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Determinants of Fertility in Bangladesh: Evidence from the Three National Surveys

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This study used the 1989 Bangladesh Fertility Survey (BFS) the 1993-94 and 1996-97 Bangladesh Demographic and Health Surveys (BDHS) to investigate the determinants of fertility. It used cumulative approach to measure the fertility. Multiple regression analysis were used to identify the determinants of fertility during demographic transition. Strong and high significant effects of female education, employment, place of residence, religion, mass-media, contraceptive use, child mortality and mobility status on fertility have been found. The effect of contraceptive use and child mortality on fertility were positive and all other variables showed negative effect.

Key words: Fertility, determinants, multiple regression analysis

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Introduction

Bangladesh is one of the most densely populated countries of the world (755 persons per sq. km.) where 120.8 million (BBS, 1996) people live in a relatively small area of 143,999 sq. km. For example, it is 60% denser than Taiwan, twice the density of South Korea or the Netherlands, thrice that of India or Belgium, four times that of Britain, seven times that of China, and 32 times that of United States (Caldwell *et al.*, 1999). It is characterized by high illiteracy, low urbanization and industrialization, extensive land fragmentation and landless, an over exploitation of resources and widespread of female seclusion. Unprecedented population growth is widely believed to be a major impediment to contemporary effort to alleviate the poverty of billions of people in developing countries (Donald, 1985). The alarming rate of population growth (1.8% annually) (BBS, 1996) has been threatening the national economy. The government of Bangladesh has realized in time that if the above rate of population growth is sustained, all efforts towards development will be jeopardized. Socio-economically, Bangladesh is comparatively disadvantaged in terms of such key indicators as per capita income (US\$ 260 in 1996), proportion living below the poverty line (47.5% of total population and 47.1% of rural population) etc. Consequently, the Bangladesh economy is characterized by extremely low in savings and investments. Both the per capita food production index and daily calorie supply, as percentages of requirements (83%) are quite low in Bangladesh. The overall literacy rate is only 47.3%: male 55.6% and female 36.1% (BBS, 1996).

Life expectancy in Bangladesh is quite low (59 years in 1997). Bangladesh is one of the few countries in Asia where female life expectancy remains lower than male. This is partly due to multiple high-risk pregnancies. The country is disadvantaged regarding access to health services (60% during 1985-1991), safe drinking water and sanitation (32% during 1988-1991) as well as with respect to both population-nurse (8,340 in 1990) and nurse doctor (0.8 in 1990) ratios. Continued high infant and childhood mortality results from relatively weak pre and postnatal services, less than optimal birth spacing and widespread malnutrition among children (Khuda and Hossain, 1996).

Despite pervasive poverty and under-development, Bangladesh have undergone a remarkable demographic transition over the last two decades. Compared with other countries at similar levels of development, it is a more rapid transition (Bongaarts and Watkins, 1996). The demographic surveys conducted over the last two decades showed steady decline in fertility since mid 1975. The decline in fertility has become rapid from the mid 1980. In 1975 total fertility was over 6 children per woman. The 1996-97 BDHS shows total fertility has almost half of what it was 1975. This change is surprising in light of arguments that have been marshaled to explain why fertility decline is unlikely to occur in Bangladesh.

The aim of this investigation is to find the differentials of fertility and to identify the factors which contributed major role in fertility decline in Bangladesh.

Materials and Methods

Source of Data: This study utilized the data derived from the 1989 Bangladesh Fertility Survey (BFS, 1989), the 1993-94 Bangladesh Demographic and Health survey (BDHS, 1993-94) and the 1996-97 Bangladesh Demographic and Health survey (BDHS, 1996-97).

Statistical Analysis: There are generally two measures of fertility – cumulative and current fertility. The ‘current

approach’ based on the number of live births in the given population in a calendar year. The other approach is ‘cumulative approach’ which takes into account, the past fertility history of children ever born to each cohort of women by age. In this study the cumulative approach have been adopted. In order to reduce the age compositional effects, the number of children ever born has been further standardized by the age distribution of the respondents. A multiple regression analysis (Cramer, 1972), was employed to identify the determinants of fertility during demographic transition. The dependent variable is the number of children ever born (CEB). The selected independent variables are: respondent’s education (EDU), employment status (WORK), Place of residence (RES), religion (RELG), electricity connection in the household (ELEC), ownership of agricultural land (ALAND), ownership of radio (RADIO), whether watch TV at least once a week (TV), duration of marriage (DMARG), ever use of contraceptive methods (EUSE), whether can move alone outside the homestead (MOVE), involvement with NGO, proportion of children died (PROCD).

Results and Discussion

Differentials of the Number of Children Ever Born: This study reveals an inverse relationship between education and fertility as measured by the number of children ever born. This relationship holds good for younger as well as the older age cohorts. The mean number of children ever born decreases as levels of education increases (Table 1). Several other studies in Bangladesh have also found that mean number of children ever born is inversely related to female education (Maloney 1981; Khuda and Howlader, 1988).

It was observed that women living in urban areas had lower fertility than those living in rural areas and the relationship holds good in each age cohorts. Ueda (1985) found that the urban fertility rate was lower than that of rural areas, and its differences was wider in those countries where the levels of development was relatively higher.

The results in Table 1 suggested that, in the older age cohort working women had lower fertility than non-working women whereas in the younger age cohorts fertility was higher among working women than non-working women. The 1989 BFS and the 1993-94 BDHS suggested that overall mean number of children ever born was almost identical among working and non-working women. The 1996-97 BDHS suggested that mean number of children ever born among working women was 3.5, higher by 0.3 than non-working women but when standardized means were calculated, it was found to be higher among non-working women (3.4) compared to working women (3.2). In 1989 and 1993-94 the standardized means for working women were lower than non-working women. Several authors have also found that female employment has a negative effect on fertility (Mabud, 1989; Hossain *et al.* 1990).

The mean number of children ever born is higher among Muslim women as compared to the non-Muslim women in each age cohorts. Several authors have found fertility to be lower among non-Muslim women in Bangladesh than among Muslim women in Bangladesh, both nationally and regionally (Amin, 1979; Khuda, 1987).

Table 1 showed an inverse relationship between electrification and fertility as measured by the number of children ever born and this relationship holds good for each age cohorts. Rural electrification is a relatively recent phenomenon and data relating electrification to demographic change are limited. However, studies conducted in Bangladesh showed that electrification has a negative effect on fertility (Ahmed, 1988).

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Table 1: Mean number of children ever born by different age cohorts and selected characteristics

Characteristics	1989 BFS				1993-94 BDHS				1996-97 BDHS			
	Current age		all	standardized mean	Current age		all	standardized mean	Current age		all	standardized mean
	<30	30+			<30	30+			<30	30+		
Education												
None	2.07 (4241)	6.01 (3964)	3.97 (8204)	3.81	2.14 (2887)	5.54 (2711)	3.79 (5598)	3.56	2.22 (2499)	5.25 (2484)	3.73 (4983)	3.47
Primary	1.98 (1516)	5.83 (1051)	3.55 (1051)	3.78	1.86 (1577)	5.38 (1026)	3.25 (2603)	3.48	1.80 (1478)	4.95 (1008)	3.08 (2485)	3.28
Secondary +	1.61 (787)	4.30 (349)	2.44 (1135)	2.16	1.51 (997)	3.81 (442)	2.21 (1439)	2.72	1.23 (1102)	3.59 (557)	2.02 (1659)	2.48
Place of residence												
Rural	2.00 (6057)	5.93 (4948)	3.77 (11005)	4.04	1.96 (4865)	5.44 (3668)	3.45 (8532)	3.48	1.92 (4503)	5.10 (3561)	3.32 (8064)	3.33
Urban	1.85 (486)	5.13 (415)	3.36 (902)	3.39	1.84 (596)	4.47 (511)	3.05 (1108)	2.88	1.58 (575)	3.83 (488)	2.61 (1063)	2.55
Work status												
Not working	1.98 (5748)	6.01 (4482)	3.74 (10230)	3.80	1.91 (4704)	5.48 (3412)	3.41 (8116)	3.46	1.78 (3395)	5.06 (2341)	3.12 (5736)	3.36
Working	2.11 (795)	5.16 (882)	3.71 (1677)	3.34	2.19 (2.19)	4.61 (767)	3.40 (1524)	3.12	2.10 (1683)	4.78 (1707)	3.45 (3391)	3.20
Religion												
Non-Muslim	1.89 (828)	5.02 (816)	3.45 (1654)	3.23	1.90 (604)	4.60 (568)	3.21 (1172)	2.95	1.80 (481)	4.15 (478)	2.97 (959)	2.69
Muslim	2.01 (5716)	6.02 (4538)	3.78 (10253)	3.82	1.95 (4857)	5.43 (3611)	3.44 (8468)	3.47	1.89 (4598)	5.05 (3570)	3.27 (8168)	3.30
Electricity connection												
No	2.00 (5656)	5.94 (4653)	3.78 (10309)	3.78	1.97 (4451)	5.46 (3337)	3.47 (7788)	3.50	1.95 (3798)	5.14 (3034)	3.36 (6908)	3.38
Yes	1.91 (888)	5.40 (710)	3.46 (1598)	3.49	1.84 (1009)	4.76 (841)	3.17 (1850)	3.03	1.68 (1238)	4.36 (981)	2.87 (2219)	2.81
Ownership of agric. land												
No	2.05 (2930)	5.76 (2179)	3.66 (5110)	3.75	2.01 (2292)	5.26 (1745)	3.41 (4037)	3.43	2.04 (2135)	4.84 (1634)	3.25 (3791)	3.29
Yes	1.94 (3613)	5.94 (6184)	3.78 (6797)	3.73 (insig)	1.90 (3168)	5.36 (2434)	3.41 (5602)	3.39	1.77 (2984)	5.02 (2408)	3.24 (5336)	3.22 (insig)
Ownership of radio												
No	2.08 (4828)	5.95 (4135)	3.87 (8963)	3.83	1.99 (3962)	5.37 (2985)	3.44 (6947)	3.49	2.02 (3294)	5.00 (2673)	3.35 (5974)	3.36
Yes	1.74 (1716)	5.57 (1229)	3.34 (2944)	3.45	1.83 (1498)	5.19 (1193)	3.32 (2691)	3.21	1.64 (1779)	4.83 (1375)	3.03 (3153)	3.01
Whether watch TV												
No	2.10 (4069)	6.00 (3676)	3.95 (7744)	3.83	2.01 (4431)	5.51 (3496)	3.56 (7927)	3.54	1.99 (3586)	5.28 (3048)	3.50 (6633)	3.44
Yes	1.82 (2475)	5.57 (1688)	3.34 (4163)	3.57	1.66 (1030)	4.33 (683)	2.72 (1713)	2.83	1.63 (1477)	3.92 (986)	2.55 (2462)	2.71
Ever used contraceptive												
No	1.75 (3886)	5.97 (2680)	3.47 (6566)	3.65	1.48 (2139)	5.27 (1439)	3.01 (3578)	3.16	1.37 (1683)	4.97 (1128)	2.82 (2812)	2.96
Yes	2.34 (2657)	5.76 (2684)	4.06 (5341)	3.86	2.24 (3322)	5.35 (2740)	3.65 (6062)	3.56	2.14 (3395)	4.93 (2920)	3.43 (6315)	3.37
Previous child died												
No	1.50 (4839)	4.23 (1828)	2.25 (6667)	2.96	1.55 (4272)	3.92 (1785)	2.27 (6057)	2.78	1.54 (4120)	3.72 (1907)	2.23 (6027)	3.83
Yes	3.38 (1704)	6.71 (3535)	5.63 (5240)	4.73	3.38 (1189)	6.36 (2394)	5.37 (3583)	4.48	3.39 (958)	6.03 (2142)	5.22 (3100)	4.37
Can move alone												
No	1.96 (4605)	6.02 (3458)	3.75 (8063)	3.82	1.89 (3536)	5.47 (2585)	3.40 (6122)	3.52	1.88 (4187)	5.06 (3145)	3.24 (7332)	3.31
Yes	2.06 (1938)	5.58 (1906)	3.81 (3844)	3.56	2.05 (1925)	5.07 (1594)	3.42 (3518)	3.30	1.89 (891)	4.54 (904)	3.23 (1795)	2.97
Involved with N. G. O.												
No	na	na	na	na	1.87 (4489)	5.36 (3326)	3.36 (7815)	3.40	1.79 (4103)	4.97 (3062)	3.17 (7165)	3.22
Yes					2.28 (969)	5.15 (852)	3.62 (1822)	3.45 (insig)	2028 (972)	4.84 (984)	3.57 (1957)	3.33 (insig)

The figures in the parenthesis indicate number of women.

(Insig) The different of the standardized means are insignificance at 0.05 level

na = not applicable

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Table 2: Means and Standard Deviation of the variables employed in multiple regression analysis for different periods

Variable	1989 BFS		1993-94 BDHS		1996-97 BDHS	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
CEB	3.74	2.875	3.41	2.628	3.25	2.486
EDU	1.57	2.755	2.18	3.241	2.52	3.510
RES	0.08	0.265	0.12	0.319	0.12	0.321
WORK	0.14	0.348	0.16	0.365	0.37	0.484
RELG	0.14	0.346	0.12	0.327	0.11	0.308
ELEC	0.13	0.341	0.19	0.394	0.25	0.430
ALAND	0.57	0.495	0.58	0.493	0.59	0.493
RAD	0.25	0.431	0.28	0.449	0.35	0.476
TV	0.35	0.477	0.18	0.382	0.27	0.444
MARD	13.98	9.740	14.85	9.681	14.52	9.862
EUSE	0.45	0.497	0.63	0.483	0.69	0.462
PDIED	16.07	22.739	13.35	21.435	11.87	20.024
MOVE	0.32	0.468	0.37	0.481	0.20	0.398
NGO	na	na	0.19	0.392	0.22	0.411

Table 3: Results of multiple regression analysis of the number of children ever born for all women

Variable	1989 BFS		1993-94 BDHS		1996-97 BDHS	
	Metric Coefficient	Standard Co-efficient	Metric Coefficient	Standard Co-efficient	Metric Coefficient	Standard Co-efficient
Constant	0.53	0.18	0.39			
EDU	-0.01 (0.007)	-0.01 (0.006)	-0.02*** (0.006)	-0.03	-0.03***	-0.05
RES	-0.17** (0.070)	-0.02 (0.063)	-0.21*** (0.060)	-0.03	-0.34***	-0.04
WORK	-0.45*** (0.048)	-0.05 (0.045)	-0.41*** (0.035)	-0.06	-0.20***	-0.04
RELG	-0.48*** (0.048)	-0.06 (0.050)	-0.30*** (0.054)	-0.04	-0.38**	-0.05
ELEC	0.11 (0.057)	-0.01 (0.051)	-0.04 (0.049)	0.01	0.08	0.02
ALAND	0.04 (0.035)	0.01 (0.034)	0.06 (0.035)	0.01	0.01	0.00
RAD	-0.22** (0.042)	-0.03 (0.038)	-0.10*** (0.038)	-0.02	-0.03	-0.01
TV	-0.11*** (0.037)	-0.02 (0.050)	-0.31*** (0.046)	-0.05	-0.35***	-0.06
MARD	0.21*** (0.002)	0.72 (0.002)	0.20*** (0.002)	0.73	0.18***	0.70
EUSE	0.47*** (0.034)	0.08 (0.035)	0.58*** (0.037)	0.11	0.63***	0.12
PDIED	0.02*** (0.001)	0.14 (0.001)	0.02*** (0.001)	0.15	0.02***	0.15
MOVE	-0.18*** (0.037)	-0.03 (0.034)	-0.11*** (0.042)	-0.02	-0.25***	-0.04
NGO	na	na (0.042)	-0.04 (0.041)	-0.01	0.03	0.01
R ² adjusted		0.613		0.642		0.611

***P<0.001, **P<0.01, *P<0.05

Standard errors in brackets

na=not applicable

Studies of differential fertility according to size of landholding have suggested considerable fertility differences among landholding categories. The results (Table 1) suggested that there are no difference in the fertility according to the landown ership as measured by the number of children ever born. The overall mean number of live births as well as the standardized means between the women belonging to the landless households and those belonging to the households with cultivable landholding was almost similar in each period. In general, it is found that farm owners have higher fertility than farm workers in both developed and developing countries.

In the literature, relationship between landholding and fertility have been examined from two broad perspectives (Rob, 1987). In the first approach, it is considered that land is a good substitute for children as a source of security, therefore

landowners will have lower fertility. This relationship is commonly known as land-security hypothesis. In the second approach, it is assumed that more family members are required for the efficient management of large operational holdings, and therefore, owners of large operational holdings will have higher fertility. This particular relationship between fertility and land is also known as the land-labor hypothesis. According to Schutjer and Stokes (1984), households with larger holdings require more labor and are able to utilize family labor more effectively, and therefore, will have high fertility. Although the positive relation of fertility to landholding has been documented in several studies (Akbar and Halim, 1977; Alam *et al.*, 1980). There are studies showing an inverse relationship (Stoeckel and Chowdhury, 1969). Yet, there are other studies showing a mixed relationship, or even an absence of any relationship with landholding (Cain, 1985;

Khuda, 1987). It has been argued that access to mass media has a direct effect on the acceptability of family limitation. It was observed that fertility is lower among the women belonging to households having no radio. This relationship holds true for each age cohorts. The Bangladesh Fertility Survey (BFS, 1978) reported that families who own a radio tend to have higher fertility than those who do not. Khuda and Hossain (1996) found an inverse relationship between fertility and ownership of radio. The results (Table 1) suggested that fertility is higher among women who ever used contraception than their counterparts who did not use contraception in their entire marital life as measured by the number of children ever born.

Child mortality and fertility are interrelated factors, one influencing the other. That is to say in the societies, where child mortality is higher, the fertility is correspondingly higher. In this study an attempt has been made to study the childhood deaths of the mothers and its relationship with the mean number of children ever born. Data indicated that the mothers who had the experience of child deaths had been associated with higher fertility compared to the mothers who did not have the experience of child deaths. The studies carried out in developing countries, showed a very close relationship between the child mortality and fertility (Mahadevan, 1981).

Among the other factors the status of women also depend on whether she can move outside the homestead alone. It enables a woman to cross several socio-cultural barriers to her status in the family as well as in the society. It is an evolution of women's self-awareness and status and ultimately women become more efficient in social interactions and participation. There were no difference in the mean number of children ever born between the women who can move outside the homestead alone and those who cannot move outside the homestead alone. After controlling the age of the women it was observed that fertility was lower among the women who can move outside the homestead and this relationship holds good in each age cohorts.

It is a well-established fact that women's status is not generally raised along socioeconomic development of a country unless they participate in developmental activities (Rahman and Davanzo, 1995). The development programs are implemented to bring women into gainful economic activities and educating them in various aspects of social life including family planning.

Effects of Socioeconomic and Demographic Variables on the Number of Children Ever Born: In this section, used a simple linear model to estimate fertility at the individual level. The mean values and standard deviations of each of the variables employed in the regression equations for different periods are presented in Table 2. The results suggested that the average number of children ever born to a woman in 1989 was 3.74. It was 3.41 in 1993 and 3.25 in 1996. The mean duration of marriage in these periods were 13.98, 14.85 and 14.52, respectively. It was found that variations among the several socio-demographic variables between the periods. For example, it was observed that the respondents in 1989 have lower literacy rate as compared to 1993 and 1996. The mean numbers of years of formal school attended by the respondents' husbands increased a little from 1989 to 1996. The proportion of women engaged in employment sector was almost same in 1989 and 1993 but this proportion increased in 1996. A large amount of variations in the ever use of contraception was observed among different time periods. In 1989 approximately 45% of the respondents reported that

they have ever use a contraceptive method in their married life. This proportion raised to about 63% in 1993 and about 69% in 1996. Among the independent variables, correlations were low for each period, which suggest a low degree of multicollinearity. The results of multiple regression analysis of the number of children ever born are presented in Table 3. Standardized regression coefficients indicated the relative importance of a predictor in explaining the dependent variable after adjusting for the effect of other predictors. In addition, we also know that adjusted R^2 , the square of the multiple correlation coefficient, adjusted for degrees of freedom, estimates the proportion of variance in the number of children ever born that would be jointly explained by all predictors.

In 1989, the value of the adjusted R^2 coefficient was 0.613, which indicate that approximately 61% of the variation in the dependent variable is explained by the predictors in the model. Similarly, approximately 64% and 61% of the variations in the children ever born are jointly explained by the predictors in 1993-94 and in 1996-97 respectively.

Out of twelve predictors, ten showed statistically significant relationship with the number of children ever born in 1989. The variables which showed significant relationship are respondents education, place of residence, employment status, religion, ownership of radio, watch TV once a week, marital duration, ever use of contraception, proportion of children dead and mobility status. These variables, also showed significant relationship with number of children ever born in 1993-94. Except the variable of ownership of radio, all other variables which showed significant relationship in 1993-94 was also showed significant relationship in 1996-97. The result suggested that in each period, duration of marital union has the largest standardized regression coefficient and hence the highest relative importance in predicting children ever born. Similarly, proportion of children dead has the second highest value in each period.

A number of factors affecting fertility have differential impacts on fertility in the three time periods. Majority of the population in Bangladesh are Muslim and Rural dwellers. So the dominating majority of the people of Bangladesh are in favor of high fertility. The evidence indicates that empowerment in women's status is a critical determinant of fertility decline in Bangladesh. Most Bangladeshi and population experts observe that during the past two decades women's status in terms of education, employment, mobility and decision-making power has undergone major changes. There is also evidence that such changes have contributed to increased contraceptive use and consequent fertility decline. So, there is a need for widespread measures that enhance the mobility of women in Bangladesh. Child mortality is one of the post-partum variables contributing to high fertility. It motivates the couple to replace the dead child. Proportion of children died was therefore, positively associated with fertility. It implies that child survival schemes have to be popularized through better implementation of health service.

Policy makers should also give priority to the development of social sector, including women's status and improvement through increased female education and employment opportunities and wider access to mass media. The educational opportunity of girls accompanied by employment would help the girls indirectly in the rising age at marriage. The more years the girls will stay in education the higher will be the age at first marriage. These investments would bring direct benefits and would contribute to the process of fertility transition in Bangladesh to achieve replacement level of fertility.

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