\text{Log}_e n - H(y) = I(y)$ shows the extent of inequality in distribution of holdings (Y), H(y) being actual entropy in distribution of holdings. The equation for entropy is $H(y) = \sum_{i=1}^{n} y_i \log \frac{1}{y_i}$.

Entropy is maximum when H(y) is equal to $\log_e n$. This happens when each size class contains equal proportions of total numbers of observations (n). In this case the equation for the entropy stands as :

$$H(y) = \sum_{i=1}^{n} y_i \log \frac{1}{y_i} = \sum_{i=1}^{n} \frac{1}{n} \log \frac{1}{\frac{1}{n}} = \sum_{i=1}^{n} \frac{1}{n} \log n$$

$$= \frac{1}{n} \sum_{i=1}^{n} \log n = \frac{1}{n} . n \log n = \text{Log } n.$$

Entropy is minimum when H(y) is equal to zero. This happens when only one size class contains all the observations (n) and all other size classes have zero observations. In

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* Henri Theil. Economics and Information Theory. Amsterdam : North Holland Publishing Company, 1967.

this case the equation for the entropy will be as follows :

$$H(y) = \sum_{i=1}^{n} y_i \log\frac{1}{y_i} = y_1 \log\frac{1}{y_1} + y_2 \log\frac{1}{y_2} - - - - - + y_n \log\frac{1}{y_n}$$

$$= y_1 \log\frac{1}{y_1} = 1 \times \log\frac{1}{1} = 1 \times 0 = 0$$

where, $y_1 = 1$ and $y_2 \_ \_ \_ \_ \_ \_ \_ y_n = 0$.

At first proportion of holdings ($y_i = \frac{Y_i}{\Sigma Y_i}$) in different size classes are estimated. Inverse of each proportion ($\frac{\frac{1}{Y_i}}{\Sigma Y_i} = \frac{1}{y_i}$) is found out. Natural logarithm (to the base "e") of each such inverse ($\log_e \frac{1}{y_i}$) is taken. In the final step, each such inverse is multiplied by the respective proportions of holdings ($y_i \log_e \frac{1}{y_i}$). The summation of these products ($\Sigma y_i \log_e \frac{1}{y_i}$) is the value of total entropy.

Between-class entropy is estimated by putting individual size-classes into broader classes according to specific objectives, hereunder according to economic objectives, into marginal, small, semi-medium, medium and big farmers' groups. The procedure for estimating between-class entropy is the same as that for total entropy. Here proportions of holdings of broader classes to the total numbers of holdings (y_i^*) are first estimated. Inverses of such proportions ($\frac{1}{y_i^*}$) are then

estimated. Their natural logarithms are then taken ($\log_e \frac{1}{y^*}$). Products of the proportions of the broader classes and the natural logarithms of inverses of such proportions ($\log_e \frac{1}{y^*}$) are computed. These products are then summed up ($\Sigma y_i^* \log_e \frac{1}{y_i^*}$). This shows the value of between-class entropy of number of holdings.

Entropy within the class = Total entropy – Entropy between the class.

H(y), i.e., entropy of distribution is maximum when it is equal to $\log_e n$ when distribution is perfectly even for all size classes. H(y) is minimum at zero when distribution is perfectly uneven. Distribution is perfectly even when $y_i = \frac{1}{n}$ for all "i"(individuals) and it is perfectly uneven when $y_i = 1$ and $Y_j = 0$ for all other individuals ($J = 2,3 - - - - - n$). Here "n" indicates number of observations. H(y) is the index of equality. $I(y) = \log_e n - H(y)$. This is the index of inequality or concentration. H(y) is directly related to equality in distribution and I(y) is directly related to inequality. H(y) and I(y) are thus inversely related to each others. The higher the H(y), the lower the degree of concentration and the higher the degree of equality in distribution of holdings.

An estimate of entropy in distribution of holdings worked out in course of this exercise is given below as an example :

Appendix Table–1

Entropy of Number of Operational Holdings in Andhra Pradesh During 1976–77

Sl. No.	Operational size group of holdings	Number of holdings (Y_i)	$\frac{y_i}{y_i = \Sigma Y_i}$	$\frac{1}{y_i}$	$\log_e \frac{1}{y_i}$	$y_i \log_e \frac{1}{y_i}$	y_i^*	$\frac{1}{y_i^*}$	$\text{Log}_e \frac{1}{y_i^*}$	$y_i^* \text{ Log}_e \frac{1}{y_i^*}$
1	Below 0.5	17237	0.2804	3.5663	1.2715	0.3565				
2	0.5 – 1.00	11443	0.1862	5.3706	1.6809	0.3130	0.4666	2.1432	0.7623	0.3557
3	1.00 – 2.00	12519	0.2037	4.9092	1.5911	0.3241	0.2037	4.9092	1.5911	0.3241
4	2.00 – 3.00	6973	0.1134	8.8183	2.1768	0.2469				
5	3.00 – 4.00	3712	0.0604	16.5563	2.8068	0.1695	0.1738	5.7537	1.7499	0.3041
6	4.00 – 5.00	2558	0.0416	24.0385	3.1797	0.1323				
7.	5.00 – 10.00	4892	0.0796	12.5628	2.5307	0.2014	0.1212	8.2508	2.1103	0.2558
8.	10.00 – 20.00	1692	0.0275	36.3636	3.5936	0.0988				
9.	20.00 – 30.00	296	0.0048	208.3333	5.3391	0.0256				
10.	30.00 – 40.00	81	0.0013	769.2308	6.6454	0.0086				
11.	40.00 – 50.00	32	0.0005	2000.0000	7.6009	0.0038				
12.	50.00 & above	31	0.0005	2000.0000	7.6009	0.0038	0.0346	28.9017	3.3639	0.1164
	Total :	61466				1.8843				1.3561

Within the class entropy $H^{**}(y)$ = Total entropy $[H(y)]$ – Between class entropy $[H^*(y)]$

= 1.8843 – 1.3561 = 0.5282.

APPENDIX-IV

A SCHEDULE
FOR STUDYING THE DISTRIBUTION OF LAND HOLDINGS IN POST INDEPENDENCE YEARS IN WEST BENGAL AND ITS IMPACTS
(1.6.79 - 31.5.80)

I. Identification :

i) Name of the Head of Household (Only Head man of the family or his next responsible relative is to be interviewed) : .....

ii) Address of the Informant :

Village ..... P.O. .....

P.S. or Block ..... District .....

State .....

iii) Description of family :

Total no.of members in the family	Male total	Female total	No.of literates	No.of illiterates	No.of persons attended High school	No.of persons attending high school	Persons receiving high education

iv) Occupation :

(a) Primary (Max. income yielding occupation) .....

(b) Secondary : (i) .....

(ii).....

v) Land Ownership and Land Tenancy (area in hec.)

Land owned (cultivable land)	Land leased-in	Land leased-out	Domestic land under dwelling, ponds, farm yards, cattle shed, orchard, etc.	Fallow land	Other land (give description)

vi) Land Utilisation :

Irrigated (ha.)									
Paddy	Jute	Wheat	Potato	Pulses	Oil-seeds	Vegetables	Fruits	Plantation crops	Other crops
1	2	3	4	5	6	7	8	9	10

Continued :

Non-irrigated (ha.)									
Paddy	Jute	Wheat	Potato	Pulses	Oil-seeds	Vegetables	Fruits	Plantation crops	Other crops
11	12	13	14	15	16	17	18	19	20

VII. Inputs (Per hectare) :

Human labour		Bullock labour		Rent		Seeds				Fertilizer(Qtls)						Manures		Land revenues etc.
Hrs.	Value (Rs.)	Pair hrs.	Value (Rs.)	Received (Rs.)	Paid (Rs.)	H.Y.V.		Local		N		P		K		Q	V	
						Q	V	Q	V	Q	V	Q	V	Q	V			

Continued :

Insecticides & plant protection								Irrigation**		Farm Implements***								Cattle****											
1*		2*		3*		etc		Hrs	Value (Rs.)	1			2			3			1			2			3			etc	
Q	V	Q	V	Q	V	Q	V			a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b c

N.B. : Q=Quantity; V=Value : 1* _____, 2*_____, 3*_____(identification of insecticides)

** Specific irrigation is to be noted.....

*** Description of the farm implements : (a) Description.....(b) No.....
(c) Present market value in rupees.....

**** Description of cattle : (a) Description.....(b) No.....(c) Value....

VIII. Output

Paddy		Jute		Wheat		Potato		Pulses		Oilseeds		Vegeta-bles		Fruits		Plantation crops		Other crops		Milk	
Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V

N.B. : Q = Quantity in Qtls/Kgs. ; V = Value in rupees.

IX. Other Sources of income :

(i) Occupation..... (2) Hours..... (3) Income(Rs.).....

X. Borrowing :

Source of funds or agencies for loans.	Amount borrowed (Rs.)	Period of loan (in yrs.)	Date of borrowing	Amount of repayments (Rs.)	Date of repayments	Interest rate (% per annum)

OPINION OF VILLAGERS

i) Have you heard of land reforms ?

ii) Have you received land from Govt. during recent year ?

Distributed land .....(area in ha.)

iii) Any land taken from you by Govt. as surplus over ceiling ? .....(area in ha.)

iv) Got any minikits from the Govt.? If yes, mention : (a) Quantity.....(b) Value.....

v) Any other subsidy received by you from the Govt ?

Cash..... Kind..... Description.....

Value.....

vi) Social amenities improved recently ? YES/NO

Type of improvement.....(a).....(b).....(c).....

vii) No.of children receiving education :

Primary..... Secondary..... Technical.....

University..... Vocational.....

Other types.....

viii) Land distribution pattern improved recently ?

(a) very well.....(b) Well.....(c) Fair.....

(d) Detoriated.....

ix) Any other matter .....