INCOME INEQUALITIES AMONG THE FARMERS IN SOME SELECTED AREAS OF BANGLADESH

M. S. Rahman[1], F. A. Mila[2], M. R. Hasan[3] and S. J. Rayhan[4]

ABSTRACT

The study was conducted in Jessore and Rangpur district of Bangladesh to determine the income inequality among the farmers. Gini-coefficient and multiple regression analysis were used to achieve the objectives of the study. The findings of the study indicated more than 50% of the total income was come from non agriculture sources. More income inequality was found among the farmers of Jessore district than that of Rangpur district. Overall Gini-coefficient was found to be 0.25 in the study areas. Income from non agriculture sources contributes 52% of the overall income inequality. Income, education, family size, access to credit etc. had positive and significant effect on the welfare of the farmers. Credit with low interest rate, low cost production technologies played a vital role to increase the income as well as the welfare of the farmers in the study areas.

Keywords: income inequality, gini-coefficient, income sources, welfare farmer

INTRODUCTION

Inequality is of concern to the international development community for many reasons. Increased inequality for a given level of an average welfare indicator (*e.g.*, income) will almost always be associated with higher levels of poverty, because a smaller share of income obtained by those at the bottom of the income distribution (McKay, 2002). This is particularly true for developing countries, where a highly unequal income distribution is almost always accompanied by high levels of poverty incidence (Ellis, 2000). Regional inequality is a growing concern in Bangladesh. Bangladesh during the pre independence period experienced serious regional inequality. The Government of Bangladesh is well acquainted about the sensitivity of economic inequality and income distribution. Inequality is defined over the whole distribution of a given indicator in a population. Welfare also captures the whole distribution of a given indicator, but it differs from inequality in that the latter is independent of the mean of the distribution and instead is solely concerned with its dispersion (Litchfield 1999; McKay 2002; Naschold 2002). Accelerating GDP growth will allow the economy to break through continuing reducing income inequality and increasing income share of the poor people which ultimately improve the level of poverty. Poverty is the inability to adequately meet the basic human necessities, such as food, shelter, clothing and medical care. These days, it is very rare to find farmers in developing countries collecting all their income from one source. Furthermore, rural people in developing countries are not equally committed to agriculture. Households may derive their incomes from a diverse portfolio of activities, including work in the rural non-farm sector (Adams 1999; Ellis, 2000). Some analysts argued that non-farm income sources may account for 40-45 % of the average rural household income in many developing countries (Reardon 1997; Barrett *et al.,* 2001).

The causes and implications of changes in inequality many societies remain unclear (Sewanyana *et al.,* 2004). The components that make up the acceptable standard of living can be represented as a composite whole by the real income expressed in currency values. Since, poverty be linked to the income level of individuals of households and their standard of living is a measure of income obtained or received by them. It then becomes necessary to analyze income inequalities and welfare of farmers in Bangladesh, where agriculture is the major occupation. But there is dearth of this kind of study in

[1 & 4]Assistant Professor, Dept. of Management and Finance, Sher-e-Bangla Agricultural University, Dhaka, [2] Lecturer, Dept. of Agricultural Marketing and Business Management, Sylhet Agricultural University, Sylhet, [3] Assistant Professor, Dept. of Agribusiness and Marketing, Sher-e-Bangla Agricultural University, Dhaka.

Bangladesh. Keeping these factors in consideration the present study was undertaken to determine the income inequality among the farmers and to identify the factors that influences the welfare among the farmers in the study areas.

MATERIALS AND METHODS

The study was conducted in Jessore and Rangpur district of Bangladesh. For this study sample farmers were selected from the sadar upazila of Jessore and Rangpur district. A total 150 sample farmers taking 75 from each upazila were selected randomly for the study. Data were collected during the period from January to March, 2012.

Analytical technique

The Gini coefficient is a dimensionless measure of statistical dispersion that is frequently used in the analysis of income distribution. The Gini coefficient (G) of a data set or income distribution curve ranges from 0 to 1, with 0 being the most unequal distribution of wealth and 1 being the most equal. In this study the following formula was used to calculate Gini coefficient.

$$G = \frac{n+1}{n} - \frac{2\sum_1^n (n+1-i)x_n}{n\sum_1^n x_i}$$

Where, the level of income (X_i) is ordered from least to highest.

Income inequality by income source

Following the approaches employed by Adams, 1999; Adams, 2001 and Huang *et al.*, 2005 and using the Gini coefficient, the contribution of each income source of farmers in rural areas to their respective overall income inequality as explained below;

Assuming that *yk* represents the income (*y*) from source *k* (for instance, non-farm income), the total income for a particular individual or household, *yo* can be written as:

$$Y_0 = \Sigma_{k=1}^k \ y_k, k = 1.........k$$

Using the method employed by Stark *et al.*, 1986; Adams, 1999 and Huang *et al.*, 2005, the Gini coefficient for total is as follows;

$$G = \sum_{k=1}^k R_k G_k S_k$$

where *Rk, Gk and Sk* is the contribution of income source *k* to overall income inequality; *Sk* represents the share of income from source *k* in total income; *Gk* represents the Gini coefficient of the inequality in the distribution of income source *k* (i.e., the Gini coefficient of *yk*); and *Rk* stands for the Gini correlation between income from source *k* and total income. According to Adams (1999) and Huang et al. (2005), *Rk* can be calculated as follows:

$$R_k = cov \ \{y_k, F(y_o)\} \ / \ cov \ \{y_k, F(y_k)\}$$

It then applies that the contribution of each individual income source *k* to the overall income inequality can be decomposed into three components. As shown in the equation, the first component is the share of income from source *k* in total income. The second component is the Gini coefficient of the inequality in the income distribution of income source *k*. The third component is the correlation between income source *k* and the overall income. The smaller the product of these three components multiplied together, the lower the contribution of income from source *k* to total income inequality, and vice-versa.

Notably, the value of *Sk* is always positive and less than 1; the value of *Gk* is always positive and may be greater than 1 when the values for of one or more of the income sources are negative; and the value of *Rk* is always between -1 and +1. *Rk* shows the strength of the relationship between the income sources and the total income, and reflects the degree to which they are related. When *Rk* = +1, there is a perfect positive relationship between income source and total income. When *Rk* is less than 0, the income source is negatively correlated with the overall income.

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Adams (1999) further illustrates how to detect whether an income source decreases or increases the overall income inequality based on the share of that income source, by re-writing the above equation as follows;

$$g_k = R_k \frac{\bar{G}_k}{G}$$

where, gk represents the relative concentration coefficient of income source k in the total income inequality. Whether gk is greater or less than 1 shows whether income source k respectively increases or decreases the overall income inequality.

Factors affecting the welfare

To identify the factors affecting the welfare of the farmers, the following implicit function of regression is used (Agwu and Orji, 2013);

$Q = f(X_1\ldots\ldots\ldots\ldots\ldots X_n\, e)$

Where, Q = Expenditure on food and non food items

$Xi\ldots\ldots Xn$ = explanatory variables

e = error term

The explanatory variables used in the model were as follows:

X_1 = Total income (Tk/year)

X_2 = Education (years)

X_3 = Age (years)

X_4 = Family size (person/family)

X_5 = Membership in organizations (if yes=1, no = 0)

X_6 = Farm size (decimal)

X_7 = Access to credit (if yes=1, no = 0)

Here, Expenditure is chosen as proxy for household welfare because expenditure is a good proxy for permanent income and thus also for long-term average well-being (Balisacan *et al.,* 2003). Moreover, data on expenditure are less difficult to gather than those on income, especially for developing countries where self-employed individuals are reluctant to provide their earnings precisely. Thus, in this study, household expenditure is employed as an approximation for household welfare.

RESULTS AND DISCUSSION

Average annual income

It is evident from Table 1 that respondents in the study areas received highest 53% of their income from non agricultural sources. Average total income per year was found to be Tk. 3,21,924 from different income sources. Respondents of Rangpur district received higher income compared to Jessore district.

Table 1. Average annual income of the respondents (Tk./year)

Items	Jessore	Rangpur	All areas
Agriculture income	66915 (45)	83402 (48)	150317 (47)
Non agriculture income	82450 (55)	89158 (52)	171608 (53)
Total income	149365 (100)	172559 (100)	321924 (100)

Note: Figures in the parentheses indicates percentage of total income

Income inequality among the respondents

It is revealed from Table 2 that the Gini-coefficient obtained using the formula as specified above was 0.25. According to income sources, Gini-coefficient for agricultural income (0.40) was higher than the non agricultural income (0.27). Gini-coefficient higher than 0.35, indicates higher inequality (Dillon

and Hardaker, 1993). This result means that there is a high income inequality specially for agriculture income in the study areas. Gini-coefficient for Jessore farmers was higher than Rangpur farmers which indicate more income inequalities exist in Jessore district. Poverty and income inequality are closely related and it has been argued that income inequality is a manifestation as well as strong cause of poverty (UNU/WIDER, 2000). Thus as income inequality increases, the incidence of poverty may also increases.

Table 2. Income inequality among the farmers of different areas

Items	Gini coefficient		
	Jessore	Rangpur	All areas
Agriculture income	0.47	0.31	0.40
Non agriculture income	0.26	0.27	0.27
Total income	0.27	0.22	0.25

Contributions of different income sources to income inequality

The overall Gini coefficient of 0.25 represents the expected difference in incomes of any two households randomly selected from the entire population (Table 3). In the study the mean value of total income is Tk.321,924 (1 US$ = Tk. 80), so the expected difference in incomes of the two randomly selected households is 25 percent of the mean income. When considering agriculture and non agriculture income, the corresponding differences are 47 and 26 percent respectively. The decomposition of income inequality by income source shows that income from non agriculture sources (52%) contributes most to overall income inequality. The non agriculture income derived from different sources like services; business etc. which requires special skill and higher level of education from the each individual. But in Bangladesh only a few farmers have higher level of education. As a result all the farmers don't get similar type of services which may be responsible for the finding that non agricultural income is the most important inequality increasing source of income. Although agriculture income is distributed more unequally than the non agriculture income, its contribution to overall income inequality is the smallest (48%). This is probably because agriculture income comprises the smallest share in total income among the respondents. The Gini correlation of agriculture income with total income is found higher than that for the non agriculture income.

Table 3. Contributions of different sources of income to overall income inequality

Income sources	Gini coefficient for income source (Gk)	Gini correlation with total income rankings (Rk)	Contribution of income source to overall income inequality (Sk)	Relative concentration coefficient of income source (gk)	Percentage contribution to overall income inequality
Agriculture	0.40	0.82	0.12	1.31	48
Non agriculture	0.27	0.62	0.13	0.67	52
Total income	0.25	--	--	--	100

Factors Influencing Farmers Welfare

It is revealed from the Table 4 that total income, education, age, family size, farm size and access to credit have positive and significant effect on the farmers' welfare. The coefficient of farmers' income was positive and significant at one percent level indicates that as income increases, welfare of farmers also increases. This result is similar to previous studies like Avery and Kannicke, 1991; Ukoha *et al.*, 2007. The coefficient of age has a positive sign and significant at one percent level. This means that as age increases farmers gain more experience in farming, as a result welfare also increases. This result is consistent with Agwu, 2009.The coefficient of family size also found to be positive and significant which suggests that as household size increases, farmers' welfare also increases. This may be for the fact that increased household size could be used for farm labour, thus reducing the cost of labour which is an additional expenditure and thus capable of reducing farmer's welfare. The positive coefficient of

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access to credit indicates that farmers who receive credit can use this amount in productive sector and increases the welfare although they have to pay the interest attached to credit. The negative coefficient of membership in different organization indicates that farmers involve in different organizations' may passes their time in unproductive manner. The adjusted R^2 value was 0.54, meaning that 54 percent of the variation in welfare were explained by the variables included in the model. F-value is significant at 1% level indicates that the variations mainly depends on the variables included in the model.

Table 4. Factors affecting the farmer's welfare in the study areas

Variables	Coefficients	Std. error	t-value
Constant	1.10	1.18	0.93
Total income (X_1)	0.64***	0.11	6.12
Education (X_2)	0.08*	0.04	1.87
Age (X_3)	0.30***	0.11	2.68
Family size ((X_4)	0.39***	0.09	4.16
Membership (X_5)	-0.10*	0.06	-1.67
Farm size (X_6)	0.08**	0.04	1.97
Access to credit (X_7)	0.50***	0.07	651
Adjusted R^2	0.54		
F-value	25.73***		

The overall result of the study showed that the farmers in the study area received highest portion of their income from non agriculture sector. There exist income inequalities among the farmers in the study area. Highest income inequality was found in the case of agriculture income. The decomposition of income inequality by income source indicates that the contribution of non agriculture income to overall income inequality is the highest among the different sources of income. Different factors like yearly income, education, farm size, access to credit etc. plays an important role to increase the welfare of the farmers in the study areas. Based on the findings of the study it may be recommended that efforts should be made to narrow down the gap of income inequalities. Credit at low interest rate should introduce to increase farmers welfare. Cost saving technologies should be introduced along with proper training to adopt such measures. This will help to reduce the production cost and increase the income. It is also recommended that activities aimed at boasting farmers' income should be intensified. To this end, access to highway roads and markets should be improved so that the farmers can sale their agricultural product in proper time and receive higher income.

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