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Measuring Poverty and its Associated Factors in Different Backward Regions of Bangladesh

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Abstract

Poverty is one of the major problems for a developing country and it is much more complex in the backward regions such as Monga, Haor, Char, Hilly, Costal areas, etc. Because of the complexity of this problem, governments often fail to execute proper policies to get rid of poverty in these regions. Thus, the present study aims to discuss the poverty measurement technique being used in and the factors associated with poverty in these regions. The data for this study is extracted from Household Income and Expenditure Survey (HIES) 2010, conducted by Bangladesh Bureau of Statistics (BBS). Poverty in Bangladesh was earlier measured by direct calorie intake (DCI) method. The food energy intake (FEI) method was first used in the Poverty Monitoring Survey 1995. The cost of basic need (CBN) method is used in this study to measure poverty which was first used in HIES 1995-1996 and then in HIES-2000. Besides, two-level binary logistic regression is used to identify the factors associated with poverty. The analyses found that the households of the regions Monga, Haor, Hilly, Char and Costal areas were below upper poverty line (poor) were 79%, 50%, 48%, 66%, and 39% respectively and the households of the regions Monga, Haor, Hilly, Char and Costal areas were below lower poverty line (extreme poor) were 68%, 37%, 30%, 53%, and 26% respectively. The potential factors having significant association with poverty were found to be age and education of household head, specific region, household size, household types, number of dependents, per capita income, household own land, access to electricity, amount of cultivable land, engagement in livestock, engagement in fishing and farm forestry, household non-agricultural assets, remittance receiving from outside, number of male and female earner in the family.

Keywords: Poverty, Regression, Household, MDGs, SDGs.

INTRODUCTION

The incidence of poverty is a serious problem in Bangladesh. Millions of people in our country suffer from the hardship of poverty. Poverty eradication issues were given the highest emphasis in the Millennium Development Goals (MDGs) and subsequently, these have been kept as the priorities in the Sustainable Development Goals (SDGs). Poverty restrains economic growth and sustainable development. The social, economic, demographic, cultural and other significant contributing factors for poverty reduction have implications on the economic development and policy interventions (World Bank, 2014).

About one-third (31.5 percent) of its population is living below the upper poverty line and 17.6 percent of its population is living below the lower poverty line (HIES, 2010). According to 2005 data from BBS (HIES 2005) Bangladesh has around 40 percent of its population living below the upper poverty line and 25.1 percent of its population living below the lower poverty line. So the incidence of poverty shows downward trend day by day. But the chance of being poor can be greatly influenced by the geographic location of a household.

This study considers the regions as Haor area, Monga affected area, Costal area, Hilly Tracks, and Char area. These are the regions which are not developed in terms of landscape, literacy rate, industrialization, knowledge about modern technology in farming etc.

Haors cover about 1.99 million hectares of area in the North-East of Bangladesh which have their unique hydro-ecological characteristics (CEGIS 2012). 54% people in the haor areas depend on agriculture and 13% are involved in business. Haor area includes districts Sunamgonj, Kishorgoj, Moulvibazar and Sylhet.

The landless and poorest people survive on agricultural wage labor, their opportunities and ensuing incomes drop in this period, and trapped in what is called „Monga" a cyclical phenomenon of poverty and hunger, which also termed as seasonal poverty (Elahi & Ara, 2008). The monga affected areas are Lalmonirhat, Kurigram, Dinajpur, Gaibandha.

Because of geographical location, land characteristics and the closeness of Bay of Bengal the coastal areas of Bangladesh are particularly disaster prone. Costal area includes the districts Cox"sBazar, Chattagram, Noakhali, Potuakhali, Khulna. Hill Tracts (CHT) are the only extensive hilly area in Bangladesh lies in southeastern part of the country including Khagrachori, Rangamati, Bandorbon.

Char areas have specific characteristic and a set of special features that differentiate them from other parts of Bangladesh. Generally, char is separated from the river or sea and as a result they are low lying. Char dwellers face flood, erosions, etc. Char areas include Bhola, Jhalokati, Jamalpur.

MATERIALS AND METHODS

Data Collection Procedures:

This research is based on secondary data. The secondary data will be collected from Bangladesh Bureau of Statistics (BBS) which conducts „Bangladesh Household Income and Expenditure Survey (HIES)". The survey was duly completed without interruption in one year (February 1, 2010 to January 31, 2011). The one-year period was divided into 18 terms. The 2010 HIES covers 12,240 households, drawn from 612 Primary Sampling Units (PSUs), from 16 strata - 6 rural, 6 urban, and 4 Statistical Metropolitan Areas. Data was collected over a year to capture the seasonal variations in income, expenditure, and consumption patterns. Two-stage stratified random sampling is used to collect data from the respondents. 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. Strata: 16 - of which 6 are urban, 6 are rural, and 4 are Statistical Metropolitan Areas (SMAs). PSU: 612 (392 rural and 220 urban) were selected systematically.

FSU: 20 households from each PSU.

Sample size:
In the HIES 2010, a total of 12240 households were randomly selected from 7 divisions, 64 districts, and 384 sub-districts. In this study, 3880 households in Bangladesh is used to measure poverty and identify the important factors associated with poverty in these specific regions.

Locale of the study:
This study is conducted in different regions of Bangladesh which are assumed to be mostly poverty affected area or zone. These areas are divided into five regions. They are: Haor, Char, Costal, Hilly and Monga. This study selects those districts covering those regions. The regions covering those districts are:

Table 1: Study Area

Regions	Districts
Haor	Sunamgonj, Habiganj, Kishorgoj, Moulvibazar, Sylhet
Costal	Cox'sBazar, Chattagram, Noakhali, Potuakhali, Khulna
Hilly	Khagrachori, Rangamati, Bandorbon
Char	Bhola, Jhalokati, Jamalpur
Monga	Lalmonirhat, Kurigram, Dinajpur, Gaibandha

Measures of Poverty
The main goals of the study is to measure poverty and determine its associated factors. To measure poverty, various approach is used. In this study, Cost of Basic Needs (CBN) method is used to measure poverty.

Cost of Basic Needs (CBN) Method
With the CBN method, poverty lines represent the level of per capita expenditure at which the members of households can be expected to meet their basic needs. In Bangladesh, absolute poverty is defined as the households whose per capita expenditures are below the upper poverty line (UPL), whilst hard-core or extreme poverty refers to the households whose per capita expenditures are below the lower poverty line (LPL).

Food poverty line: $Zkf = \sum Pjk Fj$ Lower poverty line: $ZLk = Zkf + ZLkn$ Upper poverty line: $ZUk = Zkf + ZUkn$
Where, F*j* is the required per capita quantity of food item j. P*jk* is the price of food item j in kth area.

ZL*kn* is the lower allowances for non-food consumption were estimated as $ZLkn = E[yi - xi \text{ I } yi <= Zkf]$

Yi is the total per capita consumption. Xi is the food per capita consumption.
ZU*kn* is the upper allowances for nonfood consumption were estimated as $ZUkn = E[yi - xi \text{ I } xi <= Zkf]$

Determination of household poverty

Another goal of this study is to examine the factors related to the response variables (e.g., absolute poor and extreme or hard-core poor). In our study the dependent variables are dichotomous. The categories are as follows: (i) 1 = household is poor if household per capita consumption expenditure is less than UPL; 0 = otherwise (reference category) (ii) 1 = household is extreme poor if household per capita consumption expenditure is less than LPL; 0 = otherwise (reference category). The primary preference of explanatory variables for this study was based on previous other studies on the factors influencing household poverty. The independent variables used in the study are region, age of household"s head (years), household size, sex of household"s head, household type, household head"s education, number of dependents, per capita income (BDT), household own land (decimals), access to electricity, amount of cultivable land (decimals), household engaged in livestock, household engaged in farm forestry, household"s nonagricultural assets, number of male and female earner.

Two-level Binary Logistic Regression Model

Two level binary logistic regression model considering household at level-1 and communities (PSU) at level-2 can be written as follows:

$$\text{logit}(\pi_{ij}) = \log\left(\frac{\pi_{ij}}{1-\pi_{ij}}\right) = \beta_{0j} + \sum_{k=1}^{m} \beta_k X_{ijk};$$

where = $Pr(Y_{ij} = 1)$ is the probability that the household *i* in community *j* is poor, X_{ijk} is the *kth* explanatory variable ($k= 1,2,3,\ldots,m$) for household *i* in community *j* and βk is the *kth* regression coefficient to be estimated.

Also, β_0 is a fixed component and the random cluster-specific effect μ_{oj} is assumed to be independently and identically normally distributed.

Moreover, assuming different values for μ_0 , the effects of the community-specific component on the response variable can be explored in relation to other explanatory variables due to the additive nature of the model.

The two-level binary logistic regression model will be fitted by considering only the independent variables found significant in the bi-variate analyses and variables found significant at this stage will be kept in the final models.

RESULTS AND DISCUSSION

The following table represents the incidence of poverty at household level by cost of basic needs (CBN) method.

Table 2: Estimation of the Incidence of Poverty at Household Level by CBN Method

Per capita Food Poverty Line (Zf)	15475.12
Per capita lower allowances for nonfood consumption (ZLn)	3794.97

Per capita upper allowances for nonfood consumption (ZLn)	8252.75
Per capita lower poverty line (ZL= Zf+ZLn)	19270.09
Per capita upper poverty line (ZU= Zf+ZUn)	23727.87
Per household lower poverty line expenditure	91532.88
Per household upper poverty line expenditure	112707.36

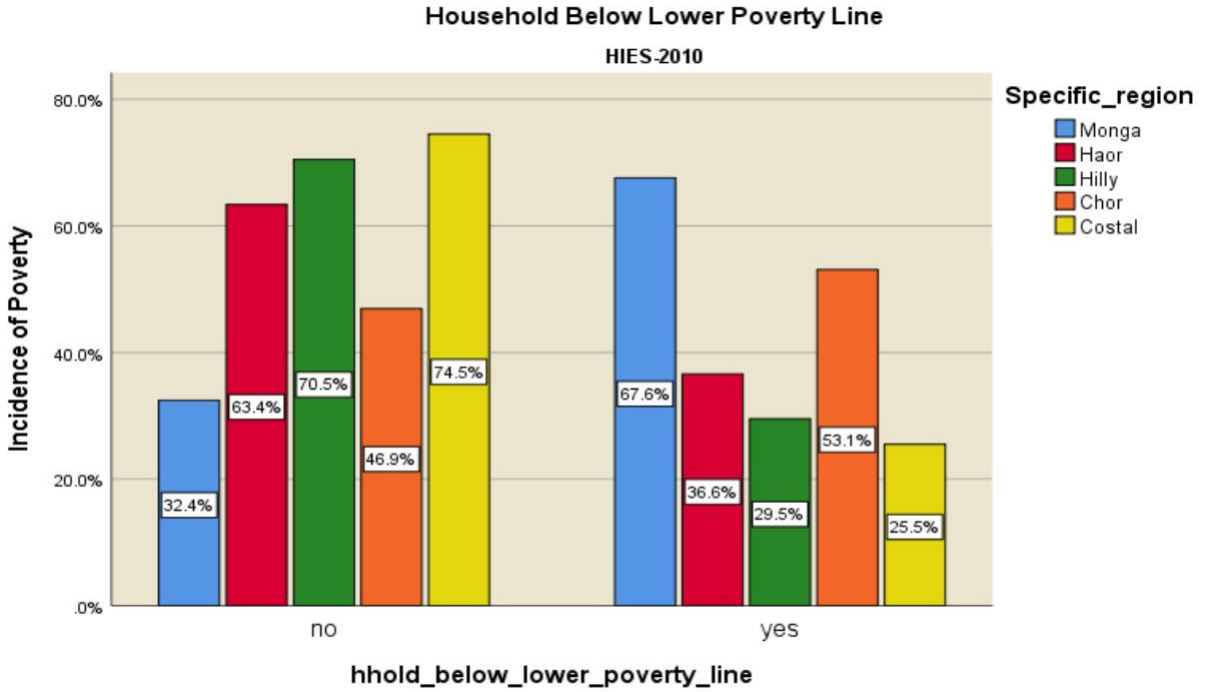
The table shows that per capita food poverty line is 15475.12 taka i.e., annual food expenditure for each person belongs to these household is 15475.12. It also shows the lower poverty line and upper poverty line. The household whose total income is less than the lower poverty line is considered as below lower poverty line or extreme poor. Similarly, the household whose total income is less than the upper poverty line is considered as below upper poverty line or poor.

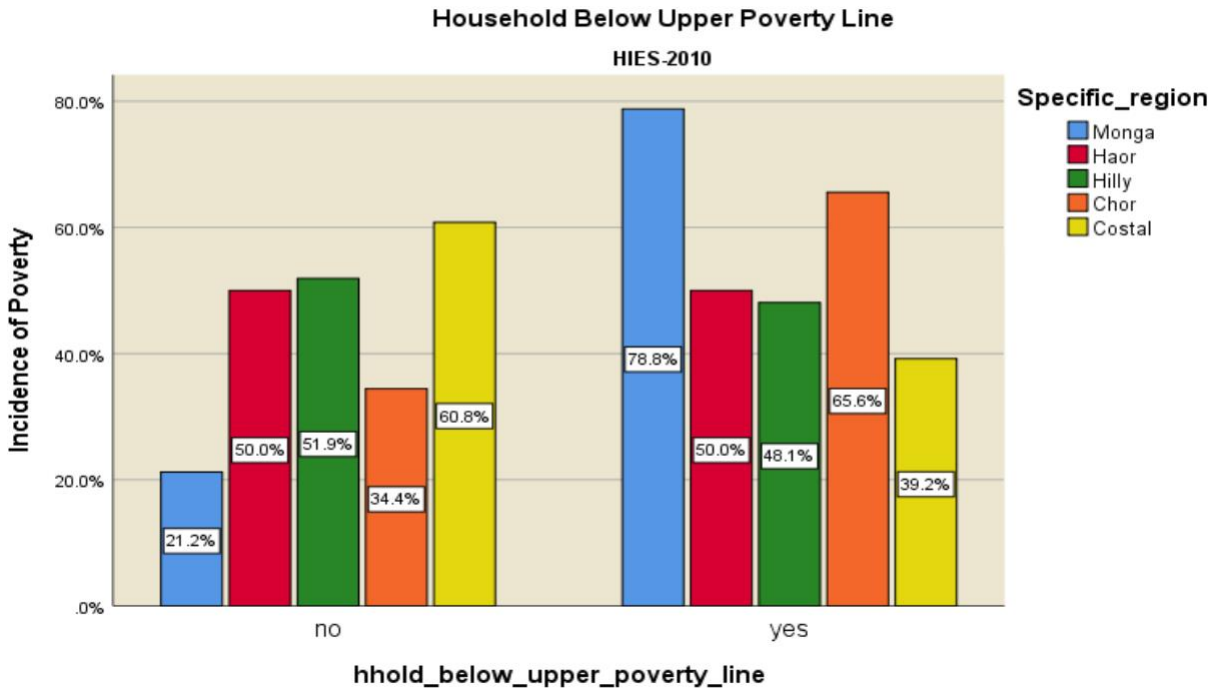
Table 3: Incidence of poverty among lower poverty line and upper poverty line

Region	Household below lower poverty line (Extreme poor)	Household below upper poverty line (Poor)
Monga	67.6%	78.8%
Haor	36.6%	50%
Hilly	29.5%	48.1%
Char	53.1%	65.6%
Costal	25.5%	39.2%
Overall	39.8%	53.4%

The table shows that, according to lower poverty line, the incidence of poverty in Monga region is 67.6% which is the highest compared to the other regions and the incidence of poverty in Costal region is 25.5% which is the lowest compared to the other regions. Similarly, according to upper poverty line, the incidence of poverty in Monga region is 78.8% which is the highest compared to the other regions and the incidence of poverty in Costal region is 39.2% which is the lowest compared to the other regions.

Hence it is concluded that the incidence of poverty is the highest in Monga region and lowest in Costal region comparing with other areas under this study. Also, through graphical inspection, the incidence of poverty among these regions can easily be understood.


Household Below Lower Poverty Line
HIES-2010
Specific_region
Monga
Haor
Hilly
Chor
Costal
Incidence of Poverty
80.0%
60.0%
40.0%
20.0%
.0%
32.4%
63.4%
70.5%
46.9%
74.5%
67.6%
36.6%
29.5%
53.1%
25.5%
no
yes
hhold_below_lower_poverty_line


Household Below Upper Poverty Line
HIES-2010
Specific_region
Monga
Haor
Hilly
Chor
Costal
Incidence of Poverty
80.0%
60.0%
40.0%
20.0%
.0%
21.2%
50.0%
51.9%
34.4%
60.8%
78.8%
50.0%
48.1%
65.6%
39.2%
no
yes
hhold_below_upper_poverty_line

Determinants of poverty (Household below lower poverty line):

In this study the dependent variables are dichotomous. The categories are as follows: 1 = household is poor if household per capita consumption expenditure is less than LPL; 0 = otherwise (reference category).

The following table represents the estimates of the factors associated with lower poverty line.

Table 4: Two-level binary logistic regression estimates of different region on Poverty (Lower poverty line) in Bangladesh.

Independent Variables		B	S.E.	Wald	Sig.	OR
H-head age		-.022	.004	37.035	.000	.978
H_type	Ref: Jhupri			87.448	.000	
	Pacca and semi pacca	-1.561	.167	87.248	.000	.210
	Kacha	-.449	.112	16.061	.000	.638
No_of_Male_earner		-.892	.086	108.472	.000	.410
No_of_Female_earner		-.336	.117	8.277	.004	.715
N_dependent		-.698	.037	347.084	.000	.497
Other assets	Ref: no					
	yes	.988	.100	97.013	.000	2.685
Operating_land	Ref: below 50			59.889	.000	
	200 and above	-1.198	.185	42.013	.000	.302
	100-200	-.780	.160	23.767	.000	.459
	50-100	-.543	.161	11.351	.001	.581
Income	Ref: 3000 and above			37.979	.000	
	Below 1000	.296	.370	.642	.423	1.345
	1000-2000	.890	.257	12.043	.001	2.436
	2000-3000	1.023	.193	28.121	.000	2.782
H_education	Ref: No education			111.852	.000	
	Class (I-V)	1.264	.124	104.611	.000	3.540
	Class (VI and above)	.535	.149	12.876	.000	1.708
Region	Ref: Costal			217.481	.000	

	Monga	1.954.154	160.227	.000	7.056
	Haor	.971.127	58.798	.000	2.639
	Hilly	-.034.172	.039	.844	.967
	Char	1.572.155	103.082	.000	4.816
Electricity	Ref: no				
	yes	.990.105	88.652	.000	2.691
Forestry	Ref: no				
	yes	.499	.10721.610		.0001.647
Remittances	Ref: no				
	yes	.939	.19124.247		.0002.558
H_head sex	Ref: Female				
	Male	-.169	.1641.064		.302.844
Constant		.585	.3233.274		.0701.795

With the increase in household head's age, the likelihood of being extremely poor seems to decrease (OR=.978). The obvious reason is that asset ownership tends to increase with age. Our findings are consistent with the results of Bogale *et al*. (2005). When the household is living in Kacha house and Pacca and semi pacca, the likelihood of being extremely poor seems to decrease. For example, the household living in Kacha house were 0.638 times less likely to be extremely poor and the household living in Pacca and semi pacca house were 0.210 times less likely to be extremely poor compared to the household living in Jhupri. World Bank (2014) also reported the same.

With the increase in number of male and female earners, the likelihood of being extremely poor seems to decrease. The odds ratios were 0.410 and 0.715 for number of male earner and number of female earner respectively. But an increase in the number of dependent members, surprisingly the likelihood of being extremely poor also seems to decrease (OR = 0.497). With the increase in operating land, the likelihood of being poor seems to decrease compared to the reference category (below 50 decimals). The operating land of a household between 50-100 decimals are
0.581 times, the operating land of a household between 100-200 decimals are 0 .459 times, the operating land of a household 200 and above decimals are .302 times less poor than the household operating below 50 decimals.

The income of household below 3000tk seems to be extremely poor. The income of households below 1000tk are 1.345 times and the income of households between 1000-2000tk are 2.436 times and the income of households between 2000-3000tk are 2.78 times likely to be extremely poor compared to the households whose income is 3000 and above.

The likelihood of being extremely poor also seems to be increased when the education of the household head increased compared to the household head having no education. But education of the household head who have passed Class (VI and above) are less likely to be extremely poor compared to who have passed Class (I-V). The data analysis suggests that households from Hilly region is 0.967 times less likely to be extremely poor compared to the households from Costal region. But the households from Monga, Haor and Char region are likely to be poor compared to the reference group (Costal) and the odds ratios are 7.056, 2.639 and 4.816 respectively. It is seen that the Monga region is likely to be extremely poor compared to the other regions.

To improve the situation of poverty, the availability of electricity does not help much in these areas. The results indicated that the households with electricity access were 2.691 times likely to be extremely poor than the household without electricity access. The fact is that getting electricity connection is not available in these regions specially in hilly, coastal, char, etc. The likelihood of being extremely poor seems to be decrease 0.844 times if the household head's sex is male compared to female.

Determinants of poverty (Household below upper poverty line):
The following table represents the estimates of the factors that are associated with the upper poverty line.

Table 5: Two-level binary logistic regression estimates of different region on Poverty (Upper poverty line) in Bangladesh.

Independent Variables		B	S.E.	Wald	Sig.	OR
H-head age		-.023	.004	42.691	.000	.977
H_type	Ref: Jhupri			124.453	.000	
	Pacca and semi pacca	-1.628	.149	118.755	.000	.196
	Kacha	-.418	.112	14.046	.000	.658
No_of_Male_earner		-.704	.073	93.859	.000	.495
No_of_Female_earner		-.328	.112	8.555	.003	.721
N_dependent		-.580	.033	306.964	.000	.560
Other assets	Ref: no					
	yes	.791	.094	71.486	.000	2.205
Operating_land	Ref: below 50			57.348	.000	
	200 and above	-1.127	.159	50.008	.000	.324
	100-200	-.628	.152	17.034	.000	.534
	50-100	-.374	.161	5.422	.020	.688

Income	Ref: 3000 and above			37.142	.000	
	Below 1000	.466	.380	1.501	.220	1.593
	1000-2000	1.125	.301	14.001	.000	3.080
	2000-3000	1.149	.235	23.913	.000	3.156
H_education	Ref: No education			113.650	.000	
	Class (I-V)	1.220	.115	112.385	.000	3.386
	Class (VI and above)	.625	.136	21.208	.000	1.869
Region	Ref: Costal			181.169	.000	
	Monga	1.869	.160	136.521	.000	6.483
	Haor	.845	.118	51.085	.000	2.327
	Hilly	.133	.158	.711	.399	1.142
	Char	1.341	.151	78.966	.000	3.823
Electricity	Ref: no					
	yes	1.119	.102	120.055	.000	3.061
Forestry	Ref: no					
	yes	.443	.103	18.644	.000	1.557
Remittances	Ref: no					
	yes	1.002	.170	34.570	.000	2.724
H_head sex	Ref: Female					
	Male	-.209	.159	1.738	.187	.811
Constant		1.128	.299	14.236	.000	3.090

Similarly, with the increase in household head's age, the likelihood of being poor seems to decrease (OR=.977). The obvious reason is that asset ownership tends to increase with age. Our findings are consistent with the results of Bogale *et al*. (2005).

When the household is living in Kacha house and Pacca and semi pacca, the likelihood of being poor seems to decrease. For example, the household living in Kacha house were 0.658 times less likely to be extremely poor and the household living in Pacca and semi pacca house were 0.196 times less likely to be poor compared to the household living in Jhupri. World Bank (2014) also reported the same. With the increase in number of male and female earners, the likelihood of being poor seems to decrease. The odds ratios were 0.495 and 0.721 for number of male earner and number of female earners respectively. But an increase in the number of dependent members, surprisingly the likelihood of being poor also seems to decrease (OR = 0.56).

With the increase in operating land, the likelihood of being poor seems to decrease compared to the reference category (below 50 decimals). The operating land of a household between 50-100 decimals are .688 times, the operating land of a household between 100-200 decimals are .534 times, the operating land of a household 200 and above decimals are .324

times less poor than the household operating below 50 decimals. The income of household below 3000tk seems to be poor. The income of households below 1000 tk are 1.593 times and the income of households between 1000-2000tk are 3.08 times and the income of households between 2000-3000tk are 3.156 times likely to be extremely poor compared to the households whose income is 3000 and above.

The likelihood of being poor is also seems to be increased when the education of the household head increased compared to the household head having no education. But education of the household head who have passed Class (VI and above) are less likely to be poor compared to who have passed Class (I-V). The data analysis suggests that households from Hilly, Monga, Haor and Char region are likely to be poor compared to the reference group (Costal) and the odds ratios are 1.142, 6.483, 2.327 and 3.823 respectively. It is seen that the Monga region is likely to be poor compared to the others region.

To improve the situation of poverty, the availability of electricity does not help much in these areas. The results indicated that the households with electricity access were 3.061 times likely to be poor than the household without electricity access. The fact is that getting electricity connection is not available in these regions specially in hilly, coastal, char, etc. The likelihood of being poor seems to be decrease .811 times if the household head's sex is male compared to female.

CONCLUSION & RECOMMENDATIONS

This research explores the factors of poverty among different backward regions in Bangladesh using HIES 2010 dataset. A widely used measure of poverty, the cost of basic need (CBN) method is used to measure poverty among this region. Here two poverty lines, namely lower poverty line (LPL) and upper poverty line (UPL) were used to evaluate the fact of poverty that if the household is below poverty line or not among these regions. The analyses present that among Monga, Haor, Char, Hilly, Costal areas the incidence of poverty is the highest in Monga region and lowest in Costal region comparing with other areas under this study.

There are various factors that are in charge of poverty, which must be investigated in order to control or minimize poverty. This study identifies that household type, number of male and female earner, number of dependent, assets owned, operating land, income, household head education and electricity are significantly affecting poverty of these region.

The household whose total income is less than the lower poverty line is considered as below lower poverty line or extreme poor. Similarly, the household whose total income is less than the upper poverty line is considered as below upper poverty line or poor. This indicates that the people from these backward areas are suffering the most from poverty and require immediate step from Government. So, the administration, different agencies as well as Government should pay proper attention to control the factors of poverty to achieve a better life for the welfare of the resident's future and for the sake of the country.
The study used data on household income and expenditure survey (HIES)-2010, but in present, HIES-2016 data is available. If HIES-2016 data is used, it will be easy to understand the current poverty profile of those region. Besides the HIES survey conducted by BBS in nationally. For this reason, the actual image of the backward region of Bangladesh does not emerge. Therefore, the policy makers cannot take proper steps to eradicate poverty in these backward regions. If a survey is conducted specially for these regions, it will be helpful to overcome the current problem.

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