European Journal of Population **19:** 29–45, 2003.

Supply and Demand Factors in the Fertility Decline in Matlab, Bangladesh in 1977–1999

JEROEN VAN GINNEKEN[1,*] and ABDUR RAZZAQUE[2]
[1]*Netherlands Interdisciplinary Demographic Institute (NIDI), P.O Box 11650, 2502 AR The Hague, the Netherlands;* [2]*International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B), G.P.O. Box 128, 1000 Dhaka, Bangladesh (*Author for correspondence: E-mail: ginneken@nidi.nl)*

Received 31 October 2001; accepted in final form 18 January 2002

Van Ginneken, J.K. and Razzaque, A., 2003. Supply and demand factors in the fertility decline in Matlab, Bangladesh in 1977–1999, European Journal of Population, **19**: 29–45.

Abstract. A model family planning programme started as a component of a reproductive and child health project in part of Matlab (the Intervention area), a rural area of Bangladesh, in 1977 while another part of Matlab served as a comparison area. The paper analyses data from a vital registration system, censuses and sample surveys, and uses both cross-sectional and longitudinal techniques of analysis. The supply factor alone, i.e., the model family planning programme, contributes substantially to the observed decline in fertility in the Intervention area. Of the several demand factors (indicators of socio-economic status) studied, women's education has the largest impact on the fertility decline. A very important role in the fertility decline is played by changes in attitudes towards feasibility and acceptability of birth control. The overall conclusion is that not only the supply factor, but also demand factors contribute to the fertility decline observed in the Intervention area. Due to limitations in study design and data, we cannot provide a precise, quantitative answer to the question on the specific contributions of both types of factors.

Key words: Bangladesh, education, family planning programme, fertility, socioeconomic factors

Van Ginneken, J. et Razzaque, A., 2003. Effets de l'offre et de la demande sur la baisse de la fécondité au Matlab, Bangladesh, 1977–1999, Revue Européenne de Démographie, **19**: 29–45.

Résumé. En 1977, dans le cadre d'un projet sur la santé de la reproduction et la santé des enfants développé au Matlab, un programme de planning familial a été lancé dans une région de la zone d'intervention tandis qu'une autre région servait de zone témoin. S'appuyant sur des techniques d'analyse transversales et longitudinales, l'article analyse les données issues du système d'état-civil, des recensements et d'enquêtes spécifiques. L'offre seule, c'est à dire le programme de planning familial lui-même, contribue largement à la baisse de la fécondité observée dans la zone d'intervention. Parmi les différents facteurs caractérisant la demande (indicateurs du statut socio-économique), l'instruction des femmes pèse le plus lourdement sur la baisse de la fécondité. Les changements d'attitude en matière de faisabilité et d'acceptabilité du contrôle des naissances jouent un rôle particulièrement important. En conclusion, il apparaît que non seulement l'offre mais aussi la demande contribuent à la baisse de la fécondité observée dans la zone d'études. Toutefois, les données disponibles ne permettent pas d'estimer précisément la part respective des deux types de facteurs.

Mots clés: Bangladesh, facteurs socio-économiques, fécondité, instruction, programme de planning familial

1. Introduction and theoretical framework

The Matlab Family Planning programme has been in operation as part of the Family Planning and Health Services (FPHS) project in Matlab, a rural area of Bangladesh, with a population of about 200,000, since October 1977. The project was initiated by the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) based in Dhaka, Bangladesh and is still in operation at the time of writing. Half of the Matlab population (in the so-called Intervention or Maternal and Child Health-Family Planning (MCH-FP) area) has participated in this FPHS programme; the other half of the population lives in the so-called Comparison area. The FPHS project relies on frequent home visits by Community Health Workers (CHWs) to mothers and their children and emphasises counselling in matters of MCH-FP and delivery of MCH-FP care. Provision of various contraceptive methods is one of the services provided by CHWs and this includes distribution and administration of oral and injectable contraceptives. Both of these methods were introduced from the start of the FPHS project. Although a number of changes have taken place in the MCH component of the FPHS project, the FP component has continued in the same way since the beginning. The project provides, therefore, a unique opportunity to study the long-term impact of the family planning programme and factors influencing the outcome observed. In the Comparison area of Matlab, MCH and FP services are provided by the government. One component of this programme consists of home visits by health workers, but the frequency and intensity of these visits is much less than in the FPHS project. The programme started in the early 1980s and gradually expanded. Injectable contraceptives were added to the FP component around 1990.

The results of the FHPS experiment have been widely published and used to support the thesis that the supply factor (i.e. the family planning programme) alone is sufficient to achieve considerable results in a disadvantaged economic and social environment (Phillips et al., 1982; Menken and Phillips, 1990; Fauveau and Chakraborty, 1994; Cleland et al., 1994).

In this paper we will not only pay attention to this *supply factor*, but also to the role of *demand factors*. According to the demand perspective, social and economic factors have a considerable impact on acceptance and use of contraceptive methods and fertility (Davis, 1969; Demeny, 1975; Hernandez, 1981; Caldwell et al., 1999). In support of this perspective, several researchers have drawn attention to the considerable social and economic changes which have taken place in Bangladesh since the early 1970s (Das Gupta and Narayana, 1997; Briscoe, 1998). This raises the question what was the role of these demand factors in the explanation of the fertility decline in Bangladesh. In this article this will be investigated using various sources of information derived from the above-mentioned Matlab Project.

In the analysis of the causes of fertility change in Bangladesh, use will be made of a theoretical framework developed by Freedman (1987). It classifies factors influencing fertility into three groups: underlying, intermediate psycho-social, and proximate factors. The first group consists of variables dealing with social and economic structure; one of these variables – specifically mentioned in the Freedman framework – is the presence or absence of a family planning programme. Included here – but not specifically mentioned by Freedman – is the socioeconomic status of a person, expressed by indicators such as level of education and income. The second group of factors consists of attitudes, norms and values about expected, desired and ideal family size (also called fertility preferences). Use of contraception and abortion are examples of direct proximate determinants. Also in this group is a factor described as "approval and perceived availability of fertility control". The family planning programme is typically a supply-side factor while socio-economic status and norms and attitudes towards family size are examples of demand-side factors. Use of contraception and unmet need for family planning are examples of variables which cannot be classified as supply or demand factors since they are the outcome of the operation of both types of factors.

The importance of attitudes, norms, and values in the explanation of fertility in developing countries has been emphasised by Cleland and Wilson (1987). They reviewed micro-economic theories on fertility change and criticized them on the ground that they did not take cultural or ideational changes into account. "Economic conditions both at the macro- and micro levels have not changed a lot in developing countries. Nevertheless, there have been rapid declines in fertility which can be explained by ideational changes". They add that of particular importance are changes in the "perceived feasibility of birth control, moral acceptability of the principle of control and acceptability of particular methods" (Cleland and Wilson, 1987). This factor is very similar to what Freedman called "approval and perceived availability of fertility control". We will re-name this variable or cluster of variables as "feasibility and acceptability of birth control".

The central question that will concern us in this paper is to determine what were the roles of supply and demand factors in the fertility decline in the MCH-FP area. We will do this by focusing on the role of the model family planning programme (a supply variable), social and economic variables and attitudes towards family size (underlying and intermediate demand variables), and use of contraception and unmet need (proximate determinants). The Comparison area serves to some extent as the control area (see next section). More specifically, in this paper we will deal with the following topics. After a section describing data and methods used, we will look at trends in fertility and contraceptive use in both areas in the period from 1976 to 1999. This provides an overall impression on the role of the family planning programme conducted in the MCH-FP area. Next, data will be presented on changes in education and other social and economic variables in Matlab between 1974 and 1996. Next, we will present results of a cross-sectional, multivariate analysis dealing with the role of social and economic factors as determinants of

fertility, to be followed by results of several longitudinal analyses. Section 3 will conclude with findings on the influence of a second proximate determinant (unmet need) and two intermediate determinants. These results will be discussed in section 4 and conclusions will be drawn at the end.

2. Data and Methods

The fertility data to be presented below are derived from the vital registration system of the Matlab Demographic Surveillance System (DSS), which is a major part of the Matlab Health and Demographic Surveillance System (HDSS). (For a description of this system see, e.g., D'Souza et al., 1990; Van Ginneken et al., 1998; ICDDR,B, 2000). Information on social and economic conditions in Matlab is available from three censuses conducted in 1974, 1982 and 1996 in the framework of DSS. Data on attitudes towards family size and use of contraception are derived from several knowledge, attitudes and practice (KAP) surveys conducted in Matlab between 1975 and 1990, as well as the Matlab Health and Socio-economic Survey (MHSS) carried out in 1996 (Rahman et al., 1999). The (quantitative) data on attitudes towards family size and related matters will be supplemented with results of an anthropological (qualitative) study.

Fertility will be measured by both cohort and period indicators. The first yields information on the number of children ever been born (CEB) while the second leads to total fertility rates (TFR) and age-adjusted general fertility rates (GFR). Data will be analysed both cross-sectionally and longitudinally. The cross-sectional analysis consists of the study of differentials of fertility using data from KAP surveys. Results of both bivariate and multivariate analyses will be shown. With respect to the multivariate analysis we have used Multiple Classification Analysis (MCA) (Retherford and Choe, 1993). A first type of longitudinal type of analysis is a comparison of changes over time in two (or more) variables simultaneously (e.g., use of contraception and fertility). If the values of the variables change in the same direction and if the amount of change is similar, it is possible that these variables are related. (It does not mean, however, that a cause-effect relationship has been established). A second type of longitudinal analysis is to compare fertility rates by social or economic characteristics at two or more points in time. A third type of longitudinal analysis it to measure the influence of changes in social and economic characteristics on fertility over time by means of standardisation (e.g., GFR standardised by age and education).

Before presenting the results, several limitations of our data need to be mentioned. The first is that we had at our disposal information on a limited number of independent variables as collected in Matlab with the surveillance system, censuses and surveys. The second limitation deals with the measurement of family planning programme efforts. Throughout the paper we will present fertility data by area (Intervention and Comparison areas). This makes it possible to compare to what extent the family planning programme implemented in the Intervention

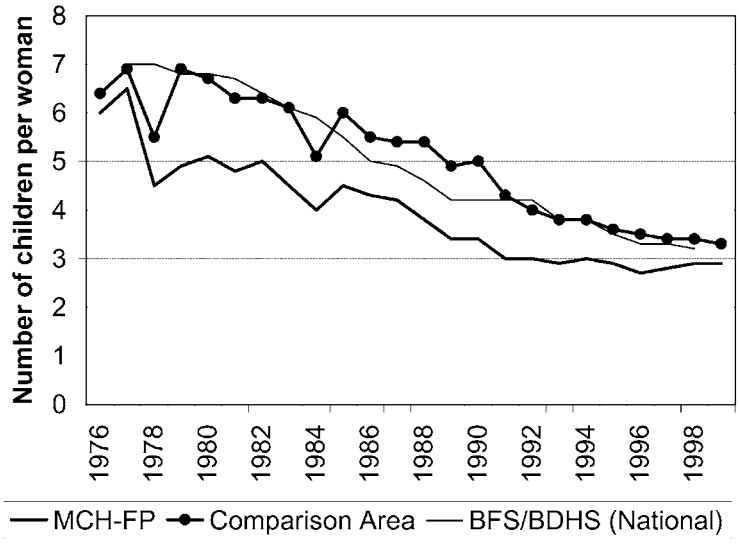

Figure 1. Trends in total fertility rates, Matlab, Bangladesh, 1976–1999.

area (the FPHS project) led to results which are different from that of the family planning programme implemented in the Comparison area. We were not successful in constructing a variable measuring different degrees of exposure to a family planning programme (ranging from exposure to the FPHS project to no exposure to any type of family planning programme). The third limitation is that we were unable to take into account the indirect impact of social and economic conditions on fertility. Social and economic improvements are likely to lead to lower infant and child mortality and to more effective family planning programmes, and both of these factors are known to contribute to lower fertility. A fourth limitation (or, probably more appropriate, a characteristic) is that our study focuses on a rural area of Bangladesh and not on Bangladesh as a whole. It means that the full range of values of key variables is not present in our data sets and this influences the size and form of relationships between independent and dependent variables.

3. Results

Figure 1 shows total fertility rates (TFR) in Matlab in 1976–1999 as well as national figures for 1977–1998. The TFR declined in the MCH-FP area from 6.5 in 1977 (the year in which the FPHS project started) to 3.0 in 1991 and remained around this latter level during the 1990s. In the Comparison area, the TFR decreased from 6.9 in 1977 to 4.3 in 1991 and to 3.3 in 1999. The fertility pattern in the Comparison area in the 1980s and 1990s was very similar to that of Bangladesh as a whole.

The impact of the FPHS project was largest in 1979, the first full calendar year in which the impact of this programme could be assessed. The TFR in that year

was 4.9 in the MCH-FP area and 6.9 in the Comparison area. In the period between 1980 and 1991 the impact of the FPHS project was considerable. In this period the TFR was in the MCH-FP area on average 1.4 lower than in the Comparison area. The programme impact was smallest in the 1990s; the TFR averaged 0.7 less in the MCH-FP than in the Comparison area.

There was apparently already some difference in fertility between the MCH-FP and the Comparison areas prior to the start of the FPHS project in October 1977. The TFR averaged 6.3 in the MCH-FP area and 6.7 in the Comparison area in 1976–1977. This may have been due to the operation of the Contraceptive Distribution Project (CDP) which was implemented in more households in the MCH-FP area than in the Comparison area in 1975–1977 (Phillips et al., 1982).

Figure 1 shows fluctuations in fertility in several years in the 1970s and 1980s. Fertility was lower in 1976, 1978 and 1984 than in 1977, 1979 and 1985 in both MCH-FP and Comparison areas. The lower values in 1976 and 1978 may have been due to the after-effects of major disruptions in normal life in Matlab in the period 1970–1975 following civil unrest and war in 1970–1971 and a famine in 1974. The reason for the lower fertility in 1984 was probably an outbreak of an epidemic of Shigella dysentery in Matlab in that year; it did not only increase mortality, but led to a decrease in fertility as well.

Table I (top panel) shows that the Contraceptive Prevalence Rate (CPR), derived from KAP surveys, increased in the Intervention area from 19.0% in 1977 to 38.2% in 1984 to 68.5% in 1996 while corresponding figures in the Comparison areas were 15.8% (in 1984) and 46.5% (in 1996). Injectables are by far the most important method of contraception used in the MCH-FP area followed by oral contraceptives and this has been so since the FPHS project started in 1977. Oral contraceptives are by far the most frequently adopted method in the Comparison area followed by female sterilisation (ICDDR, B, 2000). These last two methods are also the most popular in Bangladesh as a whole (Mitra et al., 1997). Results of other parts of Table I dealing with unmet need and attitudes towards family size will be discussed later.

Figures on trends in achievements in education for men and women 15–49 years old are provided in Table II. The percentage of women between 15 and 50 with no schooling decreased in the Intervention area from 75% in 1974 to 44% in 1996. Corresponding figures for men were 62 and 32%, respectively. Likewise, percentages of men and women with more than primary education (equivalent to more than 5 years in school) increased during 1974–1996. The level of education in the Intervention area was very similar to that of the Comparison area.

Table III shows changes that have taken place in households in Matlab between 1974 and 1996. The changes deal mostly with ownership of household goods such as radio, watch, quilts, etc. The table shows that possession or use of the following items has increased substantially in 1974–1996: radio, watch, hurricane lamp, quilt, and tubewell as a source of drinking water. On the other hand, possession of cows has decreased. The percentage of households receiving remittances from absent

Table I. Percentage of currently married women aged 15–49 by indicators of contraceptive use and attitudes towards family size in Matlab in 1975–1996

	1975	1977	1984	1990	1996
Contraceptive use					
MCH-FP area	–	19.0	38.2	57.6	68.5
N		13,594	3,123	4,181	1,664
Comp. area	–	–	15.8	27.9	46.5
N	–	–	1,966	3,613	1,646
Unmet need for family planning[a]					
MCH-FP area		57.9	51.8	29.3	19.5
N		4,810	1,716	2,270	851
Comp. Area	–	–	76.0	62.9	40.4
N	–	–	1,148	2,102	895
Want no more children[b]					
MCH-FP area	–	36.9	49.8	54.3	59.0
N	–	13,605	3,123	4,181	1,540
Comp. area	–	–	51.6	55.6	64.2
N	–	–	1,966	3,613	1,456
Ideal family size[b]					
MCH-FP area	4.4	–	–	3.1	–
N	269	–	–	4,238	
Comp. area	4.5	–	–	3.2	–
N	238	–	–	3,708	

Source: 1975–1990 figures from Koenig et al., 1992; 1996 figures: MHSS
Note: [a]Defined as % of women who do not want additional children and are not using contraception.
[b]Standardised on 1990 MCH-FP area distribution of numbers of living children. Women who gave non-numerical responses have been excluded.

household members increased between 1974 and 1996 while access to cultivable land decreased between 1982 and 1996. Social and economic conditions were very similar in both areas.

Data on the impact of the family planning programme and woman's education on fertility come from the already mentioned Matlab Health and Socio-economic Survey (MHSS). Table IV shows data on the number of children ever born (CEB) by area, education and age. The difference in CEB between the Intervention and Comparison areas is largest in the age group 40–49 years old (5.6 versus 6.6 children). In other age groups CEB is also consistently lower in the MCH-FP than in the Comparison area. There is also a difference in CEB by level of education, but it is necessary to make here a distinction in impact for those with 5 years of education or less, and those with 6 years and more. In general, fertility is only lower for women with 6 or more years of education compared to those with 5 years of education or less. This does not hold, however, for the group of women between

Table II. Percentage distribution of population 15–49 years old by level of education and sex in Matlab in 1974–1996[a]

	MCH-FP area			Comparison area		
	1974	1982	1996	1974	1982	1996
Female						
0 years	75	66	44	78	71	45
1–5 years	21	26	30	18	23	32
6+ years	4	8	26	4	6	23
Total	100	100	100	100	100	100
N	17,984	22,397	27,357	17,724	21,557	24,839
Male						
0 years	62	42	32	66	46	32
1–5 years	17	31	29	17	31	33
6+ years	21	27	39	18	23	35
Total	100	100	100	100	100	100
N	17,667	20,980	25,630	17,085	20,404	23,382

Source: DSS.
Note: [a]Maktab (religious education) is not included.

Table III. Percentage of households owning or using selected articles and with economic characteristics in Matlab, in 1974–1996

	MCH-FP area			Comparison area		
	1974	1982	1996	1974	1982	1996
Ownership/use of articles						
Radio	12	17	46	11	16	40
Watch	13	15	56	12	15	52
Hurricane lamp	59	70	87	56	68	89
Quilt	37	44	63	31	35	57
Dwelling size >375 sq ft	16	17	19	13	16	17
Tin in construction of walls	8	11	32	7	10	26
Tubewell for drinking water	33	66	96	17	43	93
Fixed latrine	78	96	98	82	95	99
Economic characteristics						
Sending of remittances	16	16	27	14	14	28
Cultivable land	–	74	64	–	73	59
One or more cows	46	38	30	38	36	35
N	14,265	16,338	20,956	14,334	15,637	18,948

Source: Razzaque et al., 1998 and other data, DSS.

Table IV. Mean number of children ever born by area, age and education, ever married women 15–49 years old, Matlab, in 1996

Age	MCH-FP area				Comparison area			
	0 yrs	1–5 yrs	6+ yrs	Total	0 yrs	1–5yrs	6+ yrs	Total
15–29	1.8	1.4	1.0	1.5	2.2	1.8	1.1	1.8
30–39	4.0	3.9	3.4	3.8	4.8	4.7	3.7	4.6
40–49	5.7	5.9	4.2	5.6	6.7	6.6	(5.3)	6.6
Total	3.6	3.1	2.0	3.2	4.4	3.5	2.1	3.8
N	968	592	275	1,835	954	597	231	1,782

Source: MHSS.
Note: Figure in brackets based on small number of respondents.

15 and 30 years old. Fertility for the women in this age group with between 1 and 5 years of schooling is already lower than for those without any education.

In spite of this last finding we hypothesize that education in particular made a contribution to lowering fertility for those who had at least several years of schooling or who had completed primary school. It is reasonable to assume that in Matlab 4 to 5 years of primary schooling are required in order to achieve literacy (and numeracy). There is some support for this statement when looking at MHSS data on reading and writing ability by level of education. Cross-tabulation of this variable with education showed that 4 or 5 years of education were required before respondents considered themselves to be literate (data not shown here).

In addition to education of women and literacy, a number of other social and economic variables have been studied with respect to their impact on number of children ever born. Examples of such variables are husband's education, an index of assets available in the household, receipt of remittances from absent household members, and ownership of land. The results of a multivariate analysis of four of these determinants of fertility as well as women's age is shown in Table V.

Of the five factors included in this model, women's age has the largest impact (eta = 0.727, beta = 0.706), but this variable is only of interest here as a control variable and, therefore, not shown in Table V. After this, area and education of women remain as variables with the largest impact on fertility. With respect to education it can be seen again that after controlling for age and other variables, fertility is only lower for the group of women with 6 or more years of education. CEB for those with no or 1–5 years of education is 3.5–3.6 while for those with at least some secondary education it is 2.8. Table V also shows that there is a small influence in the expected direction of number of assets on fertility. This is not the case for ownership of land. We expected a negative relationship of ownership with CEB (women from households without land should have more children than women from households with land), but, instead, we found a positive relationship. The reason for this could be that a number of women from households without land

Table V. Mean number of children ever born (unadjusted and adjusted) by area, education and other variables, ever married women 15–49 years old, Matlab, in 1996 (Multiple Classification Analysis)

	CEB unadjusted	CEB adjusted for other variables[1]	N
Area			
MCH-FP	3.2	3.2	1,812
Comparison	3.8	3.8	1,772
Eta/beta	0.122	0.129**	
Education of women			
0	4.0	3.6	1,905
1–5	3.3	3.5	1,177
6+	2.0	2.8	502
Eta/beta	0.279	0.118**	
Assets in household			
0–2	3.6	3.6	1,474
3–4	3.5	3.5	1,456
5–6	3.3	3.2	634
Eta/beta	0.037	0.052*	
Ownership of land			
Owns land	3.7	3.6	2,024
Rented land/share cropping	3.6	3.7	442
No land	3.1	3.2	1,098
Eta/beta	0.094	0.065*	
R^2		0.531	
Grand mean	3.5	3.5	3,584

*$p < 0.01$, **$p < 0.001$.
[1]: Adjusted for the variables in the table plus age of women.
Source: MHSS.

belong to relatively high-income households with husbands in occupations such as running businesses or provision of services.

We will now turn to the topic of whether there were changes over time in the influence of education and other socio-economic variables on fertility. In this type of longitudinal analysis we will rely on the current fertility approach using the age-adjusted General Fertility Rate. GFRs by level of education in 1974, 1982 and 1996 derived from DSS are provided in Table VI. The main findings can be summarised as follows.

First, GFR declined from 178 per 1,000 women of reproductive age in 1974 to 84 in 1996 in the Intervention area and from 185 in 1974 to 108 in 1996 in the Comparison area. The relative decrease was larger in the Intervention area (53%) than in the Comparison area (42%). Second, there was considerable fertility decline

Table VI. Age-adjusted general fertility rates per 1,000 women 15–49 years old by women's education in Matlab in 1974–1996[a]

Education	MCH-FP area				Comparison area			
	1974	1982	1996	% diff '74–'96	1974	1982	1996	% diff '74–'96
0 years	176	154	97	–45	186	189	130	–30
1–3 years	172	153	69	–60	174	195	107	–38
4–6 years	191	146	89	–53	185	181	96	–48
7+ years	189	109	60	–68	182	147	73	–60
Age-adjusted GFR	178	150	84	–53	185	187	108	–42
Age-and-educ.-adjusted GFR[b]	178	151	93	–53	185	187	122	
% difference	0	1	10		0	0	14	
N	17,984	22,397	27,357		17,724	21,557	24,839	

Source: DSS.
Notes:
[a]The age distribution of women with no education in 1974 was used as the standard population for all education-specific GFR's.
[b]The distribution of women by level of education in 1974 was used as the standard population.

in the group without any education. GFR declined in this group from 176 in 1974 to 97 in 1996 in the Intervention area, a decrease by about 45%. Third, education exercised a larger influence on fertility for women with educational levels varying from 1–6 years. The decline in GFR between 1974 and 1996 for this group was 57% in the Intervention area. Fourth, education exercised the largest impact on fertility for the group with levels of education of 7 years and more. The decline for this group was 68% between 1974 and 1996 in the Intervention area. Fifth, in 1974 there was no differential in fertility by education in the Intervention area; in 1982 fertility was lower for the group with 7 or more years of education than for those with less than 7 years of education; in 1996 there was a clear relation between education and fertility including a differential between "no education" and "1–6 years of education". Sixth, improvement in the level of education between 1974 and 1996 as such had only a limited impact on the decline in observed fertility. This can be seen by comparing the age-adjusted GFRs with the age-and-education-adjusted GFRs. This last type of GFR assumes that the educational distribution remained the same between 1974 and 1996. If in 1996 the level of education would have been similar to that of 1974, GFR would have been 93 instead of 84 in the Intervention area. This means that 10% of the fertility decline observed between 1974 and 1996 was due to improvement in the level of education.

Relationships have also been determined between several other social and economic variables and age-adjusted GFR in 1974, 1982 and 1996 (e.g., number of assets in the household and husband's education). Relationships of these variables with GFRs in 1974, 1982 and 1996 were in general in the expected direction, but smaller than in the case of women's education (data not shown here).

Results dealing with the remainder of Table I will be discussed next. Trends in contraceptive use (already discussed above) are very much in line with those on unmet need for family planning services. Unmet need for family planning is much smaller in the MCH-FP than in the Comparison area and patterns of decrease over time match the increases in CPR. The picture is different when we consider the two indicators dealing with attitudes towards family size (percentage wanting no more children and ideal family size). Differences in values of these two indicators between MCH-FP and Comparison areas are much smaller than differences by area in CPR and unmet need. For instance, in 1996 the difference in the proportion wanting no more children between the two areas was 5.2 percentage points (59.0–64.2) while the difference in contraceptive use by area was 20 percentage points (68.5–48.5). Moreover, the increase in the percentage wanting no more children in both MCH-FP and Comparison areas between 1977 and 1996 was much smaller than was the increase in use of contraceptives. In other words, the major difference between the two areas lies in access to and availability of contraceptive services and not in attitudes towards family size.

4. Discussion

The role of the supply factor will be reviewed first, to be followed by underlying demand factors (social and economic variables). Intermediate demand factors (attitudes towards family size) will be discussed next and we will end with proximate determinants.

Family planning programme. The Family Planning and Health Services Project was an important factor in explaining the fertility decline in the MCH-FP area. The family planning component of this project led to more fertility decline (measured by TFR) in the MCH-FP area than was the case for the family planning programme implemented in the Comparison area (especially during the 1970s and 1980s). This result was obtained from analyses using both cross-sectional and longitudinal approaches. There is thus clear evidence that supply factors played an important role in explaining the fertility decline in the Intervention area in Matlab. Phillips et al. (1982) concluded this already on the basis of data for the period 1977–1980 and our results show that this also applies to a much longer time period.

The results of the various analyses underestimate the role of the model family planning programme in the MCH-FP area. In Tables IV, V and VI we compared the MCH-FP area with the Comparison area and not with a control area with no input by an organised family planning programme. Had data on a control area

been available, the association of the family planning effort variable with fertility would undoubtedly have been larger. For instance, the eta and beta values in Table V dealing with the influence of the area variable (a proxy of family planning effort) would be larger than the reported 0.122 and 0.129 while the etas and betas of the other variables of Table V would hardly change. It would mean that the family planning effort variable is more crucial in explaining the fertility decline than women's education and other social and economic variables.

Women's education and other social and economic factors. Since our results on the influence of education on fertility differ to some extent depending on whether a cross-sectional or longitudinal approach is used, we will deal with them separately. According to the cross-sectional approach, the contribution of women's education to the fertility decline (expressed in CEB) in both the MCH-FP and Comparison areas was only evident for those who had completed primary school (equivalent to 5 years of education) or more. This has also been found in other studies in Bangladesh (e.g., Ministry of Health, 1978; Maloney et al., 1981; UN, 1987). Apparently, in Matlab, education led only to lower fertility for those older women who had been in school for at least 5 years. We also followed a longitudinal approach using current fertility rates (age-adjusted GFRs) by education in 1974, 1982 and 1996. According to this approach, we found no impact of education on fertility in 1974 and a strong impact in 1996 with women having 1–3 years of schooling already having lower fertility than women without schooling. Other social and economic factors than women's education had no or only a small impact on fertility. These results were found using both cross-sectional and longitudinal approaches.

Changes occurred in several indicators of modernisation between 1974 and 1996, but we are of the opinion that these changes are in general moderate in size. There is, in the first place, qualitative evidence to support this view. Simmons conducted a focus group study among women in the Intervention area of Matlab in the late 1980s (Simmons, 1996). One of her conclusions is that "women perceive[d] changes in the material and social circumstances of their lives and acknowledge the influence of new ideas. This change is relatively small . . . and by no means amounts to [a] massive structural transformation [of Bangladesh society]" (Simmons, 1996). Examples of changes which women described are: smaller landholdings for their households compared to their parents, more interest in sending children to school, less influence of parents and parents-in-law, more focus on nuclear households, a greater independence in decision-making, and a lessening of control by the husband (Simmons, 1996). More evidence in support of the view of moderate changes in social and economic conditions in Matlab comes, in the second place, from a comparison with other countries. For instance, improvement in women's education in the 1970s and 1980s was in Bangladesh less large than in several East Asian and Latin American countries (see, e.g., Van Ginneken, Lob-Levyt and Gove, 1996). Relative small improvements in social and economic conditions

imply a relative small decline in fertility (after controlling for other factors). This is in agreement with the finding that improvement in education in the MCH-FP area in the period 1974-1996 only explained 10 percent of the fertility decline.

On the basis of what was stated above, one could conclude that the impact of social and economic factors was small or negligible. This conclusion is not warranted, however, because we were unable to take into account the *indirect* influence of improvement in social and economic conditions on the fertility decline (already mentioned in Data and methods). Improvements in social and economic conditions in the Matlab Intervention area, although moderate in size and scope compared to other countries, did probably help to decrease infant and child mortality and led to more effectiveness in the implementation of the FPHS project.

Attitudes towards family size. These attitudes have changed little over the past 20 to 25 years and they were fairly similar in both MCH-FP and Comparison areas. This was already the conclusion reached by Koenig et al. (1992) for the period 1975-1990 and we have shown that this also holds for the 1990s. This finding is in accordance with another one mentioned earlier on the existence of relatively small improvements in social and economic conditions in Matlab in the past 25 years. It also fits with findings from research by others showing that family planning programmes in general only had a small influence on family size preferences (see, e.g., Feyisetan and Casterline, 2000).

Use of contraception, unmet need and acceptability of birth control. The rapid increase in the use of contraception in the MCH-FP area between 1974 and 1996 is an indication of drastic changes in mentality on feasibility and acceptability of birth control that must have taken place in the MCH-FP area in the past 25 years. Evidence on the importance of these ideational changes or changes in mentality can be derived from our finding that there was no relationship of women's education with age-adjusted GFR in 1974 and a strong relationship in 1996. There was no or little approval for family planning in Matlab in 1974. This view was so widespread that fertility of women with more than primary education was the same as that of women without education. Soon afterwards, attitudes started to change and the first to change were women with the highest education (and living in the Intervention area). These new ideas then gradually spread to more strata in society so that by 1996 women with only a couple of years of schooling had already lower fertility than women without education. The net result of the combined influence of improvements in education as such, more positive attitudes towards acceptability and increased use of contraception (and other factors), is the appearance of a strong negative relationship of education with fertility in 1996. These changes in attitudes with respect to the feasibility and acceptability of birth control probably occurred faster in the MCH-FP than in the Comparison area.

These ideational changes have been described in a qualitative study mentioned earlier in the Intervention area of Matlab (Simmons, 1996). On the basis of focus group discussions, she refers to the view of participants "... that family planning implies a new concept or mentality, and that this new concept is transforming their lives" (Simmons, 1996). The model family planning programme carried out in the MCH-FP area played an important role in bringing about these changes. Simmons describes, for example, how Community Health Workers in the MCH-FP area succeeded in transforming the views of village women on the family planning programme and use of contraception from open hostility to widespread acceptance (Simmons, 1996). We want to add here that not only the family planning programme, but also at least one social factor namely women's education contributed to bring about this change in mentality in the Intervention area. Similar changes as the ones mentioned by Simmons et al. in the Matlab Intervention area have been described by Caldwell et al. in two districts in Chittagong (Caldwell et al., 1999).

5. Conclusions

Opposing views have been stated on the relative importance of supply and demand factors in the fertility transition in Bangladesh. Phillips et al. (1982) and Cleland et al. (1994), have in particular emphasised the role of supply factors while Das Gupta and Narayana (1997) and Caldwell et al. (1999) have drawn attention to the importance of demand factors. Reviewing the evidence as a whole, as presented in this paper and supplemented with other information, we conclude that both factors are important. The model family planning programme implemented in the MCH-FP area was a major contributor to the fertility decline observed especially if one takes into account that we did not have data from an appropriate control group with which the MCH-FP area could be compared. Of the various social and economic factors studied, women's education was the most important. The impact of this and other social and economic factors on the fertility decline was probably underestimated, because it was not possible to take into account of the indirect impact of social and economic conditions on fertility. We are unable to give a more precise answer to the question of the relative importance of supply and demand factors due to limitations of study design and lack of data.

Finally, mention has to be made of the finding that fertility in the MCH-FP and Comparison areas of Matlab has remained at the same level since about 1990. It could be that the family planning programmes in both areas have succeeded in enabling couples to have the number of children they want. There could be other reasons as well, and both supply and demand factors could have contributed to this levelling off. Further research on this topic is urgently needed.

Acknowledgements

We express our appreciation to Mr. A.M. Sarder and other staff of DSS in Matlab and Dhaka of ICDDR,B and to N. Smidtman, G. Groenewold and T. Nieuwstraten of NIDI for various types of support as well as two anonymous reviewers for comments on an earlier version of this article.

References

Briscoe, J., 1998. Report on poverty immersion program – Fatepur village, Bangladesh. World Bank office memorandum to J.D. Wolfensohn, President, 10 July.

Caldwell, J., Khuda, B.E., Caldwell, B., Pieris, I. and Caldwell, P., 1999. 'The Bangladesh fertility decline: An interpretation', *Population and Development Review* 25(1): 67–84.

Cleland, J. and Wilson, C., 1987. 'Demand theories of the fertility transition: An iconoclastic view', *Population Studies* 41(1): 5–50.

Cleland, J., Phillips, J.F., Amin, S. and Kamal, G.M., 1994. *The Determinants of Reproductive Change in Bangladesh*. The World Bank, Washington D.C.

Das Gupta, M. and Narayana D., 1997. 'Bangladesh's fertility decline from a regional perspective', *Genus* 53(3, 4): 101–128.

Davis, K.A., 1969. 'Population policy: Will current programs succeed?', *Science* 158: 730–739.

Demeny, P., 1975. 'Observations on population policy and population program in Bangladesh', *Population and Development Review* 1(2): 307–321.

D'Souza, S., Karim, M. and Razzaque, A., 1990. 'The 1982 database update of the population laboratory at Matlab, Bangladesh: implications for mortality analysis', in J. Vallin, S. D'Souza and A. Palloni (eds), *Measurement and Analysis of Mortality*. Clarendon Press, Oxford, 11–34.

Fauveau, V. and Chakraborty, J., 1994. 'Family planning and maternal and child health services in Matlab', in V. Fauveau (ed), *Matlab: Women, Children and Health*, Special Publication No. 35. ICDDR, B, Dhaka, 89–108.

Feyisetan, B. and Casterline, J., 2000. 'Fertility preferences and contraceptive change in developing countries', *International Family Planning Perspectives* 26(3): 100–108.

Freedman, R., 1987. 'Fertility determinants', in J. Cleland and C. Scott (eds), *The World Fertility Survey: An Assessment*. Oxford University Press, London, 773–795.

Hernandez, D.J., 1981. 'The impact of family planning programs on fertility in developing countries: A critical evaluation', *Journal of Social Research* 10: 32–66.

ICDDR,B, 2000. *Health and Demographic Surveillance System – Matlab, Vol. 31, Registration of Demographic Events 1998*, Scientific Report No. 87. ICDDR, B, Dhaka.

Koenig, M., Rob, U., Khan, M.A., Chakraborty, J. and Fauveau, V., 1992. 'Contraceptive use in Matlab in 1990: Levels, trends and explanations', *Studies in Family Planning* 23(6): 352–364.

Maloney, C., Aziz, K.M. and Sarker, P., 1981. *Beliefs and Fertility in Bangladesh*, Monography no. 2. ICDDR,B, Dhaka.

Menken, J. and Phillips, J.F., 1990. 'Population Change in a rural area of Bangladesh, 1967–1987', *Annals of the American Academy of Political and Social Science* 510: 87–101.

Ministry of Health and Population Control, 1978. *Bangladesh Fertility Survey 1975, First Report*. National Inst. of Population Research and Training (NIPORT), Dhaka.

Mitra, S., Al-Sabir, A., Cross, A.R. and Jamil, K., 1997. *Bangladesh Demographic and Health Survey 1996–1997*. NIPORT, Mitra and Ass. and Macro International, Dhaka and Calverton, MD.

Phillips, J.F., Stinson, W.T., Bhatia, S., Rahman. M. and Chakraborty, J., 1982. 'The demographic impact of the family planning – Health Services Project in Matlab, Bangladesh', *Studies in Family Planning* 13(2): 131–140.

Rahman, O., Menken, J., Foster, A., Peterson, C. and Khan, M.N., 1999. *The 1996 Matlab Health and Socio-Economic Survey: Overview and User's Guide*, DRU-2018/1-NIA. RAND and ICDDR,B, Santa Monica and Dhaka.

Retherford, R.D. and Choe, M.J., 1993. *Statistical Models for Causal Analysis*. Wiley and Sons, New York.

Simmons, R., 1996. 'Women's lives in transition: a qualitative analysis of the fertility decline in Bangladesh', *Studies in Family Planning* 27(5): 251–268.

United Nations, 1987. *Fertility Behaviour in the Context of Development: Evidence from the World Fertility Survey*. Population Studies No. 100, UN, Dept. of International Economic and Social Affairs, New York

Van Ginneken, J., Bairagi, R., de Francisco, A., Sarder, A.M. and Vaughan, P., 1998. *Health and Demographic Surveillance in Matlab: Past, Present and Future*, Special Publication No. 72. ICDDR, B, Dhaka.

Van Ginneken, J., Lob-Levyt, J. and Gove S., 1996. 'Potential interventions for preventing pneumonia among young children in developing countries: Promoting maternal education', *Tropical Medicine and International Health* 1(3): 283–294.