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Research note

MODERN RICE TECHNOLOGY AND INCOME DISTRIBUTION: FA RM LEVEL IMPACT ANALYSIS IN AN AREA OF BANGLADESH

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ABSTRACT

The study examined the impact of modern rice technology on the pattern of income distribution by farm size. The analysis was based on primary data collected through personal interviews from 60 randomly selected farmers-30 farmers from irrigated MV and 30 from rainfed LV rice farms. The study was conducted at Keliakair of Gazipur in 1986.

Percentage distribution of net farm income per unit area into quartile groups followed by a graphical presentation (Lorenz Curve) was used to achieve the study objectives. The major findings of the study are :(i) MV rice having irrigation facilities has increased per unit area of farm income of the lower group resulting in a decrease in the income gap between the poorer and the richer groups. The reverse was observed in rainfed LV rice cultivation. (ii) For irrigated MV rice farms the smaller the farm size, the higher was the share of net farm income pe r unit area resulted to a greater equality in income distribution pattern among farm families and (iii) Negatively skewed distribution of net farm income per unit area was observed in rainfed LV rice cultivation.

1. INTRODUCTION

High rates of economic growth and rising levels of per capita income do not necessarily imply economic development in the sense of improved levels of living for the masses of people (Tadaro 1977 and Andriano 1980).

The high rates of economic growth and rising levels of per capita income might be the reflection of negatively skewed farm income distribution. The negatively skewed farm income distribution may clearly be explained in the way

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that the larger frequencies of farms having higher income are concentrated toward higher income group. This higher income of a group of farms may reflect on higher per capita income which might not be the real income of the lower group. So knowledge of the mechanism which generates farm income inequality is a number one problem of the challenging economic issues in the third world countries.

Irrigation as a component of new rice technology is a source of income streams. The on-going controversy about income distribution effects of those technologies is a consequence of the fact that growth in output does not necessarily result in increased net income in all those engaged in the production of that output. There is a need, therefore, for a study with the objectives as: (i) to compare the impact of modern rice technology on income distribution of farm families and (ii) to ascertain the income distribution pattern as affected by farm size under irrigated MV and rainfed LV rice cultivation, which stresses in some details, who losses and benefits from modern rice technology and its components.

II. METHODOLOGY

A total sample of 60 farmers, 30 from irrigated MV and 30 from rainfed LV rice farms was selected randomly and interviewed personally. The study was conducted at KaliaKair of Gazipur in 1986. The type of irrigation technology used in the study area was low lift pumps (LLP). The pumps were privately owned and managed The payment for irrigation water was in kind. In the cases of MV Boro and Aman, the irrigation charges were 1/4th and 1/8th of the harvested paddy respectively.

The analytical procedure like percentage distribution followed by a graphical presentation (Lorenz Curve) using quartile group was used to show income distribution patterns between irrigated MV and rainfed LV rice farms.

The concept of farm income used in this study was that of seasonal farm income per unit area per farm family which was the net of total variable cost of such items as seeds/seedlings, fertilisers, insecticides, labour and irrigation water charge etc. (Islam 1986).

III. RESULTS AND DISCUSSION

Impact of Modern Rice Technology on Income Distribution

The farm incomes of sample farmers have been ranked in ascending order and then the income shares have been estimated into quartile groups in order to see pattern of distribution of income in the sample. The impact of MV rice technology on income distribution has been assessed by comparing the income share of various groups of irrigated MV and rainfed LV rice farmers. The results can be reviewed from Table 1 and also from the Lorenz curves in Figure 1.

The income distribution between MV and LV rice cultivation is fairly unequal. The lower 50 percent of MV rice farmers have an income share of about 40 percent and the upper 50 percent of farmers having income share of about 60 percent. While the lower 50 percent of LV rice farmers have an income share of about 14 percent and the upper 50 percent of farmers having income share of about 86 percent. The higher percent of income shared by lower group of MV rice farmers indicates that the income distribution between MV and LV rice farmers are unequal and the MV rice farmers are of better position in income share.

The results imply two things (i) the MV rice with irrigation facilities has increased the farm income of the lower group and tended to decrease the gap between the poorer and the richer groups and (ii) the LV rice under rainfed

Table 1. Relative shares of aggregate farm income earned from irrigated MV and rainfed LV rice cultivation by various quartile groups of farm families at Gazipur in 1886.

Quartile groups	Irrigated MV rice farmers (All farms)		Rainfed LV rice farmers (All farms)	
	Aggregate net income (%)	Cumulative of aggregate net income	Aggregate net income (%)	Cumulative of aggregate net income
First	15.95	15.95	3.39	3.39
Second	23.69	39.64	11.10	14.49
Third	27.12	66.76	25.49	39.98
Fourth	33.24	100.00	60.02	100.00
All groups	100.00	—	100.00	—

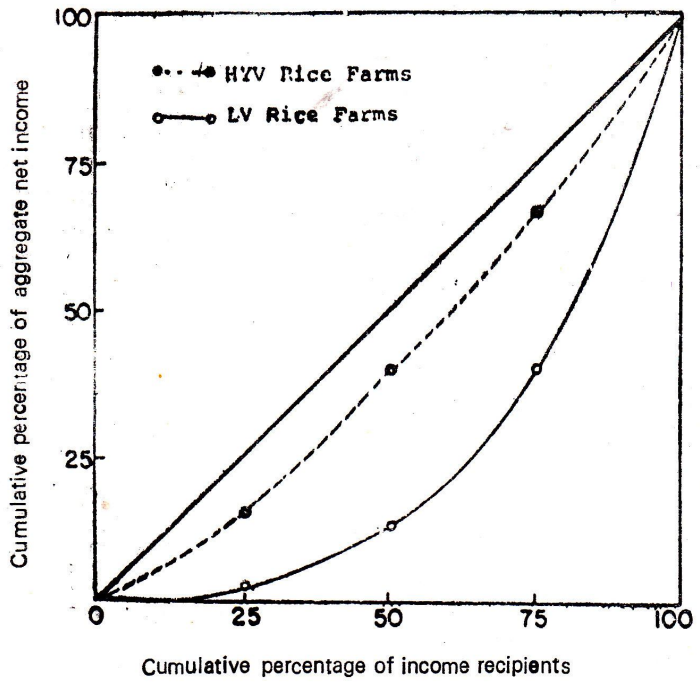

Fig. 1. Distribution of net income earned from irrigated HYV and rainfed LV rice cultiyation at Gazipur in 1986.

condition has decreased the farm income of the lower group and tended to increase the gap between the poorer and the richer groups.

The inequality in income distribution between MV and LV rice farmers is shown in Lorenz curves in Figure 1.

The curves for MV and LV rice farming conditions are very far from each other indicated that their distribution patterns are different, The Lorenz curve for MV rice farming is more close to the line of equity and laying above the Lorenz curve for MV rice farming meaning that the income distribution patterns for MV rice farming are more equitable and higher than LV rice farmers.

Income Distribution as Affected by Farm Size

Irrigated MV rice: The comparative analyses of distribution of farm income earned from irrigated MV rice cultivation by small, medium and large farms are depicted in Table 2 and Figure 2.

Looking at the percentage distribution of aggregate net farm income earned by each quartile group of different farm sizes, it can be seen that the poorer 50 percent of the small farmers have an income share of about 44 percent followed by medium and large farmers as 42 percent and 38 percent respectively. Further, the Lorenz curves (Fig. 2) also indicate an improvement in the distribution of aggregate farm family income for small farms because, the closer the Lorenz curve is toward diagonal, the greater is the equality in income distribution. The results imply that the distribution of farm income earned by small farms are more equitable than medium and large farm families as they (small farmers) have greater share of aggregate net income. Other studies (Abedin 1986; Islam, 1986; Abedin, 1987 and Jabber. 1987) also showed that the productivity as well as benefit-cost ratio (BCR) of small farmers are significantly higher than the medium and large farmers. The higher productivity of the small farmers in the case of MV has reduced income gap between small and large farmers.

Table 2. Relative shares of aggregate farm income earned from irrigated MV rice cultivation by various quartile groups of farm families at Gazipur in 1986.

Quartile groups	Small Farms (<=0 99 ha)		Medium Farms (1.00—1.99 ha)		Large Farms >=2.00 ha)	
	Aggregate net income (%)	Cumulative of aggregate net income	Aggregate net income (%)	Cumulative of aggregate net income	Aggregate net income (%)	Cumulative of aggregate net income
First	18.68	18.68	19.28	19.28	14.17	14.17
Second	24.83	43.51	22.27	41.55	24.18	38.35
Third	26.14	69.65	28.35	67.90	27.72	66.07
Fourth	30.35	100.00	32.10	100.00	33.93	100.00
All groups	100.00	—	100.00	—	100.00	—

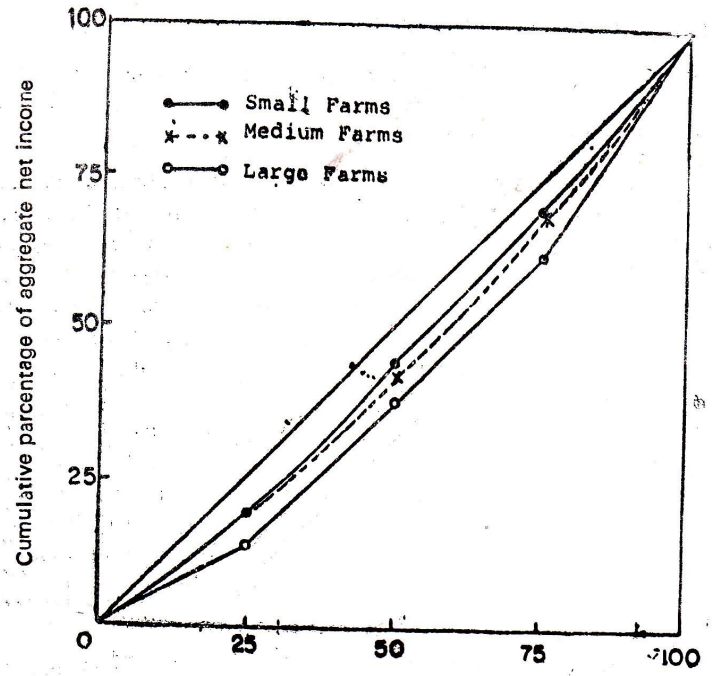

Fig. 2. Distribution of net income earned from irrigated HYV rice cultivation by farm size at Gazipur in 1986.

Rainfed LV rice : The distribution of farm income earned from rainfed LV rice by farm size is shown in Table 3 and Figure 3.

It appears from the table that about 6 percent of the aggregate farm income is owned by the lowest 25 percent of all large farm families. On the other hand about 61 percent of the aggregate income is shared by the upper 25 percent of the farm families. In other words, about 17 percent of the aggregate farm income is owned by the lower 50 percent of the farm families and the rest 83 percent of the aggregate farm income is owned by the upper 50 percent of all large farm families. The distribution of farm income for medium farm families is relatively more unequal as compared to that of the large farms. Only 1 percent of the

Table 3. Relative shares of aggregate farm income earned from rainfed LV rice cultivation by various quartile groups of farm families at Gazipur in 1986.

Quartile groups	Small Farms (<=0.99 ha)		Medium Farms (1.00—1.99 ha)		Large Farms (>=2.00 ha)	
	Aggregate net income (%)	Cumulative of aggregate net income	Aggregate net income (%)	Cumulative of aggregate net income	Aggregate net income (%)	Cumulative of aggregate net income
First	3.77	3.77	1.34	1.34	5.79	5.79
Second	9.52	13.29	14.01	15.35	11.14	16.93
Third	25.88	39.17	30.11	45.46	21.58	38.51
Fourth	60.83	100.00	54.54	100.00	61.49	100.00
All groups	100.00	—	100.00	—	100.00	—

aggregate farm income is owned by the poorest 25 percent of the farm families, while about 54 percent of the aggregate farm income is owned by the richest 25 percent of the farm families. In this case, the lower 50 percent of the farm families is owned only about 15 percent of the aggregate farm income while the upper 50 percent of the farm families is owned about 85 percent of the aggregate farm income. For small farm, the distribution of farm income is attuned to the distribution of medium farm income. In both the cases (small and meduim farms) the distribution is skewed to the right i, e. , negatively skewed meaning that the larger frequencies are concentrated towards the nigher income groups and the smaller frequencies towardf the lower income groups. This situation could be changed by expanding areas under MV for small farms with proper irrigation facilities as and when needed.

The Lorenz curves in Figure 3 for small, medium and large farms show the distribution of income earned from rainfed LV rice by different farm size groups. All the three curves are overlapping each other meaning that neither of the curves shown better income distribution over another. But we can infer from the position of the curves, staying far away from the line of equity, that the adoption of MV rice with the introduction of modern irrigation facilities could increase income per unit area of small farmers which will, inturn, have a higher share in aggregate net farm income.

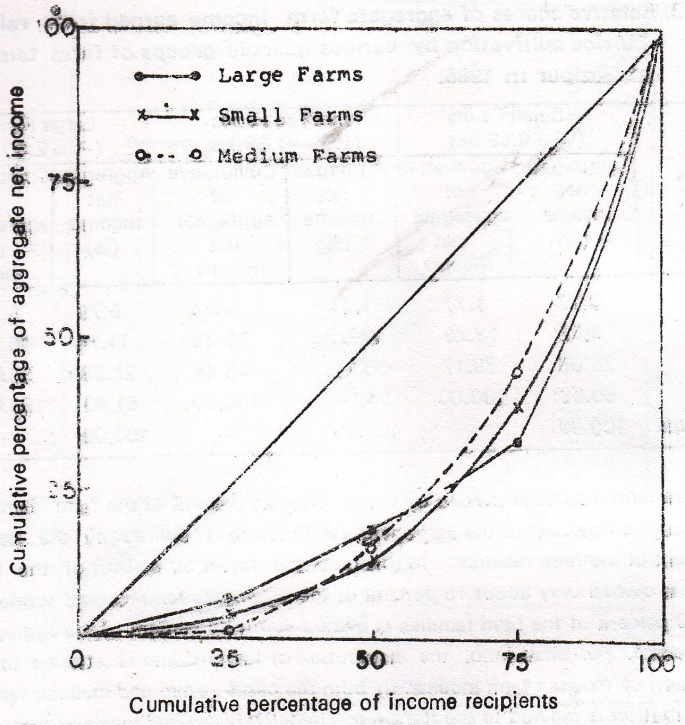

Fig. 3. Distribution of net income earned from rainfed L V rice cultivation by farm size at Gazipur in 1986.

Moreover, it is well known that the MV adoption by small farmers are much higher than the medium and large farmers (Jabber, 1987). On the other hand they seldom cultivate LV rice as the large farmers do (Adedin, 1989). The cultivation of LV and even MV rice by large farmers generated lower income per unit of area comared to income earned by small farmers from MV rice cultivation as the productivity of large farmers is lower. This has influenced in reducing income gap between the large and small farmers.

IV. CONCLUSION AND RECOMMENDATIONS

Based on the results of the study showing the impact of irrigated MV and rainfed LV rice cultivation on income distribution pattern as influenced by farm size the following conclusions can be drawn.

- The MV rice with proper irrigation facilities has increased the per unit area of farm income of the lower group and tended to decrease the gap between the poorer and the richer groups.
- In the case of irrigated MV rice farms, the smaller the farm size, the greater is rhe equality in income distribution among farm families.
- Negatively skewed distribution of per unit area of farm income is observed in LV rice cultivation meaning that the large frequencies of farm families are concentrated toward the higher income groups and the smaller frequencies toward the lowar income groups.

The analyses indicate that the adoption of MV rice with expansion of irrigation facilities may reduce income gap between small and large farmers.

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