

# Socioeconomic Determinants of Household Fertility in Bangladesh

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**Abstract:** This paper unravels some key determinants of fertility in Bangladesh by showing a multivariate model analysis on a cross-sectional data set. The sample data set is taken from a massive household survey conducted in 2011. From one thousand and fifty two variables, I have selected twenty nine key regressors covering ten socioeconomic domains on the basis of the following factors: education, wealth, nutrition, locality, religion and lastly the awareness of family planning tools and services.

It is demonstrated that in spite of the fact that a linear model functions works well in accommodating more regressors but it is plagued with the presence of heteroscedasticity. We then defeat this issue by demonstrating that an alternative log-linear model with less regressors finishes the Breusch-Pagan test without a drawback. At long last, we display the major discussions and conclusion.

**Keywords:** Household Fertility, Bangladesh, Multivariate Regression, Log-Linear Model, Micro econometrics, Cross-Sectional Data Analysis.

## 1 Introduction

The total fertility rate (TFR) is a measure of the level of fertility. It is more direct than the crude birth rate, since it refers to births per woman. This rate shows the potential for population change in the country. A rate of two children for each woman is viewed as the substitution rate for a population, bringing about relative stability regarding total numbers. Rates above two children demonstrate populations developing in size and whose median age is decreasing. Higher rates may likewise show challenges for families, in a few circumstances, to educate and feed their children and for women to enter the work compel. Rates beneath two children show populations diminishing in size and becoming more established. Now, fertility rate is a very important issue of Bangladesh being one of the most densely populated country. In 2011, the total population was 152,518,015 which ranks Bangladesh 8<sup>th</sup> in the world. The official census which is conducted every after 10 yearshas a baseline for population studies on Bangladesh, the last one was conducted in 2011. Though the marriage pattern of Bangladesh is often considered as the important factor for this but MN, H and J, C (1990) mentioned in his paper "Bangladesh Fertility Survey 1989" that marriage patterns were not found to have a large effect on fertility. They added that 41 percent of household were visited by female family planning

workers. Thus, the household fertility of Bangladesh is still an important issue to discuss about and this paper unravels some important determinants regarding this issue.

## 2 Literature Review

The major objective of Bangladesh demographic and health survey 2011 was to survey fertility stages, developments, and differentials in Bangladesh which is more or less relevant to my paper. The survey includes the fact that fertility varies extensively by administrative divisions. Fertility is lowest in Khulna division i.e. 1.9 births per woman, followed by Rajshahi and Rangpur at 2.1 births per woman, and highest in Sylhet i.e. 3.1 births per woman and Chittagong with 2.8 births per women. The current Health, Population, and Nutrition Sector Development Program of Bangladesh (HPNSDP) targets to reduce fertility to 2.0 births per woman by 2016. Khulna has already reached that level, and Rajshahi and Rangpur are very close. My paper include these phenomenon in the methodology part (summary of variables). One of the important factor of this survey was that the education of women is strongly associated with fertility. The fertility rate decreases to 1.9 births for women who have completed secondary or higher education from 2.9 births for women with no education. On the contrary, fertility rate is negatively related to wealth.

The survey also talks about the ever born child, nutrition, age of husbands and wives, education etc. as the factors of household fertility. Thus, a very important reason for fertility rate is also the fact that primary infertility is very negligible in Bangladesh which is slightly more than 2 percent.

Bangladesh fertility survey of 1989 portrays a different view about fertility rate in comparison to the discussed survey of 2011. MN and J (1990) chalks out the fact that the fertility rate was declined by 15 percent since 1975 and the contributors include higher female marital age and reduced number of births for women less than 20 years old. The survey also talks about the difference between the rural and the urban phenomenon. The rural women marry early and expects at least 2 to 3 children and expects to have 1 son among them. The urban women are considered to have less children compared to that of the rural areas. The further findings of this survey considers age as one of the important factor of fertility. I too have mentioned all these in my paper. The basic finding is really surprising that among the women aged 45-49, the fertility rate is still high. Thus, the mean age difference in years between the husbands and wives is 7.5 which means women get married in an early age and gives birth to many children. Hence, the fertility rates increases to a great extent.

Miah (1993), in his paper "Determinants of High Fertility in Bangladesh: Their Implications for Social Development" said that the study basically examines the determinants of fertility among the married women in Bangladesh and their consequences for social development. He suggested multivariate models analysis for determining the fertility rate which I have done in my paper in the empirical part. He further said that infant mortality, age, religion, husband's education and the practice of family planning have positive effect on marital fertility. He added that wives' education and her employment in the modern sector have inverse effect on marital fertility. These information helped my paper to confirm its discussion and conclusion. The survey includes the statistics that the fertility rate of Bangladesh was 4.9 (Population Reference Bureau, 1991).

Lastly, The Basic Econometrics by Damodar N. Gujarati is a very well published book of econometrics. It helped a lot in case of preparing the empirical as well as the methodological parts of my paper. It includes all the necessary models and basic formulas of econometrics which is an essential part of this paper.

### 3 Methodology

#### 3.1 Descriptive Statistics

This cross-sectional dataset is examined from the 2011 Bangladesh Demographic and Health Survey (BDHS). It is the 6th national demographic and health study distributed intended to give point by point data on different fundamental national markers of social advancement, including fruitfulness, which is the fundamental center of this paper. Our regression models endeavors to predict the quantity of children ever born to a family by joining regressors assembled over the accompanying ten key factors:

1. Educational and Wealth of Parents: r\_edu, h\_edu, wealth, affluency
2. Age and Health of Parents: r\_age, h\_age, nutrition
3. Demography: dhaka, chittagong, sylhet, etc.
4. Religion: muslim, hindu, christian, buddhist
5. Occupation: r\_works, h\_fisherman, h\_midtier, h\_lowtier, etc
6. Knowledge of Family Planning: heard\_of\_fp
7. Awareness of Community Health Services: aware\_of\_clinic
8. Contraceptive Measures: tcont
9. Domestic Abuse: dom\_abuse\_1, dom\_abuse2, etc
10. Affiliations to NGOs or Microcredit Organizations: brac, asha

#### 3.2 Description of Variables

The following table describes all variables of interest.

Variables	Label/description	Variable type
everborn	total children ever born	Quantitative
r_age	respondent's current age	Quantitative
r_edu	education in single years	Quantitative
h_age	husband/partner's age	Quantitative
h_edu	husband/partner's total number of years of education in single years	Quantitative
wealth	wealth index ranging from 0 to 100	Quantitative
affluency	piecewise dummy of the ultra-rich	Quantitative
nutrition	nutritional score	Quantitative
rural	type of place of residence	Qualitative
dhaka	Bangladesh division	Qualitative
chittagong	Bangladesh division	Qualitative
barisal	Bangladesh division	Qualitative
rajshahi	Bangladesh division	Qualitative
khulna	Bangladesh division	Qualitative
rangpur	Bangladesh division	Qualitative
sylhet	Bangladesh division	Qualitative

muslim	Religion	Qualitative
hindi	Religion	Qualitative
buddhist	Religion	Qualitative
christian	Religion	Qualitative
tcont	Traditional contraceptive use	Qualitative
heard_of_fp	Heard about family planning	Qualitative
aware_of_clinic	aware of community clinic	Qualitative
r_works	respondent currently working	Qualitative
h_fisherman	Husband is a fisherman	Qualitative
h_agri	Husband works in agriculture	Qualitative
h_poultry_cat~e	Husband raises cattle or poultry	Qualitative
h_lowtier	Husband has a low-paying job such	Qualitative
h_nonagri	Husband works in non-agricultural sector	Qualitative
h_midtier	Husband has a mid-level job	Qualitative
brac	Respondent belongs to brac	Qualitative
asha	Respondent belongs to asha	Qualitative
dom_abuse_1	beating justified if wife goes out without telling	Qualitative
dom_abuse_2	beating justified if wife neglects the children	Qualitative
dom_abuse_3	beating justified if wife argues with husband	Qualitative
dom_abuse_5	beating justified if wife burns the food	Qualitative

### 3.3 Summary of Variables

The following table summarizes all variables of interest.

Variables	Observation	Mean	Std. Deviation	Min	Max
everborn	21218	3.224715	1.743626	1	11
r_age	21218	32.9097	8.533218	13	49
r_edu	21218	6.618013	3.129052	1	18
h_age	21218	42.43322	10.79271	17	99
h_edu	21218	7.777689	4.013612	1	99
wealth	21218	40.60129	22.06011	0	100
affluency	21218	.0291922	.3625791	0	8.960243
nutrition	21218	.9630974	2.255221	0	15
rural	21218	1.616269	.4863051	1	2
dhaka	21218	.1536431	.3606148	0	1
chittagong	21218	.1903572	.3925922	0	1
barisal	21218	.1511453	.3581988	0	1
rajshahi	21218	.1222076	.3275331	0	1
khulna	21218	.141625	.3486734	0	1
rangpur	21218	.1165049	.3208369	0	1

syhlet	21218	.1245169	.3301781	0	1
muslim	21218	.8857102	.3181704	0	1
hindi	21218	.1091526	.3118379	0	1
buddhist	21218	.0020266	.044973	0	1
christian	21218	.0031106	.055687	0	1
tcont	21218	.1085399	.3110684	0	1
heard_of_fp	21218	.3423037	.4744918	0	1
aware_of_c~c	21218	.1793289	.3836365	0	1
r_works	21218	.1012819	.3017088	0	1
h_fisherman	21218	.0072109	.0846121	0	1
h_agri	21218	.047554	.2128256	0	1
h_poultry_~e	21218	.0013196	.0363036	0	1
h_lowtier	21218	.0314827	.1746224	0	1
h_nonagri	21218	.1257894	.3316197	0	1
h_midtier	21218	.1997832	.3998467	0	1
brac	21218	.0601847	.2516987	0	1
asha	21218	.1146197	.3290498	0	1
dom_abuse_1	21218	.1667923	.4318429	0	1
dom_abuse_2	21218	.1820153	.4461403	0	1
dom_abuse_3	21218	.225139	.560667	0	1
dom_abuse_5	21218	.0415213	.3042812	0	1

### 3.4 Outliers and Inconsistencies

In case of tabulating the variable *everborn*, we would see that only twenty out of over forty-two thousand defendants have more than 15 children. The presence of such outliers can create problems in the data. Heteroscedasticity may also arise as a result of their presence. (Gujarati 390) They have therefore been dropped from the dataset. A few entries in the variable *h\_edu* (husband's education in single years) were missing. Some values were oddly greater than the husband's age. Such missing and anomalous entries have also been dropped. Furthermore, after regressing, any entries with missing residuals were removed.

## 4 Empirical Results:

### 4.1 Model Specification

Two competing models have been tested: a linear and a log-linear model with apiecewise component. The previous one shows to accommodate a greater number of significant regressors, the second has proven essential in removing the residuals of heteroscedasticity.

Multivariate Linear Model  
 Where,  
 =r\_age, r\_edu, h\_age, h\_edu, nutrition and wealth  
 = threshold value of wealth (set at 90)  
 = ultra\_rich (the top 10% richest)  
 = 1 if >  
 = 0 <=  
     = rural, dhaka, barisal, rajshahi, khulna, rangpur, sylhet  
 = hindu, buddhist, Christian  
 = tcont, heard\_of\_fp, aware\_of\_clinic  
 = r\_works, f\_fisherman, h\_agri, h\_nonagri, h\_poultry\_cattle,  
 h\_lowtier  
 H\_midtier, log\_wealth  
 = brac, asha  
 = dom\_abuse\_1, dom\_abuse\_2, dom\_abuse\_3, dom\_abuse\_5

Multivariate Log-Linear Model  
 Where,  
 = r\_age, r\_edu, h\_age, h\_edu, nutrition and wealth  
 = threshold value of wealth (set at 90)  
 = ultra\_rich (the top 10% richest)  
 = 1 if >  
 = 0 <=  
     = rural, dhaka, barisal, rajshahi, khulna, rangpur, sylhet  
 = hindu  
 = tcont, heard\_of\_fp, aware\_of\_clinic, h\_poultry\_cattle, h\_midtier  
 =asha  
 =dom\_abuse\_3

**4.2 Heterogeneity**

The Breusch-Pagan/ Cook-Weisberg test for Heteroscedasticity

A preliminary run of this test on the first linear model yielded disappointing results. This is because with a p-value of zero, we are bound to reject the null hypothesis of constant variance.

<p><i>Linear Model</i></p> <p>Ho: Constant variance                  Variables: fitted values of everborn</p>	<p><i>Log-Linear Model</i></p> <p>Ho: Constant variance                  Variables: fitted values of log_everborn</p> <p>chi2(1) = 0.05</p>
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chi2(1) = 7479.39 Prob> chi2 = 0.0000	Prob> chi2 = 0.8210
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To overcome this problem, I tried out various functional forms. Among them, the Log-linear model proved surprisingly effective, because this time around, the p-value jumped to 0.8210!

### 5 Discussion and Conclusion:

Though the number of children is obviously a whole number but we must remember that these coefficients describe mathematical averages.

A minor observation is that older, healthier parents have more children, as shown by the positive coefficients of  $r\_age$  and  $h\_age$  and nutrition. The more interesting part is that the years of education have a negative impact on the number of children and to be precise, the education of the mother has a bigger impact than the father. A decade of additional education implies that on average, a mother is likely to have 2.2 fewer kids, and a father only 0.2. Policy-makers therefore, are better off investing more on the education of women if their goal is to encourage smaller families.

Up until a threshold level of 90, wealth appears to have a negative but negligible impact on the number of children. However, this number decreases at an increasing rate of  $0.0089 + 0.1050$  units among the ultra-rich. Families living in rural areas are likely to have more children than those in urban regions, although only by a small number of 0.067 units. Among the divisions of Bangladesh, people in Dhaka, Barisal, Rajshahi, Khulna and Rangpur have smaller families on average in comparison to those residing in Sylhet. Data on Myemsinh was not available. Chittagong was arbitrarily placed in the benchmark or intercept of our model.

Since Bangladesh has a Muslim majority, the category for Islam was also placed under the benchmark. Compared to Muslim families, our model suggests that the number of children decreases by 0.98 in Buddhist families, 0.78 in Hindu families and 0.48 in Christian families.

Working mothers have fewer children. Among the various occupations of the husband, fishing, cattle raising and poultry farming have a positive impact whereas low paying jobs such as rickshaw pulling, mid-level jobs, and jobs in the agricultural and non-agricultural sectors all appear to have a negative impact on family size.

An interesting finding is that members of NGO's such as BRAC and ASHA are likely to have larger families by 0.09 and 0.13 units respectively. This could be owed to the fact that such NGO's help families get out of poverty and consequently, they enable them to afford more children. However, given that NGO's are known to promote family planning practices, this comes off as a bit surprising. Another way to look at it would be that majority of the members of such NGO's are from rural areas, where family sizes are larger. Besides, correlation does not imply causation (Shamim, 2020).

Finally, the impact of domestic violence has varying effects on family size, depending on the reason behind the abuse. In families where the husband believes beating is justified if the wife argues with him or goes out without telling him, the number of children increases by 0.05 and 0.04 units respectively. On the other hand, if the reason behind abuse is the belief that the wife neglects her children the number of children decreases by 0.05 units. No conclusive remarks can therefore be made. Log-Linear Model Some of the regressors are dropped in this second model because they no longer remain significant. The key difference in interpretation

is that this model describes percentage changes as opposed to unit changes. The key purpose of presenting this second alternative model was to remove heteroscedasticity. However, the general theme of our findings remains unchanged.

## 6 References

Gujarati, Damodar N. "The Nature of Heteroscedasticity." *Basic Econometrics*. New York: McGraw-Hill, 1995. Print, 390-392.

National Institute for Population Research and Training (2011), Bangladesh Demographic and Health Survey Preliminary Report. Retrieved From: [http://www.niport.gov.bd/wp\\_content/uploads/download/1377417082-BDHS\\_2011\\_preliminary\\_report.pdf](http://www.niport.gov.bd/wp_content/uploads/download/1377417082-BDHS_2011_preliminary_report.pdf)

MN, H and J, C. (1990). Bangladesh Fertility Survey 1989. Retrieved from: <http://www.popline.org/node/371841>

Miah, M. R. (1993). Determinants of High Fertility in Bangladesh: Their Implications for Social Development. Retrieved from: <http://www.jstor.org/stable/41421596>

Shamim, M.M., Shavarebi, K. and Raihan, M., 2020. Planning of Information and Communication Technologies Training Project and Its Impact: A Case Study of Bangladesh. *ELK ASIA PACIFIC JOURNAL OF PROJECT MANAGEMENT AND CONTROL*, 5(1).