

FERTILITY DECLINE IN BANGLADESH:

An Investigation of the Major Factors

Barkat-e-Khuda
Mian Bazle Hossain



CENTRE
FOR HEALTH AND
POPULATION RESEARCH

International Centre for Diarrhoeal Disease Research, Bangladesh
Mohakhali, Dhaka 1212, Bangladesh

1996

ICDDR,B Working Paper No. 48

Editing: M. Shamsul Islam Khan
Kathryn Viguerie

Layout Design and Desktop Publishing: Jatindra Nath Sarker
Milton Quiah
Manash Kumar Barua

Cover Design: Asem Ansari

ISBN: 984-551-045-11

© 1996. International Centre for Diarrhoeal Disease Research, Bangladesh

MCH-FP Extension Project (Rural) Working Paper No. 111
ICDDR,B Working Paper No. 48

Published by:
International Centre for Diarrhoeal Disease Research, Bangladesh
GPO Box 128, Dhaka 1000, Bangladesh
Telephone: (880-2) 871751-871760 (10 lines): Cable: CHOLERA DHAKA
Fax: (880-2) 871568 and (880-2) 883116

Printed by Adprint, Dhaka

ACKNOWLEDGEMENTS

The MCH-FP Extension Project (Rural) is a collaborative effort of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) and the Ministry of Health and Family Welfare (MOHFW) of the Government of the People's Republic of Bangladesh, supported by the Population Council. Its purpose is to improve the delivery of maternal and child health and family planning services through the MOHFW programme.

This publication is funded by the United States Agency for International Development (USAID) under the Cooperative Agreement No. 388-0071-A-00-3016-00 with the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). The ICDDR,B is supported by the aid agencies of the Governments of Australia, Bangladesh, Belgium, Canada, China, Denmark, Germany, Japan, the Netherlands, Norway, Republic of Korea, Saudi Arabia, Sri Lanka, Sweden, Switzerland, Thailand, the United Kingdom, and the United States; international organizations including Arab Gulf Fund, Asian Development Bank, European Union, the United Nations Children's Fund (UNICEF), the United Nations Development Programme (UNDP), the United Nations Population Fund (UNFPA), and the World Health Organization (WHO); private foundations including the Aga Khan Foundation, Child Health Foundation, Ford Foundation, Population Council, Rockefeller Foundation and the Sasakawa Foundation; and private organizations including American Express Bank, Bayer A.G., CARE, Family Health International, Helen Keller International, the Johns Hopkins University, Macro International, New England Medical Centre, Procter Gamble, RAND Corporation, SANDOZ, Swiss Red Cross, the University of Alabama at Birmingham, the University of Iowa, and others.

An earlier version of the paper was presented at the Continuing Demographic Transition Seminar in honour of Professor John C. Caldwell,

The Australian National University, Canberra, Australia, August 14-16, 1995. The authors are grateful to the key discussant, Dr. Steven Sinding, Director, Population Division, The Rockefeller Foundation, and other seminar participants for their valuable comments and suggestions. The paper was subsequently presented at the ICDDR,B Inter-Divisional Scientific Forum on September 25, 1995, and the authors are grateful to various Centre colleagues for their valuable comments and suggestions.

CONTENTS

	Page
ABSTRACT	v
BACKGROUND	1
DATA AND METHODOLOGY	3
Selected Variables and Possible Mechanisms	
of Change in Reproductive Behaviour	5
Education	6
Female employment	6
Access to mass media	7
Access to safe drinking water and sanitation	7
Landownership	7
FINDINGS	9
DISCUSSION	22
REFERENCES	24

TABLES

	Page
Table 1. Proportion of married women of reproductive age who have used any family planning method by their characteristics in Bangladesh.	12
Table 2. Proportion of women who have not had any birth by their characteristics in Bangladesh.	14
Table 3. Logistic regression estimates of the odds ratios ($OR = \exp(B)$) of characteristics of married women of reproductive age on contraceptive use in Bangladesh	17
Table 4. Logistic regression estimates of the odds ratios ($OR = \exp(B)$) of characteristics of married women of reproductive age on the proportion who have not had any birth during the reference period in Bangladesh	19
Table 5. Logistic regression estimates of the odds ratios ($OR = \exp(B)$) of composite score on any family planning method use during the reference period	21
Table 6. Logistic regression estimates of the odds ratios ($OR = \exp(B)$) of composite score on the proportion of women who have had no birth during the reference period	21

FIGURES

Fig. 1. CPR in Bangladesh: 1975-1994	10
Fig. 2. TFR in Bangladesh: 1975-1994	10

ABSTRACT

Bangladesh represents an apparent anomaly for significant decline in fertility, despite the absence of conditions believed to be necessary for such a reproductive change. Bangladesh is indeed the only country among the 20 poorest countries of the world where such a change has occurred.

This paper examines the nature of fertility transition in the country, looks at the trends in contraceptive use and fertility, and then identifies the major dominant factors responsible for the fertility decline in Bangladesh, despite its poor socioeconomic conditions. Two types of factors account for the fertility decline: (a) positive factors which encourage eligible couples to contracept for spacing and/or limiting births; and (b) negative factors which compel women to contracept for spacing and/or limiting births.

This analysis examines the effects of various positive and negative factors on contraceptive use and fertility, based on the data from the rural sample of 4,194 women from the 1993-1994 Bangladesh Demographic and Health Survey (BDHS), 2,597 women from the MCH-FP Extension Project area, and 8,110 women from the Matlab MCH-FP Project area. The reference period used for the MCH-FP Extension Project and the Matlab Project is ten years prior to 1994; however, the reference period used for the 1993-1994 BDHS is six years (1988-1994) due to the non-availability of data preceding 1988. Logistic regression is used in analyzing the data. Strong and highly significant effects of female education, female employment, access to media, etc. on contraceptive use and fertility have been found.

BACKGROUND

Bangladesh is the ninth most populous country in the world. According to the 1991 Population Census, the country had a population of over 111 million people, increasing at an annual growth rate of around 2% (1). Today, the country has an estimated population of around 120 million. Except for some island states, Bangladesh has the highest population density in the world.

The scarcity of resources and subsistence-level economic conditions characterize the Bangladesh economy (2). Bangladesh is predominantly dependent on land, with agriculture¹ as its primary industry; however, increasing population pressure on the land is continually decreasing the land-man ratio--from 49 decimals in 1951 to 20 decimals in 1991. Although high-yielding variety (HYV) technology has expanded since the early 1960s, covering over one-quarter of cultivable land area, the per hectare yield is among the lowest in the world (3).

Socioeconomically, Bangladesh is comparatively disadvantaged in terms of such key indicators as per capita income (US\$ 220 in 1991) (4), proportion living below the poverty line (78% of total population and 86% of rural population) (5), 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 37% -- male 49% and female 23%. Female school attendance is low, and there is an uneven ratio of male/female school enrollment, especially beyond the primary level (6).

¹ The share of agriculture to GDP continues to be quite high, though its relative share has been declining over time, down to 37% in 1988-1989 from about 45% in 1984-1985. There is virtually no change in the relative share of industries in GDP, remaining at only about 10% (3).

Life expectancy in Bangladesh continues to be quite low. 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 (5). Continued high-infant and childhood mortality results from relatively weak pre- and postnatal services, less than optimal birth spacing, and widespread malnutrition among children.

Despite pervasive poverty and underdevelopment, Bangladesh has achieved a considerable decline in fertility. 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. Bangladesh is the only country among the 20 poorest countries of the world where such a change has occurred.

The purpose of this paper is to examine the nature of fertility transition in Bangladesh. The paper begins by looking at the trends in contraceptive use and fertility, and then examines the major factors which might have accounted for the fertility transition in Bangladesh, despite its poor socioeconomic conditions. Two sets of factors may account for the fertility decline: (a) positive factors which encourage eligible couples to contracept for spacing and/or limiting births; and (b) negative factors which compel women to contracept for spacing and/or limiting births. Positive factors include education, especially female education; female employment; modernization, access to media; and ideational changes; decline in child mortality, etc. Negative factors include landlessness, impoverishment, and reduced employment opportunities, which affect the economic value of children, etc.

The paper is organized into four sections: section 1 describes the background; section 2 describes the data source; section 3 presents the main findings; and section 4 discusses the major findings and their implications.

DATA AND METHODOLOGY

Three main sources of data were used in this analysis: various national surveys, particularly the 1993-1994 Bangladesh Demographic and Health Survey (BDHS); longitudinal data from the ICDDR,B Matlab Maternal and Child Health and Family Planning (MCH-FP) Project Record-keeping System (RKS) and Demographic Surveillance System (DSS); and longitudinal data from the ICDDR,B MCH-FP Extension Project (Rural) Sample Registration System (SRS).

The 1993-1994 BDHS employed a nationally representative, two-stage sample. A total of 8,168 rural households was selected for the sample, of which 7,798 were successfully interviewed. Of the interviewed rural households, 8,390 women were identified as eligible for interview, and interviews were completed for 8,174 women. Of these 8,174 rural sample women, 4,194 were women who were married throughout the entire reference period², and they were included in the analysis, while those women who were not married throughout the entire reference period were excluded from the analysis.

The second data set has been taken from the ICDDR,B Matlab MCH-FP Project³. Since its inception, the Matlab MCH-FP Project has been collecting longitudinal data from its catchment area population on contraceptive use dynamics, immunization, etc. through its RKS, and on demographic events, such as births, deaths, migration, change in marital

² The reference period used for the MCH-FP Extension Project and Matlab is ten years prior to 1994; however, a six-year reference period (1988-1994) has been used for the 1993-1994 BDHS due to the non-availability of data preceding 1988.

³ A major goal of the Project is to assess whether a village-based maternal child health (MCH) and family planning (FP) service-delivery system can substantially reduce fertility and mortality in an unfavourable rural setting, like Bangladesh. Detailed descriptions of the Project and the areas are given elsewhere (7-11).

status, etc. through its DSS. A total of 8,110 married women of reproductive age, who were married throughout the entire reference period, were included in this analysis, while those who were not married throughout the entire reference period were excluded from the analysis.

The third set of data has been taken from the ICDDR,B MCH-FP Extension Project (Rural)⁴. Since its inception, the MCH-FP Extension Project has been collecting longitudinal data on demographic events as well as on selected variables to monitor the impact of the Project's different interventions on contraceptive use dynamics, etc. (12). A total of 2,597 married women of reproductive age, who were married throughout the entire reference period, were included in the analysis, while those who were not married throughout the entire reference period were excluded from the analysis.

In addition to data on the two dependent variables, namely, contraceptive use and fertility, data on such selected client characteristics as education, age, religion, children born before the reference period, employment status, possession of a sealed latrine, possession of a radio, sources of drinking water, landholding, and electricity (in case of the 1993-1994 BDHS) were used.

The number of births for each woman during the reference period was calculated from all three data sets. Two categories of each dependent variable were used: no children born and one or more children born during the reference period, and use of any family planning methods and never use of any family planning methods during the reference period.

⁴ Since 1982, the MCH-FP Extension Project has been working in close collaboration with the Government of Bangladesh to improve the national FP-MCH service-delivery system. The Project field sites are located in the rural *thanas* (subdistricts) of Sirajganj and Abhoynagar in central and western Bangladesh respectively. In mid-1994, the Project opened a new laboratory area, Mirsarai Thana in Chittagong District. However, no data from Mirsarai Thana have been used in this paper, since there are no trend data as yet.

Data on children born before the reference period were excluded from Model II for each of the regressions to see the effects of other independent variables on contraceptive use and fertility, without controlling the effects of children born before the reference period. Results presented in Tables 1 and 2 show no significant changes, after excluding data on children born before the reference period from the model.

A composite score was developed, using almost all the covariates of each data set. The scores for the different variables were assigned as follows: education (no education=0, any education=1); employment status (housewife=0, other than housewife=1); sources of drinking water (tubewell=1, other than tubewell=0); possession of latrine (sealed latrine=1, other=0); possession of radio (yes=1, no=0); possession of land (no land=0, any land=1); and electricity (women belonging to households with electricity connected=1, and those without electricity=0). Other variables, such as age of women, religion, and children born before the reference period, were not used in building the composite scores. Scores of each individual variable were added to give a composite score, ranging from 0 to 6 for ICDDR,B SRS and DSS, and from 0 to 7 for the 1993-1994 BDHS. Using the composite score as an independent variable, logistic regression was carried out to see the effects of the composite score on contraception and fertility.

Selected Variables and Possible Mechanisms of Change in Reproductive Behaviour

Due to the lack of data, it has not been possible to examine the process through which each factor may have affected contraceptive use and fertility behaviour. This is planned for in the second phase of the study, scheduled to begin around the middle of the next year. However, the possible mechanisms whereby the selected variables may have affected reproductive behaviour are discussed below.

Education: Although literacy continues to remain quite low in Bangladesh, it has shown some improvements over the years. Between 1973 and 1992, primary school enrollment increased by 48% for boys (rising from 5,060,000 to 7,472,000) and for girls by over two times (from 2,698,000 to 6,245,000). During the same period, secondary school enrollment increased by 85% for boys (from 1,343,000 to 2,480,000) and by over three times for girls (from 498,000 to 1,529,000) (13).

How may female education have affected contraceptive use and fertility decline? There are at least three possible mechanisms of change: (a) female education creates more favourable fertility attitudes and norms; (b) it empowers women in household decision-making, including matters related to contraceptive use, fertility, children's schooling, health care, etc.; and (c) it increases prospects of female employment.

Female employment: There has been an increase in the number of females in the work force nationally. However, there is also an evidence of poverty-driven female employment due to poor household economic conditions, high rates of female headships either de jure or de facto as a result of temporary male out-migration (14), and higher incidence of female headships among the poor and landless households (15-16). A study found that between 8% and 24% of the households in Faridpur and Tangail districts send their women in search of wage employment, and the proportion is much higher among the poorer households (50-77%) (17). The same study also found that there has been a rise in female employment since the mid-1970s, and argued that the pressures of poverty may have been critical in sending women out in search of work.

Female employment may have affected contraceptive use and fertility in at least three ways: (a) female employment creates more favourable fertility attitudes and norms; (b) it empowers women in household decision-making; and (c) it increases opportunity costs associated with childbearing.

Access to mass media: Radio ownership has increased from less than 10% in the early-1970s to about 25% in 1989 (18). The role of mass media, especially radio, in popularizing the family planning movement in many developing countries is widely recognized. The use of radio is far greater than its price. Villages in Bangladesh are less isolated today, having been linked to the outside world by the mass media, etc. (19). This linkage promotes diffusion of ideas not only about family planning but also about lifestyles; and the ideational hypothesis argues that reproductive behaviour is affected by such ideas (20).

Access to safe drinking water and sanitation: Access to safe drinking water and improved sanitation has increased over time, though there is still considerable room for improvements.

Access to tubewell drinking water and to sealed latrines represents status symbol in the rural areas. Also, they ensure better health for all, and contribute to reduction in infant and child mortality, and hence, the desired family size. Furthermore, access to tubewells and sealed latrines reflects rising living standards and aspirations, which raises the relative cost of bringing up children and reduces the economic use of children.

Landownership: Increasing population pressure on the land is continually decreasing the land-man ratio, from 49 decimals in 1951 to 20 decimals in 1991. In the process, a large proportion of the rural population have been rendered functionally landless. The average size of farms has indeed diminished rapidly, from 3.5 acres in 1960 to less than two acres in 1994 (13). Furthermore, there has been greater skewness in the distribution in farm size. Farms were divided evenly in the categories of small and medium-sized farms in 1960, but in a span of two decades 70% of the holdings were in the small farmholding category (18). The overall economic scenario indeed suggests that living standards for the vast majority of the people have stagnated for past three decades.

How may the worsening landholding scenario and that of the overall economy have affected reproductive behaviour in Bangladesh? This is likely to have been affected in at least four ways: (a) demand for labour in agriculture has been adversely affected; (b) there has been a rise in rural unemployment and underemployment, affecting adults and children; (c) there is a declining use of child labour (plus increased direct costs of children, thus altering the economic value of children, thereby changing reproductive preferences); and (d) a combination of near stagnant real wages, shrinking farm sizes, chronic unemployment and underemployment, and deepening poverty may provide the conditions for a radical reassessment of the desired number of children.

FINDINGS

The successive governments in Bangladesh have attached top priority to containing the rate of population growth and, accordingly, strengthened and intensified the family planning programme efforts in the country⁵. This has resulted in a near universal awareness of at least one family planning method as well as increasingly positive attitudes toward contraception. Between 1975 and 1993/94, ever use of any methods of family planning increased by about five times (23,26). During the same period, the national contraceptive prevalence rate (CPR) increased by about 6 times. CPR in Matlab increased by about 5 times, and the Matlab CPR is considerably above the national average and that of the MCH-FP Extension Project areas (Fig. 1).

The appreciable increase in CPR over time has resulted in a sharp decline in fertility, with the total fertility rate (TFR) declining from over 7 in the mid-1970s to less than 4 in 1993-1994 (Fig. 2).

⁵ Details of the family planning programme are given elsewhere (21-25).

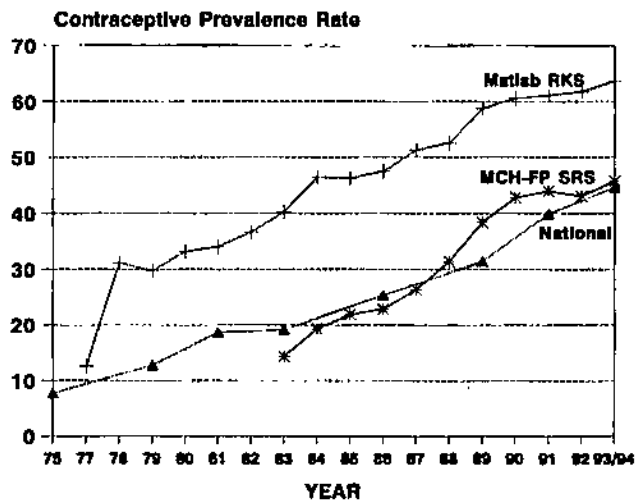


Fig. 1. CPR in Bangladesh: 1975-1994

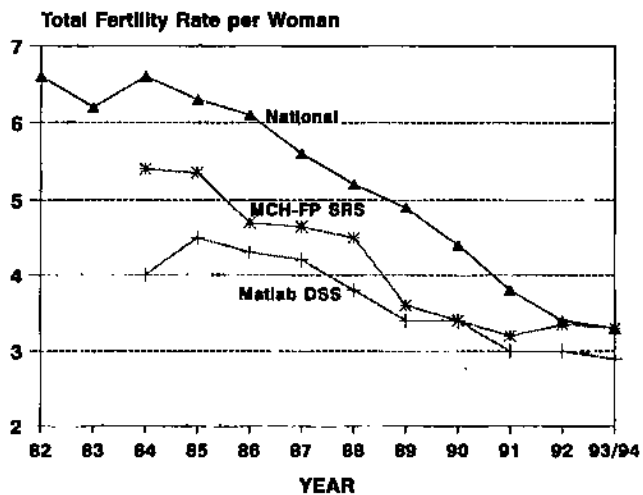


Fig. 2. TFR in Bangladesh: 1975-1994

Table 1 presents data on contraceptive use by selected characteristics of the women during the 1984-1993 period for the MCH-FP Extension Project areas and Matlab, and the 1988-1994 period for the national level. Contraceptive use is positively associated with education; higher among working women than housewives; higher among women belonging to households with sealed latrines than those without; higher among women belonging to the households having radios than those without; higher among women belonging to households using tubewells for drinking water than those without; and higher among women belonging to households with electricity connections than those without. No clear relationship emerges with landholding, indicating that those belonging to the landless households feel the pressure to contracept, implying poverty-led demand for contraception among the poor. It is also possible that there is some aspiration-led demand for family planning among the poor, resulting from access to media and ideational changes.

Table 2 presents data on women who had no birth during the reference period by their selected characteristics. The proportion of women who had no birth during the reference period is higher among the educated women than non-educated women; higher among working women than housewives; higher among women belonging to households with sealed latrines than those without, except in the case of the DSS households; higher among the women of the MCH-FP Extension Project area who belong to households which use tubewell water for drinking purposes than those without; higher among women belonging to households having radios than those without, except the DSS households; and higher among women belonging to households with electricity than those without. Similar to what has been observed with regard to contraceptive use, there is no clear relationship with landholding.

Table 1. Proportion of married women of reproductive age who have used any family planning method by their characteristics in Bangladesh

Characteristic	BDHS 1988-93		MCH-FP Extn. 1984-93		Matlab MCH-FP 1984-93	
	% of Women	No.	% of Women	No.	% of Women	No.
Education						
No education	63.6	(2578)	80.9	(1805)	94.3	(5203)
Primary	75.6	(1165)	90.0	(601)	95.9	(2225)
Above primary	82.5	(451)	92.2	(91)	95.6	(682)
Age of women (in years)						
<25	63.8	(1137)	86.9	(1031)	95.1	(3151)
25-29	71.1	(1285)	86.2	(682)	95.7	(2112)
30-39	70.7	(1772)	78.5	(884)	94.0	(2847)
Religion						
Muslim	68.3	(3650)	83.2	(2226)	94.6	(6632)
Hindu and others	73.5	(544)	88.1	(371)	96.1	(1478)
Employment status						
Housewife	67.7	(3499)	83.8	(2568)	94.8	(7986)
Other than housewife	75.5	(695)	93.1	(29)	96.0	(124)
Possession of latrine						
Sealed latrine	77.0	(848)	87.9	(627)	94.9	(7266)
No sealed latrine	66.9	(3346)	82.6	(1970)	94.7	(844)
Source of drinking water						
Tubewell	69.7	(3817)	86.5	(1796)	95.9	(652)
Other than tubewell	61.3	(377)	77.9	(801)	94.8	(7458)
Possession of radio						
Has	77.5	(1043)	91.3	(378)	94.9	(1183)
Does not have	66.1	(3151)	82.6	(2219)	94.9	(6927)

Contd....

Table 1 - *contd.*

Characteristic	BDHS 1988-93		MCH-FP Extn. 1984-93		Matlab MCH-FP 1984-93	
	% of Women	No.	% of Women	No.	% of Women	No.
Land (in decimals)						
No land	65.2	(1650)	84.4	(981)	94.9	(2053)
Has land	71.4	(2544)	-	-	-	-
1-100	a	a	83.3	(684)	94.6	(3859)
101-300	a	a	82.9	(579)	95.3	(1719)
301+	a	a	85.0	(353)	95.0	(479)
Electricity connection in household						
No electricity	68.0	(3746)	a		a	a
Has electricity	76.8	(448)	a		a	a
Children born before 1984-1988						
	1988		1984		1984	
0	55.2	(745)	74.0	(227)	86.4	(656)
1-2	69.2	(1621)	84.8	(854)	94.6	(2958)
3-4	76.2	(1142)	87.0	(753)	96.4	(2430)
5+	71.3	(686)	82.7	(763)	96.1	(2066)
Total No.		(4194)		(2597)		(8110)

^a Data not available

Table 2. Proportion of women who have not had any birth by their characteristics in Bangladesh

Characteristic	BDHS 1988-93		MCH-FP Extn. 1984-93		Matlab MCH-FP 1984-93	
	% of Women	No.	% of Women	No.	% of Women	No.
Education						
No education	30.6	(2578)	22.8	(1805)	21.2	(5203)
Primary	29.7	(1165)	29.3	(601)	23.1	(2225)
Above primary	31.9	(451)	37.2	(191)	21.7	(682)
Age of women (in years)						
<25	13.1	(1137)	10.5	(1031)	3.5	(3151)
25-29	24.1	(1285)	27.1	(682)	16.6	(2112)
30-39	46.4	(1772)	41.4	(884)	45.7	(2847)
Religion						
Muslim	29.3	(3650)	22.5	(2226)	20.3	(6632)
Hindu and others	38.4	(544)	42.6	(371)	28.4	(1478)
Employment						
Housewife	29.2	(3499)	25.0	(2568)	21.6	(7986)
Other than housewife	37.0	(695)	55.2	(29)	33.9	(124)
Possession of latrine						
Sealed latrine	33.8	(848)	34.5	(627)	21.5	(7266)
No sealed latrine	29.7	(3346)	22.5	(1970)	24.2	(844)
Source of drinking water						
Tubewell	30.0	(3817)	30.5	(1796)	21.0	(652)
Other than tubewell	35.8	(377)	14.0	(801)	21.8	(7458)
Possession of radio						
Yes	35.5	(1043)	32.0	(378)	20.0	(1183)
No	28.9	(3151)	24.3	(2219)	22.0	(6927)

Contd..

Table 2 - *contd.*

Characteristic	BDHS 1988-93		MCH-FP Extn. 1984-93		Matlab MCH-FP 1984-93	
	% of Women	No.	% of Women	No.	% of Women	No.
Land (in decimals)						
No land	29.4	(1650)	23.8	(981)	23.2	(2053)
Has land	31.3	(2544)	-	-	-	-
1-100	a	a	20.9	(684)	20.8	(3859)
101-300	a	a	31.8	(579)	22.2	(1719)
301+	a	a	28.1	(353)	21.5	(479)
Electricity connection in household						
No electricity	30.0	(3746)	a	a	a	a
Has electricity	35.0	(448)	a	a	a	a
Children born before 1984-1988						
	1988		1984		1984	
0	15.2	(746)	15.0	(227)	8.1	(656)
1 - 2	22.2	(1621)	15.6	(854)	5.6	(2958)
3 - 4	43.4	(1142)	28.4	(753)	25.6	(2430)
5+	45.5	(686)	36.4	(763)	44.6	(2066)
Total No.		(4194)		(2597)		(8110)

^a Data not available.

Tables 3 and 4 show the logistic regression estimates of odds ratios for the effects of selected characteristics of married women of reproductive age on contraceptive use and fertility respectively. Odds ratios (OR) are shown in place of regression coefficients for easy interpretation of the results. An OR below 1.00 means a negative effect of an independent variable, while an OR above 1.00 means a positive effect. The first two panels, second two panels and third two panels of the table respectively give the results based on data from the 1993-1994 BDHS, the MCH-FP Extension Project, and the Matlab Project. The results are in the expected direction for most variables.

The probability of contraceptive use rises with education. It is higher among working women than among housewives; among women belonging to households with sealed latrines than those without; among women belonging to households using tubewell for drinking water than those without; among women who belong to households having radios than those without, and among women belonging to households with electricity connections than those without. There is little or no effect of landholding on contraceptive use, indicating that the probability of using contraception is almost the same among the landed as well as the landless, implying poverty-led demand for contraception among the poor. It is also possible that there is some aspiration-led demand for family planning among the poor, resulting from access to media and ideational changes.

The probability of not having given birth during the reference period is higher among the educated than non-educated women; among working women than among housewives; among women belonging to households with sealed latrines than those without; among women belonging to households with radios than those without; and among women belonging to households with electricity connections than those without. Similar to what has been observed with regard to contraceptive use, there is little or no effect of landholding.

Table 3. Logistic regression estimates of the odds ratios (OR=exp(B)) of characteristics of married women of reproductive age on contraceptive use in Bangladesh^a

Characteristic	1993-94 BDHS		MCH-FP Extn.		Matlab MCH-FP	
	Model I	Model II	Model I	Model II	Model I	Model II
Education						
No education (RC) ^b	1.00	1.00	1.00	1.00	1.00	1.00
Primary	1.68***	1.66***	1.98***	1.95***	1.42**	1.44**
Above primary	2.31***	2.06***	2.37**	2.06*	1.52*	1.27
Age of women (in years)						
<25 (RC)	1.00	1.00	1.00	1.00	1.00	1.00
25 - 29	0.91	1.36***	0.44***	0.90	0.48***	1.19
30 - 39	0.69**	1.39***	0.18***	0.56***	0.16***	0.84
Religion						
Muslim (RC)	1.00	1.00	1.00	1.00	1.00	1.00
Hindu and others	1.20	1.15	1.50*	1.33	1.53**	1.47*
Employment status						
Housewife (RC)	1.00	1.00	1.00	1.00	1.00	1.00
Other than housewife	1.62***	1.63***	3.22	3.29	1.09	1.17
Possession of latrine						
Sealed latrine	1.23*	1.20	1.02	1.09	1.07	1.13
No sealed latrine (RC)	1.00	1.00	1.00	1.00	1.00	1.00
Source of drinking water						
Tubewell	1.39**	1.36**	1.59***	1.60***	1.22	1.23
Other than tubewell (RC)	1.00	1.00	1.00	1.00	1.00	1.00
Possession of radio						
Yes	1.45***	1.43***	1.73**	1.75**	1.10	1.04
No (RC)	1.00	1.00	1.00	1.00	1.00	1.00
Land						
No land (RC)	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.14	1.14	0.79*	0.80*	1.01	0.99

Contd...

Table 3 - contd.

Characteristic	1993-94 BDHS		MCH-FP Extn.		Matlab MCH-FP	
	Model I	Model II	Model I	Model II	Model I	Model II
Electricity connection in household						
No electricity (RC)	1.00	1.00	c	c	c	c
Has electricity	1.05	1.08	c	c	c	c
Children born before reference period						
	1988		1984		1984	
0 (RC)	1.00	-	1.00	-	1.00	-
1 - 2	2.06***	-	2.14***	-	3.42***	-
3 - 4	3.56***	-	5.32***	-	12.80***	-
5+	3.18***	-	7.56***	-	19.76***	-
-2Log-likelihood	4911***	5011	2120***	2189***	3068***	3262**
No.	4194	4194	2597	2597	8110	8110
df	14	11	13	10	13	10

* $p < .05$; ** $p < .01$; *** $p < .001$

^a Intercept: -0.62*** -0.20 0.76*** 1.44*** 1.70*** 2.64***

^b Reference category

^c Data not available

Table 4. Logistic regression estimates of the odds ratios (OR=exp(B)) of characteristics of married women of reproductive age on the proportion who have not had any birth during the reference period in Bangladesh^a

Characteristic	1993-94 BDHS		MCH-FP Extn.		Matlab MCH-FP	
	Model I	Model II	Model I	Model II	Model I	Model II
Education						
No education (RC) ^b	1.00	1.00	1.00	1.00	1.00	1.00
Primary	0.98	0.98	1.49**	1.50***	1.30***	1.32***
Above primary	0.97	0.91	1.71**	1.72**	1.75***	1.68***
Age of women (in years)						
<25 (RC)	1.00	1.00	1.00	1.00	1.00	1.00
25 - 29	1.71***	2.08***	3.36***	3.19***	4.44***	5.61***
30 - 39	3.86***	5.82***	7.63***	6.79***	15.64***	25.63***
Religion						
Muslim (RC)	1.00	1.00	1.00	1.00	1.00	1.00
Hindu and others	1.51***	1.45***	2.12***	2.15***	2.13***	2.08***
Employment status						
Housewife (RC)	1.00	1.00	1.00	1.00	1.00	1.00
Other than housewife	1.40***	1.40***	2.68*	2.70*	1.63*	1.53
Possession of latrine						
Sealed latrine	1.11	1.09	1.38**	1.37**	0.87	0.89
No sealed latrine (RC)	1.00	1.00	1.00	1.00	1.00	1.00
Source of drinking water						
Tubewell	0.71**	0.71**	2.39***	2.38***	0.88	0.88
Other than tubewell (RC)	1.00	1.00	1.00	1.00	1.00	1.00
Possession of radio						
Has	1.50***	1.49***	1.16	1.16	1.02	1.02
Does not have (RC)		1.00	1.00	1.00	1.00	1.00
Land						
No land (RC)	1.00	1.00	1.00	1.00	1.00	1.00
Has land	1.02	1.03	0.78*	0.78*	0.98	0.97
Electricity connection in household						
No electricity	1.00	1.00	c	c	c	c
Yes electricity	1.02	1.03	c	c	c	c

Contd...

Table 4 - contd.

Characteristic	1993-94 BDHS		MCH-FP Extn.		Matlab MCH-FP	
	Model I	Model II	Model I	Model II	Model I	Model II
Children born before reference period						
	1988		1984		1984	
0 (RC)	1.00	-	1.00	-	1.00	-
1 - 2	1.15	-	0.72	-	0.47***	-
3 - 4	1.93***	-	0.76	-	0.90	-
5+	1.74***	-	0.66	-	1.14	-
-2Log-likelihood	4653***	4688***	2516***	2519***	6593***	6661***
No.	4194	4194	2597	2597	8110	8110
df	14	11	13	10	13	10

* $p < .05$; ** $p < .01$; *** $p < .001$

^a Intercept:

-1.93*** -1.82*** -2.82*** -3.08*** -3.03*** -3.51***

^b Reference category

^c Data not available

Tables 5 and 6 show the logistic regression estimates of odds ratios for the effect of composite score on contraceptive use and fertility respectively. Results show that the probability of contraceptive use increases by varying proportions (13-37%) for a unit change in the composite score for the three data sets. Results also show that the probability of not having given birth during the reference period increases by varying proportions (9-35%) for a unit change in the composite score for the two data sets; however, the reverse is true, though not statistically significant, for the Matlab data.

Table 5. Logistic regression estimates of the odds ratios (OR=exp(B)) of composite score on any family planning method use during the reference period^a

Variable	1993-94 BDHS	MCH-FP Extn. SRS	Matlab DSS/RKS
Score	1.37***	1.33***	1.13***
*** p < .001			
^a Intercept:	0.01	1.12	2.65

Table 6. Logistic regression estimates of the odds ratios (OR=exp(B)) of composite score on the proportion of women who have had no birth during the reference period^a

Variable	1993-94 BDHS	MCH-FP Extn. SRS	Matlab DSS/RKS
Score	1.09***	1.35***	0.97
*** p < .001			
^a Intercept:	-1.05	-1.73	-1.21

DISCUSSION

Bangladesh is the best example of a country with a strong family planning programme effort which has brought about a significant decline in fertility, even when social and economic development is at low level and not improving much. Bangladesh ranks low on almost every social and economic development indicator. Nevertheless, an intensive family planning programme effort has been followed by a substantial increase in the use of contraception and the consequent fertility decline. The speed with which reproductive behaviour changed in Bangladesh, especially in the absence of much parallel change in social and economic development in the country, strengthens the argument that the family planning programme has had a considerable influence on fertility decline (27). The Bangladesh case has, no doubt, strengthened the argument that a strong family planning programme can make a positive contribution to the process of demographic transition. There is already evidence of the impact of family planning programmes on contraceptive use dynamics (28-32). A more pronounced effect is observed, when standard quality of care is ensured (33). The evidence from Bangladesh has, therefore, challenged conventional demographic transition theory, which generally associates fertility decline with economic development. Accordingly, population scientists are trying to understand the factors that have contributed to this change in Bangladesh.

Female education has emerged as the single most important variable affecting both contraceptive use and fertility regulation. The powerful effect of education on reproductive behaviour is indeed undisputed. Data from the World Fertility Surveys and the Demographic and Health Surveys confirm the strong positive effect of education on reproductive behaviour (34-35). A similar evidence is also available from other studies (36-38). Other positive factors accounting for reproductive change in Bangladesh include female employment, access to safe drinking water and sanitation, and the media (radio). The evidence indicates that improvement in women's status is a critical determinant of fertility decline in Bangladesh. Most Bangladeshis

and foreign observers agree 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 an evidence that such changes have contributed to increased contraceptive use and consequent fertility decline (39,6). Access to safe drinking water and sanitation can be argued to have had some depressing effects on infant and child mortality, and therefore, on fertility decline. Ideational changes resulting from an increased access to the media have fostered more modern attitudes, thereby depressing high fertility norms, even among the poor. Furthermore, landlessness and impoverishment have altered the economic value of children, especially sons. Consequently, there is an evidence of a poverty-led demand for contraception.

The findings have clear policy implications. The Government of Bangladesh should further strengthen its family planning programme efforts to accelerate the rate of fertility decline to be able to achieve replacement level by the year 2005. While achievement of replacement level fertility by the year 2005 would be difficult, it would not be impossible, given considerable unmet need for contraception and decline over time in the mean ideal family size. One-fifth of the married women in Bangladesh have an unmet need for contraception -- 10% and 9% respectively for spacing and limiting births. The mean ideal family size was 2.5 children in 1994, a sizeable decline from 4.1 in 1975 (40). Data from Matlab also show a decline in the mean ideal family size from around 4.5 in both the treatment and comparison areas in 1975 to around 3.2 in 1990 (41). There is now little reason to doubt that there is a substantial demand for contraceptives and that supply-side approaches are having net demographic effects in Bangladesh (8,10). Nevertheless, while pursuing family planning programme efforts vigorously, the government should attach high priority to development in the social sector, including enhancement of women's status, especially through increased female educational and employment opportunities, improved access to the media, etc. Such efforts, in addition to their direct benefits, would accelerate the process of fertility decline in the country.

REFERENCES

1. Bangladesh Bureau of Statistics. Bangladesh population census, 1991. Dhaka: Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning, 1993.
2. Barkat-e-Khuda. Fertility decline amidst unfavorable socioeconomic conditions: Bangladesh a test case. Paper presented at the Workshop on the Development of Long-term Strategic Plan for FPAB, Cox's Bazar, 1991.
3. Barkat-e-Khuda, Barkat A, Helali J. Agricultural development in Bangladesh: a macro study on sustainability considerations. Dhaka: University Research Corporation (Bangladesh), 1991.
4. World Bank. World development report 1993: investing in health. New York: Oxford University Press, 1993. 329p.
5. United Nations Development Program (UNDP). Human development report 1994. New York: Oxford University Press, 1994. 226p.
6. Barkat-e-Khuda, Barkat A. Female education scholarship program -- an impact study. Report prepared for the World Bank, Dhaka, and University Research Corporation (Bangladesh), Dhaka, 1992.
7. Bhatia S, Mosley WH, Faruque ASG, Chakraborty J. The Matlab Family Planning Health Services Project. *Stud Fam Plann* 1980;11:202-12.
8. Phillips JF, Stinson WS, Bhatia S, Rahman M, Chakraborty J. The demographic impact of the family planning health services project in Matlab, Bangladesh. *Stud Fam Plann*, 1982;13:131-40.

9. Phillips JF, Simmons R, Simmons G, Yunus M. Transferring health and family planning service innovations to the public sector: an experiment in organization development in Bangladesh. *Stud Fam Plann* 1984;15:62-73.
10. Phillips JF, Simmons R, Koenig MA, Chakraborty J. The determinants of reproductive change in a traditional society: evidence from Matlab, Bangladesh. *Stud Fam Plann* 1988;19:313-34.
11. D'Souza S. Mortality structure in Matlab (Bangladesh) and the effect of selected health interventions. In: United Nations Department of International Economic and Social Affairs. Determinants of mortality change and differentials in developing countries: the five country case study project. New York: United Nations, 1986 (Population studies series, 94).
12. Mozumder ABMK, Koenig MA, Phillips JM, Murad S. The SRS: an innovative system for monitoring demographic dynamics, *Asia-Pacific Pop J* 1991;5:63-70.
13. Bangladesh Bureau of Statistics. 1993 statistical yearbook of Bangladesh. Dhaka: Bangladesh Bureau of Statistics, 1994.
14. Safilios-Rothschild C, Mahmood S. Women's roles in agriculture -- present trends and potentials for growth: agriculture sector review. Dhaka: UNDP and UNIFEM, 1989.
15. Bangladesh Institute of Development Studies. The face of rural poverty in Bangladesh: trends and insights. Dhaka: Bangladesh Institute of Development Studies, 1990.
16. Rahman HZ, Hossain MB. Rethinking poverty: dimension, process, option. Dhaka: Bangladesh Institute of Development Studies, 1991.

17. Rahman RI. The wage employment market for rural women in Bangladesh. Dhaka: Bangladesh Institute of Development Studies, 1986. (BIDS research monograph 6).
18. Huq N, Cleland J. The Bangladesh fertility survey, 1989. Dhaka: NIPORT, 1990.
19. Cleland J, Phillips JF, Amin S, Kamal GM. The determinants of reproductive change in Bangladesh. Washington, D.C.: The World Bank, 1994.
20. Cleland J, Wilson C. Demand theories of the fertility transition: an iconoclastic view. *Pop Stud* 1987;41: 5-30.
21. Barkat-e-Khuda. Population control in Bangladesh: the prospects. In: Jones GW, editor. Demographic transition in Asia. Singapore: Maruzen Asia Pty. Ltd., 1984.
22. Barkat-e-Khuda, Barkat A, Helali J. Population. In: Report of the Task Force on Bangladesh Development Strategies for the 1990s -- policies for development, v.1. Dhaka: University Press Ltd., 1991.
23. Barkat-e-Khuda, Barkat A, Helali J, Shahzadi N, Akhter R, Mannan MA. Literature review for the development of the national FP-MCH strategy: Bangladesh. Dhaka: University Research Corporation (Bangladesh), 1992. 171p.
24. Barkat-e-Khuda, Barkat A, Whitney E, Shajahan M, McCoskrie M. The national FP-MCH IEC strategy for Bangladesh: 1993-2000. Prepared on behalf of the FP-MCH IEC Strategy committee. Dhaka: The Ministry of Health and Family Welfare, 1993. 61p.

25. Barkat-e-Khuda, Barkat A, Helali J, Miller PC, Haaga J. The Bangladesh population policy: review of ten priority areas. Dhaka: University Research Corporation (Bangladesh), 1994. 55p.
26. Barkat-e-Khuda, Barkat A. The Bangladesh family planning program: key programmatic challenges and priority action areas. Report prepared for the 1994 ICPD on behalf of the Ministry of Health and Family Welfare, Government of the People's Republic of Bangladesh, Dhaka, and Management Sciences for Health, Boston, 1994.
27. Freedman R. Asia's recent fertility decline and prospects for future demographic change. Hawaii: East-West Center, 1995. (Asia-Pacific population research report, I).
28. Phillips JF, Hossain MB, Koblinsky MA. Improving the climate of choice: the effect of organizational change on contraceptive behavior in rural Bangladesh. In: Bulatao RA, Palmore JA, Ward SE, editors. Choosing a contraceptive: factors in method choice in Asia and the United States. Boulder: Westview Press, 1989;212-33.
29. Phillips JF, Hossain MB, Simmons R, Koenig MA. Worker-client exchanges and contraceptive use in rural Bangladesh. *Stud Fam Plann* 1993;24:329-42.
30. Hossain MB, Mozumder KA, Das SC, Alam SM, Barkat-e-Khuda. Sample registration system - contraceptive prevalence and FWA contact rates: MCH-FP Extension Project areas (rural), 1983-92. Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B), 1994 [Documentation Note - unpublished].
31. Hossain MB, Phillips JF, Haaga JG. The impact of field worker visits on contraceptive discontinuation in two rural areas of Bangladesh. Paper presented at the 1994 Population Association of America meeting, Miami, 1994.

32. Hossain MB, Mozumder KA, Das SC, Alam SM, Barkat-e-Khuda. Sample registration system - demographic events and rates: MCH-FP Extension Project areas (rural), 1983-92. Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B), 1994 [Documentation Note - unpublished].
33. Hossain MB, Barkat-e-Khuda, Phillips JF. The effects of outreach worker visits on perceived quality of care in two rural areas of Bangladesh. Paper presented at the 1995 Population Association of America meeting, San Francisco, 1995.
34. Schultz TP. Human capital, family planning and their effect on population growth. *Am Econ Rev* 1994;83(2).
35. World Bank. Development in practice -- population and development. Washington, D.C.: Oxford University Press, 1994.
36. Cochrane S. Fertility and education: what do we really know? Baltimore: Johns Hopkins University Press, 1979.
37. Caldwell JC. Mass education as a determinant of the timing of fertility decline. *Pop Dev Rev* 1980;6:225-55.
38. Jejeebhoy S. Women's education, fertility, and the proximate determinants of fertility. UNFPA Expert Group Meeting on Population and Women, Gaborone, 1992.
39. Barkat-e-Khuda, Islam S, Sultana R, Sirajee SA, Laila RA. Women's savings groups and contraceptive behavior among rural Bangladeshi women. Dhaka: University Research Corporation (Bangladesh), 1990.
40. Mitra SN, Ali MN, Islam S, Cross AR, Shaha T. Bangladesh demographic and health surveys - 1993-94. Dhaka: NIPORT, Mitra and Associates, and Macro International Inc., 1994.
41. International Centre for Diarrhoeal Disease Research Bangladesh, (ICDDR,B). Demographic surveillance system: early indicators. Dhaka: Matlab - 1993, 1994.