

Factors Affecting Fertility in Sylhet Division of Bangladesh: A Path Analytic Approach

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Abstract : *The objective of the paper is to study the effects of selected socio-economic and demographic factors on fertility in Sylhet administrative division of Bangladesh based on the data collected in the Bangladesh Demographic and Health Survey, 2004 employing the technique of path analysis for two age cohorts of women. 10 paths out of 23 hypothesized paths are found to be statistically significant for both the age cohorts below 30 years and aged 30-49 years respectively. It is found that age at effective first marriage has significant direct negative effect on fertility for both the cohorts. Total effect of female education on fertility is observed to be negative while the total effects of religion and place of residence on fertility are found to be positive for both the age cohorts of women.*

Key words: *Path analysis, Fertility, Cohort*

Introduction

Despite pervasive poverty and under-development, Bangladesh has achieved an impressive fertility decline since the mid 1980s. The total fertility rate (TFR) has declined from around seven in the 1970s to 3.0 in 2003-2004 (BDHS, 2005). Though TFR has declined but it is not up to the desired level. The population of Bangladesh still ranks seventh in the world, but its area of approximately One hundred forty four thousand squares kilometers is ranked ninety fourth, making it one of the most densely populated countries in the world.

Bangladesh indeed represents an apparent anomaly for a significant decline in fertility despite the absence of conditions believed to be necessary for such a reproductive change. Since different socio-

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economic factors are associated with fertility behavior, the fact demands an in-depth study. There are six divisions in Bangladesh. TFR is not uniform in all divisions. Bangladesh Demographic and Health Survey (BDHS), 2004 has documented that fertility is the highest in Sylhet division as compared to other divisions of Bangladesh. Sylhet administrative division that comprises of about 12 percent of total area of Bangladesh is inhabited by nearly 10 million of the total national population. Thus attaining national demographic goal of limiting population size depends to a large extent on the fertility behavior of couples residing in this division.

Objectives of the Study

The purpose of the present paper is to investigate the direct, indirect and joint effects of selected socio-economic and demographic factors on fertility in Sylhet division of Bangladesh.

Material and Methods

This study is based on data derived from the Bangladesh Demographic and Health Survey (BDHS), 2004 that was conducted by the NIPORT of ministry of health and family welfare. The Survey successfully interviewed 11440 ever-married women below age 50 years. A sub-set of data from the above survey consisting 1150 women residing in Sylhet division has been used in this paper.

Path analysis technique has been applied in this study to investigate the influences of selected factors on fertility. Nine variables have been chosen for using in the path analysis (Table-1). In this paper, the number of children ever born to each woman (x_9) is used as the index of fertility. Respondent's age at effective first marriage (x_5), use of contraception (x_6), duration of breastfeeding in last closed birth interval (x_7) and foetal loss (x_8) are considered as the intermediate variables, while respondent's education (x_1), religion (x_2), place of residence (x_3), and electricity in the household (x_4) are selected as socio-economic and background variables. The explanatory variables x_1 , x_2 , x_3 , and x_4 have indirect effects on fertility through x_5 , x_6 , x_7 , and x_8 . Since the current age of women is highly associated with fertility, the path model has been separately applied to two age cohorts of women: (i) cohort aged below 30 years at the time of interview (younger cohort) and (ii) cohort aged 30-49 years at the time of interview (older cohort). The causal model of relationships between fertility (dependent variable) and predetermined variables may be expressed by the system of equations as follows:

$$x_5 = p_{54}x_4 + p_{53}x_3 + p_{52}x_2 + p_{51}x_1 + p_{5u}e_u$$

$$x_6 = p_{65}x_5 + p_{64}x_4 + p_{63}x_3 + p_{62}x_2 + p_{61}x_1 + p_{6v}e_v$$

$$x_7 = p_{75}x_5 + p_{74}x_4 + p_{73}x_3 + p_{72}x_2 + p_{71}x_1 + p_{7w}e_w$$

$$x_8 = p_{85}x_5 + p_{84}x_4 + p_{83}x_3 + p_{82}x_2 + p_{81}x_1 + p_{8y}e_y$$

$$x_9 = p_{98}x_8 + p_{97}x_7 + p_{96}x_6 + p_{95}x_5 + p_{94}x_4 + p_{93}x_3 + p_{92}x_2 + p_{91}x_1 + p_{9z}e_z$$

where p_{ij} values are path co-efficients from standardized values x_i to x_j in the model and e_u, e_v, e_w, e_x, e_y and e_z are random disturbance terms which are mutually independent and independent of their corresponding explanatory variables. The direct, indirect, and joint effects of predetermined variables on the dependent variable in the path model can be estimated by decomposing the correlation co-efficient between the dependent variable and any predetermined variable using the fundamental theorem of path analysis, which may be expressed as:

$$r_{ji} = \sum_k p_{jk} r_{ik}$$

where, j and i are two variables and k runs over all the variables which have paths leading directly to variable j (Duncan, 1966).

Results:

10 paths for both younger and older cohorts out of the 23 hypothesized paths are found to be statistically significant (Figures 1 and 2). Age at start of effective marriage has significant direct negative influences on fertility for both the younger and older cohorts. The effect of age at start of effective first marriage on fertility is higher for the older cohort as compared to the younger cohort. Age at marriage is one of the important factors, which affect fertility highly. It has been shown in several studies that age at marriage is strongly related to fertility (For example, Amin and Faruque, 1980; Ahmed, 1982; Bumpuss, 1969). High fertility is observed because of early marriage (Osborn 1958). Fertility has been reduced due to late marriage of women (Coale, 1975: 348). Ryder (1959: 415-16) has shown that late marriage eliminates fecund exposure, whereas early marriage may prejudice fecundity through morbidity attributable to premature exposure. Though in late marriage a woman has a chance to take more children during their remaining child bearing

age, but **Rele** (1962) has shown that it is not actually possible by them to take more children. Early age at marriage can reduce fertility adopting contraception more effectively. It is found in the study that age at marriage has highly significant negative effect on fertility. In two Indian studies, it has been found the same inverse relationship between age at marriage and fertility (**U.N.**,1961; **Driver**, 1963:83-84).

Total effect of respondents' education on fertility is negative for both the cohorts. This effect is found to be more pronounced belonging to the younger cohort than to the older cohort. From Table-2, it can be seen that the respondents' education for those belonging to the younger cohort has a total effect of -.3059 on fertility, of which -.1539 (50.32 per cent) is transmitted through its implied effect, -.0845 (27.62 per cent) through its indirect effect via age at start of effective first marriage and -.0835 (27.29 per cent) through its joint association with other variables in the same direction. Education of wife may affect fertility highly because education raises age at marriage, increases knowledge and awareness, expand vision and increases uses of birth control (**Ryder**,1967; **Janowitz**, 1976). Most of the studies indicate that wife's education has inverse relationship with fertility (**Stoeckel and chowdhury**,1969; **Dixon**,1975; **PCFP Division**, 1978; **Khuda**, 1985b). **Driver** (1963) has noted that wife's education is inversely related with fertility while an inverted U shaped relationship by other researches (See, for examples, **Chaudhury**, 1977; **NIPORT**, 1981; **Maloney et al.**,1981 and **Khuda**, 1985a). The finding indicates that the woman who have higher education will have lower fertility. There is a common belief in Bangladesh that most conservative families are reluctant to send their female child to school for education, especially that school with co-education exists and hence Bangladeshi women have high level of fertility. **Rodriguez et al.** (1980) have found that in Asia, the women who have no formal education have higher fertility than those women who have some formal education.

Total effects of religion and place of residence on fertility are observed to be positive for both the cohorts. This indicates that Muslim and rural women have higher fertility as compared to their non-Muslim and urban counterparts. **Kirk** (1966:567) has found that Muslim fertility is almost universally high and is generally higher than that of neighboring peoples of major religions. Religion and fertility are more closely correlated, especially for Muslims than for any other major religious groups. Religious affiliation is a determinant of demographic behavior that affects fertility (**McQuillan**, 2004). **Lucus et al.** (1980:85) has observed that early age at marriage and tendency for not using contraception and abortion are the factors for favoring high fertility among Muslims. **Islam**

(1981) has identified the two factors polygamy and remarriage in case of widowed under some conditions. Studies by **Nag** (1962), and **Saxena** (1965) have all observed higher fertility for Muslims than that for Hindus. Muslim traditions are more correlated with higher fertility than those of other religious groups (**Farooq**, 1980). **Stoeckel** and **Chowdhury** (1969), and **Chaudhury** (1971, 1975) have all found higher fertility among Muslim women.

As expected, total effect of electricity in the household on fertility is negative for both the cohorts. Electricity itself is an index of modernity and households having electricity are, in general, indicative of higher socio-economic status. Several studies have indicated that fertility is lower for those women living in households having electricity (For example, **Kabir** et al. 1988; **Ahmed** 1988). Availability of electricity in the household has an inverse influence on fertility. It means that TFR would be less for those women who have electricity in their household.

Contraceptive use has a positive significant direct effect on fertility for younger cohort. Total effect of contraceptive use on fertility is positive for both the cohorts. Many studies have shown similar findings (**Tuladhar**, 1985; **Govindasamy** et al., 1996; **Rahman** et al., 1996; **Islam** et al., 1986). Foetal loss has a positive significant direct influence on number of children ever born for older cohort.

Conclusion

This study reveals some important findings that merit consideration from the standpoint of policy implications. Age at start of effective first marriage is found to have a significant direct negative effect on fertility. Thus delaying age at effective first marriage by implementing a minimum age marriage law may contribute to a reduction in fertility. Total effect of respondent's education on the number of children ever born is observed to be negative. Female education may provide better labor force participation outside the home, create awareness for the use of contraception and age at marriage of females can be raised by providing education to them, particularly at the secondary or higher levels. This study also reveals that rural and Muslim women had higher fertility than their urban and non-Muslim counterparts. This suggests that the most effective policy measure might be renewed emphasis on the need of providing educational facilities, especially for rural Muslim women with a view to lower the level of fertility in Sylhet Division.

Table1: Variables and their measurements used in the path analysis

VARIABLE	ABBREVIATION	MEASUREMENT
Respondent's education(x_1)	REDU	Completed no. of years
Religion (x_2)	REL	1 = Muslim 0 = Others
Place of residence (x_3)	PR	1=Rural 0=Otherwise
Electricity in the household (x_4)	EL	1=Available 0= Not available
Age at start of effective first marriage, (X_5)	AEFM	Completed years
Contraception, (X_6)	CU	1=Ever use 0=Never use
Duration of breastfeeding in last closed birth interval, (X_7)	DBF	Completed months
Foetal loss, (X_8)	FL	Number of wasted pregnancies
Children ever born, (X_9)	CEB	Number of live births

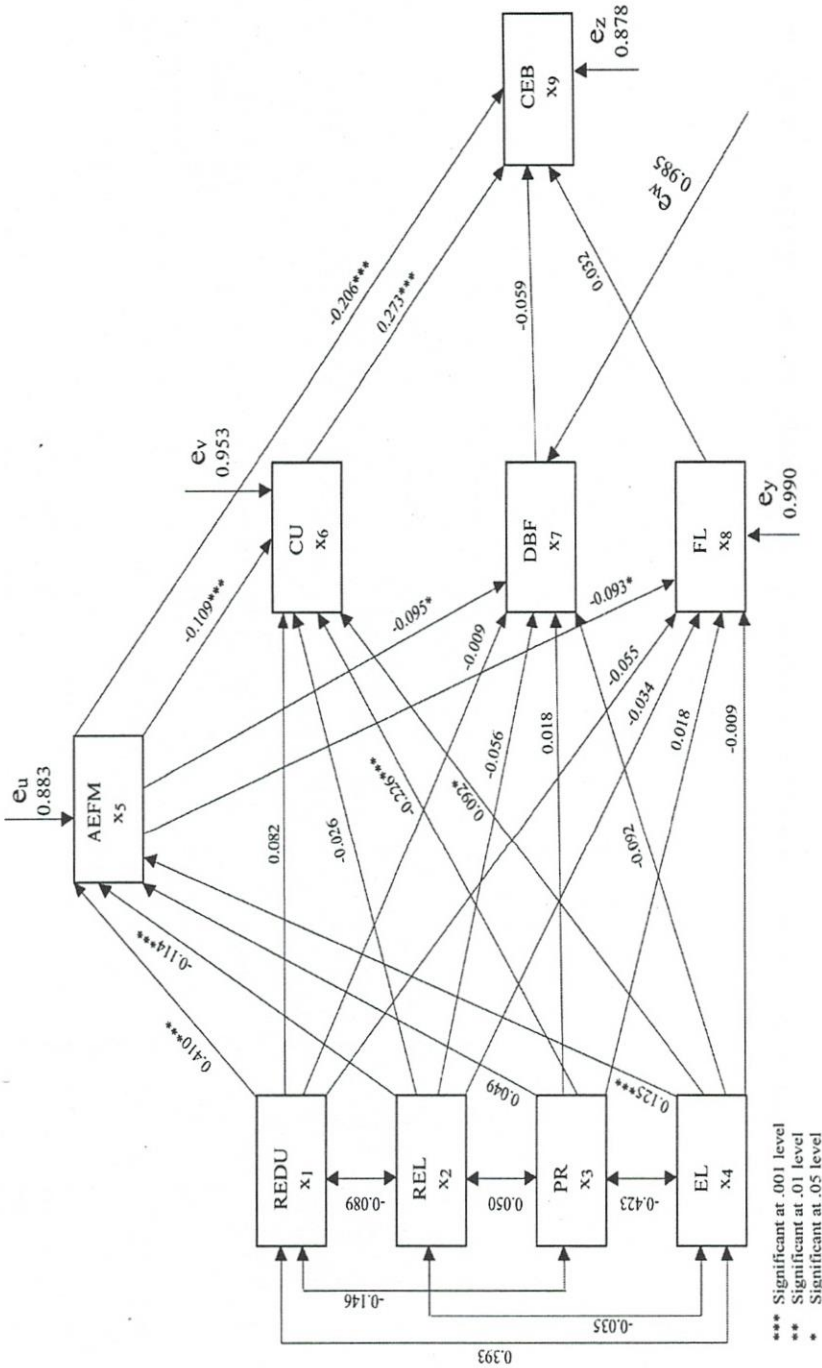
Table 2: Effects of variables used in the path model for explaining fertility of women aged below 30 years

Dependent Variable	Predetermined Variable	Direct Effect	Implied Effect	Joint Association	Indirect effect through							Total Effect	Zero Order Correlation
					x_5	x_6	x_7	x_8	x_5x_6	x_5x_7	x_5x_8		
x_9	x_1		-.1539	-.0835	-.0845	.0224	.0005	.0018	-.0122	.0023	.0012	-.3059	-.344
	x_2		.0148	.0124	.0235	-.0071	.0033	.0011	.0034	-.0006	-.0003	.0505	.055
	x_3		.0447	.0342	-.0101	-.0617	.0054	.0003	-.0015	.0003	.0001	.0117	.016
	x_4		-.0528	-.0223	-.0258	.0251	.0054	.0003	-.0037	.0007	.0004	-.0727	-.092
	x_5	-.206				-.0298	.0056	.0030				-.2272	-.322
	x_6	.273										.273	.321
	x_7	-.059										-.059	-.001
	x_8	.024										.024	.048

Table 3: Effects of variables used in the path model for explaining fertility of women aged 30 -49 years

Dependent Variable	Predetermined Variable	Direct Effect	Implied Effect	Joint Association	Indirect effect through							Total Effect	Zero Order Correlation
					x_5	x_6	x_7	x_8	x_5x_6	x_5x_7	x_5x_8		
x_9	x_1		-.0421	-.0329	-.1443	.0162	-.0018	.0108	-.0018	-.0006	.0003	-.1962	-.211
	x_2		.0919	.0322	.0302	-.0017	-.0085	.0022	.0004	.0001	-.0001	.1467	.190
	x_3		.0723	.0298	-.0496	-.0128	.0009	.0147	-.0006	-.0002	.0001	.0546	.087
	x_4		-.0627	-.0394	-.0254	.0037	-.0044	.0028	-.0003	-.0001	.0000	-.1258	-.175
	x_5	-.403				-.0051	-.0016	.0007				-.4104	-.357
	x_6	.075										.075	.101
	x_7	.056										.056	.053
	x_8	.008										.008	.011

Figure 1 : path diagram showing the influence of various factors on fertility of women aged below 30 years



References

- Ahmed, B. 1982 "Differential Fertility in Bangladesh: A Path Analysis" *Social Biology*, Vol.28, No.1-2, Pp 102-110.
- Amin, R and R.Faruquee;1980 *Fertility and its Regulation in Bangladesh*, Washington D.C.: Population and Human Resource Division, The World Bank.
- Bumpass, L. 1969 "Age at Marriage as a Variable in Socio-Economic Differentials in Fertility" *Demography*, vol.6, No.1, Pp 45-54.
- Bangladesh Demographic and Health Survey (BDHS), 2005, Final report, Bangladesh Demographic and Health Survey-2004, Dhaka, Bangladesh
- Chaudhury, R.H. ; 1971 "Differential Fertility by Religious Group in East Pakistan". *Social Biology*, Vol. 18, No. 2.
- Chaudhury, R.H, 1975 "Attitude of Some Elites Towards Introduction of Abortion as a Method of Family Planning in Bangladesh", *The Bangladesh Development Studies*, Vol. 3, No.4.
- Chaudhury, R.H.; 1977. "Education and Fertility in Bangladesh". *The Bangladesh Development Studies*, vol.5, No.1, Pp 82-103.
- Coale, A.J. 1975 "The Demographic Transition" Pp 347-355 in the *Population Debate. Dimensions and Perspectives* , Vol.1, United Nations.
- Duncan, O.D.; 1966 "Path analysis: Sociological examples, *The American Journal of Sociology*, 72(1): 1-16
- Dixon, R.B. ; 1975 "Women's Right and Fertility". *Reports on Population Family Planning* , No.17, Pp 1-20.
- Driver, E.D. 1962; *Differential Fertility in Central India*, Princeton: Princeton University Press.
- Farooq, G.M.; 1980, *Household Fertility Decision Making in Nigeria*" Paper presented at the Annual Meeting of the Population Association of America, April 10-12, Denver, Colorado.
- Govindasamy , p., and A. Malhotra; 1996 "Womens Position and Family Planning in Egypt" *Studies in Family Planning*, 27,8: 333-340
- Islam, M.B.; 1980 "Causes of High Fertility in Bangladesh" Paper Presented at the First National Conference of the Bangladesh Population Association Held at Dhaka During April 12-14.
- Islam, M.A., E. Frankenberg, and S. Islam; 1986 "Duration of Contraceptive Use in Bangladesh" *Bangladesh Contraceptive Prevalence Survey-1985, Secondary Analysis*.
- Janowitz, B.S.; 1976 "An analysis of the Impact of Education on Family Size". *Demography*, vol. 13, No.2, Pp 189-198.
- Kabir, M., Mosleh Uddin and A. Ahmed Howlader;1988 "Husband-wife communication and Status of women as a determinant of contraceptive use in rural Bangladesh". *The Bangladesh Development Studies*, Vol.16, No.1, Pp 86-97.
- Khuda, B.; 1985a *Rural Development and Change: A Case study of a Bangladesh village*, Dhaka: the university press.

- Khuda, B.; 1985b "Agricultural Development And Demographic Change: New Evidence from Commila Kotwali Thana, Commila District" In W.C.Robinson (Ed.). Studies in the Fertility Impact Of Development Programme In Bangladesh, Dhaka:
- Kirk, D. 1966 "Factors Affecting Moslem Natality" Pp. 561-579 in B.Berelson et al.(eds.), Family Planning and Population Programs, Chicago: University of Chicago Press.
- Lucas, D., P.Mc.Donald, E. Young and C.Young; 1980 Beginning Population Studies, Canberra: The Australian National University.
- Maloney, C., K.M.A. Aziz and P.C. Sarkar; 1981 Beliefs and Fertility in Bangladesh, Rajshahi: Institute of Bangladesh Studies, Rajshahi: University.
- McQuillan, K. 2004 "When does Religion influence fertility?" Population and Development Review, Vol. 30, No.1, Pp. 25-66.
- Nag, M.; 1962, Factors Affecting Human Fertility in Non-industrial societies: A cross cultural studies. Ph.d. thesis, Department of Anthropology, Yale University.
- National Institute of population Research and Training (NIPORT); 1981, Bangladesh Contraception Prevalence Survey-1979, Dhaka: Ministry of Health and Population Control, Government of the People's Republic of Bangladesh.
- Osborn, F., 1958 Population: An international Dilemma, New York: The Population Council.
- PCFP Division; 1978 World Fertility Survey: Bangladesh Fertility Survey, 1975-1976, First Report, Dhaka: Ministry of Health and Population Control, Population Control And Family Planning Division, Government of The People's Republic of Bangladesh.
- Rahman, M., and S.c. Sutradhar, 1996, " Women's Status and Fertility Behavior in Rural Bangladesh" Bangladesh Demographic and Health Survey 1993-94, Extended Analysis NIPORT, East West Center.
- Rodriguez, G., and J. Cleland; 1980 "Socio-Economic Determinants of Marital Fertility in Twenty countries: A Multivariate Analysis". Paper Presented at the World Fertility Survey
- Ryder, N.B. "Fertility" in P.M. Hauser and O.D. Duncan(eds.). The study of Population: An Inventory and Appraisal, Chicago: The University of Chicago Press.
- Ryder, N.B.; 1967 "The Character of Modern Fertility" Pp 296-306 in W. Peterson (ed.), Readings in Population, New York : The Macmillan Company.
- Rele, J.R.; 1963 "Some Aspects of Family Fertility in India". Population Studies, vol.15, No.3 Pp. 267-278.
- Saxena, G.B. 1965, A Study Of Fertility And Family Planning In Three Villages Of Uttar Pradesh, Delhi: Institute Of Economic Growth, University Enclave.
- Stoeckel, J., and M.A. Chowdhury, 1969 "Differential Fertility In A Rural Area Of East Pakistan" Milbank Memorial Fund Quarterly, Vol. 47, No.12, Pp 189-197.
- Tuladhar J.M. 1985 " Determinants of Contraceptive Use in Nepal" Journal of Biosocial Science, 17,2:185-93
- United Nations, 1961 The Mysore Population Study, New York: Population Studies, No 34 (ST/Soa/Series A/34).