Impact of Education and Health in Poverty Alleviation in Bangladesh: A logistic Regression Analysis

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ABSTRACT. EDUCATION AND HEALTH PROVIDES A FOUNDATION FOR ERADICATING POVERTY AND FOSTERING ECONOMIC DEVELOPMENT. THE OBJECTIVE OF THE STUDY IS TO ANALYZE THE IMPACT OF EDUCATION AND HEALTH ON POVERTY OF HOUSEHOLD IN BANGLADESH.THE DATA USED ARE FROM THE HOUSEHOLD INCOME AND EXPENDITURE SURVEY (HIES) 2010 CONDUCTED BY BANGLADESH BUREAU OF STATISTICS (BBS). A TOTAL OF 12,240 HOUSEHOLDS ARE CONSIDERED FOR ANALYZING THE STATUS OF HOUSEHOLD'S POVERTY. CBN METHOD IS EMPLOYED FOR ESTIMATING POVERTY OF HOUSEHOLD. THELOGISTIC REGRESSION MODEL SHOWS THAT AN INCREASED IN EDUCATIONAL LEVEL OF HOUSEHOLD'S HEAD AND THE NUMBER OF LITERATE MEMBER IN HOUSEHOLD, THE PROBABILITY OF HOUSEHOLD BEING POOR IS DECREASED GRADUALLY. THE RESULTS ALSO FOUND THAT THE PROBABILITY OF HOUSEHOLD BEING POOR IS MORE WHILE THE HOUSEHOLD'S HEAD SUFFERED FROM VARIOUS CHRONIC DISEASES LIKE CHRONIC FEVER, INJURIES/DISABILITY, ECZEMA, LEPROSY AND ASTHMA/BREATHING TROUBLE AS COMPARED TO THE HOUSEHOLD WHOSE HEAD NOT SUFFERED FROM ANY CHRONIC DISEASE. THE STUDY RESULTS HIGHLIGHTS THAT RURAL HOUSEHOLDS ARE POORER THAN URBAN HOUSEHOLDS.

Keyword: Education, Health, Poverty, Logistic regression analysis, Bangladesh.

1 INTRODUCTION

Poverty is a diverse and multidimensional phenomenon which is dominant in most regions of the world and one of the greatest challenges people in the 21st century face. Education and health endowments of individuals are important components of human capital which make them productive and raise their standard of living or reduce poverty. Their economic values are founded in the effects they have on productivity: both education and health make individuals more productive. Also, education and health have a considerable impact on individual well-being.

Effect of education on poverty is very important with respect to 'human poverty' because as education improves the income, the fulfillment of basic necessities becomes easier and raises the living standard which surely means the fall in human poverty (Jeffery and Basu, 1996). Individuals with low educational levels are likely to be poor than those with higher education (Armstrong et al, 2008: 19).

Educational levels are significant elements in reducing the chances of the household to be poor (Okojie, 2002). In 2010, Nigerian poverty was high for those with little or no education. For instance, those with no education have a higher proportion of poverty than those with at least primary education. For instance, among those with no education, their proportion in

terms of poverty was 75.32 per cent. For those with post-secondary (tertiary) education, their proportion was 56.46 per cent (Anyanwu, 2013).

Investment in education increases the ability of the individual and makes them more productive and more efficient (Lockheed et al., 1980, and Jamison and Lau, 1982).The study by Jha, Biswal and Urvashi (2001) found that public expenditures on education, health and other development activities have been effective in reducing poverty in India.

In Bangladesh, the level of poverty falls systematically with higher educational status of the head of the household in both 2000 and 2010. The difference is enormous; for instance, while the rate of poverty for households with illiterate heads was as high as 45 per cent in 2010, it was close to 4 percent for those who had higher secondary education or more. The proportion of households with illiterate heads has come down considerably from 62 per cent in 2000 to 43 per cent in 2010, while the largest improvement has occurred in the 'less than primary education' group from 5 to 16 per cent (Osmani and Latif, 2013).

Chaudhary *et al.* (2010) examined the impacts of different education levels on poverty incidence by using the time series data of 35 years. The study concluded an important role of education in the Pakistan economy. Chaudhry *et al.* (2010) termed human capital (education and health) as "productivity enhancing device" for female labor force. Health and education increase female earnings.

Gupta and Mitra (2004) study assessed the likely link among poverty, health and economic growth; by using panel data for Indian States. They concluded despite the fact that economic growth reduces poverty but health improvement is also essential for poverty alleviation. Explanatory variable such as literacy and industrialization contributed to growth, better health conditions and poverty reduction. So, good health is an important element in reducing poverty.

Ill-health is frequently a risk factor for poverty, and it may prolong the duration of impoverishment. Life history research in rural Bangladesh showed how health shocks could prove critical in the persistence of poverty (see, Hulme, 2004).

Poverty and disease are indivisible and there are a variety of linkages between them (Schwefel et al, 2004). In Jamaica 59% of people with chronic diseases experienced financial difficulties because of their illness, and a high proportion of people admitting such difficulties avoided some medical treatment as a result (Henry and Yearwood, 1999).

Chronic diseases will take the lives of over 35 million people in 2005, including many young people and those in middle age. The total number of people dying from chronic diseases is double that of all infectious diseases (including HIV/AIDS, tuberculosis and malaria), maternal and perinatal conditions, and nutritional deficiencies combined. 80% of chronic disease deaths occur in low and middle income countries and half are in women. Without action to address the causes, deaths from chronic diseases will increase by 17% between 2005 and 2015 (WHO, 2005).

The study conducted by NISRA, 2005 indicates, Poverty relates to the incidence of limiting long term illness. Individuals with a limiting long-term illness are at a greater risk of poverty (40%) than those who have no limiting long-term illness (21%). Some 31 per cent of all individuals have a liming long-term illness and 69 per cent do not. Persons in poverty are more likely to have a limiting long-term illness (46%) and this is significantly more than individuals not in poverty (25%).

Better healthcare, besides good education, is anticipated to improve work output of existing and prospective generations. Presently the healthcare status of Pakistanis, in particular, females, is not up to the mark. According to the Human Development report of UNDP (2001), female life expectancy in Pakistan is 65.1 years, higher than the male life expectancy of 62.9 years; but it is lower than the female life expectancy in most developing countries

Inadequate access to good-quality health services, including diagnostic and clinical prevention services, is a significant cause of the social and economic inequalities in the

burden of chronic diseases. The poor face several health-care barriers including financial constraints, lack of proximity and/or availability of transport to health-care centres, and poor responsiveness from the health-care system (Goddard and Smith, 1998, and Lorant V. et.al., 2002).

Patterns of poverty differ by division, and between rural and urban areas.An understanding of the extent, nature, and determinants of poverty is a precondition for effective public action to reduce deprivation in the rural and urban areas. The objective of the study is to analyze the impact of education and health on poverty of household in Bangladesh. Furthermore, this study will cast light upon need to develop its relation to the reduction of poverty with reference to the improvements in the quality of education and health.

2 METHODOLOGY

2.1 Source of Data

The data utilized for the present study are picked out from the Household Income and Expenditure Survey (HIES) 2010, which is a nationally representative survey conducted by Bangladesh Bureau of Statistics (BBS). A two stage stratified random sampling technique was followed in drawing sample of HIES 2010 under the framework of Integrated Multipurpose Sample (IMPS) design developed on the basis of the sampling frame based on the Population and Housing Census 2001. The IMPS design consisted of 1000 Primary Sampling Units (PSUs) throughout the country. There were 640 rural and 360 urban PSUs in the sample. The PSU was defined as contiguous two of more enumeration areas (EA) used in Population and Housing Census 2001. Each PSU comprised of around 200 households. In the first stage about one half, 612 is in exact out of total 1000 IMPS PSUs, were drawn. These PSUs were selected from 16 different strata. There were 6 rural, 6 urban and 4 SMA strata. In the second stage, 20 households were selected from each of the rural PSUs and also PSUs located in the municipal areas and SMAs. Thus, the HIES is a sub-set of IMPS. In HIES-2010, a total of 12240 households were selected where 7840 from rural area and 4400 from urban area.

2.2 Cost of Basic Need Method

For determining poverty status of household as dependent variable, the Cost of Basic Needs (CBN) method is used as the standard method for estimating the incidence of poverty. In this method, two poverty lines are estimated:

I. Lower poverty line
II. Upper poverty line

A brief description of estimating incidence of poverty using CBN method is as follows:

A. Food poverty line

1. A basic food basket (eleven food items) is selected. The food basket consists of eleven items; rice, wheat, pulses, milk, oil, meat, fish, potato, other vegetables, sugar and fruits, as recommended by Ravallion and Sen (1996), based on Alamgir (1974).
2. The quantities in the basket are scaled according to the nutritional requirement of 2,122 k.cal per person per day.
3. The cost of acquiring the basket is calculated. This estimated cost is taken as the Food Poverty Line (FPL)

B. Non-food poverty line

A nonfood poverty line is calculated by estimating the cost of consuming non-food items by the households close to the food poverty line.

Lower Poverty Line
The extreme poor households are those households whose total expenditures on food and nonfood combined are equal to or less than the food poverty line.

Upper Poverty Line
The upper poverty line is estimated by adding together the food and nonfood poverty lines. The moderate poor households are those households whose total expenditures are equal to or less than the upper poverty line.

2.2 Logistic Regression Model

To identify determinants of poverty we first computed a dichotomous variable indicating whether the household is poor or non-poor. That is,

$$Poverty\ Status\ of\ Household = \begin{cases} 0, & if\ the\ household\ is\ non-poor \\ 1, & if\ the\ household\ is\ poor \end{cases}$$

Here, for estimating the poverty status of household, we employed the Cost of Basic Need (CBN) method in this study.

On the basis of Pearson's Chi-square statistic, we determine whether the predictors household size, age of household's head, sex of household's head, educational level of household head, number of literate member (7 years and above) in household, household's head suffered from chronic disease, number of household's members suffered from chronic disease, employment status of household, division of residence and place of residence were associated with the poverty of household.

Then, we used a Logistic regression model, given by

$$logit\ (P) = \log\left(\frac{P}{1-P}\right) = \sum_i \beta_i X_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots\cdots\cdots\cdots + \beta_{10} X_{10}$$

where $X_1, X_2, X_3 \cdots\cdots\cdots\cdots, X_{10}$ were the predictor variables household size, age of household's head, sex of household's head, educational level of household head, number of literate member (7 years and above) in household, household's head suffered from chronic disease, number of household's members suffered from chronic disease, employment status of household, division of residence and place of residence and p denoted the probability that the household was poor, was used.

For the Study purpose, entre method of binary logistic regression analysis is used.

3 RESULTS OF LOGISTIC REGRESSION ANALYSIS AND DISCUSSION

Table:1 presents the results of the fitted logistic regression model using both upper and lower poverty line separately. In the present analysis, non-poor of household category of outcome variable (Y=0) has been considered as the reference category of dependent variable. The logistic model shows in the table 1that all variables have significantly associated with poverty of household in both upper and lower poverty line.

The logistic model shows that the probability of household being poor is highly increased when the household size is increased in both upper (odds ratio: 2.699, 7.879, 18.158) and lower poverty line (odds ratio: 2.304, 7.073, 18.782). The results also reveal that the probability of a household being poor is decreased with increasing age of household's head as compared to the household whose head is less than 35 years old. In both upper and lower poverty line, the results illustrate that female headed households are 1.208 and 1.358 times more likely to be poor respectively than male headed households.

The results show that in both poverty lines, the households whose head has no education are more likely to be poor as compared to the households whose head has educated. In both upper and lower poverty line, the households whose head completed primary education, junior secondary education and SSC or higher education are .895, .603 & .214 times and .943,

.584 & .271 times less likely to be poor respectively as compared to those whose head has no education. The results also represent that in both poverty lines, increasing number of literate members in household; the probability of household being poor is decreased. In upper and lower poverty line, the households with 1-2 members, and 3 and more literate members are .503 & .223 times and .527 & .208 times less likely to be poor respectively as compared to those whose have no literate member.

Table 1: The Result of Logistic Regression Model for Household's Poverty, Education and Health Factors Relationship using Upper and Lower Poverty Line

Variables	Upper Poverty Line					Lower Poverty Line				
	Coefficient (β)	*P*-value	Odds Ratio	95% C.I. for EXP(β) Lower	Upper	Coefficient (β)	*P*-value	Odds Ratio	95% C.I. for EXP(β) Lower	Upper
Household Size										
1-2 members (RC)		.000	1.000				.000	1.000		
3-4 members	.993	.000	2.699	2.111	3.452	.835	.000	2.304	1.664	3.190
5-6 members	2.064	.000	7.879	6.131	10.124	1.956	.000	7.073	5.099	9.810
7 and more members	2.899	.000	18.158	13.928	23.672	2.933	.000	18.782	13.351	26.421
Age of Household's Head										
Less than aged 35 (RC)		.000	1.000				.000	1.000		
Aged 35-44	-.156	.010	.856	.760	.963	-.181	.010	.835	.727	.958
Aged 45-59	-.486	.000	.615	.544	.695	-.473	.000	.623	.538	.721
Aged 60 and above	-.372	.000	.689	.595	.799	-.338	.000	.713	.598	.850
Sex of Household's Head										
Male (RC)			1.000					1.000		
Female	.189	.028	1.208	1.020	1.430	.306	.004	1.358	1.103	1.671
Educational attainment level of Household's head										
No education (RC)		.000	1.000				.000	1.000		
Primary education	-.111	.049	.895	.801	1.000	-.059	.402	.943	.822	1.082
Junior Secondary	-.505	.000	.603	.517	.704	-.537	.000	.584	.473	.723
SSC and higher education	-1.543	.000	.214	.177	.258	-1.306	.000	.271	.208	.353
Number of literate members (7 years and above) in household										
No member (RC)		.000	1.000				.000	1.000		
1-2 members	-.688	.000	.503	.445	.568	-.640	.000	.527	.463	.601
3 and more members	-1.500	.000	.223	.192	.259	-1.570	.000	.208	.175	.247
Household's head suffered from chronic disease										
Not suffered (RC)		.000	1.000				.000	1.000		
Chronic fever	.292	.196	1.339	.860	2.083	.530	.034	1.699	1.040	2.777
Injuries/ Disability	.512	.002	1.669	1.203	2.315	.396	.036	1.486	1.027	2.151
Eczema	.780	.028	2.182	1.088	4.376	1.081	.003	2.947	1.435	6.053
Leprosy	1.030	.127	2.801	.746	10.521	1.924	.005	6.845	1.788	26.199
Asthma/ Breathing trouble	.279	.034	1.322	1.021	1.712	.108	.504	1.114	.812	1.529
Others	-.043	.502	.958	.844	1.087	-.235	.003	.790	.677	.922
Number of household's members suffered from chronic disease										
No member (RC)		.000	1.000				.000	1.000		
1-3 members	-.355	.000	.701	.630	.780	-.192	.003	.825	.727	.936
4 and more	.778	.002	2.176	1.340	3.536	.969	.000	2.636	1.615	4.302
Employment status of household's head										
Unemployed (RC)		.000	1.000				.000	1.000		
Daily labour	.926	.000	2.524	2.146	2.969	.869	.000	2.386	1.955	2.912
Self-employed/ employer	-.184	.023	.832	.710	.975	-.210	.039	.810	.664	.989
Employee	.403	.000	1.497	1.239	1.808	.385	.002	1.469	1.153	1.873
Division of residence										
Barisal (RC)		.000	1.000				.000	1.000		
Chittagong	-.861	.000	.423	.353	.506	-1.171	.000	.310	.252	.381
Dhaka	-.335	.000	.715	.605	.846	-.598	.000	.550	.456	.663
Khulna	-.307	.001	.736	.608	.889	-.669	.000	.512	.412	.637
Rajshahi	-.497	.000	.609	.504	.735	-.665	.000	.514	.415	.637
Rangpur	.109	.257	1.115	.923	1.347	.047	.653	1.048	.853	1.288
Sylhet	-1.039	.000	.354	.283	.443	-.824	.000	.439	.343	.561
Place of residence										
Rural (RC)			1.000					1.000		
Urban	-.297	.000	.743	.671	.824	-.778	.000	.459	.399	.529

RC= Reference category

The logistic result shows that the households whose head suffered from different types of chronic disease (like as Chronic fever, Injuries/Disability, Eczema, Leprosy, Asthma/ Breathing trouble) are more times likely to be poor as compared to the households whose

head not suffered from any types of chronic disease in both upper and lower poverty line. The model shows that in both poverty lines, the probability of household being poor is high when a large number of household's members suffered from any types of chronic disease. In both upper and lower poverty line, the result mentions that the households whose 4 and more members suffered from any chronic disease are 2.176 and 2.636 times more likely to be poor respectively as compared to the households whose no member suffered from any chronic disease.

The logistic analysis reveals that in both poverty line, it is very interesting that daily labour headed and employee headed household are more poor than unemployed headed household, but self-employed/employer headed household are less poor than unemployed headed household. In both upper and lower poverty line, it is showed that the households whose head is daily labour, and employee (odds ratio: 2.524, & 1.497 and 2.386, & 1.469 respectively) are poorer as compared to the household whose head is unemployed. Again, self-employed headed household are .832 and .810 times less likely to be poor in upper and lower poverty line respectively as compared to unemployed headed households.

Regional variations are marked with respect to household's poverty. The logistic result shows that in upper poverty line, the household lives in Sylhet is comparatively less poor (odds ratio: .354) and in lower poverty line, the household lives in Chittagong is comparatively less poor (odds ratio: .310) than the all others divisions. Again, in both poverty lines, the household lives in Rangpur are highest poor than the household lives in other divisions. The logistic model shows that urban households are .743 & .459 times less likely to be poor than rural households

From the above mentioned discussion, the present study indicates that there exists a strong and effective relationship among education, health and poverty in Bangladesh. The main factors that really play a pivotal role in poverty alleviation are productive quality education and condition of health. Keeping in the mind these factors, the current economic condition of Bangladesh can be greatly improved by improving the educational and health conditions.

4 CONCLUSION AND RECOMMENDATION

This study is done to estimate the effect of education and health on poverty in Bangladesh. The data used for this study is taken from the Household Income and Expenditure Survey (HIES) 2010 conducted by BBS. The results of logistic analysis show that increased household size, the probability of household being poor is gradually increased. Thus people should be encouraged to keep their family size small and people should be advised to use contraceptives for spacing and limiting births. Lately the reduction in population growth in Bangladesh has become stagnant. In this situation, policy and decisions makers should review the family planning programs. The study findings displays that female headed household is poorer than male headed household. The employment status of female headed households is very important in addressing the issue of poverty. Policy-makers should continue to implement policies that create employment opportunities for females.

The logistic analysis shows that an increase in educational level of household's head has an impact on the probability of a household being non-poor. Achieving higher education can lead a household from being poor to non-poor. Education is a significant tool required to be incorporated in all programs intended to fight poverty. Bangladesh needs to take education seriously since the experience in developing countries has proved its potential in poverty reduction. There is a need for the government of Bangladesh and other stakeholders to improve the quality of education if a positive success in reducing poverty is to be realized. Again, the study reveals that increasing number of literate members in household, the probability of household being poor is decreased. So, people should be encouraged to send their children in schools or other educational institutions in ensuring education for all members. In this situation, policy and decisions makers should review the policies for

achieving and ensuring education for all. The government should consider allocating more financial resources to educational sector, while striving to improve the quality in education and reduce poverty in Bangladesh.

Chronic diseases and poverty are interconnected in a vicious cycle. Chronic diseases are already the major cause of death in almost all countries, and the threat to people's lives, their health and the economic development of their countries is growing fast. In both poverty lines, the result shows that the probability of household being poor is more while the household's head suffered from various chronic diseases like chronic fever, injuries/disability, eczema, leprosy and asthma/breathing trouble as compared to the household whose head not suffered from any chronic disease. From the analysis, it is also found that when a large number of household's members suffered from any chronic disease, the probability of household being poor is more as compared to no member and a few number of household's members suffered from any chronic disease. The government should consider investment in chronic disease prevention programmes for poor people of Bangladesh struggling to reduce poverty. It is important that a line item for chronic disease prevention and control should be included in the annual health budget.

The study also found that daily labour headed households and employee headed households are poorer than unemployed headed household. This then pointed to the need of further investigating into the types of jobs people who are reported to be working are involved in. A policy implication would be that it is not the quantity of jobs that can be a good tool to deal with poverty, but the quality of the job too. The study result shows that rural households are poorer than urban households. Poverty alleviation efforts should also be made through grassroots-level planning to raise both farm and nonfarm rural real incomes. This can be done through job creation, micro- and small-scale entrepreneurship.

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