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Fertity and Its Proximate Determinants in Bangladesh: Evidence from the 1993/94 Demoaraphic and Health Survey: ***Contraception plays the most prominent role in reducing fertility in Bangladesh***

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The recent decline in fertility in Bangladesh froin a total fertility rate of 6.3 children per women in 1975 to 3.5 in 1995 (MHPC, 1978:73; BBS, 1996) has created interest among researchers, policy makers and academicians. This is because such a dramatic change in fertility has occurred without a substantial improvement in socio-economic status, health conditions and otlier factors thought to be needed to bring about a fertility decline. Some argue that the decline in the fertility level was achieved mainly because of a successful family planning programme (Cleland and others, 1994). Population development programmes have, no doubt, contributed to the fertility decline. However, several biological, behavioural and cultural factors are also involved. Bongaarts (1978) termed these factors the proximate determinants of fertility, since they directly, affect fertility; all other social, economic and environmental factors affect fertility through these variables. Using data from 41 developed and developing countries, Bongaarts and Potter (1983) further obsencd that 96 percent of the variance in the total fertility rates of these populations could be explained by the four principal prominate determinants of fertility: namely, marriage, contraception, induced abortion and lactational infecundability. Because of these findings, it seems reasonable to put the main stress only on these four variables in both data collection and subsequent analysis. To quantify the fertility-inhibiting eftect of the four major proximate determinants, Bongaarts developed a model, which is now widely used in fertility analysis.

To improve our understanding of the causes of fertility decline in Bangladesh, it is necessary to analyse how proximate determinants influence fertility. This understanding is important, because it may indicate ways in which the national population programme could be made even more effective.

This article examines the levels, trends and proximate determinants of fertility in Bangladesh. The study provides a critical review of the four principal proximate determinants of fertility: marriage, contraception, induced abortion and lactational infecundability, and then estimates their fertility-inhibiting effects using the Bongaarts model. The contribution of each of the proximate determinants in the process of fertility change is studied through the decomposition of total fertility rates into their proximate components. The findings of the study provide the basis for drawing out some policy implications and making recommendations with the aim of achieving a further decline in fertility in Bangladesh.

Data

The study utilizes data from the 1993/94 Bangladesh Demographic and Health Survey (BDHS). The 1993/94 BDHS employed a nationally representative two-stage sample. The sample was selected from the frame of the Integrated Multipurpose Master Sample (IMPS), newly created by the Bangladesh Bureau of Statistics on the basis of 1991 census data. Eligible for interviews under the survey were ever-married females aged 10-14. A sample of 9,681 households was selected; 9,640 eligible wozncn in these households there successfully inlterviewed. Field Work began on 17 November 1993 and ended on 12 March 1994. The main source of fertility data collected in the 1993/94 BDHS was tile birth history by each of the ever-married women aged 10-49. Each woman was asked to provide information on the date of birth of each child, sex of the child, survival status and age at death if any of the children had died.

Results and discussion

Fertility levels and trends

Table 1 presents the age-specific fertility rates (ASFR) for all women and currently married women for the period of three years prior to the 1993/94 BDHS date along with the fertility rates obtained from the 1989 BFS for comparison purposes. The age distribution of the fertility rates shows that the age-specific fertility rate (ASFR) was highest for women aged 20-24; in older cohorts, it starts to decline. Howexer, the age-specific marital fertility rate (ASMFR) was highest among women in the age group 15-19. The age pattern of fertility indicates that Bangladeshi women have children early in the childbearing period. For example, women under 30 years of age accounted for

71.8 percent of the total fertility rate (TFR); women under 20 years of age accounted for only 20.3 percent of the TFR.

Table 1 : Age-specific fertility rates for all women and currently married women: 1989 Bangladesh Fertility Survey and 1993/94 Bangladesh Demographic and Health Survey

Age group	1993/94 BDHS			1989 BFS		
	ASFR	Relative percentage of ASFR	ASMFR	ASFR	Relative percentage of ASFR	ASMFR
15-19	0.140	20.3	0.287	0.182	17.8	0.320
20-24	0.196	28.5	0.232	0.260	25.4	0.314
25-29	0.158	23.0	0.170	0.225	21.9	0.247
30-34	0.105	15.3	0.113	0.169	16.1	0.182
35-39	0.056	8.1	0.062	0.114	11.1	0.127
40-44	0.019	2.8	0.022	0.056	5.5	0.066
45-49	0.014	2.0	0.017	0.018	1.8	0.022
Total	0.689 TFR=3.44		0.903 TMFR=4.52	1.024 TFR=5.12		1.278 TMFR=6.39

Note : ASFR = Age-specific fertility rate, ASMFR = age-specific marital fertility rate, TFR = total fertility rate, TMFR = total marital fertility rate

The corresponding figures obtained in the 1989 BFS were 65.1 and 17.8 per cent, respectively (MHPC, 1978). This indicates that fertility is shifting towards earlier ages. The shifting is also evident from a fall in the mean age at childbearing from 27.7 years in 1989 to 25.9 years in 1993/94. This suggests that childbearing is taking place relatively earlier now than it was previously, presumably because of greater fertility regulation at older ages in recent years.

The total fertility rate was estimated to be 3.44 births per woman in the 1993/94 BDHS. The corresponding figure in the 1989 BFS was observed to be 5.12, which indicates that fertility, has declined by almost 1.7 births, a drop of 33 percent in only half a decade. This is a huge decline in fertility over a short period of time.

To gain further insight into the declining nature of fertility, birth-spacing patterns are explored in table 2 by means of the life table technique developed by Rodriguez and Hobcraft (1980). Three types of summary, measures are used: the median, the proportion who experienced (i +1) *th* birth within five years of i*th* birth (quantum), and the conditional mean (trimean) among those who experienced the next birth within 60 months. The quantum refers to the proportion of women at each parity who eventually move to the next highest parity, or the parity, progression ratio. When it is measured for a 60-month period, it is called "quintum". The conditional mean or the trimean is a more refined measure of the tempo or speed of reproduction than the median, while the 60-month progression ratio indicates the quintum of reproduction.

Table 2 : Change in birth-spacing patterns, 1993/94 Bangladesh Demographic and Health Survey

Interval	**Period at start of interval**			
	1974-1978	**1979-1984**	**1984-1988**	**1989+**
Marriage to first birth:	34.09	31.58	28.74	26.20
Median	0.75	0.78	0.85	0.86
60-month progression ratio	30.82	31.55	28.36	23.73
Conditional mean (trimean)				
First to second birth:	29.97	30.64	30.94	32.84
Median	0.90	0.90	0.87	0.85
60-month progression ratio	31.25	31.19	31.49	32.17
Conditional mean (trimean)				
Second to third birth:	30.00	30.76	32.05	33.44
Median	0.88	0.85	0.82	0.82
60-month progression ratio	31.15	31.21	31.49	32.52
Conditional mean (trimean)				
Third to fourth birth:	31.03	31.55	33.32	33.63
Median	0.85	0.81	0.78	0.81
60-month progression ratio	31.19	31.16	31.44	32.12
Conditional mean (trimean)				
Fourth to fifth birth:	32.18	33.31	33.91	34.54
Median	0.79	0.76	0.75	0.79
60-month progression ratio	31.18	31.28	31.46	32.43

Conditional mean (trimean)				
Fifth to sixth birth:	32.92	34.97	35.10	34.56
Median	0.75	0.72	0.72	0.78
60-month progression ratio	31.03	31.50	31.34	32.19
Conditional mean (trimean)				
Sixth to seventh birth:	35.10	36.70	37.63	39.36
Median	0.70	0.69	0.68	0.71
60-month progression ratio	31.07	30.32	31.01	36.09
Conditional mean (trimean)				

Note : The conditional mean, or trimean (T), is obtained using the following formula: $T = (q_1 + 2q_2 + q_3)/4$, where q_1 is the ith quartile of the distribution of the birth interval, as suggested by J. W. Tukey (1977). Exploratory Data Analysis (Reading, Massachusetts: Addison-Wesley).

It may be seen that first birth interval, i.e. the interval between marriage to first birth, has been shortened more for the younger cohorts than their older counterparts (table 2). On the other hand, the proportion of women who had a first child within five years has increased; among them, the mean length of the interval has declined from about 31 months in the mid-1970s to 24 months in the early 1990s. This phenomenon reflects higher fecundability among the women of recent cohorts as a result of a decline in early adolescent marriages and possibly a greater sexual intimacy among the couples in the early months of cohabitation than was previously the case.

The most important finding is that the birth intervals increased consistently over the period 1970-1993 (table 2) irrespective of the parity, indicating a declining trend in fertility. The declining trend in fertility is also evident from a reduction in the proportion of women who had another birth within five years of a previous birth. The conditional mean, however, remained constant except for the most recent cohorts (1989 and later).

Table 3 presents total fertility rates obtained from various sources. Fertility declined from 6.3 children (births) per women in 1975 to 3.4 for the period 1991-1993. This is by far the steepest decline in fertility ever recorded in Bangladesh and also in Asia in such a short period of time (Cleland, 1994). This has created a sensation among researchers, policy makers, planners and academicians. However, many have also speculated that the fertility level may be seriously

under estimated. However, a validation study of the 1993/94 BDHS in Matlab did not find any important inconsistency, especially in the BDHS fertility data (Bairagi and others, 1995).

Table 3 : Annual total fertility rates from selected sources, Bangladesh, 1982-1993

Year	1975 Bangladesh Fertility Survey (BFS)	Bangladesh Bureau of Statistics (BBS)	1989 Bangladesh Ferility Survey (BFS)	1993/94 Bangladesh Demographic and Health Survey (BDHS)	Matlab (Comparison area)
1975	6.3				
1980		5.0	6.8		
1981		5.0	6.7		
1982		5.2	6.4	6.6	6.3
1983		5.1	6.1	6.2	6.1
1984		4.8	5.9	6.6	5.1
1985		4.7	5.5	6.3	6.0
1986		4.7	5.1	6.1	5.5
1987		4.4	4.8	5.6	5.2
1988		4.4		5.2	5.4
1989		4.3		4.9	4.9
1990		4.3		4.4	5.0
1991		4.2		3.8	4.3
1992		4.2		3.4	3.8
1993		3.7a		3.3	3.9

Source: 1975 BFS from Ministry of Health and Population Control (MHPC) (1978). Bangladesh Fertility Survey 1975: First Country Report (Dhaka: Ministry of Health and Population Control); BBS from J. Cleland (1994). "Fertility levels

and trends in Bangladesh", in: J. Cleland and others (eds.) Bangladesh Fertility Survey, 1989, Secondary Analysis (Dhaka: National Institute of Population Research and Training [NIPORT]), p. 15, and Bangladesh Bureau of Statistics (1994). "Summary presentation of results of prevalence of morbidity and disability". Presented at the workshop on dissemination of summary results of the Health and Demographic Survey, May 1994, Dhaka, p.5; 1989 BFS from N.M.Huq and J. Cleland (1990). Bangladesh Fertility Survey (BFS), Main Report (Dhaka: National Institute of Population Research and Training [NIPORT]), p. 104; and Matlab from International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) (1994). Demographic Surveillance System: Early Indicators, Matlab 1993 (Dhaka: ICDDR,B), p.3.

a This figure is from the 1995 Health and Demographic Survey of the Bangladesh Bureau of Statistics.

The estimated fertility in the 1993/94 BDHS is far lower than reported by the Bangladesh Bureau of Statistics (BBS) sample vital registration system, which itself is thought to under estimate fertility. The BBS reported a TFR of 3.7 children per woman in 1993. Despite its painstaking methodology, the BBS sample registration system probably suffers from under counting of births (Cleland 1994).

Although data from Matlab (which are considered to be of very high quality) may not be nationally representative and therefore not fully comparable with BDHS data, they do provide evidence that a very sharp decline in fertility has taken place in Bangladesh. The data from the BDHS and Matlab comparison area show roughly comparable rates of decline over time, but the decline depicted from the BDHS is steeper than from the Matlab comparison area. In the Matlab comparison area, the TFR was reported to be 3.9 in 1993. To sum up, whatever may be the exact level of current fertility, it can be said that there is ample evidence that, during the last two decades, fertility in Bangladesh has declined by at least 30 percent.

To improve our understanding of the causes of such a dramatic fertility decline, we critically examine the proximate determinants of fertility in this study. Because most of the variations in fertility can be attributed to the differential impact of marriage, contraception, lactational infecundability and induced abortion (Bongaarts and Potter, 1983), we present a brief overview of these factors in the subsequent sections.

Marriage

Bangladesh has a long tradition of early marriage among females (Maloney and others, 1981; Aziz and Maloney, 1985) and this situation still prevails. The 1993/94 BDHS data (Table 4) suggest that among the 9,640 ever-married females aged below 50 years in the sample, about 95 percent were married when they were below 20 years of age and only 5 percent were married at ages 20 and older. The corresponding figures in the 1989 BFS were 96 and 4 percent, respectively (Mahmud, 1994).

Table 4 : Percentage distribution of ever-married women by age at first marriage and current age, Bangladesh

Age at first marriage	Current age				Total	Cumulative percentage (%)
	< 20	20-29	30-39	40-49	N	
[3] 14	64.9	54.6	66.3	76.5	6,047	62.7
15-19	35.1	37.9	28.0	20.3	3,093	94.8
20 and older	--	7.5	5.7	3.2	500	100.0
Total	100.0	100.0	100.0	100.0	100.0	
N	1,417	4,029	2,679	1,514	9,640	
Mean age at marriage (years)	14.0	14.7	14.1	13.3	14.5	

More than 60 percent of the ever-married females got married when they were 14 years of age or younger (table 4). The average age at first marriage among the ever-married females was very low, i.e. 14.5 years. But the singulate mean age at marriage (SMAM) for females was 18.2 years.

Despite these data, the situation is improving slowly but steadily. Over the last 18 years, the singulate mean age at first marriage has increased by two years, from 16.3 years in 1975 to 18.2 years in 1993/94 (table 5). The mean age at first marriage is higher among the young cohort than their older counterparts, indicating a rising trend in the age at marriage (table 4).

Table 5 shocks the *de facto* age distribution of the female population aged 10-49 at various points in time by age and current marital status. It shows that the overall proportion currently married has remained static in the vicinity of 64 percent since 1981. However, a number of changes have occurred in the age distribution of the proportion currently married since 1975. There is an appreciable rise in the proportion never married and a fall in the proportion currently married at early ages among females, indicating a rising trend in the age at marriage. The most remarkable decline in the proportion of currently married women has occurred among the 15-19 age group. The proportion currently married rose to almost 98 percent by age 35, which indicates almost universal marriage among females in Bangladesh.

Table 5 : Age pattern of proportion currently married as reported in various censuses and surveys, Bangladesh, 1975-1994

Age	**1975 Bangladesh Fertility Survey (BFS)**	**1981 census**	**1989 Bangladesh Fertility Survey (BFS)**	**1991 census**	**1993/94 Bangladesh Demographic and Health Survey (BDHS)**
10-14	8.2	7.0	3.5	3.0	4.6
15-19	64.8	65.4	48.1	49.6	47.7
20-24	90.3	90.9	82.8	86.6	84.6
25-29	92.1	94.4	91.4	94.0	92.9
30-34	90.7	92.9	92.7	93.8	97.9
35-39	84.3	89.8	89.7	92.1	90.9
40-44	78.8	81.9	84.1	86.9	87.4
45-49	71.0	74.5	80.3	81.7	82.4
Total	62.3	66.4	63.0	64.4	63.4
Singulate mean age at marriage: Males	24.0 16.3	23.9 16.6	25.5 18.0	25.0 18.1	25.6 18.2

Females					

Source: 1975 BFS from Ministry of Health and Population Control (MHPC) (1978). Bangladesh Fertility Survey 1975: First Country Report (Dhaka: MHPC); 1981 and 1991 censuses (Bangladesh Bureau of Statistics); 1989 BFS from N.M.Huq and J. Cleland (1990). Bangladesh Fertility Survey (BFS), Main Report (Dhaka: National Institute of Population Research and Training [NIPORT]), p. 43.

Contraception

The family planning programme in Bangladesh is considered to be an example of an effective programme in country without a high level of socio-economic development, the latter being a factor which is usually considered as a necessary precursor for a successful family planning programme (Koenig and others, 1987; Duza and Nag, 1993). With the help of the concerted efforts of the government in conjunction witli NG0s in the field, the national family planning programme has achieved a remarkable level of success in a short period of time, attaining a contraceptive prevalence rate (CPR) of 44.6 percent in 1993/94. Results of the 1993/94 BDHS show that, among currently married women aged 15-49, knowledge about at least one family planning method is almost universal. However, only 65.7 percent of women reported ever having used any family planning method (Mitra and others, 1994:40-42).

According to the 1993/94 BDHS, 44.6 percent of currently married women were using any method of family planning, 36.2 percent being modern methods and 8.4 percent traditional methods (table 6). Modern methods account for 81.2 percent of total use, while traditional methods account for 18.8 percent of total use. Among the modern methods, the oral pill has the highest prevalence rate (17.4 percent), followed by female sterilization (8.1 percent), injectables (4.5 percent), condom (3 percent), IUD (2.2 percent) and male sterilization (1.1 percent).

Table 6 : Percentage of currently married women who are currently using specific family planning methods as reported in various surveys, Bangladesh, 1975-1994

Methods	**1975 BFS**	**1981 CPS**	**1983 CPS**	**1985 CPS**	**1989 CPS**	**1989 BFS**	**1991 CPS**	**1993/94 BDHS**

Modern (Total)	**5.0**	**11.0**	**13.8**	**18.4**	**24.4**	**23.2**	**31.2**	**36.2**
Pill	2.7	3.5	3.3	5.1	9.1	9.6	13.9	17.4
IUD	0.5	0.4	1.0	1.4	1.7	1.4	1.8	2.2
Injection	0.4	0.2	0.5	1.1	0.6	2.6	4.5	
Condom	0.7	1.6	1.5	1.8	1.9	1.8	2.5	3.0
Vaginal method	0.0	0.3	0.3	0.2	0.2	0.1	0.0	0.0
Female sterlization	0.6	4.0	6.2	7.9	9.0	8.5	9.1	8.1
Male sterilization	0.5	0.8	1.2	1.5	1.5	1.2	1.2	1.1
Traditional (total)	**2.7**	**7.6**	**5.3**	**6.9**	**7.0**	**7.6**	**8.7**	**8.4**
Periodic abstinence	0.9	3.9	2.4	3.8	3.8	4.0	4.7	4.8
Withdrawal	0.5	1.8	1.3	0.9	1.2	1.8	2.0	2.5
Other	1.3	1.9	1.8	2.2	2.0	1.8	2.0	1.1
Any method (CPR)	**7.7**	**18.6**	**19.1**	**25.3**	**31.4**	**30.8**	**39.9**	**44.6**

Note: See tables 3 and 5 for abbreviations.

The results indicate that a substantial proportion (8.4 percent) of the couples, accounting for 18.8 percent of the total CPR, still rely on traditional methods. The sizable contribution of traditional methods to overall CPR deserves special attention by family planning programme managers.

Table 6 shows a number of changes in method mix in Bangladesh since 1975. It may be seen that much of the total increase in the CPR was due to increased adoption of oral pills, female sterilization and injectables. The proportion of current use of other mctliods remains more or less stable. The proportion relying on oral pills has increased almost five times in the last 13 years, from 3.5 percent in 1981 to 17.4 percent in 1993/94, while injectables increased more than 10 times, from 0.4 percent in 1981 to 4.5 percent in 1993/94. Also showing slow but steadily increased use is the IUD. Although the female sterilization rate has increased very rapidly up to 1989, it started declining slowly afterwards. Male sterilization also followed the same pattern over that period. The use of the condom is increasing slowly.

Breastfeeding and post-partum amenorrhoea

Information on breastfeeding in the 1993/94 BDHS was collected on all children born during the last three years proceeding the survey date. A total of 3,926 women provided information; 96.2 percent of them reported having ever breastfed their last born child (table 7), which indicates the universality of breastfeeding in Bangladesh.

Table 7 : Summary of initial breastfeeding, timing of supplementary foods and median duration of difference types of breastfeeding, frequency of breastfeeding and average duration of post-partum amenorrhoea, Bangladesh

Breast feeding status	%	Duration in months
Never breastfeed	3.8	
Within one hour	8.6	
Within one hour to one day	48.0	
After one day	43.4	
Breastfeed six or more times in 24 hours	91.9	
Median duration of exclusive breastfeeding		1.6
Median duration of full breastfeeding (including plain water)		2.7
Median duration of any breastfeeding		30.0

Median duration of post-partum amenorrhoea		12.1

Note : Durations were obtained by life table techniques.

Although universal breastfeeding has long been a tradition in Bangladesh, only 8.6 percent of the last born children were given the initial flow of breast milk, i.e. colostrum, which is rich in nutrients and antibodies to protect the child's health, within one hour of birth, and less than half (48 percent) of children are put to the breast within the first day of life. Breastfeeding was initiated for 43.4 percent of babies one day after birth. This situation indicates an apparent widespread late initiation of breastfeeding in Bangladesh, which deserves the special attention of health policy makers and planners (see Khan, 1990:73).

According to the 1993/94 BDHS, the average duration of breastfeeding in Bangladesh is 30.0 months (table 7). Our estimate of overall duration of breastfeeding is very close to the estimate of 28.0 months obtained by Mitra and others (1994) from the same data set, using the prevalence/incidence method. Various studies during the last two decades have reported average duration of breastfeeding in Bangladesh in the vicinity of two and a half years. The variation in the estimates are a result partly of the type of data used as well as the methodologies applied.

The average duration of post-partum amenorrhea was estimated to be 12.1 months for the country as a whole (table 7). This estimate is slightly higher than that obtained by Mitra and others (1994) using the prevalence/incidence method, i.e. 11.5 months.

It should be noted that, although the duration of breastfeeding did not change much over the last two decades the length of amenorrhea shows a declining trend. The 1975 BFS reported a mean post-partum amenorrhea of 14.6 months (Singh and Ferry, 1984). In another study, Ford and Kim (1987) found that the median amenorrheic period in Bangladesh (Matlab) was over 14.6 months during the period 1975-1979. In a recent study, Salway and others (1993) examined changes in post-partum amenorrhea over the 1978-1990 period utilizing longitudinal data from rural Matlab. They observed that the median duration of post-partum amenorrhea fluctuated around 13 months for the cohorts of births from the 1978-1983 period. Thereafter, a sharp decline occurred, with the duration falling from 13.5 months for the 1982-1983 cohort to 9.4 months

for the 1988-1989 cohort. Salway and others (1993) also observed that increased use of contraception is one of the important factors accounting for the declining trend in post-partum amenorrhea in Bangladesh.

Induced abortion

Induced abortion is still illegal in Bangladesh except in a few special circumstances, such as pregnancy as a result of rape or when the pregnancy threatens the woman's life. Because of legal constraints as well as social sensitivities, no reliable information on abortion has been obtained through any national level survey. None the less, evidence from hospital and clinic records and other sources suggests that abortion is not rare in Bangladesh (Khan and others, 1986; Obaidullah and others, 1981). In most cases, it is done under the name of menstrual regulation, which procedure is approved by the government's health and family planning programme. Hence, appropriate efforts should be made to assess the true effect of this factor.

The 1993/94 BDHS does not provide any useful estimate of the induced abortion rate. Only 51 women (0.5 percent) reported having had an induced abortion during their lifetime, which does not permit calculation of a total abortion rate for the country. However, data from the Demographic Surveillance System in the Matlab comparison area, which is generally comparable to other rural areas of Bangladesh, may be utilized in order to obtain a rough estimate of the induced abortion rate for the country. In a recent study, Ahmed and others (1996) obsened tliat, during the period 1982-1991, there were 1,183 induced abortion cases among about 22,1500 women of reproductive age in the Matlab comparison area. Based on these data, we estimate the total induced abortion rate to be 0.18 during the average woman's 30 years of potential exposure (Hill, 1985). However, owing to under reporting, this estimate may be taken as a lower bound of the rate in Bangladesh.

Fertility-inhibiting effects of the proximate determinants

To estimate the fertility-inhibiting effects of the four important proximate determinants: marriage, contraception, induced abortion and lactational infecundability, we applied the Bongaarts model. Table 8 presents the estimated values of the indices of the four principal proximate determinants of fertility obtained from the 1993/94 BDHS along with the same from the 1975 BFS and 1989 BFS for comparison purposes. The complement of each index represents the proportionate reduction in fertility attributable to each fertility determinant. The

lower the index value, the greater is the fertility-reducing impact. The index Cm represents the proportion by which TFR is smaller than TMFR (total marital fertility rate) as a result of the marital pattern. Similarly, the index Cc gives the proportion by, which TMFR is smaller than TN (total natural fertility) with the level and effectiveness of contraceptive use, and the index Ci indicates by how much TN is smaller than TF (total fecundity) due to the effect of lactational infecundability.

Table 8 : Estimates of indices of proximate determinants of fertility, Bangladesh

Indices of proximate determinants	**1975 BFS**	**1989 BFS**	**1993/94 BDHS**	**Percentage change during period 1975-1994**
Cm	0.850	0.801	0.761	-10.47
Cc	0.937	0.727	0.610	-34.90
Ci	0.604	0.666	0.653	+8.11
Ca	1.000	0.982	0.971	-2.90
Combined effect of four indices (Cm x Cc x Ca x Ci)	0.481	0.381	0.294	-38.88
TF	15.3	15.3	15.3	
TFR (estimated)	7.33	5.83	4.5	

Note: See tables 3 and 5 for abbreviations. The average use-effectiveness adopted here is from the Matlab study by R. Bairagi, M. Mazharul Islam and M.K. Barua (1998). "Contraceptive failure: levels, trends and determinants in Matlab, Bangladesh" Journal of Biosocial Sciences (in press).

The results indicate that in 1993/94 contraception had the highest fertility-reducing effect, accounting for a 39.0 percent (Cc = 0.610) reduction in TN relative to TMFR. Lactational infecundability was the second most important fertility-reducing factor, reducing the total fecundity rate (TF) by 34.7 percent (Ci

= 0.653). The marriage pattern had the lowest fertility-reducing effect, reducing actual fertility levels below marital fertility by 23.9 percent (Cm = 0.761).

In an attempt to document changes among the indices over a period of one and a half decades (1975-1993/94), the results at different points in time are compared in table 8. The results indicate that, during the period 1975-1993/94, the only appreciable change that occurred was in the contraceptive use variable. During the period, the index of marriage declined by almost 10.5 percent and the index of contraception declined by 34.9 percent whereas the index of lactational infecundabililty increased by 8.1 percent. Thus, the decline in the total fertility rate (from 6.33 children per woman to 3.44) between 1975 and 1994 has been caused primarily by contraception. The fertility-reducing effect of the marriage pattern is offset by a reduction in the duration of lactational infecundability. The combined fertility-limiting effect of the three proximate determinants (Cm x Cc x Ci) was 0.481 in 1975 and 0.294 in 1994, indicating a decline of about 38.9 percent in fertility during the period 1975-1994.

Table 9 exhibits the magnitude of the total fertility-inhibiting effect accounted for by each proximate fertility, determinant at two points in time, 1989 and 1994. The difference between total fecundity, taken as 15.3, and the estimated TFR is attributed to the result of the combined inhibitory effect of all the determinants. The total fertility-inhibiting eftect is prorated by the proportion of the logarithm of each index to the sum of the logarithm of all indices (Wang and others, 1987). The results indicate that, of a total of almost 9.5 births in 1989 being inhibited, almost 2.2 births (or 23.0 percent) were due to the effect of the marriage variable, over 3.1 births (or 33.1 percent) were due to contraception, almost 4 births (or 42.0 percent) were due to lactational infecundability and almost 0.2 birth (or 1.9 percent) was due to induced abortion. Similarly in 1994, the proximate variables (marriage, contraception, lactational infecundability and induced abortion) inhibited 10.8 births, distributed, respectively, as 2.4 births (or 22.3 percent), almost 4.4 births (or 40.4 percent), almost 3.8 births (or 34.8 percent) and 0.2 birth (or 2.4 percent).

Table 9 : Magnitude of the total fertility-inhibiting effect being accounted for by each proximate fertility determinant: Bangladesh, 1989-1993/94

Proximate determinants (indices)	**Fertility-inhibiting effect**	
	Births per woman	**Percentage**

	1989	1994	1989	1994
Marriage (Cm)	2.18	2.41	23.0	22.3
Contraception (Cc)	3.13	4.36	33.1	40.4
Lactational infecundability (Ci)	3.98	3.76	42.0	34.8
Induced abortion (Ca)	0.18	0.26	1.9	2.4
Total : [15.3-TFR (estimated)]	9.47	10.80	100.0	100.0

Note: The total fertility-inhibiting effect is prorated by the logarithm of each index e.g. effect of marriage: [TF-TFR (estimated)] x log Cm/(log Cm + log Cc + log Ci)

Proximate determinants by sub-group

Table 10 presents differential effects of some selected socioeconomic factors on the fertility-inhibiting effects of the proximate determinants. It may be seen that the urban-rural differentials in the fertility-inhibiting effect of the marriage pattern, contraception and lactational infecundability are highly pronounced. The combined effect of these three factors also shows variation across the country's administrative divisions, which is mainly due to the differential effect of contraception. The index of contraception (Cc) shows wide variation among the divisions. Rajshahi Division shows the highest fertility-inhibiting effect of contraception, followed by Khulna, Barisal, Dhaka and Chittagong divisions. However, the index of marriage (Cm) and lactational infecundability (Ci) show relatively less variation among the divisions.

Table 10 : Indices of proximate fertility determinants by some selected socio-economic characteristics, Bangladesh

Background characteristics	Indices				Combined effect
	Cm	Cc	Ci	Ca	Cm x Cc x Ci x Ca

National	0.761	0.610	0.653	0.971	0.294
Place of residence:	0.681	0.549	0.750	0.971	0.272
Urban	0.766	0.616	0.644	0.971	0.296
Rural					
Division:	0.766	0.585	0.641	0.971	0.279
Barisal	0.733	0.739	0.649	0.971	0.341
Chittagong	0.754	0.595	0.648	0.971	0.282
Dhaka	0.763	0.532	0.690	0.971	0.272
Khulna	0.756	0.526	0.647	0.971	0.250
Rajshahi					
Education:	0.780	0.847	0.633	0.971	0.406
No schooling	0.783	0.622	0.653	0.971	0.309
Primary or less	0.684	0.548	0.772	0.971	0.280
Secondary and above					
Economic status:	0.761	0.636	0.629	0.971	0.296
Poor	0.758	0.598	0.711	0.971	0.312
Middle class	0.755	0.544	0.805	0.971	0.321
Upper class					
Religion :	0.762	0.621	0.648	0.971	0.298
Muslim	0.770	0.543	0.683	0.971	0.277
Non-Muslim					
Working status:	0.578	0.497	0.655	0.971	0.183
Work	0.916	0.630	0.639	0.971	0.358
Do not work					

The fertility-inhibiting effect of contraception also varies widely by religion. The effect is less pronounced among Muslim women than those from other religions. Marriage pattern and lactational infecundability also have less of an effect among Muslim women than their non-Muslim counterparts, but the difference is not substantial.

The fertility-inhibiting effects of marriage and contraception show a positive relationship with the level of education. However, lactational infecundability shows a negative relationship with the level of education. But even then, the

combined fertility-inhibiting effect remains higher for the women with an education level of secondary and above compared with their counterparts who are illiterate or who have only a primary level of education.

Women's work status shows a strong differential effect of marriage pattern, contraception and lactational infecundability. The effect is most pronounced on marriage pattern and contraception, but the eftect of lactational infecundability is higher among non-working women, indicating a longer lactational amenorrhoca period among them.

To examine the effect of women's economic status on the proximate determinants of fertility, women were classified into poor, middle and upper classes on the basis of their household possession scores. The results indicate that women's economic status has a positive effect on marriage and contraception, but a negative effect on lactational infecundability. For women with a higher economic condition, the fertility-reducing effect of marriage and contraception is highest but the effect of lactational infecundability is weakest.

Contraception inhibits fertility most among working, higher educated, upper class, urban and non-Muslim women. By contrast, lactational infecundability shows the highest fertility-inhibiting effect among poor, non-working illiterate and rural women, while the fertility-inhibiting effect of marriage shows a substantial effect for work status, education and place of residence.

Summary and conclusion

The study reveals that the 1993/94 BDHS recorded a dramatic fall in the level of fertility in recent years. Fertility has declined from 6.3 children per woman in 1975 to 3.4 in 1993/94, that is, fertility has been virtually halved over the past two decades. This is by far the steepest decline in fertility ever recorded in Bangladesh. The declining trends in fertility are also evident from the analysis of birth-spacing patterns, which indicate that there are declining trends in the proportion of women who have another birth within five years of a previous birth. Another important finding of the study is the change in age-specific fertility patterns, which indicate that childbearing is taking place at an earlier age currently than had been the case previously. As the desired level of fertility is declining and age at marriage is rising, couples tend to reach their desired number of children in quick succession immediately after marriage and then regulate fertility at older ages.

A review of marriage variables shocks that among females there has been an appreciable rise in the proportion never married and a fall in the proportion currently married at early ages, indicating a rising trend in female age at marriage. The rising trend in the proportion single continues up to the age group 25-29. The singulate mean age at marriage is increasing slowly but steadily; it is 25.6 years for males and 18.2 years for females, indicating a wide gap of 7.4 years between the age of the typical husband and wife.

As his been observed, the national family plinning programme has achieved remarkable success in a short period of time, reaching a CPR of 45 percent in 1993/94 - it was only 7.7 percent in 1975. CPR is increasing by two percentage points annually, and if the present programme effort and current performance level can be sustained, the CPR could reach a relatively high level before the turn of the century.

Although universal and prolonged (30 months) breastfeeding is common in Bangladesh, only one-fourth of lactating women were found to continue full (including plain water) breastfeeding up to five months. The average duration of exclusive breastfeeding was observed for only one and a half months. Very few women (8.6 percent) initiate breastfeedilig within the first hour of life in order for their babies to receive colostrum. It has been observed that, although the duration of breastfeeding did not change much over the last two decades, the length of amenorrhoea shows a declining trend. This may be due to increased modernization, increased use of supplementation of breastfeeding and increased use of contraception (Salway and others, 1993).

Owing to legal and social constraints, national level data on induced abortion are not available and its effects remain unmeasurable. However, evidence from hospital and clinic records and other sources suggests that induced abortion is not rare, although it is done under the name of menstrual regulation in Bangladesh. It is a factor in accounting for current fertility levels as well as fertility reduction. Of the remaining three proximate determinants (marriage, contraception and lactational infecundability), contraception plays the most prominent role as a fertility-reducing factor. Lactational infecundability is the second most important factor; change in marriage age plays the least important role in the reduction of fertility. Our analysis suggests that the fertility-reducing effect of contraception is gradually increasing, whereas the effect of lactational infecundability remains nearly constant. Respondents' work status; education, urbanization and economic condition play a dominant role in variations of the fertility-inhibiting effect of the major proximate determinants of fertility.

From the foregoing analysis, it may be noted that in recent years contraception has emerged as the highest fertility-reducing factor in Bangladesh. Until recently, lactational infecundability was considered to be the most important and strongest fertility-reducing factor, but by 1994 contraception had become the most important determinant of fertility and its fertility-inhibiting effect is steadily increasing. The increasing effect of contraception is evident from the declining trend in the value of the index Cc from 0.937 in 1975 to 0.610 in 1994. On the other hand, the fertility-reducing effect of lactational infecundability is gradually decreasing owing to the declining trend in the lactational amenorrheic period (Salway and others, 1993). It should be mentioned that, although there is an increasing trend in the impact of the marriage component, reflecting the effect of an increased proportion non-married and/or an increased age at marriage, the rate of change is very slow. The prevailing cultural and social norms in Bangladesh are unlikely to permit a change in the proportion non-married beyond a certain limit and the prospect for an immediate rise in the age at marriage for females does not seem to be very bright. It should be noted that the joint effect of marriage and lactational infecundability did not change much over the period 1975 to 1994 as the declining effect of lactational infecundability has been offset by the increasing effect of marriage. This leads to the conclusion that future reductions in fertility in Bangladesh may be largely dependent on the increased use of effective birth control methods.

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