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Fertility and Its Proximate Determinants in Bangladesh: Evidence from the 1993/94 Demographic and Health Survey

By M. Mazharul Islam, Abdullah Al Mamun and Radeshayam Bairagi *

* M. Mazharul Islam, Associate Professor, Department of Statistics, University of Dhaka, Dhaka 1000 (e-mail: duregstr@bangla.net); Abdullah Al Mamun, Research Assistant, Population Studies Centre, International Centre for Diarrhoeal Disease Research (ICDDR,B); Radeshaym Bairagi, Senior Scientist, ICDDR,B, G.P.O. Box 128, Dhaka 1000, Bangladesh.

Contraception plays the most prominent role in reducing fertility in Bangladesh

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

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

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

Data

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

Results and discussion

Fertility levels and trends

Table 1 presents the age-specific fertility rates (ASFR) for all women and currently married women for the period of three years prior to the 1993/94 BDHS date along with the fertility rates obtained from the 1989 BFS for comparison purposes. The age distribution of the fertility rates shows that the age-specific fertility rate (ASFR) was highest for women aged 20-24; in older cohorts, it starts to decline. However, the age-specific marital fertility rate (ASMFR) was highest among women in the age group 15-19. The age pattern of fertility indicates that Bangladeshi women have children early in the childbearing period. For example, women under 30 years of age accounted for 71.8 per cent of the total fertility rate (TFR); women under 20

years of age accounted for only 20.3 per cent of the TFR. The corresponding figures obtained in the 1989 BFS were 65.1 and 17.8 per cent, respectively (MHPC, 1978). This indicates that fertility is shifting towards earlier ages. The shifting is also evident from a fall in the mean age at childbearing from 27.7 years in 1989 to 25.9 years in 1993/94. This suggests that childbearing is taking place relatively earlier now than it was previously, presumably because of greater fertility regulation at older ages in recent years.

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

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

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

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

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

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

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

Notes: The conditional mean, or trimean (T), is obtained using the following formula: T = (q1 + 2q2 + q3)/4, where qi is the ith quartile of the distribution of the birth interval, as suggested by J.W. Tukey (1977). Exploratory Data Analysis (Reading, Massachusetts: Addison-Wesley).

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

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

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

Table 3 presents total fertility rates obtained from various sources. Fertility declined from 6.3 children (births) per woman in 1975 to 3.4 for the period 1991-1993. This is by far the steepest decline in fertility ever recorded in Bangladesh and also in Asia in such a short period of time (Cleland, 1994). This has created a sensation among researchers, policy makers, planners and academicians. However, many have also speculated that the fertility level may be seriously under estimated. However, a validation study of the 1993/94 BDHS in Matlab did not find any important inconsistency, especially in the BDHS fertility data (Bairagi and others, 1995).

Table 3. Annual total fertility rates from selected sources, Bangladesh, 1980-1993

Year	1975 Bangladesh Fertility Survey (BFS)	Bangladesh Bureau of Statistics (BBS)	1989 Bangladesh Fertility Survey (BFS)	1993/94 Bangladesh Demographic and Health Survey (BDHS)	Matlab (comparison area)
1975	6.3				
1980		5.0	6.8		
1981		5.0	6.7		
1982		5.2	6.4	6.6	6.3
1983		5.1	6.1	6.2	6.1
1984		4.8	5.9	6.6	5.1
1985		4.7	5.5	6.3	6.0
1986		4.7	5.1	6.1	5.5
1987		4.4	4.8	5.6	5.2

1988	4.4	5.2	5.4
1989	4.3	4.9	4.9
1990	4.3	4.4	5.0
1991	4.2	3.8	4.3
1992	4.2	3.4	3.8
1993	3.7[a]	3.3	3.9

Source: 1975 BFS from Ministry of Health and Population Control (MHPC) (1978). Bangladesh Fertility Survey 1975: First Country Report (Dhaka: Ministry of Health and Population Control); BBS from J. Cleland (1994). "Fertility levels and trends in Bangladesh", in: J. Cleland and others (eds.) Bangladesh Fertility Survey, 1989, Secondary Analysis (Dhaka: National Institute of Population Research and Training [NIPORT]), p. 15, and Bangladesh Bureau of Statistics (1994). "Summary presentation of results of prevalence of morbidity and disability". Presented at the workshop on dissemination of summary results of the Health and Demographic Survey, May 1994, Dhaka, p. 5; 1989 BFS from N.M. Huq and J. Cleland (1990). Bangladesh Fertility Survey (BFS), Main Report (Dhaka: National Institute of Population Research and Training [NIPORT]), p. 104; and Matlab from International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) (1994). Demographic Surveillance System: Early Indicators, Matlab 1993 (Dhaka: ICDDR,B), p. 3.

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

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

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

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

Marriage

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

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

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

More than 60 per cent of the ever-married females got married when they were 14 years of age or younger (table 4). The average age at first marriage among the ever-married females was very low, i.e. 14.5 years. But the singulate mean age at marriage (SMAM) for females was 18.2 years. Despite these data, the situation is improving slowly but steadily. Over the last 18 years, the singulate mean age at first marriage has increased by two years, from 16.3 years in 1975 to 18.2 years in 1993/94 (table 5). The mean age at first marriage is higher among the young cohort than their older counterparts, indicating a rising trend in the age at marriage (table 4).

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

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

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

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

Contraception

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

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

Methods	1975 BFS	1981 CPS	1983 CPS	1985 CPS	1989 CPS	1989 BFS	1991 CPS	1993/94 BDHS
Modern (total)	**5.0**	**11.0**	**13.8**	**18.4**	**24.4**	**23.2**	**31.2**	**36.2**
Pill	2.7	3.5	3.3	5.1	9.1	9.6	13.9	17.4
IUD	0.5	0.4	1.0	1.4	1.7	1.4	1.8	2.2
Injection	0.4	0.2	0.5	1.1	0.6	2.6	4.5	
Condom	0.7	1.6	1.5	1.8	1.9	1.8	2.5	3.0
Vaginal method	0.0	0.3	0.3	0.2	0.2	0.1	0.0	0.0
Female sterilization	0.6	4.0	6.2	7.9	9.0	8.5	9.1	8.1
Male sterilization	0.5	0.8	1.2	1.5	1.5	1.2	1.2	1.1
Traditional (total)	**2.7**	**7.6**	**5.3**	**6.9**	**7.0**	**7.6**	**8.7**	**8.4**
Periodic abstinence	0.9	3.9	2.4	3.8	3.8	4.0	4.7	4.8
Withdrawal	0.5	1.8	1.3	0.9	1.2	1.8	2.0	2.5
Other	1.3	1.9	1.8	2.2	2.0	1.8	2.0	1.1
Any method (CPR)	**7.7**	**18.6**	**19.1**	**25.3**	**31.4**	**30.8**	**39.9**	**44.6**

Source: See tables 3 and 5 for abbreviations.

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

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

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

Breastfeeding and post-partum amenorrhoea

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

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

Breastfeeding status	%	Duration in months
Never breastfeed	3.8	
Within one hour	8.6	
Within one hour to one day	48.0	
After one day	43.4	

Breastfeed six or more times in 24 hours	91.9	
Median duration of exclusive breastfeeding		1.6
Median duration of full breastfeeding (including plain water)		2.7
Median duration of any breastfeeding		30.0
Median duration of post-partum amenorrhoea		12.1

Note: Durations were obtained by life table techniques.

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

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

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

It should be noted that, although the duration of breastfeeding did not change much over the last two decades, the length of amenorrhea shows a declining trend. The 1975 BFS reported a mean post-partum amenorrhea of 14.6 months (Singh and Ferry, 1984). In another study, Ford and Kim (1987) found that the median amenorrheic period in Bangladesh (Matlab) was over 14.6 months during the period 1975-1979. In a recent study, Salway and others (1993) examined changes in post-partum amenorrhea over the 1978-1990 period utilizing longitudinal data from rural Matlab. They observed that the median duration of post-partum amenorrhea fluctuated around 13 months for the cohorts of births from the 1978-1983 period. Thereafter, a sharp decline occurred, with the duration falling from 13.5 months for the 1982-1983 cohort to 9.4 months for the 1988-1989 cohort. Salway and others (1993) also observed that increased use of contraception is one of the important factors accounting for the declining trend in post-partum amenorrhea in Bangladesh.

Induced abortion

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

The 1993/94 BDHS does not provide any useful estimate of the induced abortion rate. Only 51 women (0.5 per cent) reported having had an induced abortion during their lifetime, which does not permit calculation of a total abortion rate for the country. However, data from the Demographic Surveillance System in the Matlab comparison area, which is generally comparable to other rural areas of Bangladesh, may be utilized in order to obtain a rough estimate of the induced abortion rate for the country. In a recent study, Ahmed and others (1996) observed that, during the period 1982-1991, there were 1,183 induced abortion cases among about 22,500 women of reproductive age in the Matlab comparison area. Based on these data, we estimate the total induced abortion rate to be 0.18 during the average woman's 30 years of potential exposure (Hill, 1985). However, owing to under reporting, this estimate may be taken as a lower bound of the rate in Bangladesh.

Fertility-inhibiting effects of the proximate determinants

To estimate the fertility-inhibiting effects of the four important proximate determinants: marriage,

contraception, induced abortion and lactational infecundability, we applied the Bongaarts model. Table 8 presents the estimated values of the indices of the four principal proximate determinants of fertility obtained from the 1993/94 BDHS along with the same from the 1975 BFS and 1989 BFS for comparison purposes. The complement of each index represents the proportionate reduction in fertility attributable to each fertility determinant. The lower the index value, the greater is the fertility-reducing impact. The index Cm represents the proportion by which TFR is smaller than TMFR (total marital fertility rate) as a result of the marital pattern. Similarly, the index Cc gives the proportion by which TMFR is smaller than TN (total natural fertility) with the level and effectiveness of contraceptive use, and the index Ci indicates by how much TN is smaller than TF (total fecundity) due to the effect of lactational infecundability.

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

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

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

The results indicate that in 1993/94 contraception had the highest fertility-reducing effect, accounting for a 39.0 per cent (Cc = 0.610) reduction in TN relative to TMFR. Lactational infecundability was the second most important fertility-reducing factor, reducing the total fecundity rate (TF) by 34.7 per cent (Ci = 0.653). The marriage pattern had the lowest fertility-reducing effect, reducing actual fertility levels below marital fertility by 23.9 per cent (Cm = 0.761).

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

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

Proximate determinants (indices)	Fertility-inhibiting effect			
	Births per woman		Percentage	
	1989	1994	1989	1994
Marriage (C_m)	2.18	2.41	23.0	22.3
Contraception (C_c)	3.13	4.36	33.1	40.4
Lactational infecundability (C_i)	3.98	3.76	42.0	34.8
Induced abortion (C_a)	0.18	0.26	1.9	2.4
Total:[15.3-TFR (estimated)]	9.47	10.80	100.0	100.0

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

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

Proximate determinants by sub-group

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

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

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

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

The fertility-inhibiting effects of marriage and contraception show a positive relationship with the level of education. However, lactational infecundability shows a negative relationship with the level of education. But even then, the combined fertility-inhibiting effect remains higher for the women with an education level of secondary and above compared with their counterparts who are illiterate or who have only a primary level of education.

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

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

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

Summary and conclusion

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

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

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

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

Owing to legal and social constraints, national level data on induced abortion are not available and its effects remain unmeasurable. However, evidence from hospital and clinic records and other sources suggests that induced abortion is not rare, although it is done under the name of menstrual regulation in

Bangladesh. It is a factor in accounting for current fertility levels as well as fertility reduction. Of the remaining three proximate determinants (marriage, contraception and lactational infecundability), contraception plays the most prominent role as a fertility-reducing factor. Lactational infecundability is the second most important factor; change in marriage age plays the least important role in the reduction of fertility. Our analysis suggests that the fertility-reducing effect of contraception is gradually increasing, whereas the effect of lactational infecundability remains nearly constant. Respondents' work status, education, urbanization and economic condition play a dominant role in variations of the fertility-inhibiting effect of the major proximate determinants of fertility.

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

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The Social and Demographic Correlates of Divorce in Rural Bangladesh

By Kashem Shaikh *

* Associate Scientist, International Centre for Diarrhoeal Disease Research, Bangladesh (e-mail: kshaikh@cis.icddrb.org).

Divorce is one of the processes of marriage termination and normally carries with it the loss of the potential for reproduction. The degree to which the reproductive life-span will be affected depends on how long the divorced woman remains outside of a conjugal relationship and on whether or not she remarries. Because a large proportion of divorce occurs at the younger ages in Bangladesh, the time spent in the divorced state may have a considerable impact on fertility. As suggested by Shryock and Siegel (1975), divorce statistics can be applied indirectly in fertility analysis. Davis and others (1956) recognized the changing structure of the family, the entry of women into labour force, and an emphasis on personal gratification as products of urbanization and industrialization. However, their outlook has little relevance in a non-industrialized society such as Bangladesh. According to Malaysia's 1970 census, the incidence of divorce is greater in rural areas than in urban areas (Jones, 1980). Similarly in Bangladesh, the divorce rate is higher in rural areas than in urban areas for every age group (Ahmed and Chowdhury, 1981).
It is widely believed that the presence of children in a family deters divorce in all societies. According to Jacobson (1950), three-fifths of divorced couples in the United States of America had no children. Reyna (1979) found that 49 per cent of the women divorced were without children.

Lutz (1993) analysing Finish population registration data tried to show the influence of divorce on childbearing behaviour. He found that "bivariate analysis of divorce and parity results in an annual divorce probability of 1.2 per cent for all married women at parity 0, 1.3 per cent at parity 1 and 0.7 per cent at parity 3-4". He also observed that childless men have a slightly higher probability of divorce than childless women. Bourqia (1994) found that in Morocco 50 per cent of divorces occurred among childless couples. Abdei and others (1989) analysing Sudan Demographic and Health Survey data observed that maternal employment, age at first marriage and marriage stability had a negative effect on the children ever born (CEB). In Bangladesh, there is a proverb that marriage is not permanent without children. By and large, childlessness exerts a similar effect on the divorce rate in almost all societies.

Cherlin (1977) observed that the probability of marriage dissolution was sharply higher where wives were nine or more years younger than their husbands or were five or more years older. He also observed that children were a deterrent to divorce or separation only when they were in the preschool ages.

Shahidullah (1979) analysing Bangladesh Fertility Survey data found that most divorced women in the 15-19-year-old age group did not have any living children. He also noted that infertility and sub-fecundity, especially within the first two years of marriage, is directly related to the high proportion of early divorces. Bumpass and others (1972) analysed data collected under contract with the United States National Institute of Health and Human Development. In their study, they found a substantially higher rate of marital disruption among women who marry before age 20 than those who marry at older ages.

In most Western countries, the divorce rate in urban areas is higher than that in rural areas. This may be because in rural areas of developed societies informal social control has some influence on the divorce rate. In Bangladesh, however, most people in rural areas have little or no education and belong to low income groups; the latter factor places stress on the marital union.

Religion is another factor contributing to the variation in divorce. Marriage among Muslims is civil and contractual, whereas it is sacramental and eternal for Hindus. This individualistic concept of marriage obviously leads to differential patterns in the dissolution of marriage in a society such as Bangladesh where unsuccessful marriages are more often dissolved through divorce among Muslims than among Hindus.

Data and methodology

Source and quality of data

Most of the studies undertaken in Bangladesh in the field of nuptiality and fertility have been based primarily on either census or survey data. For this study, the data have been taken from the Demographic Surveillance System (DSS) in Matlab for the period from 1974 to 1993; the surveillance was carried out by the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B).

Since 1963, ICDDR,B has been conducting a health-oriented research programme and providing limited health services in this area. The DSS is one of the components of this field programme.

The data used in this study are from registration of divorces and estimated mid-year population by marital status for a period of 18 years from 1975 to 1992. A marriage cohort comprising women married for the first time during the five-year period 1975-1979 was followed up to 1992 to determine what proportion of marriages end in divorce. Socio-economic data collected in the 1974 and 1982 censuses were also used.

Method of data collection

The DSS, as it currently operates, is an independent four-tier system. At the village level, 110 female community health workers (CHWs) with a minimum of eight years of schooling are responsible for collecting data on vital events. In the comparison area, 30 of the CHWs are responsible for visiting each household under their purview once a week and in the maternal and child health and family planning (MCH-FP) area the other 80 CHWs visit relevant the households once every two weeks to enquire about births, deaths, migration, marriages and divorces and record the data in their notebooks. Each CHW is responsible for serving a population of about 1,000 (or 200 households) and almost all of them reside in the area where they work. The work is checked by 12 male health assistants (HAs) who visit each household monthly along with the CHW to check the completeness of the registration and to record vital events in standard registration forms. Each field unit comprises a population of about 16,000, i.e. about 3,000 households; such a unit is covered by one health assistant, whose work is supervised by a senior health assistant (SHA). This officer visits each household at least four times a year to determine whether the data reflect any errors or if there are events missing, and to ensure cooperation with the target population. Supervisors and managers meet the senior health assistants once a month at the field headquarters in Matlab to exchange information on directives, ensure continuous training and perform administrative tasks.

Before 1989, the registration forms would be brought to the Dhaka office for manual checking and computer entry to detect any errors or inconsistencies. Since that time, however, the information is entered directly into a personal computer at the Matlab DSS office, which has a system of automatic detection for errors and inconsistencies.

Results

Trends in divorce by age and sex

The phenomenon of divorce has been studied by examining (a) the rate of divorce by age and sex, (b) distribution of divorced persons by their age at divorce and (c) the duration of the marital life at the time of divorce. An attempt has also been made to investigate the extent to which the incidence of divorce changes with the various socio-economic and demographic characteristics.

Table 1. Age-specific divorce rates for males, 1975-1984 and 1989-1992, rural Bangladesh

Year	**Age group at time of divorce for males**							
	15-19	**20-24**	**25-29**	**30-34**	**35-39**	**40+**	**Total**	**Age standardized rate**
1975-1979								
ASDR[a]	60.5	63.9	57.0	26.3	9.4	3.8	16.1	16.1
N[b]	(1,157)	(8,109)	(14,664)	(18,465)	(19,383)	(88,772)	(150,550)	
1980-1984								
ASDR[a]	43.0	46.1	45.9	21.3	9.3	2.3	14.1	12.5
N[b]	(1,510)	(12,419)	(19,566)	(19,001)	(18,654)	(94,252)	(165,402)	
1989-1992								
ASDR[a]	82.7	39.7	28.1	21.1	7.7	2.5	11.5	10.6
N[b]	(399)	(7,199)	(19,315)	(24,553)	(18,113)	(80,767)	(150,346)	

a ASDR = Age-specific divorce rate per thousand married males.

b N = Number of married males.

Divorce rates

The overall divorce rate for males declined during the study period, from a level of 16.1 divorces per thousand married males in the period 1975-1979 to 11.5 divorces in the period 1989-1992 (table 1). There was, however, considerable variation in the age pattern of divorce over the three periods. In the 1975-1979 and 1980-1984 periods,

the divorce rates remained uniformly high in the first three age groups: 15-19, 20-24 and 25-29 years; however, the rates were somewhat lower in the 1980-1984 period. The divorce rates in these two periods declined consistently for males above age 30. For the 1989-1992 period, the divorce rate was very high for males aged 15-19, i.e. almost twice the rate in the 1980-1984 period. The rate declined substantially among those aged 20-29 and showed a consistent decline thereafter. The pattern of divorce by age for females (table 2) is similar to that of males. For females aged 20 and older, the divorce rates fall consistently with age. However, there is no visible decline in the age-specific divorce rates for females in the 1989-1992 period. In fact, except for the 20-24 age group, the divorce rate for all age groups increased in the period 1989-1992 compared with that of the two earlier periods. The divorce rate for the youngest age group (10-14 years) in the period 1989-1992 is almost three times higher than the rate for the same age group during the period 1980-1984. The decline in the overall divorce rate in the period 1989-1992 was due to changes in the marriage pattern.

Table 2. Age-specific divorce rates for females, 1975-1984 and 1989-1992, rural Bangladesh

Year	Age group at time of divorce for females							
	10-14	15-19	20-24	25-29	30-34	35+	Total	Age standardized rate
1975-1979								
ASDR[a]	52.2	59.8	24.2	6.9	3.3	0.5	11.8	11.8
N[b]	(1,150)	(22,208)	(30,264)	(24,517)	25,698))	(102,764)	(206,601)	
1980-1984								
ASDR[a]	40.2	43.2	25.0	7.3	2.1	0.4	10.2	9.7
N[b]	(1,620)	(23,825)	(37,603)	(28,160)	(22,866)	(115,047)	(229,121)	nbsp;
1989-1992								
ASDR[a]	119.6	65.6	22.8	9.3	3.5	0.6	8.4	12.9
N[b]	(117)	(7,424)	(32,823)	(34,113)	(25,738)	(104,915)	(205,130)	

a ASDR = Age-specific divorce rate per thousand married females.

b N = Number of married females.

Average age at divorce

The mean and median age at divorce of husbands and wives are presented in table 3. A continuously declining trend has prevailed in the median age at divorce of husbands since 1975, from 30 years in 1975 to 26.9 years in 1980. By contrast, during the same period, the median age at divorce of women fluctuated within the range of 18.4 to 19.3 years. In the remaining two periods, 1981-1986 and 1987-1992, the median age at divorce of husbands varied between 26.5 and 27.7 years and 26.6 and 30.1 years, respectively. In contrast, a continuously increasing trend has prevailed in the median age at divorce of wives since 1981: from 19.3 years in 1981 to 20.6 years in 1985. A continuous increasing trend of the median age at divorce of wives was also noticeable since 1987: from 20.7 years in 1987 to 21.8 years in 1992. In all instances the mean age was considerably higher than the median, indicating an asymmetric distribution of the ages at divorce.

Table 3. Mean and median age of husband and wife at the time of divorce, 1975-1992

Year	Husband's age				Wife's age			
	N	Mean	S.D.[a]	Median	N	Mean	S.D.[a]	Median
1975	405	31.3	9.3	30.0	405	21.0	5.8	19.0
1976	390	30.5	9.7	28.4	390	20.0	5.1	18.8
1977	565	30.4	8.6	28.3	565	19.8	5.3	18.4
1978	514	29.2	7.9	27.0	514	19.9	4.5	18.8
1979	554	29.6	9.1	27.3	554	20.1	4.8	19.0
1980	536	28.9	8.0	26.9	536	20.4	4.8	19.3
1981	513	28.9	8.4	27.0	513	20.1	4.2	19.3
1982	434	29.0	8.0	26.5	434	20.7	4.9	19.9
1983	386	29.1	7.9	27.0	386	20.9	4.9	20.0

1984	461	28.9	7.5	27.2	461	21.0	4.9	20.4
1985[b]	386	29.5	7.5	27.7	386	21.7	6.3	20.6
1986[b]	230	29.4	9.2	26.5	230	21.9	5.9	20.5
1987[b]	227	28.9	9.1	26.6	227	22.2	5.5	20.7
1988[b]	419	29.4	7.4	28.0	419	21.9	5.0	20.8
1989	476	30.4	8.2	29.0	476	22.2	4.9	21.0
1990	412	31.3	8.6	30.1	412	22.7	6.1	21.7
1991	397	30.5	8.4	29.5	397	22.7	5.5	21.7
1992	438	30.7	7.9	29.7	438	22.9	5.1	21.8

a S.D. = standard deviation.

b Those brides and grooms not belonging to the DSS area were excluded from the analysis because their age for the period 1985-1987 and marital status for the year 1988 were not collected.

Age distribution and marital duration of divorced persons

Table 4 presents the average duration of marriage at the time of divorce and the age distribution of divorced males for a period of 18 years from 1975 to 1992. Sixty per cent of the divorces in the period 1975-1980 were among husbands under 30 years of age. Though the incidence of divorce at younger ages increased in the next period, it again declined in the period 1987-1992. The mean ages at the time of divorce, i.e. 29.3, 28.7 and 29.7 years, respectively, for the three periods, also show a similar trend.

Table 4. Mean duration of marriage (months) at time of divorce and percentage age distribution of divorced males, 1975-1992

Year and duration of marriage (months)	**Age group of husband at time of divorce**				
	<25	**25-29**	**30-34**	**35+**	**All**
1975-1980					
Marriage duration	20.0	23.7	35.3	38.2	28.1
Percentage divorced	(24.8)	(34.9)	(19.2)	(21.1)	(100)
1981-1986					
Marriage duration	17.6	24.6	31.0	40.3	26.5
Percentage divorced	(26.2)	(39.4)	(18.4)	(15.9)	(100)
1987-1992					
Marriage duration	18.8	19.8	20.3	24.4	20.6
Percentage divorced	(20.7)	(32.8)	(27.7)	(18.8)	(100)

Divorces have been taking place early in married life, with the average duration of marriage at the time of divorce declining from 2.3 years in the period 1975-1980 to 1.7 years in the period 1987-1992. The mean marriage duration increased with the age of the parties concerned at the time of divorce. For example, for the period 1975-1980, the mean marriage duration among those who got divorced below age 25 was only 20 months. To some extent, this phenomenon was because of a truncation effect. Since the mean age at first marriage among males was about 25 years (in the period 1975-1980), it is expected that those who would get divorced by age 25 would have a shorter marital duration. However, even among the divorces which occurred at ages above 30, the mean marriage duration in the period 1975-1980 was about three years, and it came down to two years in 1987-1992.

Among women, 56 per cent of the divorces took place by the time they were aged 19 years, 31.2 per cent occurred between the ages of 20 and 24 years and the remaining 12.7 per cent occurred among those above 25 years of age during the period 1975-1980 (table 5).

Table 5. Mean duration of marriage (months) at time of divorce and percentage age distribution of divorced females, 1975-1992

Year and duration of marriage (months)	Age group of wife at time of divorce				
	<15	15-19	20-24	25+	All
1975-1980					
Marriage duration	15.1	19.2	33.5	54.5	28.1
Percentage divorced	(2.5)	(53.6)	(31.2)	(12.7)	(100)
1981-1986					
Marriage duration	15.8	16.6	27.9	51.7	26.5
Percentage divorced	(1.8)	(41.1)	(42.7)	(14.4)	(100)
1987-1992					
Marriage duration	30.7	18.9	19.8	23.5	20.6
Percentage divorced	(0.8)	(29.7)	(43.8)	(25.8)	(100)

In the periods 1981-1986 and 1987-1992, the percentages of women divorced by age 19 were 43 per cent and 30.5 per cent, respectively. In contrast, 42.7 per cent and 43.8 per cent, respectively, of the divorces occurred during the two periods in the age group 20-24 years. It is significant to observe that the mean marriage duration among women who got divorced at ages 25 and older declined from slightly more than four years to about two years.

Socio-economic and demographic factors and incidence of divorce

The purpose of this section is to determine the extent to which the incidence of divorce changes according to various socio-economic and demographic factors. In this context it would be of interest to examine whether the rate of divorce depends on the age gap between the husband and wife. Information about this situation may be obtained from table 6; however, the table does not give the rate at which marriages among couples with a specific age gap ends in divorce. Such rates would be helpful in understanding the relationship between the two and such an analysis is done later considering only the cohort of marriages during the period 1975-1979.

Table 6. Ratio of divorces per 100 marriages by the difference in age at marriage and divorce of husbands and wives, 1975-1992

Age difference between husband and wife	Number of divorces	Number of marriages	Ratio
1975-1980			
Wife older than husband	58	283	20.5
Wife and husband same age	45	199	22.6
Wife younger than husband by 5 years	629	3,851	16.3
Wife younger than husband by 6-10 years	1,216	7,251	16.8
Wife younger than husband by 11 years or more	1,016	4,940	20.6
1981-1986			
Wife older than husband	88	459	20.8
Wife and husband same age	46	222	21.4
Wife younger than husband by 5 years	706	4,503	15.7
Wife younger than husband by 6-10 years	965	7,252	13.2
Wife younger than husband by 11 years or more	605	3,474	17.1
1987-1992			
Wife older than husband	106	466	24.8
Wife and husband same age	57	272	21.4
Wife younger than husband by 5 years	691	4,042	17.8
Wife younger than husband by 6-10 years	921	6,028	15.7
Wife younger than husband by 11 years or more	594	3,429	17.6

It is evident from the table that, during the period 1975-1980, 283 marriages were recorded in which the wife was older than her husband. During this period, 58 marriages in which the wife was older than her husband ended in divorce, yielding a ratio of 20.5 per 100 marriages. In the period 1981-1986 and 1987-1992, the ratios of divorce

were 20.8 and 24.8, respectively, among couples with the wife being older than her husband.

The relationship between the age gap and propensity to divorce appears to be U-shaped. It is relatively high when the wife is either older than or the same age as her husband, and when the husband is older than his wife by 11 years or more. Thus, it appears that the age difference between husband and wife when they marry can influence the rate of divorce; the effect is likely to be least when the husband is older than the wife and the gap is less than 10 years.

Table 7. Percentage distribution of divorced husbands by duration of marriage and education, 1975-1992

Duration of marriage	**Education of husband**					
	No schooling	***Maktab* (religious school)**	**Primary**	**Secondary**	**High school and higher**	**All**
1975-1980						
<1 year	36.0	32.1	29.9	38.0	31.0	34.1
1 to <3 years	36.0	40.6	32.7	40.1	51.6	38.0
3 to <5 years	12.1	12.1	14.2	8.1	7.7	11.8
5 years+	15.8	15.3	23.3	13.8	9.7	16.2
All durations	100.0	100.0	100.0	100.0	100.0	100.0
Mean durations (in months)	27.6	27.8	34.0	25.2	22.8	28.1
N	(1,344)	(786)	(395)	(284)	(155)	(2,964)
χ^2 = 45.4 at 12 d.f.[a]						
1981-1986						
<1 year	41.4	31.1	33.2	34.0	37.4	33.5
1 to <3 years	40.8	42.3	38.2	39.2	34.1	40.9
3 to <5 years	8.9	13.1	10.2	14.2	19.8	12.4
5 years+	8.9	13.5	18.5	12.7	8.8	13.2
All durations	100.0	100.0	100.0	100.0	100.0	100.0
Mean durations (in months)	22.6	27.3	28.0	26.5	23.8	26.4
N	(370)	(1,356)	(325)	(268)	(91)	(2,410)
χ^2 = 30.6 at 12 d.f.[a]						
1987-1992						
<1 year	80.2	51.4	54.5	49.2	39.5	55.0
1 to <3 years	12.0	28.7	28.4	29.1	32.9	26.7
3 to <5 years	3.9	11.6	9.7	11.5	21.1	10.6
5 years+	3.9	8.4	7.5	10.2	6.6	7.8
All durations	100.0	100.0	100.0	100.0	100.0	100.0
Mean durations (in months)	9.3	21.9	21.9	23.6	23.9	20.6
N	(308)	(1,281)	(391)	(313)	(76)	(2,369)
χ^2 = 137.7 at 12 d.f.[a]						

a Significant at 5 per cent level.

Table 7 deals with the incidence of divorce by duration of marriage and education of husband. It shows that more than two- thirds of the divorces occurred within three years of marriage during the period 1975-1980. Husband's education is significantly associated with the duration of marital life at the time of divorce. Initially, with an increase in education, the duration of marriage increased; however, this increase was only up to the level of a primary education after which it started declining. Eighty-three per cent of the divorces among males with an education higher than secondary school and above occurred within three years of marriage compared with 63 per cent among those with an education up to the primary level. The mean duration of marriage was found to be the highest (34 months) among husbands with a primary level of education. The pattern of divorce in the period 1981-1986 is more or less similar to that in the period 1975-1980. A drastic change was found among illiterate husbands for whom the duration of marriage declined sharply from 28 months during the period 1975-1980 to only nine months during the period 1987-1992. More than three-fourths (80 per cent) of the divorces among illiterate males took place within the

first year of marriage. It can be observed that the mean duration of marriage by the time divorce took place decreased among all education categories except the group with a high school or higher education.

Table 8. Percentage distribution of divorced wives by duration of marriage and education, 1975-1992

Duration of marriage	Education of wife				
	No schooling	*Maktab* (religious school)	Primary	Secondary	All
1975-1980					
<1 year	35.0	32.6	32.8	40.9	34.1
1 to <3 years	35.1	40.3	41.0	43.6	38.0
3 to <5 years	11.3	12.9	11.8	7.3	11.8
5 years+	18.5	14.3	14.4	8.1	16.2
All durations	100.0	100.0	100.0	100.0	100.0
Mean durations (in months)	29.3	27.2	26.5	20.3	27.9
N	(1,437)	(1,112)	(305)	(110)	(2,964)
χ^2 = 25.9 at 9 d.f.[a]					
1981-1986					
<1 year	41.8	31.5	33.5	41.2	33.5
1 to <3 years	38.1	41.1	44.1	37.6	40.9
3 to <5 years	8.2	13.2	12.2	14.1	12.4
5 years+	11.8	14.2	10.2	7.1	13.2
All durations	100.0	100.0	100.0	100.0	100.0
Mean durations (in months)	23.6	27.3	24.1	21.6	26.2
N	(354)	(1,717)	(254)	(85))	(2,410)
χ^2 = 25.3 at 9 d.f.[a]					
1987-1992					
<1 year	73.0	54.5	52.7	44.5	55.0
1 to <3 years	16.7	26.7	29.5	31.4	26.7
3 to <5 years	5.0	10.6	10.9	15.3	10.6
5 years+	5.4	8.3	6.9	8.7	7.8
All durations	100.0	100.0	100.0	100.0	100.0
Mean durations (in months)	11.0	18.1	17.7	21.4	17.7
N	(222)	(1,542)	(376)	(229)	(2,369)
χ^2 = 45.1 at 9 d.f.[a]					

a Significant at 5 per cent level.

As in the case of males, a similar trend of divorce was observed among the females (table 8). It is evident that, as with males, the maximum number of divorces among females took place within three years of marriage. With higher education of females, the duration of marriage by the time they divorced tended to decline, except in the period 1987-1992.

The mean marital duration was longest among women with secondary and above education. The lower the level of education, the higher was the proportion of divorce that occurred within three years of marriage. The mean duration was lowest (11 months) among illiterate women. The overall mean duration of marriage at the time of divorce declined from 28 months during the period 1975-1980 to 26 months during the period 1981-1986 and sharply declined to 18 months during the period 1987-1992. In fact, in the latter period, some improvement in the status of women began to occur in rural Bangladesh.

Table 9. Percentage distribution of divorced husbands by duration of marriage and occupation, 1975-1992

Duration of marriage

	Occupation of husband						
Farming	**Agri -cultural labourer**	**Non -agri -cultural labourer**	**Service**	**Business**	**Others**	**All**	
1975-1980							
<1 year	37.9	26.8	31.5	31.3	34.4	35.7	34.1
1 to <3 years	37.1	38.6	37.6	40.5	41.6	33.0	38.0
3 to <5 years	11.0	14.2	12.9	13.0	7.3	13.0	11.8
5 years+	14.0	20.4	17.9	15.1	16.8	18.2	16.2
All durations	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mean durations (in months)	26.3	31.6	29.3	28.5	27.5	29.1	28.1
N	(1,268)	(339)	(696)	(284)	(262)	(115)	(2,964)
χ^2 = 31.4 at 15 d.f[a]							
1981-1986							
<1 year	33.0	32.9	31.0	34.4	41.5	41.9	33.5
1 to <3 years	41.3	41.6	43.1	39.0	34.6	37.1	40.9
3 to <5 years	11.9	12.2	13.2	15.1	10.1	9.7	12.4
5 years+	13.9	13.3	12.7	11.5	13.8	11.3	13.2
All durations	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mean durations (in months)	26.7	26.5	26.9	26.0	25.6	22.4	26.4
N	(1,047)	(286)	(568)	(259)	(187)	(63)	(2,410)
χ^2 = 13.0 at 15 d.f.[a] NS							
1987-1992							
<1 year	56.1	53.8	53.8	59.8	59.5	48.2	55.0
1 to <3 years	25.8	27.4	28.0	17.9	24.5	32.1	26.7
3 to <5 years	9.8	10.1	11.4	11.6	9.1	13.0	10.6
5 years+	8.3	8.6	6.7	10.7	6.8	6.7	7.8
All durations	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mean durations (in months)	20.6	21.9	20.7	22.0	17.3	20.2	20.6
N	(827)	(368)	(649)	(112)	(220)	(193)	(2,369)
χ^2 = 21.2 at 15 d.f.[a] NS							

a Significant at 5 per cent level; NS = Not significant.

Table 9 presents the percentage distribution of divorced husbands by occupation and duration of marriage. There was no marked variation in the pattern of divorce among the different occupational categories of the husbands during the entire study period from 1975 to 1992. However, the proportion of divorces in the short duration marriages (less than three years) was found to be highest among businessmen followed by those in farming during the period 1975-1980. During this period, the mean duration was found to be lowest among males with farming as their occupation. During the period 1981-1986, the mean duration of marriage was the lowest (22.4 months) among the "other" occupation category. In all the remaining occupational categories the pattern of divorce was similar to that of the period 1975-1980. The mean duration declined substantially among all the occupational categories during the period 1987-1992 compared with the 1975-1980 and 1981-1986 periods.

The incidence of early divorce (within three years of marriage) seemed to be quite high in rural Bangladesh; most cases of divorce occurred within that time-frame. In analysing Bangladesh Fertility Survey data, Ahmed (1982) found that on average 63.8 per cent of divorce cases occurred within three years of marriage. Carter and Glick (1976) in their study on Poland found that the maximum number of divorces occurred within the first year of marriage.

Socio-economic and other factors affecting the incidence of divorce: a multivariate analysis

Table 10 presents the results of logistic regression analysis of socio-economic and demographic variables affecting divorce. The purpose of that analysis is to explain the relationship between the propensity to divorce with other variables such as children ever born, education of husband and wife, occupation of husband, duration of marriage, age difference between husband and wife, religion and person who negotiated the marriage.

Because divorce registration data cover only some routine information, the marriage cohort file has been used in this analysis to obtain more information such as number of children ever born, religion and person who negotiated the marriage. As mentioned previously, the marriage cohort comprising women married for the first time during the period 1975-1979 was followed up to 1992 in order to study any changes in marital status; all births during the period were matched from the birth files to determine the number of children ever born. In other words, the cohort of marriages was followed for 13-17 years to see (a) what proportion of the marriages was terminated by divorce and (b) the extent to which the proportion varies according to the characteristics of the couples.

Table 10. Logistic regression analysis of socio-economic and demographic variables on divorce

Variables	β	**SE**	**Sig.**	**Exp (β)**	
Children ever born (CEB)	-0.4532	0.0388	0.0000	0.6303	
Education of wife (EDUW)	-0.1084	0.0308	0.0004	0.8852	
Education of husband (EDUH)	-0.0413	0.0201	0.0405	0.9509	
Occupation of husband.[a]					
Agricultural labourer (OCCH1)	-0.7052	0.3796	0.0632	0.4922	
Non-agricultural labourer (OCCH2)	-0.2012	0.2841	0.4789	0.7452	
Service (OCCH3)	0.3984	0.4301	0.3543	1.4047	
Business (OCCH4)	-1.7284	0.4053	0.0000	0.2025	
Others (OCCH5)	-0.7662	0.5218	0.1420	0.3993	
Marriage arranged by:[b]					
Partners themselves	1.2720	0.7340	0.0831	4.2330	
Guardians	-0.2865	0.2100	0.1723	0.7210	
Religion (RELG):[c]					
Hindu	-3.1937	0.5280	0.0000	0.0304	
Age difference between husband and wife:[d]					
Wife older or same age as husband (AGEDIF1)	-0.1362	0.3052	0.6554	1.0361	
Wife younger than husband by 5 years (AGEDIF2)	-0.2641	0.1846	0.1525	1.2122	
Wife younger than husband by 6-10 years (AGEDIF3)	-0.0652	0.1722	0.7049	1.3353	
Marriage duration (MDUR)	-0.2432	0.0141	0.0000	0.7761	
Male age at marriage (MAGE):[e]					
Age 20 to 30 years (MAGE2)	-0.4609	0.1715	0.0072	1.0183	
Age 31 or more years (MAGE3)	0.1750	0.2689	0.5151	2.4620	
Female age at marriage (FAGE):[f]					
Age 14 to 20 years (FAGE2)	-1.3447	0.2040	0.0000	1.8441	
Age 21 or more years (FAGE3)	0.3385	0.3070	0.2702	16.7541	
Two-way interaction:					
OCCH1 AND MDUR	0.0853	0.0301	0.0046	1.1017	
OCCH2 AND MDUR	0.0309	0.0234	0.1857	1.0396	
OCCH3 AND MDUR	-0.0287	0.0344	0.4036	0.9685	
OCCH4 AND MDUR	0.1593	0.0325	0.0000	1.1790	
OCCH5 AND MDUR	0.0985	0.0396	0.0128	1.1279	
-2 Log likelihood					1900.45
Model Chi-square					1757.27
Number of cases					3,780

a Farming.
b Marriage arranged by broker.
c Muslim.
d Husband older by 11 years or more.
e Male age at marriage less than 20 years.
f Female age at marriage less than 14 years.

As mentioned previously, studies in many societies suggest that the presence of children in a family deters divorce. Our data also show that the propensity to divorce in rural Bangladesh declined significantly with an increase in the number of children. The odds of divorce, that is the ratio of the number of marriages which ended in divorce to those which remained intact, declined by 35 per cent per unit increase in family size (per unit increase in CEB). It is interesting to note that the relationship between husband's and wife's education and the likelihood of divorce is negative and significant. In other words, the incidence of divorce declines as the level of education of the husband and wife increases. It is evident from the table that the number of divorces was significantly lower among businessmen and agricultural labourers than among farmers. In rural Bangladesh, marriages are arranged mainly by guardians, marriage brokers and relatives. However, there are "love matches" in which the man and woman arrange for their own marriage. Our findings suggest that divorce is higher among such marriages than arranged ones. The odds of divorce are four times higher among persons entering this type of marriage compared with those marriages arranged by brokers or guardians.

Divorce among Hindus is significantly lower than among the Muslims in the Matlab study area. This may have some bearing on the incidence of divorce. As mentioned previously, Muslim marriages are civil and contractual, whereas Hindu marriages are sacramental and eternal. In our analysis we found that the age difference between the husband and wife can influence the incidence of divorce, although it is not statistically significant. The number of divorces occurring within the first three years of marriage was significantly higher than in longer duration marriages. It is also evident from the analysis that divorce was significantly lower among women married between the ages of 14 and 20 years compared with women who married at ages younger than 14 and older than 20 years. A similar trend is observed with regard to the males' age at marriage. Males who married between the ages of 20 and 30 years had significantly lower rates of divorce than those who got married when they were younger than 20 and older than 30 years of age.

The interaction between the husband's occupation and duration of marriage shows that the odds of divorce for longer duration of marriage increases significantly among husbands who were agricultural labourers, businessmen and working in "other" occupational categories, the latter occupational group comprising students, and persons either unemployed or not gainfully employed. In other words, among these occupational groups, a higher proportion of divorce occurs, albeit after a relatively longer duration of marriage.

Discussion and conclusion

Efforts to bring about social development and modernization in Bangladesh are accelerating structural change by changing people's perceived values and replacing traditions with novel approaches in the calculus of human social life. The consequences of this transition are apparent in people's behaviour and attitudes. In some spheres of life, people react to the changes faster than in others. Although it is difficult, it is not impossible to envisage changes in all spheres of life. In an effort to provide a better understanding of the above-mentioned social and demographic transition, this study has attempted to observe changes in people's demographic behaviour in the area of marriage dissolution through divorce. The basic interest of social researchers is to know how modernizing forces can change people's conduct in an aspect of life where strong cultural traditions dominate.

Divorce occurs as a result of both intra- and extra-familial factors. For example, industrialization and the conjugal life which exists in such a setting operate in such a way as to increase dramatically the frequency of divorce. Overall, our study showed that the divorce rate among males declined from a level of 16.1 divorces per thousand married males in the period 1975-1979 to 11.5 divorces per thousand in the period 1989-1992. The incidence of divorce was found to vary substantially by the age of the persons concerned. Divorce rates are higher at younger ages (below age 30 for males and 25 for females); with increasing age, those rates drop off steeply. In the period 1989-1992, the male divorce rate was 82.7 per thousand for the age group 15-19 compared with 21.1 per thousand for the age group 30-34. For females, the divorce rates at ages 10-14 and 25-29 were 119.6 per thousand and 9.3 per thousand, respectively. Although the overall divorce rate has declined during the study period, it increased at younger ages, i.e. 15-19 for males and 10-19 for females. Also, since the period 1989-1992, the likelihood of females getting married at younger ages (10-19) has declined. However, among those who do marry at 10-19, the likelihood of their marriage ending in divorce has increased considerably during the period. Our study also found that divorce generally occurs early in married life: the mean duration of marriage at the time of divorce was 28.1 months in the period 1975-1979 and 20.6 months in the period 1987-1992.

The study reveals that the age gap between husband and wife could be an important factor in influencing the incidence of divorce. Divorce is minimum when the husband is older than his wife and the age gap is not more than 10 years. Divorce is also related to the level of education of the husband and wife, with the incidence tending to decline with higher levels of education.

The occurrence of divorce was further examined by considering a marriage cohort (women who got married for the first time during the period 1975-1979). This cohort was followed for 13-17 years to determine what proportion of the marriages ended in divorce; a logistic regression was employed to examine the extent to which the proportion varies according to the various characteristics of the couples.

Thirty-four per cent of the marriages in the cohort were found to terminate in divorce. The incidence of divorce was intimately related to the number of children a couple had. The presence of children tended to make a marriage more stable, and the propensity to divorce declined significantly with increases in family size. Analysis of this cohort data also confirmed the observation made previously regarding the relationship between the incidence of divorce and age at marriage of husband and wife and their level of education. However, unlike in the previous case, the incidence of divorce was found to be relatively lower among agricultural labourers and persons engaged in business.

This study therefore provides ample evidence to suggest an important implication for policy and programme purposes: that a concerted effort to increase the age at marriage to a certain level could lead to stabilization of families by reducing the risk of divorce.

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Long-term Implications of Low Fertility in Kerala, India

By S. Irudaya Rajan and K.C. Zachariah *

Associate Fellow and Honorary Fellow, respectively, at the Centre for Development Studies, Trivandrum, Kerala, India. An earlier version of this article was presented at the International Conference on Kerala's Development Experience: National and Global Dimensions, organized by the Institute of Social Sciences, New Delhi, 9-11 December 1996 and later presented at a seminar in the Centre for Development Studies on 21 February 1997.

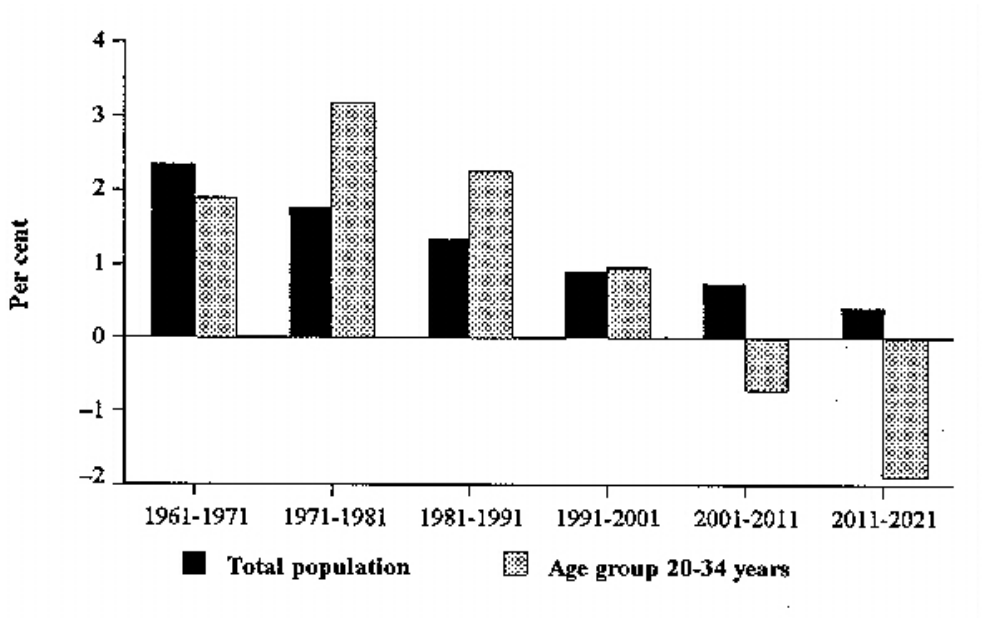
Low fertility will make it easier to bring about needed improvements in the quality of social services

In recent years, Kerala has made remarkable progress in its demographic transition. The state has achieved the below replacement level of fertility two decades ahead of the all-India target year of 2011. The total fertility rate (TFR) declined from a high of 5.6 children per woman in the period 1951-1961 to about 1.7 in 1993, a level which is very much below the replacement level of 2.05. Kerala's infant mortality rate reached a low of 13 per thousand live births in 1993, a level comparable to that of some developed countries of the world. The population growth rate declined to about 1 per cent per annum in 1995 from a high of 2.3 per cent per year during the period 1961-1971.

A number of factors and policies have contributed to these remarkable achievements in Kerala's demographic transition. High population density is one such factor; so is the peculiar settlement pattern of population in the state. But a very much larger role was played by the state's policies and programmes in bringing about the rapid transition in fertility and mortality rates: policies in the areas of education, especially female education, health care, especially child health and the universal immunization programme, the family planning programme and land reforms (Nair, 1974; Krishnan, 1976; Zachariah, 1984; Nair, 1986; Mari Bhat and Irudaya Rajan, 1990 and 1992; Kumar, 1993; Zachariah and others, 1994; Zachariah and Irudaya Rajan, 1997a).

Achievements on the demographic front, however, have not yet brought about any real solution to the economic problems of the state. Unemployment, especially among the educated, is still a very serious problem. Although data on unemployment are not very reliable, according to the 1987/88 National Sample Survey, more than 10 per cent of India's unemployed live in Kerala, a state which accounts for only 3.4 per cent of the country's population. Unemployment among the educated in Kerala has assumed alarming proportions. Its rate increased from 29.3 to 35.0 per cent and the number of educated unemployed from 350,000 to 630,000 during the period from 1983 to 1987/88. However, it is important to note that unemployment is not evenly distributed among all age groups. On the contrary, it is concentrated in the age group 15-29 years (Mathew, 1996). Also, the growth rate among this group is very much higher than the general population growth rate, owing to the high fertility in Kerala during the 1970s (see figure 1).

Figure 1. Population growth rates in Kerala



A very glaring manifestation of the unemployment problem in the state is the large number of migrants. Firm figures are not available, but according to our own estimate, there were about 618,000 emigrants from Kerala in 1991 (Zachariah and others, 1994). The rate of net migration from Kerala stood at -0.16 per cent during the decadal period 1961-1971, -0.22 per cent during that of 1971-1981 and -0.31 per cent during the decade 1981-1991 (Mari Bhat and Irudaya Rajan, 1990 and 1997; Zachariah and Irudaya Rajan, 1997a).

Thus, the state's success in moderating fertility, mortality and population growth has not yet succeeded in solving the pressing economic problems that the state faces. While it is perhaps a little too early to expect any major changes, in the coming years, however, the demographic changes will likely have repercussions on the social and economic conditions of the state. If TFR remains below the replacement level, the rate of population growth is bound to become negative and the population of the state will ultimately start declining. If fertility and mortality rates remain at current levels, the age distribution of the state's population will undergo dramatic changes, with far-reaching consequences in the social and economic sectors.

Not a single study exists in Kerala State for policy makers to use in preparing future plans based on the expected demographic changes. In view of this fact, the objective of this article is to examine some of these implications for the state: the social and economic consequences of a rate of fertility below the replacement level, a declining mortality trend at very low levels and a moderate rate of emigration.

An essential tool for such an analysis is a set of population projections using probable trends in fertility, mortality and migration. This article includes three sets of projections. The assumptions on future fertility and mortality trends and future migration trends are based on data on recent trends in fertility, mortality and migration, our understanding of the determinants of the demographic transition in the state, and international experience with regard to the fertility transition in many developed countries. As studies on these determinants are plentiful in the literature, we do not attempt a review here (see Zachariah and Irudaya Rajan, 1997a). However, as a prelude, we shall review the mortality and fertility transition in some detail.

Table 1. Estimates of mortality, Kerala, 1951-1981

Decade	Crude death rate (per 1,000)	Expectation of life at birth (years)		Expectation of life at age five (years)	
		Male	Female	Male	Female
1951-1961	19.7	44.3	45.3	50.9	49.6
1961-1971	12.2	54.1	57.4	58.1	57.7
1971-1981	8.6	60.6	62.6	59.6	61.5

Source: P.N. Mari Bhat (1987). "Mortality in India: levels, trends and patterns". PhD dissertation, University of Pennsylvania, United States; and P.N. Mari Bhat and S. Irudaya Rajan (1990). "Demographic transition in Kerala revisited" Economic and Political Weekly 1-8 September, 25(35-36):1957-1980.

Mortality transition

Kerala's health conditions are the best among all of India's states, a conclusion well supported by a variety of data sources. Tables 1 and 2 provide mortality data for Kerala taken from censuses and the sample registration system (SRS). Kerala consistently had lower levels of mortality than India as a whole even for the period 1951-1961. The crude death rate declined from 19.7 to 8.6 per thousand between 1951 and 1981. It declined further to about 6 per thousand in the first half of the 1990s.

Table 2. Mortality indicators, Kerala

Year	Crude death rate (per 1,000 population)	Neonatal mortality (per 1,000 live births)	Post-neonatal mortality (per 1,000 live births)	Infant mortality rate (per 1,000 live births)
1971	9.0	21	37	58
1972	9.2	26	37	63
1973	8.5	27	31	58
1974	7.8	23	32	55
1975	8.4	20	34	54
1976	8.1	22	34	56
1977	7.3	19	28	47
1978	7.0	15	27	42
1979	6.9	13	30	43
1980	7.0	11	30	41
1981	6.6	12	26	38
1982	6.6	9	22	31

1983	6.7	10	23	33
1984	6.4	8	21	29
1985	6.5	9	22	31
1986	6.1	8	19	27
1987	6.1	9	19	28
1988	6.1	10	18	28
1989	6.4	14	7	21
1990	5.9	12	5	17
1993	5.9	10	3	13

Source: K.C. Zachariah and S. Irudaya Rajan (1997). Kerala's Demographic Transition: Determinants and Consequences (New Delhi: Sage Publications).

The infant mortality rate (IMR) is considered an index for measuring the quality of life in any given population. Of all changes in the demographic sphere that have occurred in Kerala, the decline in IMRs is the most remarkable. Over the last 70 years, the IMR, which stood at 242 per thousand live births during the period 1911-1920, declined to 66 per thousand in the period 1961-1970. Annual series on IMR provided by the SRS also reveal a similar decline throughout the last 20 years. Currently, IMR in Kerala is 16 per thousand live births. Both neonatal and post-neonatal mortality have declined, but the decline is impressive only with regard to post-neonatal mortality. Because the SRS series are available annually for the last 25 years, most demographers use them for their analysis of mortality. However, our recent estimates, based on 1991 census data, put the IMR for Kerala at 37 per thousand (Irudaya Rajan and Mohanachandran, 1998). The district level estimates for Kerala are presented in table 3. In our opinion, the SRS system underestimates IMR for Kerala; we are in the process of writing a paper on the inconsistency of Kerala's IMR (Irudaya Rajan and Mohanachandran, 1998). Some important reasons are explored: the still-birth rate and one-week mortality rate after a live birth are extremely high in Kerala. For instance, the still-birth rate is 12 per thousand live births and the one-week mortality rate after a live birth is 10.2 per thousand live births. However, the IMR is only 14 per thousand, according to the 1994 SRS. According to the SRS, 95 per cent of deliveries are performed by medical practioners in medical institutions. Thus, the institutions always report one-week mortality as a still-birth because they cannot be held responsible for deaths occurring immediately after birth. It should be mentioned that birthweight among newborn infants in Kerala is fairly low (Kurup, 1997). Moreover, the gap between the first and last birth in Kerala is only five years and the birth interval between the first and second child is around 24 months (Mishra and Irudaya Rajan, 1997).

Table 3. Infant and child mortality rates in districts of Kerala, according to 1991 census

Districts		**Infant mortality rate (per 1,000 live births)**			**Child mortality rate (per 1,000 live births)**		
		Total	**Male**	**Female**	**Total**	**Male**	**Female**
	Total	37	36	38	46	44	47
Kerala	Rural	38	38	39	48	46	49
	Urban	30	29	34	39	37	42
	Total	33	32	29	49	50	48
Kasragod	Rural	36	33	37	53	53	57
	Urban	25	30	22	27	31	24
	Total	36	40	27	42	46	39
Kannur	Rural	39	38	39	46	46	46
	Urban	28	30	26	35	37	32
	Total	36	41	28	58	58	58
Wayanad	Rural	37	42	29	59	58	59
	Urban	34	41	24	39	48	28
	Total	43	45	41	50	49	53
Kozhikode	Rural	52	56	48	58	63	62
	Urban	29	29	28	39	42	36
	Total	36	41	28	57	57	58
Malappuram	Rural	36	42	28	58	57	59
	Urban	30	29	30	52	48	56
	Total	36	30	39	56	52	59
Palakkad	Rural	36	30	39	54	52	57

	Urban	33	28	37	63	59	67
	Total	38	32	44	46	45	46
Thrissur	Rural	41	38	44	47	47	48
	Urban	30	27	30	35	29	41
	Total	36	31	39	42	37	49
Ernakulum	Rural	35	31	36	42	35	49
	Urban	37	29	47	43	38	50
	Total	43	47	39	56	56	57
Idukki	Rural	50	49	40	57	57	59
	Urban	22	19	21	26	26	22
	Total	35	27	41	39	30	48
Kottayam	Rural	37	27	39	41	32	47
	Urban	27	22	43	31	25	51
	Total	35	30	42	42	43	45
Alappuzha	Rural	32	29	35	40	46	40
	Urban	41	32	48	45	37	58
	Total	29	27	34	33	31	43
Pathanamthitta	Rural	28	27	30	31	29	43
	Urban	36	21	47	40	26	53
	Total	39	29	44	47	45	55
Kollam	Rural	37	29	40	43	44	53
	Urban	41	27	54	60	49	70
Thiruvanantha-puram	Total	25	27	24	31	31	29
	Rural	26	28	25	32	38	29
	Urban	25	26	23	27	27	25

Source: S. Irudaya Rajan and P. Mohanachandran (1998). "Infant and child mortality estimates -- part I" Economic and Political Weekly 9-15 May, 33(19):1120-1140.

Expectation of life at birth is an important indicator for assessing the overall health situation of any population. There has been a remarkable improvement in the expectation of life in Kerala among males and females. Interestingly, even at the turn of this century, expectation of life at birth was not very different for men and women. Between 1911 and 1960, the expectation of life had increased by 21 years for males and by 23 years for females. We also provide decennial estimates made by Mari Bhat (1987) for the period 1951-1981. These estimates show that the expectation of life at birth has been consistently higher among females than males in Kerala, whereas this phenomenon is not true for India as a whole. During the period 1951-1961, the expectation of life at birth in Kerala was 44.3 years for males and 45.3 years for females. Thus, it would appear that people in Kerala have all along been enjoying a better and healthier life than people in other parts of the country (Irudaya Rajan, Mari Bhat and Dyson, 1998). The expectation of life at birth for females is higher than for males, as is the pattern in developed countries, but is not the case for India as a whole. During the period 1971-1981, the expectation of life at birth in Kerala was 60.6 years for males and 62.6 years for females. The percentage increase in the expectation of life at birth between 1951-1961 and 1971-1981 was 37 per cent for males and 39 per cent for females. Among all the states of India, longevity is highest for Kerala, both for men and women. As of the period 1991-1996, the expectation of life at birth for males was 73 years for males and 79 years for females. There are two reasons for the sharp increase in life expectancy between 1971-1981 and 1991-1996: the estimates up to the period 1971-1981 are based on census data; for later periods, the estimates are based on the SRS, which has consistently reported a sharp decline in infant mortality in Kerala. Interestingly, the difference between the rates in the life expectancy between males and females was one year during the period 1951-1961, two years in the period 1971-1981 and almost six years in recent periods.

Table 4. Estimates of fertility, Kerala, 1951-1981

Decade	Crude birth rate (per 1,000 live births)	Total fertility rate (Children per woman)
1951-1961	43.9	5.6
1961-1971	37.1	5.0
1971-1981	28.1	3.4

Source: Same as table 1.

Fertility transition

Reliable data on Kerala's fertility trends are available only for the period since the introduction of the SRS. However, estimates made by several authors using census data are available for different periods. The census-based estimates shown here are taken from Mari Bhat (1987). These estimates are presented in table 4. The annual series of fertility indicators derived from the SRS are provided in table 5. A few conclusions may be drawn from these figures.

Table 5. Fertility indicators for Kerala

Year	Total fertility rate (Children per woman)	Gross reproductive rate (Number of daughters per woman)	Crude birth rate (per 1,000)
1971	4.1	2.0	31.1
1972	4.2	2.1	31.2
1973	3.9	1.9	29.2
1974	3.3	1.6	26.8
1975	3.4	1.6	28.0
1976	3.4	1.7	27.8
1977	3.1	1.5	25.8
1978	3.0	1.5	25.2
1979	3.1	1.5	25.8
1980	3.1	1.5	26.8
1981	2.8	1.4	25.6
1982	2.7	1.3	26.2
1983	2.6	1.2	24.9
1984	2.6	1.3	22.9
1985	2.4	1.2	23.3
1986	2.3	1.2	22.5
1987	2.3	1.1	21.7
1988	2.2	1.1	20.3
1989	2.1	1.0	19.8
1990	2.1	1.0	19.0
1991	1.8	0.9	18.0
1992	1.7	0.8	17.0
1993	1.7	0.8	16.6

Source: Same as table 2.

Over the last 40 years or so, fertility has been in continuous decline in Kerala. The crude birth rate (CBR) declined from 43.9 per thousand during the period 1951-1961 to 28.1 per thousand in the period 1971-1981. TFR declined from 5.6 children per woman to 3.4 during the same period. According to the SRS, the CBR declined from 31.1 per thousand in 1971 to 25.6 per thousand in 1981 (5.5 percentage points), dropping to 16.1 per thousand in 1993 (9.0 percentage points). There was also a similar decline throughout the period under study. For instance, TFR was 4.1 in 1971, 3.1 in 1980 and 2.1 in 1990. Kerala reached the replacement level of fertility at the beginning of the 1990s. At this stage, many demographers in India and elsewhere were of the opinion that a further decline was unlikely; however, Kerala's TFR did decline further, i.e. to 1.7 by the year 1993.

Table 6. Crude birth rate by district in Kerala State during different periods

District	1983-1988	1983	1988	1974-1980	1984-1990
Trivandrum	21.5	20.8	20.5	22.8	19.6
Kollam	19.8	20.2	16.1	23.3	18.5
Alappuzha	17.7	18.1	14.8	21.0	16.7
Pathanamthitta	18.7[a]	n.a.	17.3	n.a.	17.2
Kottayam	18.5	18.1	16.8	20.1	16.6
Idukki	22.2	24.5	17.9	26.7	19.8
Ernakulum	17.9	21.0	15.8	21.4	16.9

Trissur	19.1	17.9	18.7	22.2	18.7
Palakkad	21.9	22.0	18.9	22.5	18.8
Malappuram	33.5	33.8	28.4	33.6	29.5
Kozhikode	23.7	24.3	20.0	26.3	20.5
Wyanad	25.7	31.8	19.4	31.4	23.4
Kannur	26.5	31.4	25.2	28.8	20.5
Kasargod	28.4[a]	n.a.	26.8	n.a.	24.4
Kerala State	22.6	24.9	20.3	25.0	20.3

a Average from fewer years.

Source: K.C. Zachariah, S.I. Rajan, P.S. Sarma, K. Navaneetham, S. Nair and U.S. Mishra (1994). Demographic Transition in Kerala in the 1980s (Trivandrum, Kerala: Centre for Development Studies); P.N. Mari Bhat (1996). "Contours of fertility decline in India: a district level study based on the 1991 census" in: K. Srinivasan (ed.) Population Policy and Reproductive Health (New Delhi: Hindustan Publishing Corporation).
Note: First three columns are based on SRS data; the last two columns, Mari Bhat (1996).

Table 7. Fertility levels and trends in districts of Kerala

District	Total fertility rate		
	1974-1980	1984-1990	Percentage decline
Trivandrum	2.3	1.8	21.7
Kollam	2.7	1.8	33.3
Alappuzha	2.3	1.6	30.4
Pathanamthitta	-	1.7	-
Kottayam	2.4	1.7	29.2
Idukki	2.9	1.8	37.9
Ernakulum	2.4	1.6	33.3
Trissur	2.5	1.9	24.0
Palakkad	3.4	2.4	29.4
Malappuram	4.3	3.4	20.9
Koshikode	3.0	2.0	33.3
Wyanad	3.8	2.3	39.5
Kannur	3.5	2.1	40.0
Kasargod	-	2.5	-
Kerala State	2.9	2.0	31.0

Source: P.N. Mari Bhat (1996). "Contours of fertility decline in India: a district level study based on the 1991 census" in: K. Srinivasan (ed.) Population Policy and Reproductive Health (New Delhi: Hindustan Publishing Corporation).

Birth rates by district are also available from the SRS and other sources (tables 6 and 7). Mari Bhat (1996) estimated fertility rates for all districts in Kerala using the 1981 and 1991 censuses. According to these estimates, the TFR varied from 1.6 in Emakulam to 3.4 in Malappuram during the period 1984-1990. In the beginning of the 1990s, only five districts (Palakkad, Malappuram, Wayanad, Kannur and Kasaragod) had TFRs above the replacement level. The remaining districts had already achieved the below replacement level of fertility. One major conclusion from the district-wise analysis is that all the districts have contributed to the state-wide fertility decline. A study by the Centre for Development Studies shows that the decline in TFR in Malappuram District was as sharp as in Ernakulam and Palakkad districts (36 per cent) between 1975-1980 and 1986-1991 (Zachariah and others, 1994).

Population projections

Three sets of population projections are made by the authors using various assumptions about fertility and mortality trends. The starting point is the 1991 adjusted census age-sex distribution. All three projections are made for the 60-year period from 1991 to 2051.

Table 8. Percentage distribution of population by five-year age groups and sex, for Kerala, 1961, 1991 and 2021

Age group	Males			Females		
	1961	1991	2021	1961	1991	2021
0-4	15.29	9.53	6.18	14.61	8.79	5.39
5-9	14.84	10.16	6.65	14.07	9.43	5.85
10-14	13.48	11.00	7.02	12.97	10.38	6.21
15-19	8.25	10.30	6.94	8.70	10.50	6.30
20-24	8.11	10.33	6.39	8.84	11.07	6.11
25-29	7.22	8.83	5.68	8.04	9.46	5.62
30-34	6.24	7.31	6.93	6.45	7.18	6.87
35-39	6.06	7.08	7.68	5.89	7.01	7.61
40-44	4.55	5.34	7.57	4.36	4.90	7.58
45-49	4.31	4.60	7.61	4.12	4.59	8.02
50-54	3.33	3.66	7.52	3.29	3.65	8.13
55-59	2.63	3.26	6.53	2.60	3.45	6.99
60-64	2.18	2.93	5.41	2.28	3.08	5.56
65-69	1.42	2.28	4.52	1.48	2.53	4.62
70-74	0.97	1.40	3.32	1.05	1.57	3.53
75+	1.09	1.76	4.04	1.22	2.14	5.62

Source: Calculated by the authors from the 1961 and 1991 census data; 2021 data are taken from the projections made by K.C. Zachariah and S. Irudaya Rajan (1997). Kerala's Demographic Transition: Determinants and Consequences (New Delhi: Sage Publications).

Table 9. Components of population growth, Kerala, 1901-1991

Census year	Population (1,000)	Intercensal growth rate	Rate of net migration	Rate of natural increase	Percentage of the total population of India
1901	6,398	-	-	-	2.68
1911	7,148	1.11	0.03	1.08	2.84
1921	7,802	0.88	0.04	0.84	3.10
1931	9,507	1.98	0.12	1.86	3.41
1941	11,032	1.49	-0.01	1.49	3.46
1951	13,549	2.06	-0.11	2.16	3.75
1961	16,904	2.21	-0.20	2.41	3.85
1971	21,347	2.31	-0.16	2.47	3.89
1981	25,454	1.75	-0.22	1.97	3.72
1991	29,074	1.32	-0.31	1.63	3.44

Source: P.N. Mari Bhat and S. Irudaya Rajan (1990). "Demographic transition in Kerala revisited" Economic and Political Weekly 1-8 September, 25(35-35):1957-1980; and K.C. Zachariah and S. Irudaya Rajan (1997). Kerala's Demographic Transition: Determinants and Consequences (New Delhi: Sage Publications); K.C. Zachariah, S.I. Rajan, P.S. Sarma, K. Navaneetham, S. Nair and U.S. Mishra (1994). Demographic Transition in Kerala in the 1980s (Trivandrum, Kerala: Centre for Development Studies).

Mortality assumptions are the same for the three sets. The expectation of life at birth of males is projected to increase from 73.4 years during the period 1991-1996 to 77.2 years during the period 2021-2026 and 78.9 years during the period 2046-2051. The corresponding changes in the female expectation of life at birth are 79.4, 83.2 and 84.9 years (for more details, see table 11).

Table 10. Total fertility rate assumptions in the various projections

Period	Projection 1 (Low)	Projection 2 (Medium)	Projection 3 (High)
1991-1996	1.7	1.7	1.7
1996-2001	1.6	1.7	1.7
2001-2006	1.5	1.7	1.7
2006-2011	1.4	1.7	1.7
2011-2016	1.4	1.7	1.8

2016-2021	1.4	1.7	1.8
2021-2026	1.4	1.7	1.9
2026-2031	1.4	1.7	1.9
2031-2036	1.4	1.7	2.0
2036-2041	1.4	1.7	2.0
2041-2046	1.4	1.7	2.0
2046-2051	1.4	1.7	2.0

In 1993, Kerala's TFR was 1.7; we have examined the implications of three alternate courses of the fertility trends. The first alternative is a continuation of the recent fertility decline. We assume that TFR will decline further to about 1.4 during the next 10 years and will remain at this low rate indefinitely (projection 1). As the second alternative, we assume that fertility will remain constant at a TFR of 1.7 for the entire projection period (projection 2). The third alternative is declining fertility to a TFR of 1.7 as in projection 1, followed by an increase in fertility after the period 2011-2016 (projection 3). The assumed TFRs are given in table 10. In deciding on these fertility assumptions, we were governed mostly by the trend in fertility in Kerala in recent years, the social and economic progress that the state has been making and the international experience in fertility decline. According to United Nations sources, there were nearly 40 countries with a TFR of less than 2.0 in the period 1990-1995, including large countries such as China, the Russian Federation, United Kingdom, Japan and Italy; nearly 10 of these 40 countries have a TFR of 1.5 or less.

Table 11. Expectation of life at birth assumed in the projections for Kerala

Period	Expectation of life at birth	
	Males	Females
1991-1996	73.43	79.43
1996-2001	74.47	80.47
2001-2006	75.20	81.20
2006-2011	75.78	81.78
2011-2016	76.29	82.29
2016-2021	76.74	82.74
2021-2026	77.15	83.15
2026-2031	77.53	83.53
2031-2036	77.89	83.89
2036-2041	78.23	84.23
2041-2046	78.55	84.55
2046-2051	78.85	84.85

Period Expectation of life at birth

In all three projections, we have assumed that Kerala will continue to experience a moderate level of net out-migration. The assumed rate, i.e. -0.25 per cent, is less than the observed rate of -0.31 per cent see (table 9). The assumed migration rate of -0.25 is kept constant throughout the projection period. Much of the discussion in this article is based on projection 2. (We have used the PEOPLE software package for making the projections).

Population stabilization and zero population growth

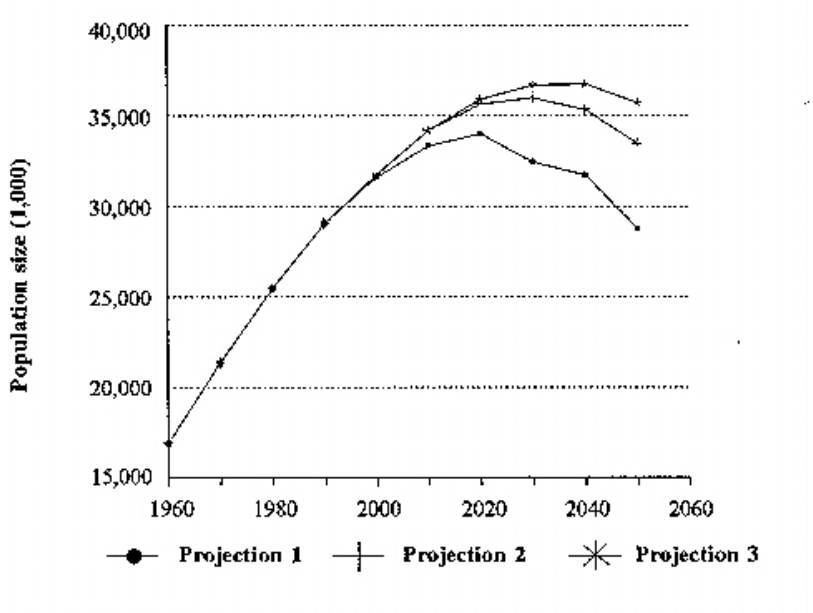
The current population of Kerala is estimated to be about 30.4 million; the decadal growth in population during the period 1981-1991 has been estimated to be about 3.5 million. It is unlikely that future decades will see anything like the growth of the past decades. During the decade 1991-2001, population growth is unlikely to be more than 2.5 million (see table 12). Population growth in Kerala during the period 1961-1991 and projected growth according to the three alternate projections are shown in figure 2.

Table 12. Population projections for Kerala

Year	Projection 1 (1,000)	Population growth rate (per cent)	Projection 2 (1,000)	Population growth rate (per cent)	Projection 3 (1,000)	Population growth rate (per cent)
1991	29,074	-	29,074	-	29,074	-
1996	30,374	0.87	30,374	0.87	30,374	0.87
2001	31,624	0.81	31,769	0.90	31,769	0.90

2006	32,641	0.63	33,076	0.81	33,076	0.81
2011	33,343	0.43	34,202	0.67	34,202	0.67
2016	33,817	0.28	35,074	0.50	35,207	0.58
2021	33,995	0.11	35,633	0.32	35,888	0.38
2026	33,871	-0.07	35,913	0.16	36,398	0.28
2031	32,459	-0.24	35,965	0.03	36,678	0.15
2036	32,745	-0.43	35,778	-0.10	36,837	0.09
2041	31,727	-0.63	35,319	-0.26	36,750	-0.05
2046	30,390	-0.86	34,536	-0.45	36,369	-0.21
2051	28,760	-1.10	33,449	-0.64	35,717	-0.36

Figure 2. Population growth in Kerala: past, present and future

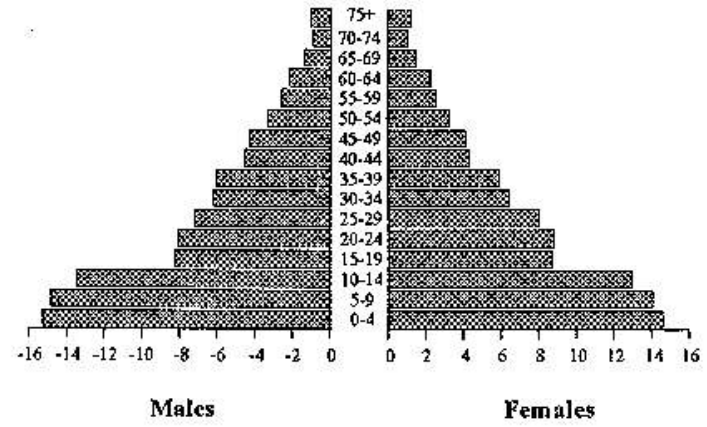


These data indicate that Kerala's population growth has lost much of its momentum. The current indications are that the total population of the state is unlikely to exceed 37.0 million. Also, Kerala is likely to achieve zero population growth (ZPG) in 25 to 30 years. Moreover, it is possible that Kerala may have short periods of negative growth rates. Thus, the demographic situation of the state in the next half century will be very much different from that of the previous half century. The socio-economic impacts of population growth in the future will be vastly different than in the past; some of these aspects are examined below in detail.

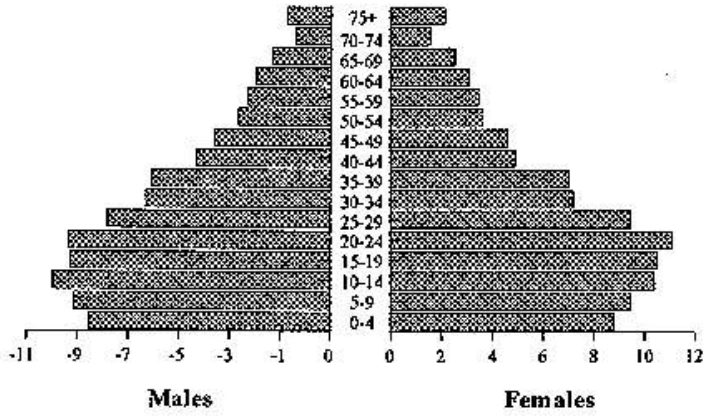
Changing age structure

One way in which demographic trends affect socio-economic conditions is through changes in the age composition of the population. Trends in fertility rate, mortality rate and migration have some repercussion on the age structure of the population. Age pyramids for Kerala's population in 1961, 1991 and 2021 are shown in figure 3. The changes in the proportion of children in Kerala's population, the proportion of working age population, and the proportion elderly are clearly brought out in these pyramids (see tables 8 and 13). We begin this analysis by considering up the changes in the number and proportion of children in Kerala. These numbers are directly relevant for the state's educational planning.

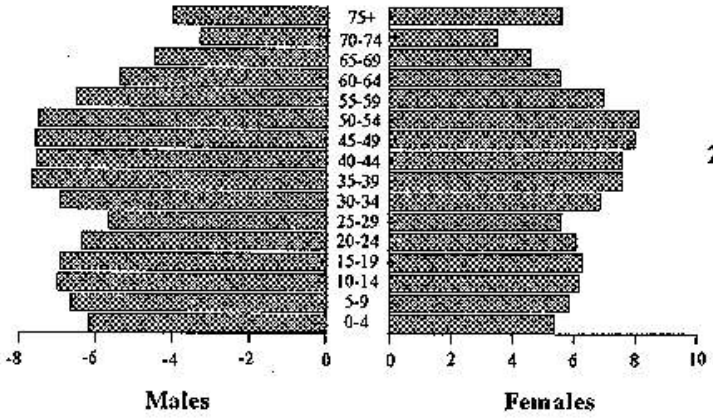
Figure 3. Age pyramids for Kerala



1961 census



1991 census



2021 projection

Table 13. Demographic scenario for Kerala: past and present

Year	Total population (1,000)	Population growth rate (per cent)	Children (1,000)	Population growth rate (per cent)	Elderly (1,000)	Population growth rate (per cent)
1961	16,904	-	7,205	-	986	-
1971	21,347	2.33	8,595	1.76	1,328	2.98
1981	25,451	1.76	8,901	0.35	1,910	3.63
1991	29,074	1.33	8,617	-0.32	2,573	2.98
2001	31,769	0.89	7,429	-1.48	3,442	2.91
2011	34,201	0.74	7,230	-0.27	4,642	2.99

2021	35,633	0.41	6,624	-0.88	6,624	3.56
2031	35,965	0.09	5,785	-1.35	9,169	3.25
2041	35,319	-0.18	5,419	-0.65	11,080	1.89
2051	33,449	-0.54	4,921	-0.96	11,732	0.57

Educational planning

In this discussion, children are defined as persons under 15 years of age. The number of children in a population is contributed mostly by the number of births and to a lesser extent by migration. As the birth rate has declined considerably (from about 40 per thousand in the 1950s to about 17 per thousand in 1993), dramatic declines in the number of children should be expected. However, part of the expected change in the number of children is cancelled by the increase in the number of mothers and the decline in the death rate among children. Table 14 gives the number of children under 15 years of age according to the various censuses since the formation of Kerala (1 November 1956) and projection 2.

Table 14. Decomposition of number of children under 15 years of age

Year	Children under 15 years (1,000)	Proportion of total population (per cent)	Children 5-9 years (Primary school)	Children 10-14 years (Secondary school)
1961	7,205	42.62	2,443	2,235
1971	8,595	40.26	2,876	2,864
1981	8,901	34.97	2,922	3,258
1991	8,617	29.64	2,847	3,108
2001	7,429	23.40	2,256	2,726
2011	7,230	21.10	2,434	2,402
2021	6,624	18.60	2,219	2,349
2031	5,785	16.10	1,896	2,012
2041	5,419	15.30	1,814	1,834
2051	4,921	14.70	1,638	1,729

Between 1961 and 1981 there was an increase of about 1.7 million children under 15 years of age, but since then the number has been declining. By 2001, the number of children would be closer to the figures for 1961.

Decomposition of the total by five-year age groups indicates that the decline will be the largest in the very young age group. The school age population will shrink considerably in the coming decades. Children in the primary school ages (taken as 5-9 years for convenience) will decline from 2,847,000 in 1991 to 1,638,000 in 2051. A similar decline is also projected in the secondary school ages (10-14 years).

The implication of such a drastic decline in the school age population has been evident for quite some time in Kerala. A decline of 32 per cent in the school age population will necessitate a corresponding decline in the number of classrooms, teachers etc. Policies and programmes taking into consideration these major demographic shifts might take some time to be implemented, but adjustments are inevitable (see Government of Kerala, 1994; James, 1995; Irudaya Rajan and Mishra, 1996 and 1997).

Apart from schooling, the repercussions from the decline in the population of children will be felt in many other areas of economic activity, such as the children's clothing industry, toy manufacturing and health care services for children. Economic activities catering to children and pregnant women are bound to shrink and will require considerable structural adjustment in the coming years. One saving factor is that not all children make use of these services, and any increase in the proportion of children using such services would partly compensate for the decrease in the number of children. The quality of life of children is likely to improve in coming years.

Table 15. A feature observed in census data on children in Kerala

Census year	Actual 0-4 population	Expected survivors aged 10-14 at 10 years later	Actual enumeration of population aged 10-14 at 10 years later	Difference (Col. 4 - Col. 3)
1961	2,527,160	2,097,084	2,863,885	766,801
1971	2,855,404	2,353,260	3,257,922	904,662
1981	2,729,731	2,240,651	3,107,600	866,949

One aspect of the census statistics on the number of school age children deserves mention. The numbers of children

enumerated in the censuses of 1971, 1981 and 1991 have always been larger than the corresponding cohort (after adjusting for inter-censal mortality) in the previous census (table 15). Thus, the number of children in the 10-14 age group in 1971 was in excess of the survivors of children 0-4 years of age enumerated in 1961 by as many as 766,000. This is not an isolated incident related to the 1961 and 1971 censuses. A similar phenomemon was observed in the 1981 and 1991 censuses, with the differences being 904,000 and 866,000, respectively. A number of explanations could be given for this situation: under enumeration of children 0-4 years of age, or mis-statement of age, for example. However, since the differences are very large (32 per cent) and there is considerable correspondence between the number of children under five years and the number of births in the previous five years, other explanations are needed. One hypothesis is that Keralites living outside the state may send their children back to Kerala for school. This is only a hypothesis, but if found to represent reality, such a situation could have some policy implications.

Labour force

As mentioned previously, unemployment, especially among the educated, is one of the major economic and social problems of Kerala. A number of factors are involved in the emergence of unemployment as a very serious problem; rapid population growth since the 1950s is one of them. Efforts to find a solution of the unemployment problem are hampered by the demographic explosion in the state.

Table 16. Working age population in Kerala

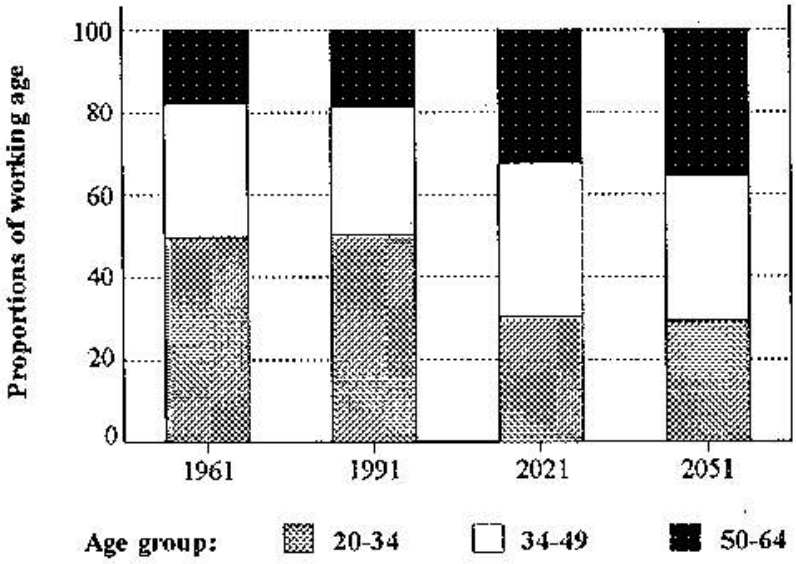
Year	**Numbers**			
20-64 years	20-34 years	34-49 years	50-64 years	
1961	7,639,624	3,798,636	2,474,651	1,366,337
1971	9,568,105	4,586,988	3,234,650	1,746,467
1981	12,312,589	6,290,800	3,709,377	2,312,412
1991	15,660,910	7,878,650	4,871,010	2,911,250
2001	18,950,664	8,665,863	6,565,096	3,719,705
2011	22,905,308	8,078,800	8,459,581	6,366,927
2021	22,070,831	6,695,974	8,210,795	7,164,062
2031	21,524,558	6,504,858	7,045,439	7,974,261
2041	19,510,631	5,905,723	6,156,965	7,447,943
2051	17,313,001	5,075,630	6,075,687	6,161,684
Year	Growth rate (pr cent)			
20-64 years	20-34 years	34-49 years	50-64 years	
1961-1971	2.25	1.89	2.68	2.45
1971-1981	2.52	3.16	1.37	2.81
1981-1991	2.41	2.25	2.72	2.30
1991-2001	1.91	0.95	2.98	2.45
2001-2011	1.90	-0.70	2.54	5.37
2011-2021	-0.37	-1.88	-0.30	1.18
2021-2031	-0.25	-0.29	-1.53	1.07
2031-2041	-0.98	-0.97	-1.35	-0.68
2041-2051	-1.20	-1.51	-0.13	-1.90

In 1961, there were only 7,640,000 persons in the working age group 20-64 years in Kerala (table 16). This number more than doubled to about 15,660,000 in 1991. Our projections indicate that the number of persons in this working age group would increase further to about 22,071,000 by 2021 (a 41 per cent increase), and then decline (by 22 per cent) to about 17,313,000 by 2051. (It may be noted that most of the persons who will be older than 20 years of age

in 2021 were already born before the 1991 census; therefore, our projections of the working age population for 2021 are quite realistic). Thus, the accentuation of the unemployment problem in the state is certainly partly due to demographic pressure. In spite of the very rapid decline in the birth rate in the state for the last two decades, the demographic pressure on the labour force will not disappear for quite some time. It is only after 2021 that we may expect a real decline in the number of persons in the working age group.

However, there will be a significant decline in the growth rate of the labour force beginning with the first decade of the next century and some actual decline after 2021. Equally important will be the change in the structure of the working age population. In 1961 and 1991, the proportion of the working age population in the young working ages (20-34 years) was nearly half of the total: 49.7 per cent in 1961 and 50.3 per cent in 1991; however, after 1991, the proportion of the young will undergo a dramatic decline to less than 30 per cent of the total. Between 1991 and 2021, the actual number of such young workers will decrease by 1.1 million. Thus, the problem of unemployment among the young will greatly ease in the coming years. Other things being equal on the economic front, such an easing of the unemployment problem in almost inevitable (see figure 4). Thus, the state could promote employment for youth; then the migration of youth from Kerala to other states in India and other parts of the world would likely decline in the near future.

Figure 4. Percentage of the population in working age groups: 1961-2051



Just the opposite is the case among the older workers, i.e. those above 50 years of age. The proportion of the population in the 50-64-year bracket will increase from 18.6 per cent in 1991 to 35.5 per cent by 2021. The actual number will also increase considerably, i.e. from 2,911,000 in 1991 to 7,164,000 by 2021. Finding suitable employment for the older working age population will be a major challenge in the early part of the next century.

The population in the middle ages (35-49 years) will also increase considerably in absolute terms (3,439,000) during the period 1991-2021, but in relative terms their share changes very little, from 31 per cent to only 35 per cent.

Marriage squeeze

One consequence of a rapidly declining fertility rate is its effect on the parity between the number of females and the number of males in the marriage-age groups. As females marry at relatively younger ages than males, the number of females in the marriage market usually exceeds the number of eligible males. However, the situation changes considerably if fertility falls rapidly as has occurred in Kerala during the last two decades. The effect of such a fertility decline is felt initially in the number of females in the usual ages at marriage. As males normally get married at higher ages, the effect of a fertility decline on the size of their age group is felt only 5-6 years later.

In Kerala, most females get married when they are in the age group 20-24 years and most males get married when they are in the 25-29 age group. The difference between the number of females and males in these age groups is a measure of the marriage squeeze in the state. These numbers are given in table 17 for the years 1961 to 2001.

Table 17. Population of marriageable age in Kerala

Year	Women 20-24 years old	Males 25-29 years old	Difference	
			Absolute increase	Percentage increase
1961	755,227	604,244	150,983	19.99
1971	1,012,032	664,365	347,667	34.35
1981	1,364,026	1,005,881	358,145	26.26
1991	1,634,240	1,263,540	370,700	22.68
2001	1,448,101	1,377,910	70,191	4.85

Females in the age group 20-24 years have always outnumbered the males in the age group 25-29 years. The excess was as much as 20 per cent in 1961; it increased to 34 per cent in 1971, greatly increasing the marriage squeeze. Since then it has been on the decline. In the coming years, females in Kerala will have a much wider choice in finding a suitable groom than they ever had in the past. The number of females in the 20-24 year age group will be more or less the same as the number of males in the 25-29 year age group in 2001. This is a welcome consequence of the fertility decline during the last two decades.

The elderly

One of the inevitable consequences of the demographic transition is population ageing. Being ahead in the demographic transition, Kerala is expected to see an increase in the number of elderly and their proportion in the total population of the state during the years to come (Irudaya Rajan, 1989 and 1998; Irudaya Rajan and Mishra, 1997; Irudaya Rajan, Mishra and Sarma, 1998). Defining the elderly population as those above 60 years of age, according to the 1961 census, the number of elderly was just 1.0 million; by the time of the 1991 census their numbers increased to 2.6 million. According to our projections, the number of elderly is expected to exceed 6.6 million by 2021 and 11.7 million by 2051. The change in the proportion of the elderly is even more dramatic. Their proportion was around 9 per cent of the total in 1991, but it is expected to increase to 19 per cent in 2021 and to 35 per cent in 2051 (table 18).

Table 18. Composition of "young old" and "old old" in Kerala's elderly population

Year	Number (1,000)		Proportion (per cent)		Growth rate (per cent)		Proportion of total population (per cent)	
	60-74 years	75 and older	60-74 years	75 and older	60-74 years	75 and older	60 and older	70 and older
1961	793	193	80.40	19.56	-	-	5.83	1.14
1971	1,060	267	79.87	20.13	2.90	3.25	6.22	1.25
1981	1,519	391	79.52	20.48	3.59	3.81	7.50	1.54
1991	2,005	568	77.92	22.08	2.78	3.74	8.85	1.95
2001	2,571	871	74.69	25.31	2.48	4.27	10.83	2.74
2011	3,355	1,287	72.27	27.73	2.66	3.90	13.57	3.76
2021	4,889	1,735	73.81	26.19	3.77	2.98	18.59	4.87
2031	6,604	2,565	72.02	27.98	3.01	3.91	25.49	7.13
2041	7,408	3,700	66.69	33.31	1.15	3.36	31.45	10.48
2051	6,932	4,800	59.08	40.92	-0.66	2.60	35.07	14.36

The decomposition of the elderly population by age and their categorization as "young old" (60-74 years of age) and "old old" (75 years and older) provides additional information on issues concerning the elderly in the state. Among all the age groups of the state population, the group growing most rapidly is the "old old". Additional demographic information on the elderly is provided in table 18.

In 1995, Kerala was administering more than 30 social security and assistance schemes for the elderly and disadvantaged groups. The annual budget provision for all such schemes was more than 10 million rupees (Rs) (US$1 = about Rs 42 in August 1998). In addition, more than Rs 40 million are spent annually on pensions for retired government employees who number around 300,000.

The old-age pension scheme was started on 1 November 1960; an addition to the scheme for the widowed and destitute was added starting on 1 January 1964. The scheme provides pensions to the elderly destitute and widowed/divorced destitute subject to the following eligibility conditions: (a) the destitute person has been residing in Kerala for a continuous period of not less than two years and (b) the destitute person is above 65 years of age. However, the age limit does not apply to a destitute person who is widowed or divorced. A recipient under this scheme is entitled to Rs 80 per month. An additional amount of Rs 5 per month is paid to a widow if she has a minor child to support.

The 1981 census revealed that the divorced, widowed or deserted population accounts for about 1.5 million people, or 6 per cent of the state's population. Calculations based on the 1991 census data are given below:

Number of widows in Kerala (1991)	1.7 million
Number of widows 60 years of age or older	0.8 million
Proportion of widows in the female population	10.6 per cent
Proportion of widows among older women	67.4 per cent
Beneficiaries of widows' pension (1991)	0.2 million
Actual coverage of eligible population	9.8 per cent
Cost of the scheme (1991)	Rs 0.14 million
If all elderly widows (in 1991) were to be covered by the scheme, the estimated cost	Rs 0.6 million
If all widows in Kerala (in 1991) were to be covered by the scheme, the estimated cost	Rs 1.3 million

Thus, as of the 1991 census, 67 per cent of elderly women were widowed. However, the scheme actually covers only 9.8 per cent of the widows. If all elderly widows were covered by the scheme, the cost would increase from Rs 0.14 million to Rs 0.64 million. In 1991, all such schemes in Kerala covered only 25 per cent of the population aged 60 and older; the cost was approximately Rs 10 million. In 2021, if the government extends pension benefits to all elderly persons (numbering around 7 million), the estimated cost would be around Rs 138 million.

The issue of social support for the elderly needs to be addressed in the context of not only the ageing population, but also the overall change in the state's age structure, the political economy and other systems of support. Currently, Kerala has more than 100 old-age homes, the highest number among all the states and Union Territories of India (Irudaya Rajan, Mishra and Sarma, 1998; Irudaya Rajan, 1998).

There is still another point to be noted. In 1996, the proportion of elderly voters in Kerala was about one out of seven, a respectable proportion by any standard. The proportion is expected to increase to one in five in 2021. Thus, the elderly will be a formidable "vote bank" in the next century. If they want to, they will be able to change the rules of the political economy to serve their interest. In fact, every year the Government of Kerala announces new social assistance programmes for the elderly in order to attract votes from this portion of the population.

Conclusions

Kerala's demographic trends in the first half of the twenty-first century will be dramatically different from those of the second half of the current century. Whereas the total population of the state will have increased by 135 per cent in the second half of this century (from 13,549,000 in 1951 to an estimated 31,769,000 in 2001), the growth (if any) in the population during the next half century will be negligible by comparison. The crude death rate declined from about 20 per thousand to about 6 per thousand in the last half of this century, but it is likely to increase from 6 per thousand to 13 per thousand during the next century. The crude birth rate decreased from 40 per thousand to about 16 per thousand in the last half of this century, but it is likely to remain more or less stable in the next half century. While Kerala experienced varying degrees of net out-migration and net emigration in this half century, the migration trend in the first half of the next century is somewhat uncertain. However, it will depend more on socio-economic developments than on demographic trends.

The socio-economic implications of the reversal of the demographic trends will be far reaching. To begin with, pressure on schools and colleges will become a thing of the past, giving ample opportunities for the educational system to concentrate on the quality of education rather than on serving quantities of students. This principle holds also for hospitals and health personnel catering to the health needs of children. It will be easier to bring about needed improvements in the quality of such services. In the transitional period, parity between the number of females and males in their respective marriage age groups will be maintained, but this will offer only a temporary respite.

Other things being equal on the economic front, unemployment among Kerala's young working age population will be greatly reduced. Educated young workers will be able virtually to pick and choose the job they want. But this will not be the case with older workers. The older working age population is expected to almost double in number in the 20 years between 2001 and 2021.

In the last half of the current century, the major socio-economic problems faced by Kerala were related to schooling, maintenance of health and nutrition, and finding employment for young people. In the first half of the next century, the major socio-economic problems will involve finding gainful employment for the older working age population, maintenance of the health and nutrition of the elderly, and providing them with means of subsistence through social security, pension and other such support programmes.

In 1991, all the social assistance and security schemes existing in Kerala covered only 25 per cent of the population 60 years of age and older; the cost was approximately Rs 10 million. In 2021, if the government extends benefits to

all elderly persons, the estimated cost will be around Rs. 138 million.

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Population Programme in Viet Nam: Highlights from the 1997 Demographic and Health Survey (Demographers' Notebook)

By Nguyen Minh Thang and Nguyen Thu Huong *

* Nguyen Minh Thang, Senior Researcher for the National Committee for Population and Family Planning (NCPFP) and Chief of the Advisory Committee for the 1997 Demographic and Health Survey (e-mail: nmthang@netnam.org.vn), and Nguyen Thu Huong, Associate Researcher, Center for Population Studies, NCPFP.

The most recent Demographic and Health Survey of Viet Nam (VN-DHS II) was conducted in 1997 as a nation-wide survey. Conducted by the General Statistical Office (GSO) with technical backstopping provided by Macro International, it is the country's first such survey since the DHS conducted in 1988. The 1997 VN-DHS was among a number of activities undertaken as part of a "population and family health" project executed by the National Committee for Population and Family Planning (NCPFP).

This note attempts to give a general overview of some of the initial findings and general highlights of the VN-DHS II, which will be published soon by Macro International. It is hoped that a more analytical study examining key determinants of various changes in Viet Nam's population picture could be published at a later date.

Data and methodology

There were two principal sampling domains: 18 provinces involved in the aforementioned population and family health project (called "project" provinces) and the "other" provinces of Viet Nam. The sample for the 1997 VN-DHS was stratified and selected in two stages for the first group and three stages for the "other" group. For the project provinces, all 18 provinces were included in the sample. At the first stage, 70 primary sampling units (PSUs) corresponding to the enumeration areas (EAs), as defined in the Viet Nam Multi-Round Survey (VNMRS), were selected from the VNMRS with equal probability. The households interviewed for the VNMRS were also used as the frame for the second-stage sampling. Ever-married women between 15 and 49 years of age were identified in selected households and interviewed. In the group of "other" provinces, 20 provinces serving as PSUs were selected with probability proportional to size (PPS). In the second stage, 135 secondary sampling units corresponding to the EAs were selected in the same manner as for the "project" provinces.

As with most DHSs, there were two questionnaires: one for the household and the other for all ever-married women aged 15-49. A questionnaire for communities was also used to examine the influence of community variables on the studied variables in a multi-level analysis. A total of 7,001 households and 5,664 ever-married women were interviewed.

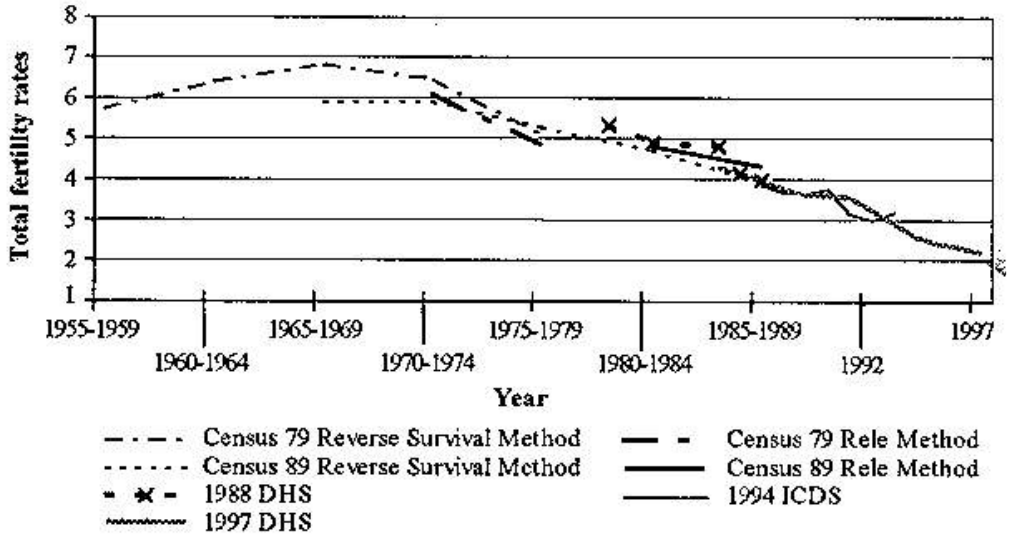
The survey provided estimates of fertility, contraceptive prevalence, access to family planning services, met need for life-saving obstetric care, abortion, infant and child mortality, immunization and reproductive health-related topics.

Table 1. Total fertility rates for three years preceding 1997 VN-DHS survey, percentage currently pregnant and mean number of children ever born to women aged 15-49

	TFR	Percentage currently pregnant	Mean number of children ever born
Place of residence:			
Urban	1.59	2.57	2.83
Rural	2.54	4.06	4.19
Region:			
Northern Uplands	2.70	5.50	4.08
Red River Delta	1.99	3.14	3.09
North Central	2.62	3.36	4.06
Central Coast	2.93	4.36	4.24
Central Highlands	4.05	3.47	4.65
South-East	1.84	3.49	3.01
Mekong River Delta	1.95	2.88	4.65
Education:			
No education	3.54	4.58	5.13

Incomplete primary	2.86	4.20	4.56
Completed primary	2.46	3.88	4.22
Completed junior high school	2.09	3.62	3.30
Completed high school	1.65	3.11	2.29
Total	2.33	3.75	3.90

Figure 1. Fertility transition in Viet Nam



Fertility

According to the maternity history collected in the baseline survey, the total fertility rate (TFR) for women aged 15-49 during the period from July 1996 to July 1997 was 2.19 children per woman for the country as a whole; however, the TFR was 1.49 in urban areas and 2.38 in rural areas. Compared with the TFR of 4.06 for the period 1985-1987 covered by the 1988 DHS, the TFR declined by 1.73 births per woman in the 10-year period. The current TFR is well below the estimate of 2.69 determined by the multi-round survey of October 1996. The 1997 VN-DHS showed a consistent TFR for different periods over the past 15 years and a long-term trend line (see figure 1). Looking at the fertility trend by different sources, it is more likely that the TFRs at the time of the 1988 DHS, the 1994 inter-censal demographic survey (ICDS) and 1997 VN-DHS were almost always lower than other estimations, suggesting that children who died soon after delivery might have been under reported. A likely reason for this could be that the mothers of such children were still mourning them and were not willing to discuss or even mention such a sorrowful event as the death of their baby.

According to the 1997 VN-DHS, TFR is lower than the replacement level in urban areas and some regions of the country such as the Red River Delta, the South-Eastern area, and the Mekong River Delta. Women who completed junior high school on average had 2.08 children. Table 2 shows the total fertility rate and fertility-related indicators by selected background characteristics. The TFR is 2.33 for the period from July 1994 to July 1997 for the country as a whole; TFRs for urban and rural areas are 1.71 and 2.52, respectively. By contrast, the mean number of children ever born (CEB) for women 40-49 years of age for the country as a whole is 3.82: 2.71 in urban areas and 4.17 in rural areas. At the time of the survey, 3.75 per cent of the women interviewed were currently pregnant.

Table 2. Current and cumulative fertility in Viet Nam for the period 1994-1997

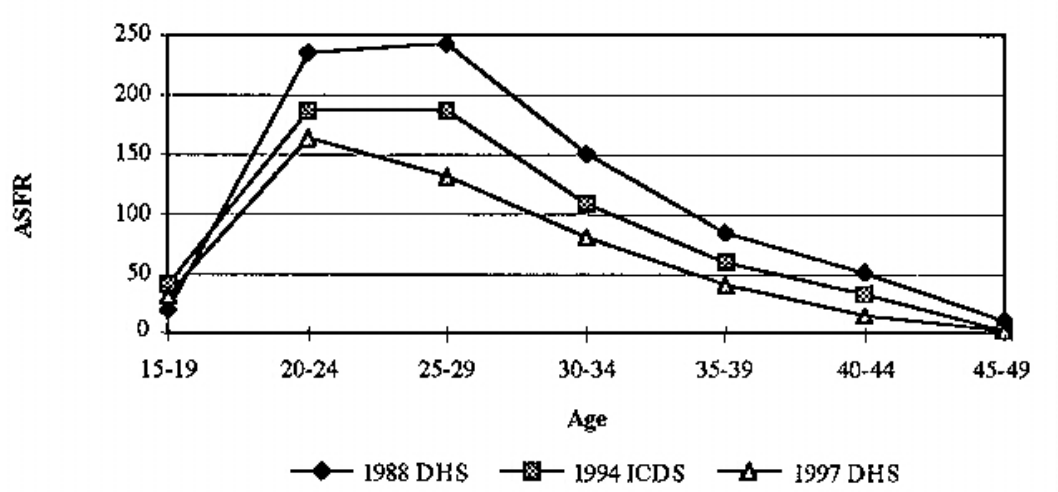
Age (5-year groups)	Age-specific fertility rates			Mean number of children ever born		
	Urban	Rural	Total	Urban	Rural	Total
15-19	12	36	32	0.01	0.04	0.04
20-24	102	182	164	0.35	0.69	0.62
25-29	100	141	132	0.94	1.68	1.53
30-34	71	83	81	1.56	2.54	2.37
35-39	24	46	41	2.05	3.32	3.06
40-44	7	17	15	2.65	4.02	3.37
45-49	1	2	2	3.11	4.43	4.15

Total fertility rate 15-49	1.59	2.54	2.33			
Total fertility rate 15-44	1.58	2.53	2.32			
General fertility rate	55.00	86.00	80.00			
Crude birth rate (1,000)	14.90	20.20	19.20			
Children ever born to women aged 40-49				2.83	4.19	3.90

The TFR for the Mekong River Delta area proved to be a big surprise for policy makers because of the magnitude of its decline. Compared with the CEB value of 4.65, the low level of fertility (TFR = 2.33) in the Mekong area suggests that the population programme may have significantly influenced young couples to have fewer children (CEB nationally = 3.82).

Table 2 shows information about current and cumulative fertility measures, including crude birth rates, age-specific fertility rates, total fertility rates, general fertility rates (GFRs), and the mean number of children ever born for all women aged 15-49 for the whole country, and for urban and rural areas for three years preceding the survey. The age-specific fertility rates indicate that a Vietnamese woman normally would give birth to only one child by age 25 and to more than two children by age 35. The figures on the mean number of children ever born by five-year age groups show that women have given birth to 2.5 children by their late twenties and around three children by their late thirties. The crude birth rate stands at 19.4 per thousand: 14.9 per thousand in urban areas and 20.2 per thousand in rural areas.

Figure 2. Age-specific fertility rate:



A comparison of the age-specific fertility rates between the 1988 DHS, 1994 ICDS and 1997 VN-DHS surveys shows a consistent drop for every age group (figure 2). The figure also shows that the drop in the fertility rate for women in the 25-29 cohort is the largest among all the women in the 15-49 age group.

An additional survey among 7 out of 204 clusters showed that the volume of births recorded in the 1997 VN-DHS was about 8.3 per cent under reported. Thus, an adjustment will be made to provide a better estimation of the TFR.

Contraception

More than 84 per cent of currently married women aged 15-49 in Viet Nam have ever used a contraceptive method. The contraceptive prevalence rate (CPR) is 75 per cent, and 56 per cent of ever-married women are currently using a modern method (table 3). The total CPR is up by 10 per cent over the level of the 1994 survey and the use of modern methods rose by 12 per cent, with traditional method use falling by about 2 per cent owing to less frequent use of periodic abstinence.

Table 3. Knowledge of methods, ever use and current use of methods in Viet Nam

	Percentage knowing method		**Percentage who ever used a method**		**Percentage currently using a method**
	Ever married	**Currently married**	**Ever married**	**Currently married**	
Any method	98.8	98.9	81.6	84.2	75.3

Any modern method	98.5	98.7	68.3	70.4	55.8
Pill	89.0	89.5	9.7	10.1	4.3
IUD	97.3	97.6	56.0	57.8	38.5
Injections	55.8	55.9	0.9	0.9	0.2
Norplant	12.3	12.4	0.0	0.0	0.0
Diaphragm/foam/jelly	10.0	10.1	0.0	0.0	0.0
Condom	92.1	92.5	12.3	12.7	5.9
Female sterilization	91.0	91.4	6.1	6.3	6.3
Male sterilization	89.0	89.5	0.5	0.6	0.5
Any traditional method	80.0	80.8	33.0	34.3	19.2
Periodic abstinence	68.3	69.0	16.9	17.6	7.3
Withdrawal	70.4	71.5	24.9	25.9	11.9
Other methods	2.0	2.0	0.5	0.5	0.3
Number of women	5,664	5,340	5,664	5,340	5,340

Compared with the 1988 DHS and 1994 ICDS, the contraceptive mix has not changed very much. The percentage of women using IUDs, which is still the predominant method, increased about 5 per cent, i.e. in the 1988 DHS the percentage using the IUD was 33.1 per cent and in the 1994 ICDS it was 33.3 per cent. Female sterilization is up by 4.2 per cent over the level of the 1994 ICDS. The male sterilization level (0.5 per cent) has shown an increase, but overall use remains low as it was in the 1988 DHS (0.3 per cent) and the 1994 ICDS (0.19 per cent). It should be mentioned that great efforts have been made in recent years under the family planning programme to popularize sterilization. However, the data indicate what a daunting challenge it will be for the programme to promote male sterilization.

Because of the differences among users, non-users and traditional method users, there is no full picture for access to family planning services. However, the 1997 VN-DHS showed that, among modern method users, 65 per cent said that they can obtain their favourite method within 30 minutes of leaving home. Only 17 per cent of the respondents reported that it took them more than one hour to access such products or services. Ninety per cent of the women interviewed said that it was easy to obtain their particular contraceptive method. For non-users and traditional users, only 63 per cent knew where to obtain a method.

Access is better in urban areas than rural areas: respectively, 87 vs. 61 per cent of users can obtain a contraceptive method within 30 minutes, and 97 vs. 80 per cent can obtain their service within one hour.

Sixty-seven per cent of non-users reported that they had not had any contact with family planning workers in the previous year and had not been told about family planning during their visits to health centres. Only 19 per cent of non-users were visited by family planning workers, and of these half who visited health clinics were informed about family planning.

Abortion

The 1997 VN-DHS survey reported a total abortion rate of 0.74, a figure which seemed lower than and quite inconsistent with service statistics. It is notoriously difficult to survey abortion experience for a large sample using a questionnaire containing many questions and indicators, since women are known commonly to under report abortions when questioned directly. Service statistics are often suspected of over reporting menstrual regulation procedures as abortions even though the former procedure may be performed on women who are not pregnant. Moreover, single women, who certainly form a portion of abortion clients in Viet Nam, were not included in the 1997 VN-DHS survey. Table 4 indicates that the ratio of abortions to births is one to five; the 1994 ICDS indicates that the ratio is one to six. Overall, the abortion rate seems to be higher in the northern part of the country.

Table 4. Percentage of pregnancies in Viet Nam during previous three years that ended in live birth, induced abortion, menstrual regulation, miscarriage and still-birth by background characteristics

	Live birth	**Induced abortion**	**Menstrual regulation**	**Mis- carriage**	**Still- birth**
Place of residence:					
Urban	75.94	3.32	12.95	7.16	0.62
Rural	76.54	6.80	10.39	5.15	1.16
Region:					
Northern Uplands	64.16	10.81	18.87	4.46	1.71
Red River Delta	67.99	10.00	18.77	2.79	0.45

North Central	84.33	6.47	1.37	6.13	1.70
Central Coast	92.70	0.32	0.00	6.33	0.65
Central Highlands	95.03	0.88	1.30	2.24	0.56
South-East	81.73	2.26	6.98	8.02	1.01
Mekong River Delta	80.42	2.73	7.85	8.17	0.82
Education:					
No education	88.44	4.61	2.45	3.50	1.00
Incomplete primary	81.04	4.07	8.02	5.81	1.05
Completed primary	77.09	5.63	9.74	6.48	1.06
Completed junior high school	72.41	8.08	12.66	5.43	1.42
Completed high school	72.30	7.63	16.18	3.38	0.52
Total	76.42	6.30	10.76	5.44	1.09

Again, the aforementioned additional survey also showed that the volume of abortions recorded in the 1997 VN-DHS was about 2.3 times lower than expected. The authors are making an adjustment for an in-depth analysis of the survey.

Infant mortality

The survey showed that the infant mortality rate in Viet Nam is relatively low. The IMR was 34.8 per thousand live births across the 10-year period before the survey. Across the two five-year periods, IMR fell from an estimated 39.9 per thousand to 28.5 per thousand.

Table 5. Infant and child mortality rates by socio-economic characteristics for 10-year period prior to 1997 VN-DHS survey

	Neonatal mortality rate (per thousand)	**Post- neonatal mortality rate (per thousand)**	**Infant mortality rate (per thousand)**	**Child mortality rate (per thousand)**	**Under 5 mortality rate (per thousand)**
Place of residence:					
Urban	19.4	3.8	23.2	7.3	30.4
Rural	22.7	13.9	36.6	12.1	48.3
Region:					
Northern Uplands	35.7	15.5	51.3	14.6	65.1
Red River Delta	16.4	12.0	28.4	4.5	32.8
North Central	26.7	3.4	30.1	7.6	37.5
Central Coast	17.2	14.2	31.4	12.7	43.7
Central Highlands	19.4	26.0	45.4	10.1	55.0
South-East	9.9	9.5	19.4	3.5	22.9
Mekong River Delta	18.4	13.5	31.9	20.6	51.9
Education:					
No education	27.0	21.8	48.8	26.3	73.8
Incomplete primary	27.2	16.1	43.4	21.2	63.7
Completed primary	21.5	13.7	35.2	7.9	42.8
Completed junior high school	18.7	8.9	27.7	7.3	34.8
Completed high school	21.4	7.7	29.1	4.4	33.4
Total	22.2	12.6	34.8	11.5	45.9

Table 5 shows that urban-rural and educational differentials exist for all indicators. All mortality rates in urban areas are lower than those in rural areas. Also, those rates all declined with increases in the mother's educational level, except some indicators for high secondary education owing to the small sample size for this category.

A frequent cause of death in young children is dehydration as a result of diarrhoea. The administration of oral rehydration therapy (ORT) is a simple means for countering the effects of dehydration. ORT consists of giving a child either a solution prepared by mixing water with a commercially prepared packet of salts for that purpose or a home-made fluid made with recommended amounts of sugar, salt and pure water. In the 1997 VN-DHS, mothers of children under three years of age were asked if their children had suffered from diarrhoea within the two-week

period prior to the survey, and if so, how they treated their children. The respondents indicated that 10 per cent of their children had diarrhoea within that two-week period: 16.8 per cent were children 6-11 months old and 11.4 per cent were 12-23 months old. Almost 40 per cent of those children were given ORT, 21 per cent receiving the home-made solution, and 50.8 per cent being given either form of ORT. The survey also indicated that rural children are more likely to suffer from diarrhoea than children living in urban areas (10.8 vs. 5.8 per cent, respectively) and boys are more likely to contract diarrhoea than girls (12 vs. 8 per cent, respectively).

Conclusion

Viet Nam's family planning programme, which is based on voluntary acceptance and cooperation, has achieved considerable results in terms of encouraging small families, reducing the fertility rate and increasing the contraceptive prevalence rate. The most important success of the intensive programme during the last 10 years is that the programme has created a demand for family planning. In general, the family planning programme has been socialized and is supported by the people and their communities. The findings from the 1997 VN-DHS show that the country's fertility is very close to the replacement level and that almost all programme targets can be achieved 5-7 years sooner than had been planned. However, there are a number of new demands that will challenge the national programme in the coming years. Among them, the quality of reproductive health services is an urgent issue because it is a key to the continued success of the national population programme. The National Committee for Population and Family Planning is very much concerned about the current situation in terms of the quality of care, counseling services, and the availability and accessibility of contraceptive methods as well as efforts to reduce the abortion rate while providing safe abortions to those who want this service.

The 1997 VN-DHS reveals what progress has been made in the past 10 years, but also where NCPFP should focus more attention in the future.
