Unchanging Fertility Level in Bangladesh in the 1990s: A Myth or Reality?

by

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Estimates from three rounds of BDHS suggest of unchanging fertility level in Bangladesh during the 1990s. This is quite puzzling given the widely acknowledged success of Bangladesh in reducing fertility in early years and it contradicts the steady increase in contraceptive practice during the same period. This paper revisits the numerical estimates upon examining several indirect methods and concludes that fertility decline did not stop during the 1990s even though the pace of decline slowed down.

I. INTRODUCTION

Bangladesh, the most populous nation on earth, has been experiencing fertility decline since the mid-1970s and many believe the process became faster since the mid-1980s. According to available evidence, fertility rate in the country had declined by about half, from over 7 children per woman to 3.4 children, during the mid-1970s to early 1990s. Most remarkably, this dramatic decline in fertility has taken place in an otherwise unfavorable atmosphere denying the conventional wisdom of fertility transition. The phenomenon thus drew much attention worldwide and is frequently cited as a success story.

After accomplishing a steady decline for about two decades, the fertility had apparently stopped declining or followed past trend in the 1990s, particularly after 1993/94. This observation, which emerged from the fertility estimates made by three rounds of Bangladesh Demographic and Health Surveys (BDHS) conducted in the 1990s, surprised many. Total fertility rate (TFR) estimated from these studies was 3.44 in 1993/94, 3.27 in 1996/97 and 3.34 in

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suggesting little or no change in the country’s fertility level during these years. Many find this observation somewhat puzzling, especially since contraceptive practice exhibits steady increase during the second half of 1990s—increasing by more than 9 percentage point during 1993/94-1999/2000 period.\(^1\)

Independent analysis and estimates differed with the view of unchanging fertility in the country in the 1990s as expressed by BDH studies. Kabir (2004) observed that the TFR estimate for 1993/94 by the BDHS was an underestimate and this was caused by systematic misplacement of children’s age. The study also observed that fertility had fallen further in the country since 1993/94 although did so slowly. Islam \textit{et al.} (1996) and Islam \textit{et al.} (2001) also expressed similar views. They posited that TFR is a period measure; hence, it is likely that estimates got affected directly or indirectly by young age structure or population momentum, shift of childbearing towards young ages, shift towards adoption of less effective method mix, and reduction in the postpartum infecundability period in the country restricting the visibility of a decline in TFR. They further suggested that the actual level of fertility in the country has been underestimated by the BDH studies.

It is worth mentioning that the BDHS had obtained their estimates directly from the data and this practice of using direct survey estimates to assess the fertility level and trend had been a departure from past practice in the country. If we were to adopt this new practice, then it would also have implications for past fertility level and trend observed in the country. A comparison of direct fertility estimates obtained by different national level studies of the past reveals that fertility was unchanging in the country, during mid-1970 to end of 1980s with TFR remaining at a level around 5 (Table A.1).\(^2\) But fertility is believed to have declined fast during this period.

To note, observation with regard to past fertility level and trend was heavily dependent upon estimates obtained through indirect

\(^1\) The contraception use rate as recorded by the BDHS was 44.6 percent in 1993/94, 49.3 percent in 1996/97 and 53.8 percent in 1999/2000.

\(^2\) The exception is BBS’ Sample Registration Survey, which is generally viewed as a less reliable source than CPS, BFS and BDHS.
means after careful evaluation and examination of data. Even the BDHS claim of unchanging fertility level in the 1990s and substantial fertility decline before this period is based on indirect fertility estimates for the previous periods (Table A.2). The central point, therefore, remains that this recent practice of emphasizing survey estimates to ascertain fertility level and trend is not only a new phenomenon and was adopted without convincing consistency or reasons to do so.

Against this backdrop, present exercise intends to re-estimate the country’s fertility level and trend during the 1990s using indirect estimation techniques to gain some fresh insight into the matter, which holds much importance for policy decisions.

II. DATA AND METHODS

For data, the current study relied heavily on different BDHS. It also utilized data from ‘Bangladesh Fertility Survey of 1989’ (Huq and Cleland, 1989) and those from the decennial Population Censuses of the country.

Three indirect estimation techniques are used to estimate TFR from the above mentioned data. The methods applied are Rele method, Proximate Determinant method and Regression method. Their choice was guided primarily by the data requirement, data availability, and easiness in application. Each of the three methods is briefly described below.

Rele Method

This method essentially entails inference on the fertility level from child woman ratios (CWR) and is based on the close linear relationship between CWR and the GRR (Gross Reproduction rate) that are shown to exist at any given level of mortality (Rele 1987, 1976). The coefficients to estimate the GRR from CWR at fixed levels of expectation of life at birth \(e^0\) are given in the methodology.\(^3\) Using those coefficients, this method estimates first GRR from CWR under suitable values of \(e^0\) for a given population; then applying the sex-ratio at birth the estimate for TFR (Total Fertility Rate) is obtained from estimated GRR.

\(^3\) GRR= a + bx where x is CRW (per woman) and values of a and b are fixed for fixed values of \(e^0\) are given in Rele (1976). TFR= GRR x2.05 (assumed sex ratio at birth).
In estimating GRR, this method uses two types of CWR, namely, children aged 0-4 years divided by women aged 15-49 (CWR\textsubscript{1}) and children aged 5-9 divided by women aged 20-54 (CWR\textsubscript{2}). The e\textsubscript{0} value used for estimating GRR corresponds to the period when the children in the CWR were born. Fertility estimates refer to the same period too. In other words, estimates obtained through using CWR\textsubscript{1} refer to the five years period immediately preceding the census/survey and that using CWR\textsubscript{2} refers to 5 to 10 years preceding the census/survey.

The Rele method has certain strengths and weaknesses. The estimated fertility is insensitive to the errors in e\textsubscript{0}, hence, an approximate value for e\textsubscript{0} is able to produce fairly accurate estimate for fertility. Among weaknesses, the derived estimates for fertility depend directly on the accuracy of CWR. In developing countries, due to errors in reporting age, notably, the exaggeration of age at young ages of 5-9 (years) and underreporting of very young children aged below 5 (years), the reported age distribution often gets distorted. To overcome this problem, the method initially suggested for an average of the two estimates obtained by using two CWR, which would reflect a decadal estimate (Rele, 1976). Alternatively, one may use smoothed age data also. But this has some disadvantages. The particular method used in smoothing the age data often influences the CWR estimates, hence, affect the estimates for GRR/TFR.

Rele (1987) later suggested a refinement of the method to address above problem, which suits better the situations in some developing countries like India, Bangladesh, etc. The suggested refinement requires age data at two or more points preferably with ten years gap and makes use of weights\textsuperscript{4} derived on the basis of extent of under/over enumeration involved in the age groups 0-4 and 5-9. These weights are used to adjust the preliminary estimates for arriving at final ones and estimates are obtained for various quinquennials between censuses or data collection points. If the weights for a population cannot be estimated very accurately, it was suggested that the somewhat inaccurate estimate of them may not

\textsuperscript{4} Suggested weights to arrive at final estimates are 0.7 for GRR obtained from CWR\textsubscript{2} and 0.3 for GRR obtained from CWR\textsubscript{1}. 
affect much the final estimates, viz., estimates for GRR/TFR are
less sensitive to some degree of variations in weights.

In the present exercise, the Rele method used data both from
population censuses and national level surveys to obtain estimates
for TFR. The survey data, as noted above, have come from three
BDH studies of the 1990s and the Bangladesh Fertility Survey
(BFS) of 1989. The population census data relate to the years of
1991 and 2001. In all cases, un-smoothed age data are used for
estimation purpose.

The value of life expectancy at birth, another necessary input for
Rele method, is assumed on the basis of estimates for the same
done by the Bangladesh Bureau of Statistics (BBS). On the basis of
BBS estimates, a value of 51 years for $e_0$ is assumed for 1981-86,
54 years for 1986-91, 57 years for 1991-96, and 60 years for 1996-

It may be noted that estimates produced under Rele method,
particularly those using survey data, have overlapping periods.
Such estimates often disagree for input data being different for
them, viz., one is derived using 0-4 age group in the CWR and
another by using 5-9 age group. Under the circumstances, weights
suggested in the latest refinement of the method are applied to
arrive at a single estimate for the period.

**Proximate Determinant Method**

Davis and Blake (1956) developed a framework outlining the
intermediate fertility variables. The seminal work identified 11
intermediate variables through which fertility gets affected in a
population. Later on, Bongaart (1978) revised this framework
incorporating only 8 of them, which he termed as “proximate
determinants” of fertility. As he suggested, each of these eight
variables directly influences the fertility and together determine the
level of fertility in a population. Using data from developed and
developing countries, Bongaart and Potter (1983) later observed
that 96 percent of the variation in total fertility rates across
populations can be explained by only four principal proximate

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5 Results of the 2001 population census are provisional ones calculated based on 5 percent
sample schedule. Final results are yet to be published.
determinants, namely, marriage, contraception, induced abortion, and lactational infecundability. The key contribution of the Bongaart’s framework has been to set up the procedure of parceling out the effects of different proximate variables on fertility. The forces of each of the intermediate variables in Bongaarts’ framework are measured by an index called ‘C’ which varies from zero to one. When it is zero, none of the potential for fertility is translated into births. When it is 1.0 the control exerts no restraining effect whatsoever on fertility.

In Bongaart’s framework, the total fertility rate (TFR) in a population is expressed as the product of four indexes measuring fertility inhibiting effect of four principal intermediate variables and the total fecundity rate (TF). The total fecundity rate (TF) is the average number of live births expected among women who during their entire reproductive period remain married, do not use contraception, do not have any induced abortion and do not breastfeed their children. The TF is less variant from across populations and lies between 13 and 17 births per woman with an average value of 15.3 (Bongaart 1978, Bongaart and Potter 1983).

The following equation summarizes the basic structure of the Bongaart’s model by relating the fertility measures to the proximate determinants:

\[ \text{TFR} = C_m \times C_c \times C_i \times C_a \times \text{TF} \]

Where TF, as noted above, is the “total fecundity rate”, Cm is the index of marriage, Cc is the index of contraception, Ca is the index of induced abortion, and Ci is the index of lactational infecundability. Each index measures the extent to which the fertility is reduced from the maximal levels by specified proximate determinant. Above mentioned four indexes are measured as follows:

\[ C_m = \frac{m(a) \times g(a)}{g(a)} \]

6 The other four proximate determinants, frequency of intercourse, sterility, spontaneous intrauterine mortality, and duration of fertile period, are found less important for this although they all relate to natural fertility.
Where \( m(a) \) = age specific proportions currently married among female and \( g(a) \) = age specific marital fertility rate. In other words,

\[
C_m = \frac{TFR}{TM}, \text{ where } TM \text{ refers to marital fertility.}
\]

\[
C_c = 1 - 1.08 \times u \times e
\]

Where \( u = \) proportion currently using contraception among married women of reproductive age; and \( e = \) average use effectiveness of contraception.

\[
C_i = \frac{20}{18.5 + i}
\]

where \( i = \) average duration of postpartum infecundity caused by breastfeeding or post partum abstinence,

\[
C_a = \frac{TFR}{TFR + .4 \times (1 + u) \times TA}
\]

where \( TA \) is total abortion rate.

For present exercise, we have estimated the values for \( C_m, C_c, \) and \( C_i \) index only. The reason for avoiding estimating \( C_a \) index quantifying the effect of induced abortion is the lack of required information on the latter. The value for the index thus is assumed 1.0 all through in estimating TFR under the proximate determinant method. This practice has the likeliness to produce an upward estimate of TFR, as abortion practices may not be totally absent in Bangladesh (Begum 2003).

Problems however remain in estimating \( C_c \) for which knowledge about average contraceptive use-effectiveness \((e)\)\(^7\) is required. The latter derived from the method-specific contraceptive use-effectiveness about which there is no uniform view. Using 1993/94 BDHS data, Islam et al. (1996) estimated a set of such values while Bairagi et al. (1996) produced another set of the same using village level statistics of Matlab. These two sets differ noticeably (Table A.3) producing different estimates for average contraceptive use-

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\(^7\) Contraceptive effectiveness is the extent to which the practice of contraception lowers fecundability which is defined as the monthly probability that sexually active, fecund, non-contracepting women will conceive (Bongaart and Potter 1983). The standard measure of contraceptive effectiveness \((e)\) equals the proportional reduction in the monthly probability of conception due to use of a particular contraception among fecund women (Potter 1961).
effectiveness \(e\) (Table A.4). Nevertheless, the general perception is, the estimates made by using Matlab data better approximate the experiences of developing countries (Ross and Frankenberg 1993). However, since both these estimates are obtained using Bangladesh data, we averaged them out to arrive for a single \(C_c\) value for the country. In this case, we may run the risk of overestimating the contraceptive effect on fertility if the above contention of village level experience resembles more the real life situation holds good.

For another reason too the contraceptive effect, particularly for 1996/97 and 1999/2000, may get overestimated. In estimating \(C_c\) for these years, value of contraceptive use-effectiveness for the year 1993/94 was used. Evidence suggests that contraceptive use-effectiveness may have had declined in these later years for increased use of less effective method (Table A.8) and higher rate of method discontinuation (Table A.5). Some of these effects, however, may get neutralized by opposing effects of \(C_a\), which we could not measure.

The \(C_i\) index is estimated using direct estimates for the postpartum amenorrhoea period as obtained by the BDH studies (Table A.6). The estimated values for \(C_m\), \(C_c\) and \(C_i\) indexes for different years are presented in Table I.

<table>
<thead>
<tr>
<th>Period</th>
<th>(C_m)</th>
<th>(C_c)</th>
<th>(C_i)</th>
<th>(C_m \times C_c) x (C_i)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BFS 1989</td>
<td>.765</td>
<td>.695</td>
<td>.730</td>
<td>.713</td>
</tr>
<tr>
<td>BDHS 1993/94</td>
<td>.754</td>
<td>.550</td>
<td>.610</td>
<td>.580</td>
</tr>
<tr>
<td>BDHS 1996/97</td>
<td>.743</td>
<td>.503</td>
<td>.573</td>
<td>.538</td>
</tr>
<tr>
<td>BDHS 1999/00</td>
<td>.726</td>
<td>.466</td>
<td>.545</td>
<td>.505</td>
</tr>
</tbody>
</table>

**Note(s):**
1. used contraceptive use-effectiveness from BDHS.
2. used contraceptive use-effectiveness from Matlab.
3. average of two \(C_c\).
Regression Method

From international comparisons of family planning programs and fertility changes, Blanc (1990) derived a set of regression equations using which a prediction for TFR is possible on the basis of CPR information. The author developed five regression equations to estimate TFR from the CPR; thus, 5 different estimates for TFR are possible under the method. However, to arrive at a single estimate the author suggested an average of the five values. Since the main and major driving force behind fertility decline in Bangladesh so far has been the contraception use (Cleland et al. 1994), we decided to use this method. This method, however, assumes the practice of contraception subsumes the average international experience with regard to use effectiveness, duration of use, method mix, age at marriage and first birth, breastfeeding duration, post-partum infecundability, level of induced abortion and incidence of secondary sterility. In other words, this method judges the proximate determinants of fertility in Bangladesh to be similar to that of the international experiences. The estimates under this method, thus, require much caution. The experience of the past users indicated that in situations such as in Bangladesh this method tends to produce under estimation of TFR (Kantner and Frankenberg 1986, Kantner and Noor (1992). They therefore suggested that estimates by this method may be treated as the lower bound estimates for TFR in a society.8

III. RESULTS OF ESTIMATION

The TFR estimates obtained under different techniques are presented in Tables II and III, and graphically in Figure 1. The estimates under Rele method using census and survey data are presented in Table II and those obtained under Proximate Determinant method and Regression method are presented in Table III.

Interestingly, the TFR estimates obtained under different methods and even under the same method (Rele method) using different data have shown close agreement among them. The only

8 The formulae used to estimate TFR under Regression method are: TFR= 7.30 – (6.42 * CPR), or 6.83 – (6.20 * CPR), or 7.38 – (7.20 * CPR), or 7.28 – (6.55 * CPR), or 7.15 – (6.56 * CPR).
exception to this has been the estimates obtained under Regression method. The latters are consistently lower than others in all periods and, as noted above, this is somewhat expected.

The Rele method using census and survey data produced two sets of estimates for the TFR and these two sets disagree most for the period of early 1980s. The census estimate indicates a level of 6.8 for the TFR for 1981-86 period while the estimate from survey data was 6.3 for 1979-84 period (Table II). Both the estimates relied more on CWR which uses children aged 5-9 and women aged 20-54. Since the Population Census of Bangladesh has a known history of over enumerating the 5-9 age group (Government of Pakistan 1961, Begum 1976, 1990), degree of overestimation is likely to be higher in the case of the census estimate. In the surveys, data are collected generally with more care and attention than population censuses, hence, are likely to be relatively free from such biases. We, therefore, accept the survey estimates as more realistic ones. Thus, for 1982/83, which represents the mid-period of 1979-86, we consider the TFR to be 6.3.

Again, using data from population censuses, Rele method produced an estimate of 6.0 for the TFR for 1986-91 period and survey data produced 5.9 for 1984-89 period. The mid-period for the former refers to 1989 and latter to 1987. For 1988/89 period, the Proximate Determinant method produced an estimate of 5.5. According to these estimates, country’s TFR during 1987-89 was somewhere between 5.5 and 6.0. In absence of any criteria to choose one over the other, we take their average of 5.8 as the best guess for TFR for the period. In short, one may conclude that the country’s TFR around 1988/89 period was 5.8. The Regression method produced an estimate of 5.2 for the period (Table III).

The Rele method using provisional age distribution of the 2001 population census obtained a TFR estimate of 4.9 for the period of 1991-96 and this method using survey data produced a level of 4.5 for 1990-92/1995-97 period. The mid period in both cases falls around 1994. For 1993/94 period the Proximate Determinant method obtained an estimate of 4.46. As before, an average 4.6 for the TFR for the period around 1993/94 may be considered. However, this average may involve some degree of overestimation, as estimate by Rele method was done using 5-9 age group in the CWR. Because of this and for the fact other two estimates are almost unanimous in suggesting 4.5 as the TFR for the period, we consider 4.5 to be more realistic. However, the difference between 4.6 and 4.5 is negligible. The estimate obtained by the regression method is 4.25 for 1993/94 (Table III).
As noted before, the Rele method using census data obtained an estimate of 4.9 for the TFR for 1991-96 period. This method using the same data obtained an estimate of 3.9 for the period of 1996-2000. By averaging them, we can get an estimate of 4.4 for the mid-year of 1996. On the other hand, using survey data from BDHS 1999/2000, the Rele method obtained an estimate of 4.5 for 1990-92/1995-97 period and obtained 3.8 for 1995-2000 period. An average of them produces a level of 4.15 for the TFR referring roughly to the period of 1995, the mid point of two periods. The proximate Determinant method produces a level of 4.16 for 1996/97 period (Table III). Again, an average of them produces a level of 4.24 for the TFR for the period around 1995/96. The regression method produces a level of 4.0 for 1996/97.

As noted before, the Rele methods using census data produced an estimate of 3.9 for 1996-2001 period and the survey data produced 3.8 for 1995-2000. The Proximate Determinant method produced an estimate of 4.0 for 1999/2000 period. Hence, one may conclude that the TFR level in the second half of 1990s was somewhere between 3.8 and 4.0, with an average of 3.9. The TFR in the late 1990s may therefore be assumed to be around 3.9-4.0.

The level of TFR in 1999/2000, estimated under Regression method, was 3.6. This is largely consistent with estimates obtained by other authors using indirect estimation techniques (Table IV).

**Figure 1:** Graphic Presentation of TFR Estimates Under Different Methods

![Graphic Presentation of TFR Estimates Under Different Methods](image)

**Note:** mid-year is used for estimates of multi-year periods.
TABLE II
TFR ESTIMATES FOR BANGLADESH USING RELE METHOD

<table>
<thead>
<tr>
<th>Period</th>
<th>Census</th>
<th>Period</th>
<th>Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981-86</td>
<td>6.82</td>
<td>1979-84</td>
<td>6.3</td>
</tr>
<tr>
<td>1986-91</td>
<td>5.97</td>
<td>1984-89</td>
<td>5.86</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1995-2000</td>
<td>3.78</td>
</tr>
</tbody>
</table>

TABLE III
TFR ESTIMATES FOR BANGLADESH USING PROXIMATE DETERMINANT AND REGRESSION METHOD

<table>
<thead>
<tr>
<th>Year</th>
<th>Proximate determinant *</th>
<th>Regression Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>5.49</td>
<td>5.16</td>
</tr>
<tr>
<td>1993/94</td>
<td>4.46</td>
<td>4.25</td>
</tr>
<tr>
<td>1996/97</td>
<td>4.16</td>
<td>3.96</td>
</tr>
<tr>
<td>1999/2000</td>
<td>4.01</td>
<td>3.56</td>
</tr>
</tbody>
</table>

* used average Cc value.

TABLE IV
INDIRECT ESTIMATES OF TFR AS OBTAINED BY DIFFERENT AUTHORS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1982/83</td>
<td>Census</td>
<td></td>
<td></td>
<td></td>
<td>6.30</td>
</tr>
<tr>
<td>1988/89</td>
<td>BFS</td>
<td>5.38</td>
<td>5.83</td>
<td>5.80</td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>CPS</td>
<td>5.86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1993/94</td>
<td>BDHS</td>
<td></td>
<td>4.50</td>
<td>4.50</td>
<td></td>
</tr>
<tr>
<td>1996/97</td>
<td>BDHS</td>
<td></td>
<td></td>
<td>3.76</td>
<td>4.24</td>
</tr>
<tr>
<td>1999/2000</td>
<td>BDHS</td>
<td></td>
<td></td>
<td>3.91</td>
<td>3.9</td>
</tr>
</tbody>
</table>
IV. FINDINGS AND DISCUSSION

Using three indirect estimation techniques, the present exercise estimates TFR for different periods. Three major observations are worth noting.

First, the TFR did not stagnate in Bangladesh in the 1990s, particularly after 1993/94. This is confirmed separately by estimates from all three techniques.

Second, as happened with all national level sample surveys in the past, the Demographic and Health Surveys (DHS) conducted in Bangladesh in the 1990s too have underestimated the fertility level of the country’s women. Degree of such underestimation was the highest in 1993/94 BDHS and lowest in 1999/2000 BDHS. The extent of underestimation of the TFR was nearly 24 percent in 1993/94, 21 percent in 1996/97, and 17 percent in 1999/2000.

Third, although fertility did decline during the second half of 1990s in the country, it did so at a much reduced rate than that noted in the late 1980s to early 1990s. For example, TFR declined by about 33 percent in the country during the entire 1989-99 decade, but 22 percent or two-third of this decline took place during 1989–1993/94 period alone\(^9\) and remaining one-third during subsequent 6 years after 1993/94.

Given above observations, particularly the last one, it is imperative to understand the fertility decline dynamics in the country over the past one decade for comprehending the slow down in fertility-decline in the second half of 1990s. An understanding of this dynamics can be approached in several ways, such as along socio-economic dimensions, regions, and through proximate determinants influencing fertility. We intend to make an attempt along the third route.

While estimating indices for different proximate determinants it is observed that all along the 1990s marriage and contraception have rendered depressing effect on fertility (Table I). According to the estimated index value, the Cm quantifying the marriage effect on fertility could increase its fertility inhibiting effect\(^{10}\) by additional

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\(^9\) According to BDHS, TFR declined by more than 30 percent during this period; see Main Reports of the 1993/94 BDHS.

\(^{10}\) \(1\)-index value measures the fertility depressing effect of an index.
17 percent during 1989-99 decade. Of the latter increase, 28 percent was acquired during 1989-1993/94 period and 72 percent after 1993/94—with 47 percent accrued after 1996/97. The marriage pattern for the women, indeed, changed more rapidly during the second half of 1990s compared to the first half. The proportion of women ever and currently married in the reproductive ages of 15-49 declined continuously after 1993/94 and such decline in the proportion women currently married, who are active contributors to fertility, was rapid after 1996/97. The median age at marriage too increased by about a year during this period (Table A.7).

It is amazing to note that during 1989/99, the period under concern, Cc measuring the contraceptive effect could enhance its fertility inhibiting effect by additional 73 percent. As opposed to marriage effect, Cc acquired nearly two-third (64%) of its additional effect during 1989-1993/94 period and one-third during 1993/94-1999/2000 period. Thus, although contraception did depress fertility throughout the decade, the rate of increase in the fertility inhibiting effect of contraception seems to have slowed down substantially after 1993/94.

The contraception effect operates through two dimensions—one through increasing the contraception use rate, viz., protecting more women through contraception and other one through increasing the contraception use-effectiveness (u). Since contraceptive use-effective has been kept constant in estimating Cc for 1996/97 and 1999/2000, the evident increase in fertility inhibiting effect of contraceptive was due to increase in contraception usage only. According to recent surveys (BFS and BDHS), the contraceptive usage in the country had increased by 23 percentage points (30.8 to 53.8) during 1989-99 decade. Of this 14 percentage points or more than 60 percent of the total increase took place during initial four years of 1989-1993/94 and remaining 9 percentage points or 40 percent increase took place in remaining 6 years after 1993/94 (Table A.8). The main reason of slowing down in the contraceptive effect after 1993/94 has been slow increase in contraceptive usage.

There were other unfavorable developments in the second half of 1990s. During this period, Ci, measuring the effect of lactational infecundability, increasingly had countervailing effect in shortening
the postpartum amenorrhea period. This was estimated 11.9 month in 1989, declined marginally to 11.8 month in 1993/94, but did so visibly after that; the estimated duration in 1996/97 was 10.9 month and 9.5 month in 1999/2000 (Table A.6). This development is likely to have neutralized part of the depressing effect rendered by marriage and contraception use, viz., by Cm and Cc. Indeed, as the estimates suggest, the fertility inhibiting effect of Ci declined by about 16 percent during 1989-99 period. Of this decline, 84 percent took place after 1993/94 with 61 percent occurring after 1996/97 (Table V).

<table>
<thead>
<tr>
<th>Period</th>
<th>Cm</th>
<th>Cc</th>
<th>Ci</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute change</td>
<td>.235</td>
<td>.287</td>
<td>.342</td>
</tr>
<tr>
<td>1989 (BFS)</td>
<td>.246</td>
<td>.420</td>
<td>.333</td>
</tr>
<tr>
<td>1993/94 (BDHS)</td>
<td>.257</td>
<td>.462</td>
<td>.320</td>
</tr>
<tr>
<td>1996/97 (BDHS)</td>
<td>.274</td>
<td>.495</td>
<td>.286</td>
</tr>
<tr>
<td>Percent change</td>
<td>16.6 (100.0)%</td>
<td>72.5 (100.0)%</td>
<td>-16.4 (100.0)%</td>
</tr>
<tr>
<td>1989-99</td>
<td>4.7 (28.3)%</td>
<td>46.3 (63.9)%</td>
<td>-2.6 (15.9)%</td>
</tr>
<tr>
<td>1993/94-</td>
<td>11.9 (71.2)%</td>
<td>26.1 (36.1)%</td>
<td>-14.1 (84.1)%</td>
</tr>
<tr>
<td>1999/2000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1993/94- 1996/97</td>
<td>4.7 (24.3)%</td>
<td>14.6 (20.1)%</td>
<td>-3.8 (23.2)%</td>
</tr>
<tr>
<td>1996/97-</td>
<td>7.2 (43.4)%</td>
<td>11.5 (16.0)%</td>
<td>-9.9 (60.9)%</td>
</tr>
</tbody>
</table>

**Note:** Figures in parentheses are the percentage distribution of percentage changes.

It emerges from above discussion that the slow down in the decline in fertility rate during the second half of 1990s was primarily an outcome of reduced performance of the contraception triggered by slow growth in the contraception usage, coupled with countervailing role of Ci. Although marriage may have enhanced its effect during this period, extent of such effect was too small to compensate for the loss of effects due to reduced effect of Cc and countervailing effect of Ci.
The relative roles played by different proximate determinants in determining fertility level in different periods too provide insights into the fertility change dynamics in the country during the 1990s (Table VI). The dominant depressant of fertility in 1989 was Ci or the post partum infecundability of the women. It alone was responsible for 53 percent decline in the natural fertility of the women in 1989; contraception accounted for 30 percent and marriage accounted for 17 percent. By 1999/2000 the situation changed qualitatively. The contraception took over the role of post partum infecundability, viz., it was by then the strongest depressant of fertility. It was responsible for nearly half of the decline in natural fertility; Ci accounted for 39 percent and 14 percent was due to marriage. Thus, contraception over the past decade could enhance its relative role substantially and became the dominant force for fertility decline in the country while marriage and post partum infecundability became less important (Table VI).

This brings us to the observation that contraception is likely to play the role of dominant actor for future fertility decline in the country, viz., contraception is likely to remain a major instrument to do so. Among other proximate determinants, Ci’s role, as evidenced, is unlikely to be important in future. It seems to have already reached its limit and may turn only unfavorable in future. In the given socio-economic and cultural context, which provides little alternative to marriage and childbearing for women, marriage is also unlikely to play any radical role in this regard. To note, marriage effect, as conceived in the Bongaart’s model, depends on the proportion of women married [m(a)] and not on the increase in age at marriage, which is the current policy focus. And at this stage, when marriage age is so low, it is unlikely that the increase in marriage age by few years will cause substantial decline in marital fertility [g(a)]. The rising age at marriage in the country in large part will help only to postpone births by the women and not forego them altogether. Indeed, marital fertility does not seem to have declined in the country in the years after 1996/97; rather there may have been some increase in it although marriage age too increased during the period (Tables A.7 & A.9). Again, for the given socio-cultural context, although abortion is not absent in the country, it is unlikely to emerge as a major cause to reduce fertility.
Hence, for future fertility decline, which would be necessary to achieve replacement fertility in the country, contraception is likely to offer an easily manipulable means, particularly in the short and medium term. More specifically, it will remain attractive within the stipulated time of achieving MDGs.

**TABLE VI**

**DIFFERENT FERTILITY RATES AND CONTRIBUTION OF PROXIMATE DETERMINANTS IN ACHIEVING TFR IN BANGLADESH**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fertility</strong></td>
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<td></td>
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<tr>
<td>TF</td>
<td>15.3</td>
<td>15.3</td>
<td>15.3</td>
<td>15.3</td>
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<td>TN</td>
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<td>10.2</td>
<td>10.4</td>
<td>10.9</td>
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<tr>
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<td>4.5</td>
<td>4.2</td>
<td>4.0</td>
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<tr>
<td><strong>Proximate Determinants</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ci</td>
<td>5.2</td>
<td>5.1</td>
<td>4.9</td>
<td>4.4</td>
</tr>
<tr>
<td>Cc</td>
<td>2.9</td>
<td>4.3</td>
<td>4.8</td>
<td>5.4</td>
</tr>
<tr>
<td>Cm</td>
<td>1.7</td>
<td>1.5</td>
<td>1.4</td>
<td>1.5</td>
</tr>
<tr>
<td>Ci,Cc,Cm,</td>
<td>9.8</td>
<td>10.86</td>
<td>11.14</td>
<td>11.30</td>
</tr>
</tbody>
</table>
% of total reduction due to a particular proximate determinants
| Ci       | 53.1 | 47.0    | 44.0    | 38.9      |
| Cc       | 29.6 | 39.6    | 43.1    | 47.6      |
| Cm       | 17.3 | 13.4    | 12.9    | 13.5      |
| Ci,Cc,Cm,| 100.0| 100.0   | 100.0   | 100.0     |

TF= total fecundity rate; TN=TF x Ci; TM= TN x Cc x Ca; TFR= TM x Cm.

Now, the question remains whether further increase in contraception use extending up to 70 or 72 percent, required to reach replacement level fertility, is possible under the given socio-economic and cultural context? Several available evidences suggest some possibility in this regard. According to BDHS of 1999/2000, 15 percent of the couples still have unmet need for family planning, 13.5 percent births are unwanted and another 19 percent mis-timed. If the women’s unmet need for family planning can be satisfied through appropriate policy measures or program interventions, a contraception use rate close to that level seems
The motivation to use contraception is already there in the society; this has to be translated into practice or behavior through careful design of the program.

There may arise yet another question, viz., who are these women with unmet needs for family planning and end up with unwanted and/or mistimed births? Do they represent particular section of women or women residing in particular geographical areas? Answers to these questions require detailed analysis of the data. Nevertheless, available evidence suggests that women from disadvantaged sections may be the ones who need to be targeted. Recent observations suggest that the fertility of the poor women, particularly that of the poorest ones, has increased somewhat over the years of 1990s although non-poor could record some decline in fertility (Table A.10).

VI. CONCLUDING REMARKS

The present exercise applying three indirect estimation techniques on population censuses and national level sample survey data came out with the observation that the fertility in Bangladesh did not stop declining during the second half of 1990s. As in the first half, it did decline in the second half too, but did so at a much slower rate than the early 1990s. This is confirmed separately by all three techniques applied. Thus, BDHS claim of unchanging fertility in the country in the second half of 1990s, particularly after 1993/94, does not appear to hold ground.

It is further observed from the present exercise that the BDH studies have underestimated the fertility level of the country’s women in all three surveys conducted in the 1990s. They underestimated the TFR by 24 percent in 1993/94, by 21 percent in 1996/97 and by 17 percent in 1999/2000.

The above two observations bear a clear message for the policy makers and planners that there is need for some rethinking about this newly introduced practice of assessing fertility level and trends from the directly observed estimates based on sample surveys. Indeed, given the socio-cultural condition of our country where

11 Contraception use rate in 1999/2000 was 54 percent; an addition of another 15 percent representing unmet needs would produce a use rate of 69 percent.
large population are illiterate or semi-literate, nearly half of the population live below the poverty line and given the conditions in which data are collected, it is advisable to undertake some evaluation/re-evaluation or validation of the data/results obtained through surveys before being accepted as true or reasonable reflection of the reality. As the present study suggests, not only that there seems no convincing reason for adopting this new practice, but it also runs the risk of misleading others using these rates for various purposes.

It may be mentioned that incorrect assessment of fertility level and trend has far reaching implications for country’s population projections and subsequently, for development planning and policy. It may lead to distortion in the population projection, hence produce wrong assessment of the ultimate population size that the country would require to support in future, may produce distorted age structure upon which many sectoral plans depend and even mislead the direction and program package for the family planning.

Second, present analysis of fertility change dynamics in the country over the past decade revealed that the reduced rate of fertility decline in the second half of 1990s was an outcome primarily of reduced performance of contraception (Cc), which was aided by countervailing effect of post partum infecundability caused by shortening of the post partum amenorrhoea. Marriage could enhance its role only by a small degree which was much less sufficient to compensate for the reduced effect of contraception and countervailing effect of post-partum infecundability.

Above observation, in combination with the fact that contraception had been an important proximate determinant of fertility assuming the most dominant role as a depressant of natural fertility during the 1990s, tends to suggest that contraception will have to be relied upon for future fertility decline in the country. Given the country’s socio-economic and cultural context, this is indeed the only manipulable instrument in the short and medium term to achieve fertility target within the stipulated time of 2015 (MOHFW 2004). Family planning program, thus, demands more serious attention, increased emphasis and renewed invigoration. Any failure on this front may remain uncompensated for, leaving the fertility target an unfinished agenda.
REFERENCES


Kabir and Chowdhury 2004: M. Kabir and Abdullah AL Mamun Chowdhury, “Plateauing Fertility in Bangladesh: Correlates and Proximate Determinants”, in Ubaidur Rob et al. (ed.) Fertility Transition in Bangladesh: Evidence and Implication, UNFPA, Dhaka


Appendix

**TABLE A.1**
DIRECT ESTIMATES OF TFR AS OBTAINED BY VARIOUS NATIONAL LEVEL SAMPLE SURVEYS

<table>
<thead>
<tr>
<th>Year</th>
<th>Surveys</th>
<th>TFR estimates</th>
<th>Direct</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>BRSFM</td>
<td>4.8</td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>BFS</td>
<td>5.4</td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>CPS</td>
<td>4.9</td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>CPS</td>
<td>4.6</td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>CPS</td>
<td>4.9</td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>BFS</td>
<td>4.6</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>CPS</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>1993/94</td>
<td>BDHS</td>
<td>3.4</td>
<td></td>
</tr>
<tr>
<td>1996/97</td>
<td>BDHS</td>
<td>3.3</td>
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</tr>
<tr>
<td>1999/2000</td>
<td>BDHS</td>
<td>3.3</td>
<td></td>
</tr>
</tbody>
</table>

*Source:* Reports for all these studies

BRSFM=Bangladesh Retrospective Survey of Fertility and Mortality, BFS=Bangladesh Fertility Survey, CPS=Contraceptive Prevalence Survey, BDHS=Bangladesh Demographic and Health Survey.

**TABLE A.2**
TFR ESTIMATES USED BY VARIOUS AUTHORS IN TRACING THE FERTILITY TREND

<table>
<thead>
<tr>
<th>Source</th>
<th>Year</th>
<th>Mabud @</th>
<th>Shahadat &amp; others #</th>
<th>Rabbani et. al *</th>
<th>BDHS (1999-00)**</th>
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<tbody>
<tr>
<td>DSEP</td>
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<td></td>
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<td></td>
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<tr>
<td>CRL</td>
<td>1966</td>
<td></td>
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</tr>
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<td>CRL</td>
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<td></td>
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</tr>
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</tr>
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<td>7.08 $</td>
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<tr>
<td>Source</td>
<td>Year</td>
<td>Mabud @</td>
<td>Shahadat &amp; others #</td>
<td>Rabbani et. al *</td>
<td>BDHS (1999-00)**</td>
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<td>---------</td>
<td>---------</td>
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<td>6.3 $</td>
<td>6.34 $</td>
<td>6.3 $</td>
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</table>

$ refer to the estimates obtained through indirect estimation technique
@ Mabud M.A, 1987;
# Hossain Shahadat & other, 1991;
* Rabbani, AKMA Ghulam and Shahadat Hossain, 1984;
** NIPORT et. al. 2001.
### TABLE A.3
**METHODS SPECIFIC USE-EFFECTIVENESS OF CONTRACEPTION**

<table>
<thead>
<tr>
<th>Method</th>
<th>BDHS 1993/94</th>
<th>Matlab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pill</td>
<td>0.96</td>
<td>0.74</td>
</tr>
<tr>
<td>IUD</td>
<td>0.99</td>
<td>0.92</td>
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<tr>
<td>Injectables</td>
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<td>0.99</td>
</tr>
<tr>
<td>Condom</td>
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<td>0.57</td>
</tr>
<tr>
<td>Sterilization</td>
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<td>1.00</td>
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<tr>
<td>Periodic Abstinence</td>
<td>0.81</td>
<td>0.70</td>
</tr>
<tr>
<td>Withdrawal</td>
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<td>0.70</td>
</tr>
<tr>
<td>Others</td>
<td>0.63</td>
<td>0.70</td>
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</tbody>
</table>

**Source:** Islam MM, Mamun AA, and Bairagi R, 1996.

### TABLE A.4
**ESTIMATED AVERAGE CONTRACEPTION USE-EFFECTIVENESS**

<table>
<thead>
<tr>
<th>Period</th>
<th>Using BDHS (1993/94) information</th>
<th>Using Matlab information</th>
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<tbody>
<tr>
<td>BFS 1989</td>
<td>.918 (.849)</td>
<td>.813</td>
</tr>
<tr>
<td>BDHS 1993/94</td>
<td>.935</td>
<td>.810</td>
</tr>
<tr>
<td>BDHS 1996/97</td>
<td>.918</td>
<td>.813</td>
</tr>
<tr>
<td>BDHS 1999/2000</td>
<td>.919</td>
<td>.783</td>
</tr>
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</table>

**Note:** Figure in parenthesis is estimated by BFS 1989 (Huq and Cleland 1990).

### TABLE A.5
**CONTRACEPTIVE DISCONTINUATION RATE**

<table>
<thead>
<tr>
<th>Methods</th>
<th>BDHS 1993-94</th>
<th>BDHS 1996-97</th>
<th>BDHS 1999-00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pill</td>
<td>1.7</td>
<td>2.9</td>
<td>3.0</td>
</tr>
<tr>
<td>IUD</td>
<td>0.3</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Injectables</td>
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<td>1.3</td>
</tr>
<tr>
<td>Condom</td>
<td>5.9</td>
<td>6.4</td>
<td>6.5</td>
</tr>
<tr>
<td>Periodic Abstinence</td>
<td>8.6</td>
<td>9.9</td>
<td>8.6</td>
</tr>
<tr>
<td>Withdrawal</td>
<td>8.8</td>
<td>4.8</td>
<td>9.7</td>
</tr>
<tr>
<td>Other traditional</td>
<td>16.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>methods</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3.5</td>
<td>3.8</td>
<td>4.3</td>
</tr>
</tbody>
</table>

**Source:** Survey Reports.
TABLE A.6  
**ESTIMATED DURATION OF POST PARTUM AMENORRHOEA**  
(IN MONTH)  

<table>
<thead>
<tr>
<th>Period</th>
<th>Duration (in month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>11.9</td>
</tr>
<tr>
<td>1993/94</td>
<td>11.8</td>
</tr>
<tr>
<td>1996/97</td>
<td>10.9</td>
</tr>
<tr>
<td>1999/2000</td>
<td>9.5</td>
</tr>
</tbody>
</table>

*Source:* Survey Reports.

TABLE A.7  
**MEDIAN AGE AT MARRIAGE OF THE WOMEN AND PROPORTION**  
**EVER AND CURRENTLY MARRIED IN REPRODUCTIVE AGES OF 15-49**  

<table>
<thead>
<tr>
<th>Year</th>
<th>Median age at marriage</th>
<th>% ever-married</th>
<th>% currently married</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BDHS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1993/94</td>
<td>14.4</td>
<td>84.1</td>
<td>78.4</td>
</tr>
<tr>
<td>1996/97</td>
<td>14.2</td>
<td>82.5</td>
<td>77.6</td>
</tr>
<tr>
<td>1999/2000</td>
<td>15.0</td>
<td>81.5</td>
<td>76.1</td>
</tr>
</tbody>
</table>

TABLE A.8  
**CURRENT CONTRACEPTIVE USE RATE BY METHODS**

<table>
<thead>
<tr>
<th>Methods</th>
<th>BFS 1989</th>
<th>BDHS 1993/94</th>
<th>BDHS 1996/97</th>
<th>BDHS 1999/00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pill</td>
<td>9.6</td>
<td>17.4</td>
<td>20.8</td>
<td>23.0</td>
</tr>
<tr>
<td>IUD</td>
<td>1.4</td>
<td>2.2</td>
<td>1.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Injectables</td>
<td>0.6</td>
<td>4.5</td>
<td>6.2</td>
<td>7.2</td>
</tr>
<tr>
<td>Condom</td>
<td>1.8</td>
<td>3.0</td>
<td>3.9</td>
<td>4.3</td>
</tr>
<tr>
<td>Sterilization (male/female)</td>
<td>9.7</td>
<td>9.2</td>
<td>8.7</td>
<td>7.2</td>
</tr>
<tr>
<td><strong>All modern methods</strong></td>
<td><strong>23.1</strong></td>
<td><strong>36.3</strong></td>
<td><strong>41.4</strong></td>
<td><strong>42.9</strong></td>
</tr>
<tr>
<td>Periodic Abstinence</td>
<td>4.0</td>
<td>4.8</td>
<td>5.0</td>
<td>5.4</td>
</tr>
<tr>
<td>Withdrawal</td>
<td>1.8</td>
<td>2.5</td>
<td>1.9</td>
<td>4.0</td>
</tr>
<tr>
<td>Other Traditional Methods</td>
<td>1.9</td>
<td>1.1</td>
<td>0.8</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>All traditional methods</strong></td>
<td><strong>7.7</strong></td>
<td><strong>8.4</strong></td>
<td><strong>7.7</strong></td>
<td><strong>10.3</strong></td>
</tr>
<tr>
<td>Overall Use Rate (any method)</td>
<td>30.8</td>
<td>44.6</td>
<td>49.2</td>
<td>53.8</td>
</tr>
</tbody>
</table>

*Source:* Survey Reports.
### Table A.9
**Marital Fertility of the Women by Age Group**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td></td>
<td>.2935</td>
<td>.3043</td>
<td>.3090</td>
</tr>
<tr>
<td>20-24</td>
<td></td>
<td>.2317</td>
<td>.2421</td>
<td>.2416</td>
</tr>
<tr>
<td>25-29</td>
<td></td>
<td>.1701</td>
<td>.1632</td>
<td>.1811</td>
</tr>
<tr>
<td>30+</td>
<td></td>
<td>.2200</td>
<td>.1883</td>
<td>.1885</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>.9153</td>
<td>.8979</td>
<td>.9202</td>
</tr>
<tr>
<td>TM</td>
<td></td>
<td>4.58</td>
<td>4.49</td>
<td>4.61</td>
</tr>
</tbody>
</table>

### Table A.10
**Trends in TFR by Economic Strata**

<table>
<thead>
<tr>
<th>Year</th>
<th>1 (Poor)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 (Rich)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>3.8</td>
<td>3.6</td>
<td>3.6</td>
<td>3.3</td>
<td>2.9</td>
</tr>
<tr>
<td>1996</td>
<td>3.6</td>
<td>3.7</td>
<td>3.4</td>
<td>3.3</td>
<td>2.5</td>
</tr>
<tr>
<td>2000</td>
<td>4.1</td>
<td>3.5</td>
<td>3.3</td>
<td>2.9</td>
<td>2.5</td>
</tr>
<tr>
<td>2001</td>
<td>4.2</td>
<td>3.7</td>
<td>3.2</td>
<td>2.9</td>
<td>2.4</td>
</tr>
</tbody>
</table>