GROWTH AND POVERTY IN THE RURAL AREAS OF THE INDIAN STATE OF PUNJAB, 1960-61 to 1970-71 [1]

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Punjab is not only one of the most advanced states in India, but also a very rapidly growing one. During the decade studied its real income per head increased at a rate two-and-a-half times as fast as that of India as a whole.[2] Like the rest of India, Punjab is overwhelmingly rural.[3] During the decade under consideration, the rural economy of the state experienced an improvement in agricultural technology—the Green Revolution—that was quite unprecedented in its spread and in the over-all prosperity it brought to the countryside.

This chapter presents the results of a study aimed at determining the extent to which the benefits of this rapid growth trickled down to the poorer sections of the population. The focus of the study is on the rural sector.

SOURCES OF DATA

There is no systematic collection in India of data from which size distribution of income can directly be derived.[4] Existing computations of the

[1] The present chapter makes use of much of the material reported in two working papers published by the Woodrow Wilson School, Princeton University and an article published in the *Journal of Development Studies*. See Indira Rajaraman: *Constructing the poverty line: rural Punjab, 1960-61* (Woodrow Wilson School, Princeton University), Discussion Paper No. 43, Mar. 1974; idem: *Poverty, inequality and economic growth: rural Punjab 1960-61 – 1970-71*, (Woodrow Wilson School, Princeton University), Discussion Paper No. 45, an abridged version of which was published in the *Journal of Development Studies*, July 1975.

[2] An increase of 26.2 per cent at 1960-61 prices as compared to 10.7 per cent for India. See Government of Punjab (Economic Adviser): *The Punjab Statistical Abstract* (Chandigarh, 1972).

[3] According to the 1971 census 10.27 million of the state's 13.47 million people were inhabitants of rural areas, i.e. 76.2 per cent; the corresponding national average is 80.1 per cent. See Registrar General and Census Commissioner: *Census of India 1971*, Series I.

[4] A few income surveys have been conducted, chiefly by the National Council of Applied Economic Research, but not on a systematic basis, so that they yield estimates only for a point in time. Even where a two-point comparison is possible, the years of comparison are limited by the years of the survey. Further, most of the surveys have not had a sample size large enough to permit state-level estimates, with the exception of the 1968-69 survey reported in I. Z. Bhatty: "Inequality and Poverty in Rural India", in T. N. Srinivasan and P. K. Bardhan (eds.): *Poverty and income distribution in India* (Calcutta, Statistical Publishing Society, 1974).

distribution of income are based on consumer expenditure data with arbitrary adjustments for the distribution of saving by level of consumption. Such arbitrary adjustments may at best be meaningless and at worst misleading, especially for a study of changes over time such as this one, where the distribution of saving itself might be expected to change. Thus, inequality was studied here in terms of consumer expenditure alone, the figures including subsistence consumption are evaluated at imputed farm prices, and are therefore comprehensive.

Primary data were obtained from the consumer expenditure surveys of the sixteenth (1960-61), seventeenth (1961-62) and twenty-fifth (1970-71) rounds of the National Sample Survey (NSS).[1] The published reports of the NSS do not process all the information collected in these surveys and are therefore not a satisfactory substitute for the raw data. The most serious omission[2] has to do with the price information collected (implicit in the quantity and value figures recorded for each consumption item). Thus the published figures of consumer expenditure distribution show changes over time only as they have occurred in money terms, which might be quite different from the change in real terms if different groups of the population have faced different price changes. Further, there is no outside source of data from which it may be determined whether or not there has been such a differential price change within each state, and if so, the extent of the difference. An added shortcoming of the published information in the case of Punjab is that the pre-1967 figures are not comparable with those for later years because of the partitioning of the state in that year into the present reduced state of Punjab and the new state of Haryana.

The data for the initial year, 1960-61, were obtained by pooling the schedules from the sixteenth and seventeenth rounds so as to obtain an adequate sample size.[3] The sample size of the twenty-fifth round was sufficiently large so that pooling of rounds was not necessary for the final year of the period. Details with respect to sample design, and with respect to the initial computations done here in order to correct for seasonality, for changes made over the years in the definition of consumption, and for the partitioning of the state, are not given in this chapter.

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[1] Consumer expenditure surveys have been made for every year from 1950-51 to 1973-74. Starting with the year 1974-75, however, they will be conducted only about every five years.

[2] There are others. The reports do not provide state-level information on the pattern of consumption or the occupational composition of different fractile groups. Further, there have been changes over the years in the definition of consumption and the reports do not adjust for these, nor for the changes made over the years in the geographical definition of many states.

[3] In all, 150 observations were obtained by pooling half the Central sample of the sixteenth and seventeenth rounds together with the entire state sample of the sixteenth round. The other subsamples of the Central sample for these rounds, and the state sample for the seventeenth round, were unavailable.

Table 10. The distribution of rural consumption in the Punjab in 1960-61 and 1970-71

Decile	Cumulated share in total real consumption	
	1960-61	1970-71
1st	4.34	3.79
2nd	10.40	8.94
3rd	16.83	14.85
4th	23.44	21.29
5th	31.40	29.12
6th	40.58	37.94
7th	50.14	48.23
8th	61.78	60.57
9th	76.84	75.33
10th	100.00	100.00

INCREASING INEQUALITY

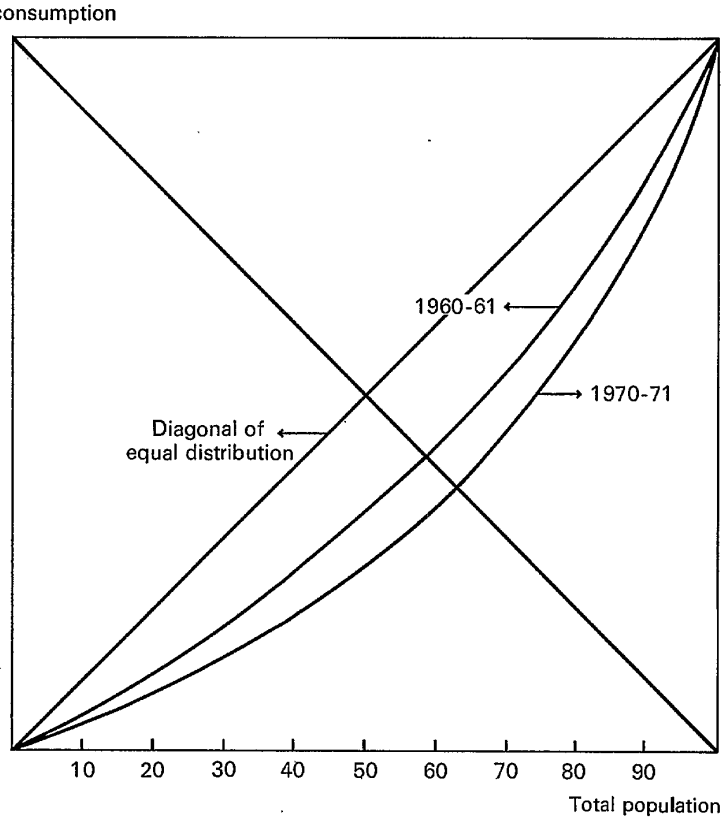
The first question to be answered on the basis of the data processed in accordance with the methodology outlined above was whether inequality in the distribution of consumption changed during the decade under review. Lorenz curves, then, were constructed for the two years, after ranking the households by per capita consumption.[1] Laspeyres price indices with 1960-61 as the base year were next constructed for each of three fractile groups of the population—the poorest 30 per cent, a middle group from 30 to 74 per cent, and a third group from 74 per cent upwards. These particular groupings were arrived at by a procedure that was devised to take the place of the more usual and arbitrary division by decile. Clearly there is a trade-off at some point between homogeneity and adequacy of sample size; one might just as well have half-deciles or percentiles in place of deciles. The procedure evolved here was designed to take care of the second requirement without any sacrifice of the first. Thus, the set of households in the base year, 1960-61, were ranked in ascending order by per capita consumption, and a cumulative percentage taken of the ratio of food consumption to total consumption by value, as being the single most important index of homogeneity of consumption pattern. The first significant drop in this percentage occurred at the thirtieth percentile, and the second at the seventy-fourth percentile.

For every commodity group[2] except cereals the price rise faced by the poorest groups was greater than or equal to that faced by the upper fractile.

[1] The per capita consumption of each household was obtained by dividing total expenditure by family size.

[2] Prices for each item were obtained by dividing value by quantity for each household, and averaging over-all the households falling in each fractile group. For the services and miscellaneous commodity group, however, quantity data were not recorded; prices for these items had to be obtained from other sources.

Figure 3. Lorenz curves of consumption inequality, 1960-61 and 1970-71



Indeed, of any pair of substitute items from any non-cereal commodity group, the inferior or cheaper commodity faced the higher price rise. The cereals group was exceptional in that the three most expensive cereals in 1960-61 also rose the most in price. The final values for the price rise faced by the three fractile groups were very similar, indicating slightly more than a doubling for all three;[1] the over-all similarity in price movement was accounted for by the greater weightage for poorer households of cereal consumption. Since the indices do not differ very much, therefore, the distribution constructed for 1970-71 after deflation by the price indices did not differ very much from that constructed before; it was only slightly more unequal.

[1] Starting with the poorest group, the values of the indices were 206.96, 206.83 and 206.26.

Table 10 and figure 3 show the distribution of real consumption in the base and final years of the period. The distributions for the two years do not intersect at all; that for 1970-71 lies everywhere below that for 1960-61. The increase in inequality thus was quite unambiguous.[1]

ABSOLUTE DECLINE IN THE LIVING STANDARDS OF THE POOR

During the period studied there was a significant rise in the level of average real per capita consumption—from Rs. 25.8 per month in 1960-61 to Rs. 28.5 in 1970-71 at 1960-61 prices. Despite the rise in the average level, the data indicate an absolute decline in consumption levels of the three poorest deciles of the population. Table 11 and figure 4 contain many of the details. The absolute level of consumption marking off each half decile within the poorest 30 per cent of the rural population in 1960-61 is presented in the first column of table 11. The third column indicates the equivalent level of consumption in 1970-71 prices and the final column the percentage of the rural population in 1970-71 that consumed less than this amount. The same information is presented in diagrammatic form in figure 4.

As can be seen, the deterioration in the absolute standard of living was quite widespread. There was a rise, for example, from 20 to 24.95 per cent in the proportion of those living on less than Rs. 16.66 per head at 1960-61 prices. This rise was tested and found to be statistically significant.[2] However, the rise from 25 to 26.9 per cent of those living on less than Rs. 17.13 was found not to be significant. Thus the fall in consumption was confined to those whose level of consumption in 1960-61 prices was equivalent to about Rs. 17. Above that level, living standards did not fall but remained constant in real terms, right up to the thirtieth population percentile.

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[1] There is no way by which the difference between two Lorenz curves can be directly tested for significance. A non-parametric test, the Kolmogorov-Smirnov two-sample test, was done on the underlying frequency distributions. The two-tailed test indicated that the null hypothesis of similarity could be rejected beyond the 0.001 level. The test, however, is sensitive to any kind of difference in the distributions from which the two samples are drawn – differences in either location or dispersion. Further testing, therefore, was necessary.

The Lorenz curves of figure 3 were seen to obey the properties peculiar to the two-parametric lognormal distribution and the chi-square test led to the acceptance of the hypothesis of two-parameter lognormality in both cases. In the two-parameter case there is a way by which the difference in dispersion between two Lorenz distributions can be tested for significance. This test confirmed that the two distributions are different at any level of significance. For the steps involved in actual testing see Indira Rajaraman: *Poverty, inequality and economic growth*, op. cit.

[2] The testing of these percentages was done using the normal approximation to the binomial distribution, at the 0.1 level.

Table 11. Percentages of population lying below selected absolute levels of per capita monthly consumption, 1960-61 and 1970-71

Per capita monthly consumption level, 1960-61 prices (rupees)	Percentage of population in 1960-61	Equivalent consumption level, 1970-71 prices[1] (rupees)	Percentage of population in 1970-71
11.66	5.00	24.14	6.32
14.31	10.00	29.62	12.36
15.72	15.00	32.52	20.52
16.36[2]	18.40	33.86	23.28
16.66	20.00	34.49	24.95
17.13	25.00	35.46	26.90
17.86	30.00	36.97	30.02

[1] The price index of 2.0696 was used uniformly for all consumption levels since the population considered here falls entirely within the poorest fractile group. [2] The poverty line constructed for the region in the manner described below.

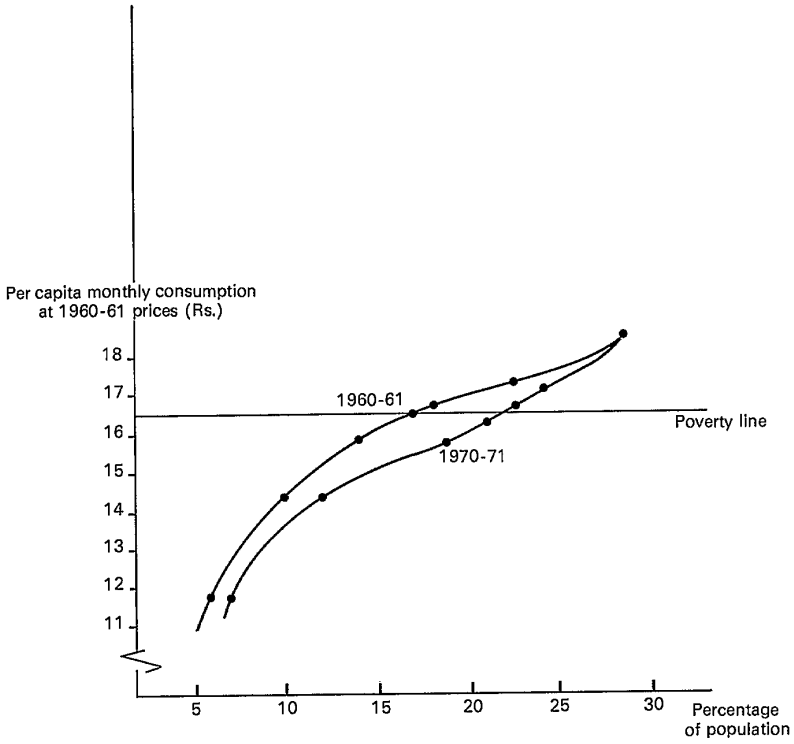
CONSTRUCTING A POVERTY LINE

A poverty line can never be determined solely in terms of objective norms of physical deprivation. Even the food component which, unlike clothing or fuel, does lend itself to objective specification on the basis of norms of nutritional sufficiency, must be constructed subject to cultural constraints on acceptability. It is thus quite meaningless to approach the problem of constructing a poverty line in all-India terms, given the enormous cultural diversity within the country. Yet it was precisely in these terms that the poverty line was first given substance—Rs. 20 per head per month at 1960-61 prices—and it is, correspondingly, the sense in which the poverty line has been conceived of by most contributors to the literature.[1] It is equally meaningless to arrive at regional poverty lines using price indices to "interpret" an all-India poverty line at each different set of prices prevailing in each state. The necessity for constructing poverty lines separately for each region with a distinct cultural identity arises not because of price variations in a common bundle of goods, but because the composition of the appropriate consumption basket itself must differ from region to region.

The first step, then, was to determine an initial set of poor households whose consumption pattern could yield the guidelines needed where objective minima cannot be established or must be modified. The poorest fractile group of the three for which price indices were constructed above provided a useful initial approximation. Beyond this 30 per cent population mark, as

[1] The poverty line was the outcome of a study group appointed by the Government of India to go into the matter. The report of the group is reprinted in T. N. Srinivasan and P. K. Bardhan (eds.), op. cit. One notable exception, the only really careful attempt at constructing a poverty line, regionally limited, has been that by Panikar. (See P. G. K. Panikar: "Economics of Nutrition", in *Economic and Political Weekly*, Annual Number, 1972, pp. 413-430.) For some of the problems with that attempt see Indira Rajaraman: *Constructing the poverty line: rural Punjab 1960-61*, op. cit.

Figure 4. Percentage of population lying below selected levels of monthly per capita consumption in 1960-61 and 1970-71



indicated earlier, the non-food component of consumption rose sharply. The procedure thus comes as close as possible to establishing objectively minimal needs for non-food items of consumption. For this group, then, the latter accounted for 20.2 per cent of total consumption (8.2 per cent on clothing, 5.6 per cent on fuel and intoxicants, 6.4 per cent on services and miscellaneous items).

The non-food factor of 20.2 per cent was added to the value of the least-cost diet, calculated on the basis of the nutritional norms established by the Indian Council of Medical Research (ICMR) in 1968.[1] These norms are

[1] See Indian Council of Medical Research: *Recommended daily allowances of nutrients and balanced diets* (Hyderabad, 1968).

specified separately for each of three levels of activity. The norms used here were those for moderate activity, and a weighted average was taken of the separate specifications for men, women and children, with the weights derived from the average household composition in the poorest fractile group. The food items taken into account in constructing the diet were limited to those available to and actually consumed by this group; the prices of the items were estimated from the same set of sample households.
The following cost function was minimised:

$$\Sigma_j c_j x_j$$

subject to: $\Sigma_j a_{ij} x_j \geq b_i$
where c_j = cost per unit of jth food;
x_j = quantity of jth food;
a_{ij} = amount of ith nutrient per unit of jth food; and
b_i = amount of ith nutrient required.

The initial calculation of the least-cost diet had to be modified because it included too much maize—for a region where the staple cereal is not maize but wheat—and completely omitted milk and sugar. Lower bounds were therefore introduced into the model on the consumption of milk and unrefined sugar, and an upper bound on maize. Some of the winter vegetables featured prominently in all these solutions because of their low seasonal cost. A summer alternative was therefore obtained after excluding these items from the list of potential foods; here again a modification was required because of the preponderance of Bengal gram, a minor cereal in Punjab.

The final estimate worked out as a simple average of the modified winter and summer diets was Rs. 0.408 per person per day at 1960-61 prices. After adding an allowance for food items such as tea, salt and spices, which are essential though of no nutritional value,[1] and the non-food component, the poverty line at 1960-61 prices for rural Punjab was calculated to be Rs. 0.538 per head per day, or Rs. 16.36 per head per month. At 1970-71 prices the poverty line was Rs. 33.86.

Table 11 indicates that between 1960-61 and 1970-71 the proportion of the population below the poverty line rose from 18.4 per cent to 23.28 per cent. This rise was tested and found significant at the 0.1 level.

Thus, during a decade of rapid growth there was a significant rise in the percentage of those unable to obtain an adequate diet and lift themselves above poverty. In absolute terms, the number of the rural poor increased by 51.6 per cent.

[1] These items account for 5 per cent of total food consumption by value.

Table 12. Occupational composition, 1960-61 and 1970-71

Occupation	Percentage of all households		Percentage of households below poverty line	
	1960-61	1970-71	1960-61	1970-71
Cultivators	53.02	51.17	47.11	31.35
Agricultural labourers	17.45	23.16	22.56	40.51
Other labourers	10.07	9.00	11.83	10.05
Artisans	10.07	3.95	16.78	5.19
Traders	1.34	3.25	0.00	5.41
Other	8.06	9.65	1.73	7.49
Total	100.00	100.00	100.00	100.00

TOWARDS AN UNDERSTANDING OF INCREASING POVERTY

The occupational composition of the population in the two years 1960-61 and 1970-71 was constructed as a first step towards understanding the phenomenon just outlined. This was made possible by the fact that all consumer expenditure surveys of the NSS classify every sample household by major occupation, i.e. that from which the major share of income is derived. The figures, both for all households and for those below the poverty line, are presented in table 12.

There was a significant rise in the number of households which obtained a livelihood from agricultural labour—the proportion rose from 17.45 per cent in 1960-61 to 23.16 per cent in 1970-71. The change was even more startling, however, among those households living below the poverty line, from 22.56 per cent to 40.51 per cent (with a rise *within* the category of those living below the poverty level from 23.67 per cent to 32.90 per cent).

Concurrently with the increased incidence of poverty among agricultural labourers, their monthly mean per capita consumption level rose from Rs. 20.35 to Rs. 23.46. A large sample one-tailed test on this was significant at the 0.1 level. Thus the rise in the incidence of poverty within the occupation group took place *despite* an improvement in the average level of living. The change over the period for this category mirrored the change for the population as a whole—a rise in the mean consumption level, a rise in the incidence of poverty, and a correspondingly larger relative dispersion.

It must be emphasised here that these findings are quite consistent with the possibility of a rise in the average real wage rate of agricultural labourers over the period. Such a rise in real wages would imply (assuming of course no offsetting decline in employment or rise in the average dependency ratio, and no decline in average income from other sources) an improvement in the average level of living, and the figures here do indeed show such an improvement.

Evidence on the movement of real wages in rural Punjab is inconclusive. The studies based on the index of average money wages (IMW) deflated by the Punjab Agricultural Labourers Consumer Price Index (ACPI) indicate there was a modest increase in real wages during the 1960s.[1] The ACPI is not a wholly reliable deflator, however.[2] Moreover, the average IMW conceals many labour market changes, e.g. changes in skill composition. At least one study shows that the rate of increase in real wages, as measured for specific operations such as ploughing and harvesting by dividing money wages by the consumer price index for food, was insignificant over the 15 years ending in 1972.[3]

Whatever the trend in average wages, it is the increased dispersion within the group that holds the key to an understanding of the reasons for increased rural poverty in the Punjab. There is independent evidence that by the late 1960s agricultural labourers in the Punjab had both the highest per capita income and the highest degree of inequality of income of all agricultural labourers in the country.[4]

Unfortunately, there is not enough detailed information available about the rural labour market to permit a conclusive understanding of the phenomenon. There are several possible explanations. The rise in demand for certain types of skills—tractor driving, operating of mechanical equipment—might have, given the initial shortage of such skills, led to a rapid increase in the prices such skills could command. At the same time, the balance beween supply and demand for more traditional types of labour might have become increasingly unfavourable over the years. Another possibility is that there might have been barriers to mobility preventing labour from moving towards those areas with the higher wage rates, though such market imperfections are likely to be more important when the region studied includes many linguistic and cultural groups. Or, there might have been an unequal availability of employment opportunities for secondary earners. The dependency ratio is an important determinant of the level of living of the household, and is closely linked to the availability of employment for women and children. These opportunities might have increased in an unequal regional pattern: the mobility of secondary earners in response to opportunity would be much less than that of the primary earners in the household. Finally, there might have

[1] See, for example, Eiswanath Santra: "Trends in Agricultural Wages – Some Indian Evidence", in *Indian Journal of Agricultural Economics*, Conference Number, July-Sep. 1974, pp. 2-16.

[2] The coverage of the data source for the ACPI is not nearly as good as that of the surveys covered here. A comparison, however, of the index for the poorest fractile group with the ACPI for Punjab (which covers Haryana and Delhi) yielded no conclusive indication of the direction of bias in the latter. The rise in food prices was higher than that obtained here, while that for non-food items was lower.

[3] S. S. Grewal and H. S. Bal: "Impact of Green Revolution on Agricultural Wages in the Punjab", in *Indian Journal of Agricultural Economics*, Conference Number, July-Sep. 1974, pp. 40-47.

[4] I. Z. Bhatty, in T. N. Srinivasan and P. K. Bardhan (eds.), op. cit.

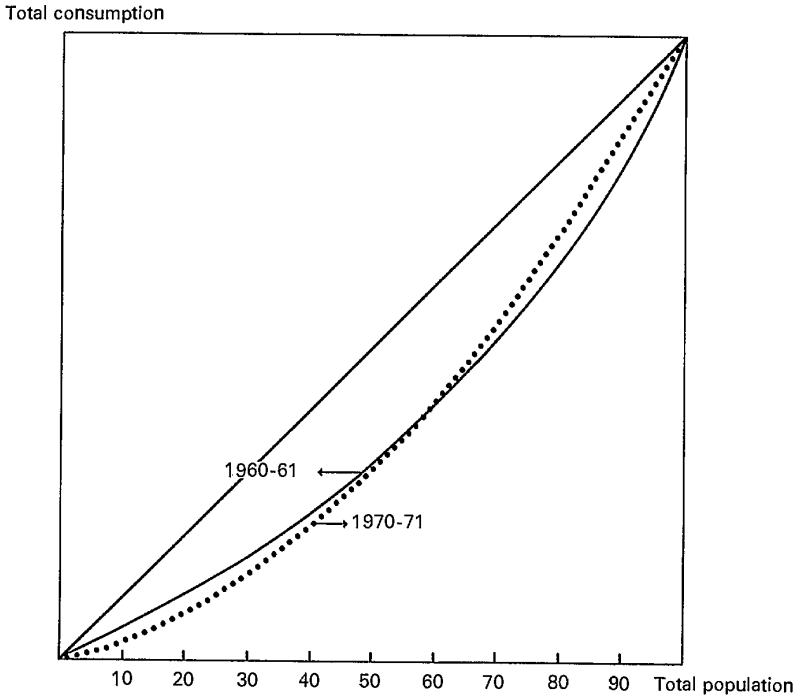
taken place over the period a worsening in the distribution of sources of non-labour income, principally land. An attempt is made below to determine whether or not such a worsening in land distribution took place over the period for all households taken together.

Of the other occupation groups, the figures in table 12 for artisans are particularly noteworthy. There was a large, significant fall in the over-all share of the group. Further, whereas in 1960-61 artisans accounted for 16.8 per cent of those below the poverty line, by 1970-71 this had fallen to 5.2 per cent. These figures seem to indicate a decline of the artisan class as a result of growing industrialisation. Prior to the ten-year period studied, there seems to have been a reduction of artisans to a state of poverty by industrial competition. In the ten years covered here these artisans appear to have abandoned their traditional occupations and joined the ranks of agricultural labourers.

The mean consumption level of the cultivator group, not surprisingly, rose significantly over the period, from Rs. 28.13 to Rs. 34.57. Further, the percentage representation below the poverty level of the group fell significantly; since the over-all percentage for cultivators was significantly unchanged, this meant an improvement over the period in the absolute levels of even the poorest among those deriving the major share of their income from cultivation. There is the interesting question of what the Green Revolution did to the relative dispersion within the group (it must be kept in mind that this category includes *only* those deriving the major share of income from cultivation). Lorenz curves for the group are presented in figure 5. The curves intersect. The change seems to have been towards a smaller relative share for the lowest deciles, and a greater equality beyond the sixth decile. The ranking for these curves, as for those in figure 3, was by per capita consumption.

The question of what happened over the period to the distribution of land is an important one. Data for an answer to the question proved to be quite a problem, however. Landholding surveys were conducted by the NSS in the course of the sixteenth, seventeenth and twenty-sixth rounds, but primary data were available for only the latest of these. The data from the earlier rounds were available in tabulated form, but they referred to the pre-partition state and were therefore not strictly comparable. However, an alternative distribution constructed from the consumption surveys indicated that the percentage of households with zero land in 1960-61 was 55.21 per cent; this figure conflicted directly with that obtained from the same source for the percentage share of those households deriving the major share of their income from cultivation (53.02 per cent; see table 12). Since the collection of data on landholding is entirely incidental to a consumer expenditure survey, that they should be inaccurate is not very surprising. The classification of each household by occupation on the other hand is an important part of the survey and is therefore much more carefully done. There was no alternative, therefore, but to compare the Lorenz curve obtained from the twenty-sixth

Figure 5. Lorenz curves of consumption inequality among the cultivator population, 1960-61 and 1970-71

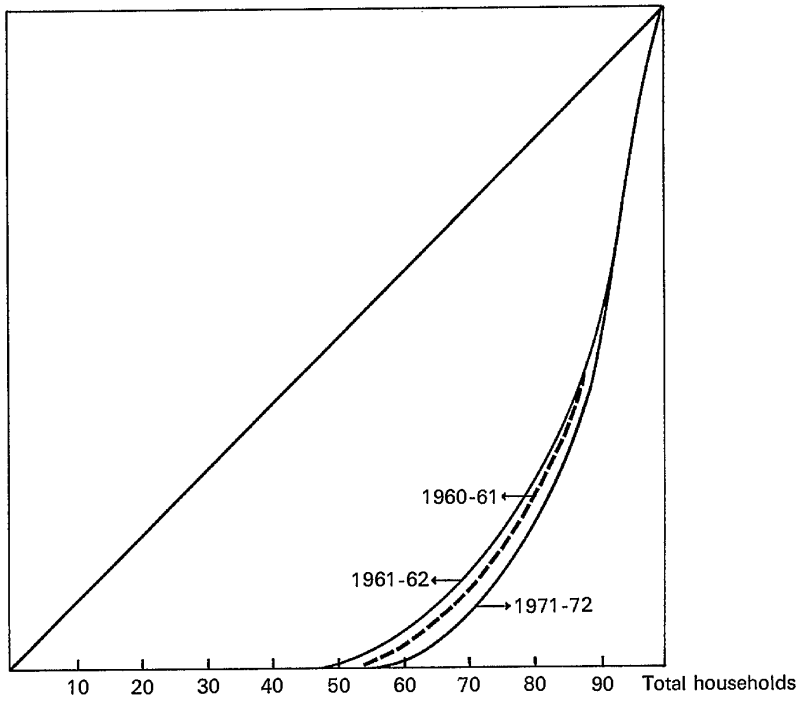


round data with those constructed from the published figures for the earlier years, despite their vastly different geographical coverage. The ranking for all three was done by household acreage operated.

The curves are drawn in figure 6. The curves for 1960-61 and 1961-62 lie everywhere above that for 1971-72. Inequality in landholding thus appears to have increased unambiguously.[1]

[1] Since the underlying distributions have non-zero frequencies at the zero value for landholding, parametric tests cannot easily be applied. The non-parametric Kolmogorov-Smirnov two-sample test was done on the cumulated distribution for 1971-72 taken with the distributions for each of the earlier years in turn. The two-tailed test was significant for both comparisons beyond the 0.001 level.

Figure 6. Lorenz curves of inequality in landholding, 1960-61, 1961-62 and 1971-72



An assessment of the change in the incidence of landlessness was difficult to make as the lowest class of the tabulated frequency distributions for the earlier years (from which the Lorenz curves were constructed) covered 0 to 0.5 acres, thus including more than the strictly landless population. The percentage frequencies of this class, however, were 51.21 per cent and 45.75 per cent for 1960-61 and 1961-62 respectively. Taking a weighted average of these percentages (48.91 per cent), the same percentage of households in 1971-72 operated 0.06 acres per household or less. It seems reasonable to infer from these figures that the percentage incidence of landlessness increased over the period. Since the percentage of households deriving the major share of their income from cultivation remained substantially un-

changed, this could only mean a displacement of the marginal cultivator household which derives the major share of its income from activities other than cultivation.

The surveys used for this study did not collect any data on migration so that it was not possible to determine whether rural poverty in Punjab might have been aggravated by immigration from neighbouring states. The investigation of the possibility would have to await detailed probing of the 1971 census data. The sample surveys used here had a survey period spanning the entire agricultural year, so that in order for immigration into Punjab to have been the sole or even principal contributor to the worsening poverty indicated in the data, it would have had to occur on more than just a seasonal or peripheral level. Casual evidence suggests that such a wholesale movement of population into the state did not take place.