Farmers' Education and Farm Productivity in Bangladesh

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Abstract

The impact of farmers' education is examined with a view to evaluate the actual situation of farmers' education in Bangladesh. The sample of the study consists of one thousand farmers. Multiple regression model was used. The result presented in this paper show that the returns to education from primary school is positive and statistically significant in Bangladesh. The benefit of college education and above degrees to the sample farms is not found in its effect on rice productivity. Some determinants of primary school, college and above degrees are also examined.

Key words*: Bangladesh, education, farmers, rice productivity*.

Introduction

Education is human right and an indispensable element for economic and social progress. Understanding this significance of education, the realization of educational expansion has been increasing world wide (Hansen 2001). However, sometimes this is not adequately appreciated by most policymakers and planners in the less developed countries like Bangladesh. In Bangladesh, about half the child population in rural areas does not receive any formal education, and the proportion of university graduates or postgraduates is no more than one percent (Ishida et al. 2000). It implies that the education arena is not so developed in this country. The existing education system in the country is not work based. This is more acute in her agriculture although it is the primary source of subsistence and income for the vast majority of the population. Education for scientific method of agriculture is still felt necessity in this country (Begum 1998). Appropriate use of inputs is not well registered here by the farmers due to illiteracy or low level of education (ibid). It is unclear about the effects of education of farmers on their agricultural activities. With this regard, the present study is conducted.

Yang (1997) in rural China studies found significant impact on highest education of farmers on their production. In Mexico, Taylor (2000) conducted his study in the municipality areas for the same purpose. Jollife (1998) observed the situation of education in Ghana. It is proven in Russia that education is necessary for her (Katz 1999). Almost all studies agreed on the importance of education. Many studies were conducted from different perceptions. Chowdhury et al. (2002) examined school enrollment of males and females in the rural areas while Begum et al. (1996) observed some rural institutions' role for the education of farmers. These studies are notable but at the same time it is necessary to keep attention whether the existing education system is keeping influence significantly or not. Rahman (1999) examined the effect of technology on income. The definition of income was not elaborate of that study. For example, it ignored the income from

homestead area which is also an important source of rural household income. So the impact of education on income is unclear from the study. This unclear situation was overcome by the study of Haq et al. (2004). Despite it, Haq at al. (2004) could not identify the effects of primary school education, higher school education, college education and education of graduate levels. Most of the farmers of Bangladesh are illiterate or primary school passed. Any serious studies of the impact of education of farmers on rice productivity by taking into consider on their levels of education is scant in Bangladesh. The current paper, based on farmers in the central area of Bangladesh, has two major objectives: 1) to assess the benefits of farmers' education on the productivity of rice and 2) to identify some determinants of education of farmers.

Methodology

Sampling Design

The research area was Gazipur district which is an average agricultural productivity area. The selection of the study sites and sample respondents were done purposively. There were some salient features in the selection procedure. First one, the selected district includes some important infrastructures such as BARI, BIRRI and BSMRAU etc. Second one, total numbers of selected villages were ten by taking two villages from five upazilas (subdistricts). Of the two villages in each upazila, one village is selected comparatively nearer to the upazila headquarters and the other one is selected comparatively away from the upazila headquarters. The selected comparatively nearer villages were namely, Samantapur (Sadar), Bagnahati (Sreepur), Dushya Narayanpur (Kapasia), Katalia (Kaliakoir) and Poinlanpur (Kaliganj). The selected villages which were comparatively away from the upazila headquarters, namely, Bara Bhabanipur (Sadar), Saitalia (Sreepur), Noyanagar (Kapasia), Poshim Chandpur (Kaliakoir) and Bhatgati (Kaliganj). Third one, the total households were more than one hundred in the selected villages (BBS, 1993). It was then decided to collect one hundred samples from each village. The total numbers of investigated farmers were one thousand (2 villages x 5 upazilas x 100 farmers) and multistage random sampling technique was followed. Primary data was collected using survey method and personal interviews were conducted through pre-tested questionnaires with a view to collect data. The survey was administered with the help of staffs of the BARI in 2002. Fourth one, each upazila has some characteristics: Sadar upazila is completely urban type; Sreepur, Kapasia and Kaliganj upazilas are rural type and headquarters of these upazilas are the only urban areas while Kaliakoir upazila headquarter is the only urban area and Safipur is the other urban area of this upazila (BBS, 1993). This study can be comprehensive compared to many research works due to the above salient features which will explore the actual situation of farmers' education in Bangladesh from the grassroots levels.

Conceptual Framework

Many of the previous researches used the productivity index representing the amount of production per unit of farm land, that is, the value added of production, which is found by deducting production costs from gross income. By using that index, it is possible to convert the specific quantities of products into given amounts of money to be added up; therefore it represents a considerable analytical benefit. The method of settling the type of variables from which the index is determined, expected to be discussed.

As is commonly used in analyzing production function, chemical fertilizer, farm buildings, irrigation facilities, family and hired labours should be considered as important investment functions

(Evenson *et al*, 2001). Haq *et al*.(2003) considered crop income per unit of land as dependent variable and chemical fertilizer cost per unit of land, irrigation cost per unit of land, experience of farmers, farm area, number of times extension contact as independent variables. Therefore, it summarized the model, Ln crop income= f (ln chemical fertilizer, ln irrigation, ln experience, ln farm area, ln labour, extension contact dummy$_1$, extension contact dummy$_2$). Haq *et al*. (2004) interpreted total income as dependent variable, while age of farmers, years of schooling of farmers, family size, number of educated family members, number of earners of a farm family, rural institutions dummy, number of times extension contact, proportionate effect of flood to crop land, distance between crop land to market, homestead area, size of farm, irrigation cost, village dummy were taken as independent variables. The income function was solved by applying ordinary least squares. The above concepts provide to run an empirical model which is found in the ensuing section.

Empirical Model

The model applied here is the input-output model. The heart of the input-output model is the concept of the production function [Y=f (Capital, Labour)] which helps us in understanding the role of important variables like capital and labour in determining the crop productivity. But only two factors have no reflection on the productivity of a major crop like rice. Therefore, based on related past studies and logical analysis some important explanatory variables which are considered in this study namely age of the farm household head (Ag), number of family members (Fm) in the household, number of family earners in the household (Fea), number of times extension contact received by the farmer for the sample crop season (Et), proportionate effect (%) of flood to crop land (Fec), distance from farm land to market in miles (Mr), actual size of cultivated land in acre (Fs) , per acre total cost of chemical fertilizer (Ch), per acre total labour cost (Lab), per acre total money spent for irrigation (Irr), primary school dummy (Prdummy) =primary school 1; otherwise 0, college dummy (Coldummy) = college and above 1; otherwise 0, and village dummy (Vdummy) = 1 if near village; otherwise = 0.

The yield of rice (maund/acre; 1 maund=37.3 kg) is the dependent variable in the present paper as it is the major food crop in the country. It includes boro rice because it is hardly affected by the natural disaster compared to other rice crops and it was cultivated by all sample farms.

Most of the farmers of Bangladesh are either illiterate or unskilled. Thus farm operators may increase their production with the knowledge derived from education (Haq *et al*, 2004). Relevant importance of other selected variables can be found in related literatures (Haq *et al*, 2004; Evenson *et al*, 2001; Begum 1998).

Data have been analyzed by regression analyses. OLS method may have heteroskedasticity problem in case of cross section data (Damodar 1995). To determine whether or not heteroskedasticity exists, the White Heteroskedasticity test was used on regression model and F-test was then used to check for heteroskedasticity. In cases in which heteroskedasticity was found, a log transformation is used (ibid). Finally, the productivity expressed in terms of physical quantity is as follows: Log of Rice yield = f (Ag, Fm, Prdummy, Coldummy, Fea, Et, Log Fs, Fec, Mr, Ch, Irr, Lab, Vdummy). It has been used binary logit model in order to examine the determinants of farmers' education.

Results and Discussion

The estimated values of coefficients and related statistics of the multiple regression coefficients are presented in Table-1. The adjusted R^2 values agree with similar studies which are understandable because of the numerous factors affecting the yield of rice. The F-values are significant at 1% level of significance which implies that the specifications of the models were reasonably accurate (Begum 1998). The results of the functional analysis suggest that except for few variables, all the variables had a positive effect on rice yield in the sample farms.

Table-1: Regression Results

Variables	Definitions	(Log)Rice yield
C	Intercept	3.480** *0.076*
Ag	Age of farmers	-0.002** *0.001*
Fm	Number of family members	0.015** *0.008*
Prdummy	Primary school 1, otherwise 0	0.096*** *0.031*
Coldummy	College and above 1, otherwise 0	-0.053 *0.047*
Fea	Number of family earners	0.067*** *0.019*
Et	Number of times extension contacted	0.102*** *0.023*
Fs(log)	Size of farm in acre	-0.414*** *0.032*
Fec	Proportionate effect of flood to crop land	-0.001*** *0.000*
Mr	Distance between market and nearest farm land in miles	-0.022** *0.010*
Ch	Cost of chemical fertilizer (Taka/acre)	0.000*** *2.82E-05*
Irr	Irrigation cost(Taka/acre)	0.000*** *1.54E-05*
Lab	Labour cost(Taka/acre)	-5.86E-05*** *1.23E-05*
Vdummy	Near villages 1, otherwise 0	-0.217*** *0.029*
	Adjusted R square 0.513 F – ststistics 79.080***	

Notes: ***, ** & * 1%, 5% and 10% level of significance. Italics denote standard error.
1 acre=.404hectare. 1$=Tk.60 in 2002

Table 1 represents the regression results of education impact on rice yield. Primary education has positive value and its impact on rice productivity is significant. The Coldummy has no impacthowever the value is insignificant. The coefficient for Prdummy is particularly great (0.096),

compared to the Coldummy (-0.053).The results of Haq et al, (2004) suggests that in Bangladesh, the higher number of education years seem more effective with a view to increase farm income. Compared with the results of Haq et al, (2004), the present analysis suggests that in Bangladesh, primary school education of farmers seem effective in order to rise per unit of rice productivity in Bangladesh. It is plausible because the farmers who have only primary school degree, may spend enough time for farm production. Accordingly, it is possible to ascertain in this context that education with only primary schooling contributed to improve the agricultural production per unit of farmland.

Small farms are ideal for higher productivity. Flood has no significant impact. Ag and Mr have negative but statistically significant effects. Fm and Fea are positive and statistically significant. Chemical fertilizer and irrigation costs contributed positively and significantly. Lab implies an excessive use of labour for rice yield. Vdummy has negative and statistically significant impact that means it has no importance for rice yield.

Relationship of the Selected Characteristics of the Farmers' with their selected Educational levels:

Table -2 shows that agricultural income (Agi) is very important for higher education such as the degree of college and any other above degrees. Therefore, the degree of primary school is not important to pursue higher degrees. It is seen that size of farms, distance between market and farm land have positive impacts in order to acquire college degree and above. The variable Ag is inversely related to the college degree and above. The impacts of other variables on Coldummy are either in positive or negative but their impacts are weak since their coefficients are insignificant.

Table -3 shows that the size of small farms, comparatively young farmers and comparatively remote villages have impacts on primary school education. The variable Ch has no impact on primary school education. Variables such as Et, Mr, Irr and Agi have no clear cut relationship with the Prdummy since their values are insignificants.

Logistic Regression Table-2: Determinants of farmers'education of college and above

					Odds	95% CI	
Predictor	Coef	SE Coef	Z	P	Ratio	Lower	Upper
Constant	-0.671967	0.591220	-1.14	0.256			
Ag	-0.0285123	0.0104449	-2.73	0.006	0.97	0.95	0.99
Prdummy	-0.860271	0.240797	-3.57	0.000	0.42	0.26	0.68
Et	-0.0616004	0.198187	-0.31	0.756	0.94	0.64	1.39
Fs	0.121498	0.205945	0.59	0.555	1.13	0.75	1.69
Mr	0.0419804	0.0656160	0.64	0.522	1.04	0.92	1.19
Ch	-0.0000782	0.0002224	-0.35	0.725	1.00	1.00	1.00
Irr	-0.0000869	0.0001318	-0.66	0.509	1.00	1.00	1.00
Vdumi	-0.148870	0.237492	-0.63	0.531	0.86	0.54	1.37
Agi	0.0000031	0.0000010	3.23	0.001	1.00	1.00	1.00

Log-Likelihood = -292.579,
P-Value = 0.000

Logistic Regression Table-3: Determinants of farmers'Primary school education

Predictor	Coef	SE Coef	Z	P	Odds Ratio	95% CI Lower	95% CI Upper
Constant	2.10833	0.350347	6.02	0.000			
Ag	-0.0220838	0.0058977	-3.74	0.000	0.98	0.97	0.99
Et	-0.0611287	0.109951	-0.56	0.578	0.94	0.76	1.17
Fs	-0.569189	0.157813	-3.61	0.000	0.57	0.42	0.77
Mr	0.0563071	0.0513487	1.10	0.273	1.06	0.96	1.17
Ch	-0.0003079	0.0001349	-2.28	0.022	1.00	1.00	1.00
Ir	0.0000394	0.0000740	0.53	0.595	1.00	1.00	1.00
Vdumi	-0.838278	0.138815	-6.04	0.000	0.43	0.33	0.57
Agi	-0.0000001	0.0000008	-0.14	0.886	1.00	1.00	1.00

Log-Likelihood = -628.378
P-Value = 0.000

Notes:

-Meanings of variables on table-2&3 are same as table-1 except Agi variable which means total agricultural incomes of farmers for one year prior to survey period.

-Primary school education :Class I-class V; High school education:class VI-X; College education:ClassXI-Class XII;After class XII, Graduate courses begin.

Conclusion

The results presented here show that the returns to education from primary school as found is positive and statistically significant. It supplements the human capital literature because it makes clear that the primary school education of farmers is rewarded. As a final comment, since the government has given top priority for the development of education in Bangladesh (Daily Star 2011), hence some further education such as extension services and infrastructure development are necessary to accelerate for farming population. These are not best but at least in the few among many. Considering the result of this study, as well as other relevant studies, policy makers should take necessary steps.

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