

# A study of impact on socio-demographic changes in Bangladesh: A multivariate analysis

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**Abstract:** Economic growth of a country includes economic development, but does not reflect every citizen's growth. Ensuring inclusive growth has turned out to be a major challenge for Bangladesh. Socio-demographic development is the relationship between economic activity and social life. In any society, the most important factor that influences patterns of household income and expenditure is the wealth status of the household. In general, research employs influential analysis solution and brings into focus those influential factors that must be given attention. The study isolates factors contributing to the changes in each attribute. It explains the correlation between Bangladesh's changes and socio-economic indicators. And, 79.6% variation of the Monthly Total Expenditure is explained by the influential factors. All socio-economic variables display statistical significant correlation with measure of demographic changes. From the multiple regression analysis technique the independent variables education, wealth index, type of place of residence, husband or partner's occupation, type of cooking fuel, husband or partner's age, household has: mobile phone, electricity, motorcycle or scooter and monthly total income have significant effect on monthly total expenditure.

**Keywords:** Multiple regression, influential factors, expenditures, economic development, Demographic changes.

## I. INTRODUCTION

Bangladesh is overpopulated and will become even more so and that this is inhibiting the demographic and social prosperity of the country keeping Bangladesh one of the poorest countries in the world is incontestable. The human development index(HDI) is widely used to compare socio-demographic situation in many countries. According to HDI, Bangladesh is ranked at position 145 out of 173. Faithful economic growth, strong inflow of remittances, controlled population growth, stable exchange rate helped improve per capital income of Bangladesh. For the current 2015 fiscal year, lower-middle-income economics are those with a GNP per capital of more than USD 1,045 but less than USD 4,126 (Calculated in Atlas methods).

In the decade since 2004, Bangladesh averaged a GDP growth of 6.5%, that has been largely driven by its exports of readymade garments, remittances and the domestic agricultural sector. In 2016, per-capita income was estimated as per IMF data at US\$3,840 (PPP) and US\$1,466 (Nominal). According to the IMF, Bangladesh's economy is the second fastest growing major economy of 2016, with a rate of 7.1%. In addition to presenting the main findings from BDHS 2014 on fertility, family planning, maternal and child health and nutrition, this report highlights the major changes that have taken place in Bangladesh's demographic and health situation. Results of BDHS 2014 illustrate that Bangladesh has achieved the Millennium Development Goal (MDG) 4 target ahead of time. There are evidences that Bangladesh is moving ahead in achieving MDG 5. Since BDHS 2004, deliveries attended by skilled providers have increased by 2.6 times and deliveries in health facilities have increased by more than 3 times. Structural reforms have not only stalled but also slipped. Despite an improving global outlook, growth in Bangladesh is projected to slow to 6.4 percent in FY18.

Bangladesh is in a difficult position to improve its HDI status having a predominately rural population of over 80% with little exporting capability. The country is one of the most densely populated countries in the world with 949 people per square kilometer and is the most densely populated of the developing nations whereas neighboring India contains population density of only 336 people per square kilometer. The population is assumed to be almost double by the year 2050 (Gayen, 2002).

## II. OBJECTIVES OF THE STUDY

The main objective of the study is to find the impact of influential factors for demographic changes in Bangladesh. The income of individual respondents is increasing and the expenditure of individual respondents is also developed. In this study, we identify the

most influential factor effects by individual parameter test. Growth factor refers to the expansion of production potential of the economy that is represented by an upward shift of the production possibility frontier.

### III. DATA AND METHODOLOGY

To estimate the influential factors for socio-demographic development in Bangladesh, we have mainly used the data extracted 2381 individual respondents from Bangladesh Demographic and Health Survey (BDHS) 2014. The dependent variable used in this analysis was the monthly total expenditure. All the independent variables used in the analysis were not found directly from the BDHS data set. Again for the convenience, we computed some new explanatory variables and transformed some original and computed variables that are suitable for study. They were recorded into homogeneous sub-groups where necessary. Some other variables remain unchanged. Most of the variables are coded as categorical and some are in dummy. In this paper, analysis has also been carried out using IBM SPSS 21.

#### Multiple Regression Analysis

Multiple linear regressions are the most common form of linear regression analysis. As a predictive analysis, the multiple linear regressions are used to explain the relationship between one continuous dependent variable and two or more independent variables. The independent variables can be continuous or categorical (dummy coded as appropriate).

In multiple regressions we form a linear composite of explanatory variables in such way that it has maximum correlation with a criterion variable. The main objective in using this technique is to predict the variability of the dependent variable based on its covariance with all the independent variables. In our study, we want to estimate the demographic factors on economic development in Bangladesh.

Regression equation can be written as,

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + b_{11}X_{11} + b_{12}X_{12} + b_{13}X_{13} + b_{14}X_{14} + b_{15}X_{15}$$

Where,  $X_1$ =Respondents current age,  $X_2$ =Division,  $X_3$ =Type of place of residence,  $X_4$ =Household has: mobile phone,  $X_5$ = Household has: electricity,  $X_6$  = Household has: television,  $X_7$ = Household has: motorcycle/scooter,  $X_8$ =Education,  $X_9$ =Wealth Index,  $X_{10}$ =Husband/partner's education level,  $X_{11}$ =Monthly total income,  $X_{12}$ = Main floor material,  $X_{13}$ = Main wall material,  $X_{14}$ = Type of cooking fuel,  $X_{15}$ = Husband/partner's occupation. Here  $b_0$  is the intercept and  $b_1, b_2, b_3, \dots, b_{15}$  are analogous to the slope in linear regression equation and are also called regression coefficients. The appropriateness of the multiple regression models as a whole can be tested by the F-test in the ANOVA table. A significant F test indicates a linear relationship between Y and at least one of the X's.

### IV. ANALYSIS AND RESULTS

Table I : Result of multiple regression for the significant effect of all factors in the model of monthly total expenditure in Bangladesh

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	.682	.197		3.472	.001	.297	1.068
Respondent's current age	-.073	.046	-.042	-1.601	.109	-.163	.016

Division	.190	.013	.293	14.309	.000	.164	.216
Type of place of residence	-.395	.062	-.123	-6.398	.000	-.516	-.274
Household has: mobile phone	.386	.101	.153	3.817	.000	.187	.584
Household has: electricity	-.269	.107	-.109	-2.512	.012	-.478	-.059
Household has: television	-.139	.066	-.053	-2.100	.036	-.270	-.009
Household has: motorcycle/scooter	-.118	.049	-.047	-2.422	.016	-.214	-.023
Education	-.145	.022	-.176	-6.670	.000	-.187	-.102
Wealth index	.124	.037	.133	3.388	.001	.052	.196
Husband/partner's education level	.035	.031	.027	1.112	.266	-.027	.096
Monthly Total Income	.046	.020	.045	2.362	.018	.008	.085
Main floor material	.286	.079	.102	3.623	.000	.131	.440
Main wall material	-.050	.016	-.064	-3.175	.002	-.081	-.019
Type of cooking fuel	.051	.022	.047	2.290	.022	.007	.095
Husband/Partner's Occupation	.046	.014	.065	3.243	.001	.018	.073
a. Dependent Variable: Monthly Total Expenditure							

Global Test on the set of Independent Variables (Testing the Multiple Regression Model)

Step-1:

$$H_0: b_1 = b_2 = b_3 = \dots \dots \dots b_{14} = b_{15} = 0 \text{ (that is the model is invalid)}$$

$$H_1: \text{Not all } b\text{'s are zero (That is the model is valid)}$$

Step-2: Here the level of significance is,  $\alpha = .05$

Step-3: F-test statistic is used here.

Step-4: If P-value <  $\alpha$ -value,  $H_0$  will be rejected.

If P-value >  $\alpha$ -value,  $H_0$  will be accepted.

Step-5: Making calculation and taking decision.

Table II: ANOVA

Model		Sum of square	Df	Mean Square	F	Sig.
1	Regression	643.727	15	42.91	34.24	.000 <sup>b</sup>
	Residual	2954.709	2359	1.253		
	Total	3598.436	2380			

a. Dependent Variable: Monthly Total Expenditure

Since  $p\text{-value} < \alpha\text{-value} (.05)$ ,  $H_0$  is rejected and  $H_1$  is accepted. That is at least one variable has significant effect. This means that the regression model is valid and the independent variables have enough capability to estimate the monthly total expenditure.

Test of Hypothesis on each of the Independent Variables (Testing the Individual Regression Coefficient)

Step-1:  $H_0: b_1 = 0, b_2 = 0, b_3 = 0, \dots, b_{14} = 0, b_{15} = 0$

$H_1: b_1 \neq 0, b_2 \neq 0, \dots, b_{15} \neq 0$

Step-2: Here the level of significance is,  $\alpha = .05$

Step-3: t-test statistic is used here.

Step-4: If  $P\text{-value} < \alpha\text{-value}$ ,  $H_0$  will be rejected.

If  $P\text{-value} > \alpha\text{-value}$ ,  $H_0$  will be accepted.

Step-5: Making calculation and taking decision.

## V. DISCUSSION

The monthly total expenditure is dependent numeric variable, we have tried to find out the significant factors affecting on economic development through regression model.

The result of regression analysis are represented in the table 1, present the estimate of regression coefficient ( $\beta$ ), S.E, T-test, P-value that are calculate for each of the categorical variable. From the table 1, we can see that, there are 15 variables appears as the significant predictor in case of monthly total expenditure. And another variables appears as insignificant predictor in case of monthly total expenditure.

The intercept value  $b_0 = .682$  indicates that, in the absence of the independent variables  $X_1, X_2, X_3, \dots, X_{15}$ , on an average the dependent variable (monthly total expenditure) will be .682.

Coefficient of respondent's current age is  $-.073$  that means for one unit increase in the respondent's current age, on an average monthly total expenditure will decrease by .073 units, holding other constant with 95% confidence interval  $(-.163, .016)$ . The P-value  $(.109) > \alpha\text{-value} (.05)$ , so  $H_0$  is accepted i.e.  $b_1 = 0$ . That means, the variable respondent's current age is not a good estimator, because it has not enough capability to estimate monthly total expenditure.

Coefficient of division is  $.190$  that means for one unit increase in the division, on an average monthly total expenditure will increase by .190 units, holding other constant with 95% confidence interval  $(0.164, 0.216)$ . The P-value  $< \alpha\text{-value} (.05)$ , so  $H_0$  is rejected i.e.  $b_2 \neq 0$ . That means the variable division is a good estimator, because it has enough capability to estimate monthly total expenditure.

Type of place of residence has been appeared as a significant factor affecting monthly total expenditure negatively. Coefficient of type of place of residence is  $-.395$  that means for one unit increase in the type of place of residence, on an average monthly total expenditure will decrease by .395 units, holding other constant with 95% confidence interval  $(-.516, -.274)$ . The P-value  $< \alpha\text{-value} (.05)$ , so  $H_0$  is rejected i.e.  $b_3 \neq 0$ . That means the variable type of place of residence is a good estimator, because it has enough capability to estimate monthly total expenditure.

Household has: mobile phone has also most significant effect on monthly total expenditure positively. Coefficient of household has: mobile phone is .386 that means for one unit increase in the household has: mobile phone, on an average monthly total expenditure will increase by .386 units, holding other constant with 95% confidence interval (.187, .584). The P-value (.000) <  $\alpha$ -value (.05), so  $H_0$  is rejected i.e.  $b_4 \neq 0$ . That means the variable household has: mobile phone is a good estimator, because it has enough capability to estimate monthly total expenditure.

Household has: electricity has been appeared as significant factor affecting on monthly total expenditure negatively. Coefficient of household has: electricity is -.269 that means for one unit increase in the household has: electricity, on an average monthly total expenditure will decrease by .269 units, holding other constant with confidence interval (-.478, -.059). The P-value (.012) <  $\alpha$ -value (.05), so  $H_0$  is rejected i.e.  $b_5 \neq 0$ . That means the variable household has: electricity is a good estimator, because it has enough capability to estimate monthly total expenditure.

Coefficient of household has: television is -.139 that means for one unit increase in the household has: television, on an average monthly total expenditure will decrease by .139 units, holding other constant with 95% confidence interval (-.270, -.009). The P-value (.036) <  $\alpha$ -value (.05), so  $H_0$  is rejected i.e.  $b_6 \neq 0$ . That means the variable household has: television is a good estimator, because it has enough capability to estimate monthly total expenditure.

Coefficient of household has: motorcycle/scooter is -.118 that means for one unit increase in the household has: motorcycle/scooter, on an average monthly total expenditure will decrease by -.118 units, holding other constant with 95% confidence interval (-0.214, -0.023). The P-value (.016) <  $\alpha$ -value (.05), so  $H_0$  is rejected i.e.  $b_7 \neq 0$ . That means the variable household has: motorcycle/scooter is a good estimator, because it has enough capability to estimate monthly total expenditure.

Coefficient of education is -.145 that means for one unit increase in the education, on an average monthly total expenditure will decrease by .145 units, holding other constant with 95% confidence interval (-.187, -0.102). The P-value (.000) <  $\alpha$ -value (.05), so  $H_0$  is rejected i.e.  $b_8 \neq 0$ . That means the variable education is a good estimator, because it has enough capability to estimate monthly total expenditure.

Coefficient of wealth Index is .124 that means for one unit increase in the wealth Index, on an average monthly total expenditure will increase by .124 units, holding other constant with 95% confidence interval (.052, .196). The P-value (.001) <  $\alpha$ -value (.05), so  $H_0$  is rejected i.e.  $b_9 \neq 0$ . That means the variable wealth index is a good estimator, because it has enough capability to estimate monthly total expenditure.

Coefficient of husband/partner's education level is .035 that means for one unit increase in the husband/partner's education level, on an average monthly total expenditure will increase by .035 units, holding other constant with 95% confidence interval (-.027, .096). The P-value (.266) >  $\alpha$ -value (.05), so  $H_0$  is accepted i.e.  $b_{10} = 0$ . That means the variable husband/partner's education level is not a good estimator, because it has not enough capability to estimate monthly total expenditure.

Coefficient of monthly total income is .046 that means for one unit increase in the monthly total income, on an average monthly total expenditure will increase by .046 units, holding other constant with 95% confident interval (.008, .085). The P-value (.018) <  $\alpha$ -value (.05), so  $H_0$  is rejected i.e.  $b_{11} \neq 0$ . That means the variable monthly total income is a good estimator, because it has enough capability to estimate monthly total expenditure.

Coefficient of main floor material is .286 that means for one unit increase in the main floor material, on an average monthly total expenditure will increase by .286 units, holding other constant with 95% confident interval (0.131, 0.440). The P-value (.000) <  $\alpha$ -value (.05), so  $H_0$  is rejected i.e.  $b_{12} \neq 0$ . That means the variable main floor material is a good estimator, because it has enough capability to estimate monthly total expenditure.

Coefficient of main wall material is -.050 that means for one unit increase in the main wall material, on an average monthly total expenditure will decrease by -.050 units, holding other constant with confident interval (-.81, -0.019). The P-value (.002) <  $\alpha$ -value (.05), so  $H_0$  is rejected i.e.  $b_{13} \neq 0$ . That means the variable main wall material is a good estimator, because it has enough capability to estimate monthly total expenditure.

Coefficient of type of cooking fuel is .051 that means for one unit increase in the type of cooking fuel, on an average monthly total expenditure will increase by .051 units, holding other constant with confident interval (0.007, 0.095). The P-value (.022) <  $\alpha$ -value

(.05), so  $H_0$  is rejected i.e.  $b_{14} \neq 0$ . That means the variable type of cooking fuel is a good estimator, because it has enough capability to estimate monthly total expenditure.

Coefficient of husband/partner's occupation is .046 that means for one unit increase in the husband/partner's occupation, on an average monthly total expenditure will increase by .046 units, holding other constant with confident interval (.018, 0.073).The P-value (.760) >  $\alpha$ -value (.05), so  $H_0$  is accepted i.e.  $b_{15} = 0$ . That means the variable respondent's occupation is not a good estimator, because it has not enough capability to estimate monthly total expenditure.

Determination of the value of  $R^2$

Table III: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.892	.796	.794	.558

From the above table,  $R^2 = \frac{SSR}{SST} = .796 = 79.6\%$

Where,

SSR= Sum of Square Regression

SST= Sum of Square Total

79.6% variation of the dependent variable Y (Monthly Total Expenditure) is explained by the independent variables i.e Respondent's current age, Monthly Total Income, Type of place of residence, Husband/Partner's Occupation, Main wall material, Household has: motorcycle/scooter, Type of cooking fuel, Division, Household has: mobile phone, Husband/partner's education level, Household has: television, Main floor material, Husband/partner's age, Education, Wealth index, Household has: electricity.

## VI. CONCLUSION

The present study attempts to examine the socio-demographic changes and their impact on the economic development of Bangladesh. The study shows that 73 percent of households in Bangladesh have access to electricity, either from the national grid or solar power connections. Independently, the national grid covers 62 percent of households all over the country, with more coverage in urban areas (91 percent in urban and 51 percent in rural areas)(BDHS 2014).

Education may provide better employment opportunities outside home and providing education to male. The Government of Bangladesh is trying to remove illiteracy from society and as a result, the recent enrolment rate has much increased. The strong influence of mother's education on the use of health care services is consistent with the findings from other studies (Abbas and Walkerns, 1986; Elo, 1992; Becker et al., 1993; Fosu, 1994). Also, women's whose husbands are involved in business/services are more likely to use both modern and traditional health care services.

Based on the findings of the study, we can conclude that income of individual respondents is increasing and the expenditure of individual respondents is also increasing. Hence, the contribution of women in family is also increasing day by day. To ahead the country's position economically we have to increase women's empowerment just like other developed countries. We have to increase our GDP growth and it is based on agriculture, industry, manufacturing and services. We need to improve conditions of these sectors for increasing GDP. The increasing trend of development is remarkable in recent years in Bangladesh. After all, the development of our country is increased gradually with the comparison of other developed and developing countries.

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