# Achieving Replacement Level Fertility in Bangladesh: Challenges and Prospects

## 1. Background

Bangladesh has been passing through a critical phase of fertility transition. The level of fertility started to decline since mid-seventies. The decline occurred at a rapid pace during the period 1975 to 1993/94. The total fertility rate was 6.3 in 1975 and decreased to 3.4 in 1993/94. However, since 1993/94, the level of total fertility appears to be unchanged at a level of 3.3, as observed from the BDHS 1996/97 and 1999/2000 results. However, during the period 1993/94 – 1999/2000, the contraceptive prevalence rate has increased substantially from 44.6 per cent to 53.8 per cent. The unchanged level of fertility despite a rapid increase in the level of contraceptive prevalence during the past 6 years, while the level of fertility still remains well above the level of replacement fertility, raised several questions: *Does this indicate plateauing of the level of fertility? Is it consistent with the increased level of contraceptive prevalence rate during the same period? Is there any other factor associated with the level of fertility? Is it consistent with other measures of fertility? Is it attributable to the beginning of population momentum?* This paper makes an attempt to address these issues of major concern to the policy makers and researchers.

The steep decline in fertility since 1975 has corresponded with the rise in Contraceptive Prevalence Rate (CPR) up to 1993-94 in Bangladesh. Using the relationship between Total Fertility Rate (TFR) and CPR during this period to predict future fertility, researchers argued that a replacement level of fertility could be attained in Bangladesh by raising the CPR at a level of 70 per cent. However, results of the last two BDHS in 1996/97 and 1999/2000 demonstrated that despite increase in CPR over the period 1994-2000, the TFR has remained at the same level of 1993/94 (Mitra *et al*. 2000). Even in Matlab experimental area (a research station of ICDDR,B), which boast of its intensive Family Planning (FP) service delivery system resulting in a sharp increase in the level of the CPR to 70 per cent, the TFR had remained at the vicinity of 3 births for the last several years (Bairagi 2001). This raises concern among researchers, policy makers and programme managers about the prospect of attaining replacement level of fertility in Bangladesh in the near future.

Cleland *et al*. (1994) stated that the past decline in the level of fertility was mainly attributed to a strong family planning programme in the absence of any remarkable change in the socio-economic status in a fundamentally traditional and impoverished society. Recently, Caldwell *et al.* (1999) and Das Gupta and Narayana (1997) questioned the validity of such remarks. Caldwell et al. questioned Cleland *et al*.'s view that almost complete dominance of family planning programmes contributed to the decline in the level of fertility. They insisted that the change in other sectors of the society and economy were also remarkable. According to Das Gupta and Narayana, the sharp decline in the level of fertility is not that steep as evident from the Demographic and Health Surveys and these are largely underestimated. They referred to Sample Registration System (SRS) estimate of higher than 4.2 for the year 1992 instead of 3.4 obtained by the BDHS 1993/94. Another point that needs to be noted carefully that the TFRs estimated from the BDHS data refer to a reference period of three years prior to the date

of survey and that might be affected by backward displacement of births, leading to overestimation of past fertility and underestimation of recent fertility. In Indonesia, under similar conditions, three-fourths of the decline of the fertility decline were resulted from increased contraceptive use, but was induced primarily through economic development and improved education and economic opportunities for females (Gertler and Molyneaux 1994).

Another disturbing element in the level of fertility, as mentioned by Freedman *et al*. (1994) and Bongaarts and Feeney (1998), is that births either postponed by marrying later or births occurring either earlier or later than the previous cohorts can make the conventional TFR misleading. Bongaarts and Feeney showed that the conventional TFR is comprised of two components attributable to *quantum* and *tempo* effects. It has been observed that delayed marriage can play an important role in reducing the level of fertility through reduction of childbearing span. However, the level of fertility appears to be a function of not only age at marriage, and hence of age at first birth, but on interval between subsequent births as well. It has been shown by Bongaarts and Feeney (1998) that upward or downward shift in age at childbirth for each birth order can distort the measure of fertility level, TFR, to a great extent, and thus the *quantum* effect cannot be estimated properly due to distortion caused by *tempo* effect (change in mean age at births for each parity). This paper examines critically the role of *quantum* and *tempo* effects on the level of fertility.

To improve our understanding of the causes of fertility decline in Bangladesh during early 1990s and then its stabilization, it is important to analyze the role of the proximate determinants in fertility transition in Bangladesh. This understanding is important, because it may indicate ways in which the national population programme could be made even more effective. This study critically examines the fertility change in Bangladesh through a systematic analysis of its proximate determinants. An attempt is made to explore the relative importance of the effect of different proximate determinants on fertility in Bangladesh, and their changing role on fertility decline and then stabilization.

Another important issue of major concern is to examine the role of fertility, mortality and population momentum in the future growth of population. This will provide us with a specific guideline to determine the trend of relative impact of these factors in exploring the growth of future population. The role of fertility in the pre-momentum and momentum phases of population growth can provide useful insights about the role of current status of fertility. It may be mentioned here that the gradual shift of young age structure towards the childbearing period will result in an unprecedented growth in the size of population in the future. This population will continue to increase rapidly even after attainment of the replacement level fertility. The effect of momentum can be reduced and the level of fertility can be decreased substantially by delaying age at marriage as well as by widening the space between consecutive births (Bongaarts 1996). A close examination of the role of these factors can provide useful indications about the future pattern of fertility decline.

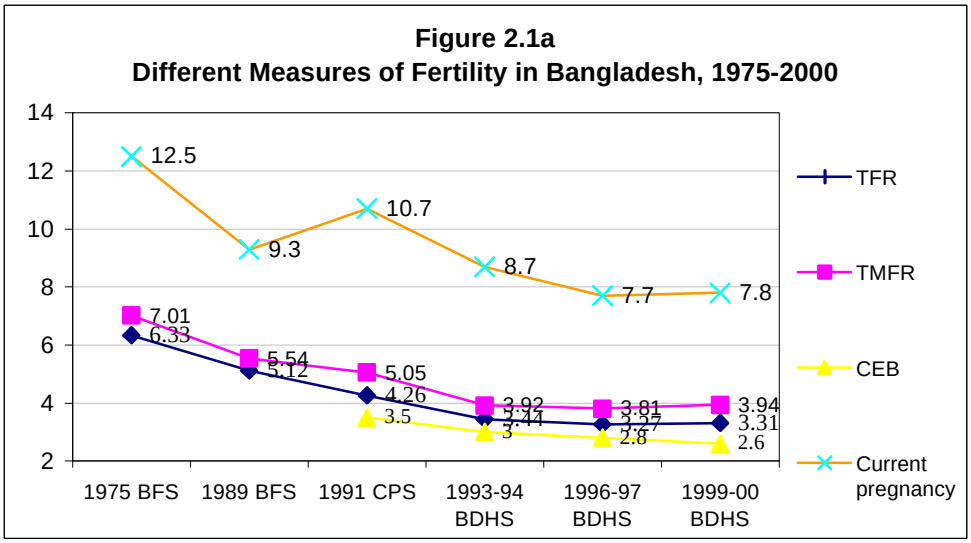
In our analysis, we have considered the factors affecting the fertility directly or indirectly. Among the direct factors, we have considered marriage, contraception and postpartum infecundity. Among the indirect factors, we have employed some selected socio-economic and demographic factors. Among the socio-economic factors we have

included place of residence (urban/rural) and level of education of mothers. The demographic factors are: birth interval, age at marriage, parity, survival status of the index child and sex composition of the children. In addition, regional differentials are performed in order to highlight the differences in the level of fertility in different regions of Bangladesh.

## 2. An Overview of Fertility and Fertility Regulation and Formulation of Hypothesis

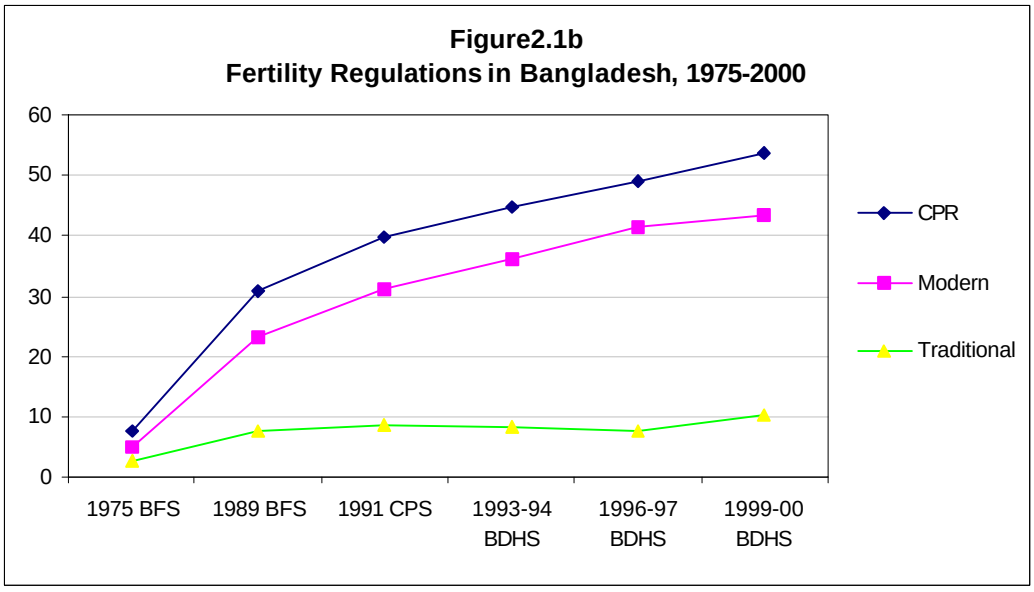
In this section, different measures of fertility and fertility regulation are reviewed to pinpoint the objectives and hypothesis of the study. Figure 2.1a shows that the total fertility rate declined from 5.12 in 1989 to 3.44 in 1993/94 and remained constant thereafter. The total marital fertility rate showed a steady decline from 5.54 in 1989 to 3.81 in 1996/97. However, the rate appears to have increased to 3.94 in 1999/2000. The mean number of children ever born indicates a steady decline from 3.5 in 1991 to 2.6 in 1999/2000. The pattern observed in the current pregnancy shows a trend similar to that of the total marital fertility rate (Figure 2.1c). In other words, the current pregnancy declined steadily from 10.7 per cent in 1991 to 7.7 per cent in 1996/97 and thereafter a small increase to 7.8 per cent is evident in 1999/2000. It is noteworthy that the current pregnancy displays an increasing trend during 1996-99 for the younger age groups, 15-19 and 20-24, but declining trend is observed for age groups 25 and above.

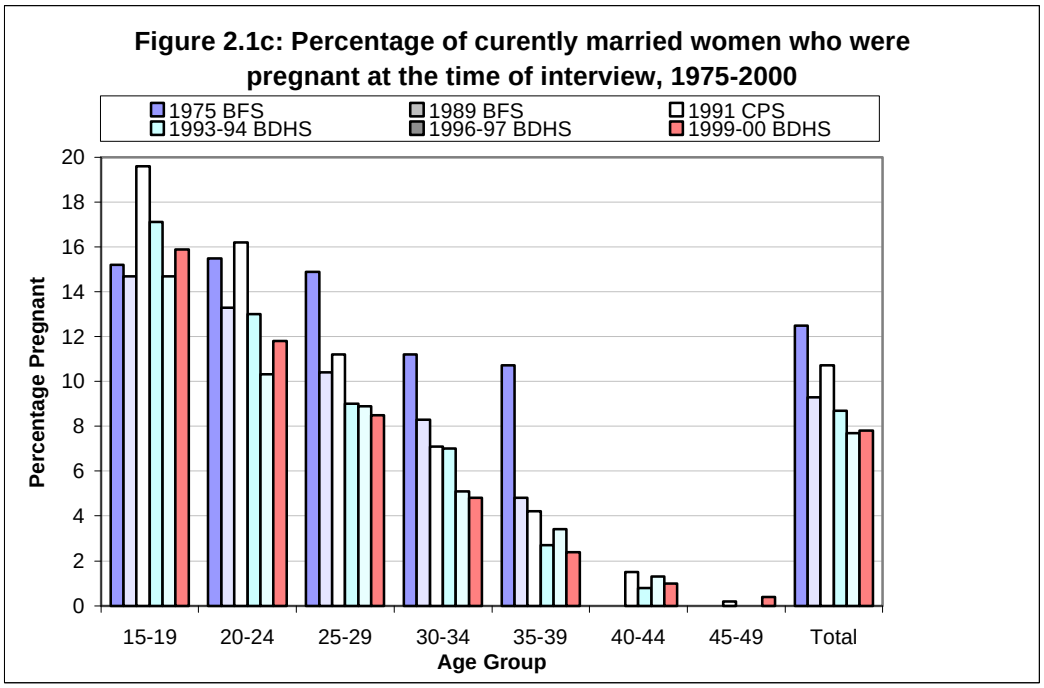
**Figure 2.1a**
**Different Measures of Fertility in Bangladesh, 1975-2000**




The contraceptive prevalence rate, on the other hand, shows a steady increase from 30.8 per cent in 1991 to 53.8 per cent in 1999/2000 (Figure 2.1b). During a time span of only 8 years, such a rapid increase in the level of CPR is an outstanding performance. It is important to note that the decline has not ceased during the period 1993/94 – 1999/2000. However, it is clearly evident from the performance of CPR for the periods 1989 – 1996/97 and 1996/97 – 1999/2000, that the prevalence of modern methods has increased rapidly from 23.2 per cent in 1989 – 41.6 per cent in 1996/97. But, it is noteworthy that as compared to an increase in the use of modern methods from 36.2 per cent in 1993/94 – 41.6 per cent in 1996/97, the increase in the use of modern methods has dropped sharply during 1997-99 period. On the other hand, the prevalence of traditional methods has

increased sharply during 1997-99. This indicates a qualitative change in the composition of use of contraception favouring a relatively less efficient composition in 1999/2000 as compared to that of 1996/97.




## Fertility Change

An examination of the fertility transition in Bangladesh by observing time series estimates of TFR over the last 25 years, beginning with the 1975 BFS, indicates a decline of 48 per cent in TFR, a decline of 1.9 per cent per year (Table 2.1). The pace of decline

was steeper during the late 1980s to early 1990s, and since then it has remained almost constant. For example, within a period of five years, starting from 1989 to 1993/94, fertility has declined by 33 per cent or 6.6 per cent per year, while for the next six years period (1993/94 – 1999/00), it is only 3.8 per cent or less than 1.0 per cent (0.63%) per year.

The analysis of the fertility rates by age cohort shows that starting from 1975 to 1993/94 fertility declined steadily in 1993/94 in all age groups with the exception of age groups 15-19. The age-specific fertility rates in 1999/00 also shows decline in all age groups since 1993/94, except ages 15-19 and 25-29 (Table 2.1). The decline is more steeper among women aged 35 and above. This indicates that there is a shift in fertility towards younger age groups in recent years and fertility has declined substantially among older age groups. The shift in timing in fertility is evident from a fall in the mean age at childbearing of 29.8 years in 1975 to 25.8 years in 1999/2000.

**Table 2.1**
**Changes in Age Specific and Total Fertility Rates, Bangladesh, 1975 to 1999/2000**

| | Fertility Rates | | | | | Percentage Change | | |
|---|---|---|---|---|---|---|---|---|
| Age group | 1975 BFS | 1989 BFS | 1993/94 BDHS | 1996/97 BDHS | 1999/00 BDHS | 1975 - 1993/94 | 1993/94 - 1996/67 | 1975 - 1999/00 |
| 15-19 | 109 | 182 | 140 | 147 | 144 | + 28.4 | + 2.8 | + 32.1 |
| 20-24 | 289 | 260 | 196 | 192 | 188 | - 32.2 | - 4.1 | - 34.9 |
| 25-29 | 291 | 225 | 158 | 150 | 165 | - 45.7 | + 4.4 | - 43.3 |
| 30-34 | 250 | 169 | 105 | 96 | 99 | - 58.0 | - 5.7 | - 60.4 |
| 35-39 | 185 | 114 | 56 | 44 | 44 | - 69.7 | -21.4 | - 76.2 |
| 40-44 | 107 | 56 | 19 | 18 | 18 | - 82.2 | - 5.3 | - 83.2 |
| 45-49 | 35 | 18 | 14 | 6 | 3 | - 60.0 | -78.5 | - 91.4 |
| TFR | 6.33 | 5.12 | 3.44 | 3.27 | 3.31 | - 45.7 | - 3.8 | - 47.7 |
| **Mean Age at Child Bearing** | | | | | | | | |
| | 29.78 | 27.56 | 26.44 | 25.78 | 25.81 | | | |

Table 2.2 shows that during late 1980s to early 1990s all the divisions in Bangladesh experienced more or less uniform decline in fertility. Even in Chittagong division having highest fertility in the mid-1980s, which is still continuing, the rate of decline was almost identical in magnitude as compared to that of the other divisions. However, since 1993/94 the decline in fertility is not uniform across the regions. During the period 1993/94 – 1996/97, Chittagong division shows increase in fertility level by about 3 per cent, while all other divisions show some decline in fertility. The magnitude of decline was higher in Khulna (17.4%) followed by Rajshahi (8.3%), Dhaka (7.8%) and Barisal (4.6%). On the other hand, during the period 1996/97 to 1999/00 fertility has increased in low fertility regions Khulna and Rajshahi and also in Dhaka, but declined in Barisal and Sylhet. Overall, during the period 1993/94 – 1999/00 the declining in fertility is observed in all the regions, except Chittagong.

**Table 2.2**
**Trends in Total Fertility Rate by Division, and Per cent Change for the Period 1989 - 1999/2000, Bangladesh**

| Division | Total Fertility Rate | | | | Percentage change in TFR | | | |
|---|---|---|---|---|---|---|---|---|
| | 1989 BFS | 1993/94 BDHS | 1996/97 BDHS | 1999/00 BDHS | 1989 - 1993/94 | 1993/94- 1996/97 | 1996/97- 1999/00 | 1993/93- 1999/00 |
| Barisal | NA | 3.47 | 3.31 | 3.26 | NA | - 4.61 | - 1.51 | - 6.05 |
| Chittagong | 5.94* | 3.95 | 4.06 | 3.96 | -33.50 | +2.78 | - 2.46 | +0.25 |
| Dhaka | 5.18 | 3.45 | 3.18 | 3.21 | -33.40 | -7.83 | +0.94 | -6.96 |
| Khulna | 4.71* | 3.05 | 2.52 | 2.70 | -35.24 | -17.38 | +7.14 | -11.48 |
| Rajshahi | 4.60 | 3.03 | 2.78 | 3.02 | -34.13 | - 8.25 | +8.63 | - 0.33 |
| Sylhet | NA | NA | 4.20 | 4.08 | NA | NA | - 2.86 | NA |
| **Bangladesh** | **5.12** | **3.44** | **3.27** | **3.31** | **-32.81** | **- 4.94** | **+1.22** | **-3.78** |

**Note:** NA=Not available, *Chittagong and Sylhet division combined, **Khulna and Barisal division is combined.

Cohort analysis of cumulative numbers of children ever born shows a consistent pattern of declining trend in fertility in Bangladesh. The overall standardised mean changes from 3.8 births in 1975 to 2.6 births in 1999/00, a fall of 32 per cent (Table 2.3). The cumulative fertility of successive birth cohorts declined in all age groups between 1975 and 1999/00. The mean number of children ever born also shows that fertility fell between 1993/94 and 1999/00 in all the divisions with consistently lower number of children ever born in Khulna and Rajshahi compared to other divisions.

**Table 2.3**
**Mean Number of Children Ever Born to All Women at Different Time Points and Their Differentials by Age and Region, Bangladesh, 1975-1999**

| | 1975 BFS | 1989 BFS | 1993/94 BDHS | 1996/97 BDHS | 1999/00 BDHS |
|---|---|---|---|---|---|
| **Standard Mean*** | 3.8 | 3.1 | 3.0 | 2.8 | 2.6 |
| **Age** | | | | | |
| 15-19 | 0.6 | 0.4 | 0.3 | 0.4 | 0.4 |
| 20-24 | 2.3 | 1.7 | 1.6 | 1.5 | 1.4 |
| 25-29 | 4.2 | 3.1 | 2.9 | 2.8 | 2.6 |
| 30-34 | 5.7 | 4.7 | 4.1 | 3.9 | 3.6 |
| 35-39 | 6.7 | 5.9 | 5.2 | 4.8 | 4.3 |
| 40-44 | 7.1 | 6.6 | 6.4 | 5.6 | 5.1 |
| 45-49 | 6.7 | 7.3 | 6.9 | 6.4 | 6.1 |
| **Division** | | | | | |
| Barisal | NA | NA | 3.1 | 2.8 | 2.8 |
| Chittagong | NA | NA | 3.2 | 3.1 | 2.9 |
| Dhaka | NA | NA | 3.0 | 2.8 | 2.5 |
| Khulna | NA | NA | 2.8 | 2.6 | 2.2 |
| Rajshahi | NA | NA | 2.9 | 2.7 | 2.4 |
| Sylhet | NA | NA | NA | 3.1 | 3.0 |

**Note**: NA = not available, * Standardized on the age distribution of the 1999/2000 BDHS.

**Formulation of Hypothesis**

The results presented in Tables 2.1-2.3 and Figures 2.1a-2.1c can be helpful in formulating the objectives of this paper. The results indicate that there are controversies about the plateauing of the level of fertility. There are clear indications from the mean number of children ever born that the level of fertility has declined from 3 children to 2.6 children during the period 1993/94 - 1999/2000. However, both the total fertility rate and the total marital fertility rate show that the fertility has either remained constant or increased slightly. This assertion is confirmed by the unchanged current pregnancy rate among the currently married women since 1996/97. The difference between the trend of current level of fertility that depend heavily on age composition and the trend of past fertility reveals an important facet of the underlying problem. In other words, the measures we employ for current fertility, namely TFR, depends on a number of very strong assumptions. Most importantly, although TFR measures current fertility, it is comprised of two components, *quantum* and *tempo* effects. *Tempo* effect is referred to the distortion caused by change in timing of births and the *quantum* effect is defined as the TFR that would have been observed in the absence of changes in the timing of childbearing during the period in which the TFR is measured (Bongaarts and Feeney 1998). Hence, the TFR, without being distorted by *tempo* effect, is seldom found, particularly in a country like Bangladesh where the population is going through a rapid transition in fertility. Hence, the acceleration in the process of transition in fertility brings about a rapid change in the age-sex composition as well. It is clearly evident that there is a *tempo* effect attributable to shift in the age at childbearing. Hence, the traditional measure of TFR can not address this problem due to underlying assumptions. The traditional measure of TFR is a function of both *quantum* and *tempo* effects, depends on both the average number of children ever born to women in a cohort and timing of births by age of mother within the cohort (Bongaarts and Feeney 1998). If there is no effect of *tempo* component (mother's mean age at childbearing), then there is no difference between period measure, TFR, and cohort measure, completed fertility rate (CFR). The TFR shows a decline if there is a rise in the mean age at childbirth in successive cohorts and, conversely, the TFR shows an increase if there is a decline in the mean age at childbirth in successive cohorts.

Within Bangladesh, different regions showed different degree of achievements in reducing the level of fertility. These differences are analysed in this paper in order to provide insights to the overall status of fertility and it's consequences to the future growth of population. The analysis of fertility decline in Khulna and Rajshahi reveals some important research questions. The number of children ever born declined steadily but the total fertility rate showed an upward trend during the recent past in Rajshahi and Khulna divisions. This indicates that there might be a problem with the interpretation of the total fertility rate which involves both cohort and period components. The potential level of fertility, free from any disturbance caused by change in extent and direction of cohort or period components, during the recent past can reveal the factors underlying such change. Another possible hypothesis is that as the fertility level approaches replacement level fertility, the role of child mortality becomes increasingly important.

The level of fertility depends also on age at marriage, age at first birth and birth spacing. It has been indicated by Bongaarts (1998) that the inevitable impact of the population momentum can be reduced to some extent by delaying age at marriage and age at childbirth as well as by widening the space of successive births. The pre-momentum status of fertility in respect of these underlying factors are also analysed in this paper.

The parity progression and it's determinants are analysed to show the potential changes in the level of fertility in terms of the pattern of impact of the underlying socio-economic and demographic factors. It may be mentioned here that progression from first to second birth as well as progression from second to third birth have important bearing on the level of fertility. These have important policy implications in order to suggest feasible policy guidelines to determine the current status of fertility as well as to identify the extent of impact on the future growth of population.

The role of population momentum in Bangladesh has been examined in the past (Islam 2000; Streatfield 2000). They showed how the young age structure of the population of Bangladesh will cause rapid increase in the growth of population even if the fertility level reaches the replacement level. Until the population composition is stabilized, the growth of population will continue at a very rapid pace. The impact of young age structure in the process of fertility transition has been examined by Bongaarts and Bulatao (1999). The relative contribution of the different components of population growth, including the role of young age structure, can reveal the possible timing of the dominance of fertility in the overall growth of population in Bangladesh. This problem is addressed for the setting of Bangladesh in this paper. This analysis will help us in relative terms to examine the future prospects of the decline in the level of fertility as compared to the components of immigration, mortality and population momentum. The hypothesis we want to examine in this connection is that until certain time period in the future, the fertility component will continue to dominate the growth of population.

## 3. Regional Differentials

The fertility decline in Bangladesh has not been uniform in different regions. It is evident that the fertility level has declined rapidly in Khulna and Rajshahi divisions. On the other hand, Sylhet and Chittagong divisions are lagging behind. The performance is average in Dhaka and Barisal divisions. This section analyses the regional differentials in order to reveal the factors associated with the difference in the level of fertility in different regions of Bangladesh.

Table 3.1 shows that the TFR increased in Khulna and Rajshahi from 2.5 and 2.8 to 2.7 and 3.0, respectively during 1996-1999 while it declined from 4.2 to 4.1 in Sylhet. It is quite surprising that the fertility increased while the level of fertility is approaching towards the replacement level in the regions that are the leaders in the success of family planning and fertility in Bangladesh. The contraceptive prevalence rates in these regions either remained same (Rajshahi) or increased only slightly (Khulna). Similarly, prevalence of modern methods remained same in these regions, during 1996-99. The mean number of children ever born indicates an opposite view. The mean number of children declined in all the divisions, except Barisal, during 1996-99. Hence, this raises an obvious question whether the fertility is still declining or not. We have opposite views

on the basis of two different measures of the level of fertility. It is interesting to note that in the low performing regions, the fertility is still declining as indicated by both the measures, but the opposite views are stemmed from the experiences observed in the high performing areas only. These views reflect our hypothesis stated in the previous section.

Now, let us examine some other selected characteristics. It is evident that the birth interval has increased in all the divisions, but surprisingly, adolescent pregnancy increased sharply during 1996-99 in Khulna. In other words, first births are taking place in Khulna more frequently during adolescence, although it is quite contrasting that Khulna has the largest interval between two births. Median age at first birth for the adolescent girls in Khulna decreased slightly from that of 1993/94 while it has increased for other divisions. Again, a recent phenomenon in Khulna, which appears to be quite opposite to the high performance in the division, is that the sterilization regrets for mostly having one more child has increased dramatically from 8.7 per cent in 1996/97 to 23.2 per cent in 1999/2000. Hence, there is an additional problem seems to have been operating in Khulna, which could be attributed to the high neonatal, postneonatal, infant and under 5 mortality rates prevailing in Bangladesh. This could also be attributed to malfunctioning in the FP services in the 1998/99 period due to transition to Health and Population Sector Programme (HPSP).

The mean number of ideal children has remained same during the recent past but it is surprising and meaningful that the wanted fertility rate has increased in the high (Khulna and Rajshahi) and medium (Barisal and Dhaka) performing regions but remained constant in the low performing regions (Sylhet and Chittagong). In other words, the level of wanted fertility around the value of replacement level has increased recently. This is indicative of the fact that a slight reversal or offsetting effect has been taking place as the fertility is approaching the replacement level. Can this be attributed to a response to the lack of socio-economic development that is required to achieve the target of replacement level? One such indicator, the prevailing high under five mortality rates in all the regions, supports this view. We observe that although there is a slight decline in the under five mortality during the recent past, the level of mortality among the children remains to be persistently high that does not favour the replacement level fertility due to high rate of child loss.

Although researchers and policymakers tipped the family planning programmes as the most important contributor to the decline in fertility in the past, it is evident from the twelve-month discontinuation rates of family planning methods that about half of the users of contraception in all the regions discontinue within twelve months. In recent years, the discontinuation rates have increased slightly in most of the regions indicating a further decline in the efficiency of the methods of contraception. In other words, the effective contraceptive prevalence rate has declined to a small extent during the recent past in all regions, except in Barisal and Chittagong. This decline in the effective contraceptive offsets the potential impact of rising contraceptive prevalence rates, at least to some extent.

**Table 3.1**
**Regional Differentials for Some Selected Characteristics**

| Characteristics | Division | | | | | |
|---|---|---|---|---|---|---|
| | Barisal | Chittagong | Dhaka | Khulna | Rajshahi | Sylhet |
| TFR | | | | | | |
| 1993/94 | - | 3.95 | 3.45 | 3.20 | 3.03 | - |
| 1996/97 | 3.31 | 4.06 | 3.18 | 2.52 | 2.78 | 4.20 |
| 1999/2000 | 3.26 | 3.96 | 3.21 | 2.70 | 3.02 | 4.08 |
| Mean CEB | | | | | | |
| 1993/94 | 3.1 | 3.2 | 3.0 | 2.8 | 2.9 | - |
| 1996/97 | 2.8 | 3.1 | 2.8 | 2.6 | 2.7 | 3.1 |
| 1999/2000 | 2.8 | 2.9 | 2.5 | 2.2 | 2.4 | 3.0 |
| **Age at First Birth (Median)** | | | | | | |
| 1993/94 | 17.7 | 18.1 | 17.6 | 17.7 | 17.3 | - |
| 1996/97 | 17.5 | 17.9 | 17.4 | 17.2 | 16.7 | 18.9 |
| 1999/2000 | 17.7 | 18.4 | 18.2 | 17.8 | 17.4 | 19.3 |
| **Birth Interval (Median)** | | | | | | |
| 1993/94 | 36.3 | 33.4 | 34.4 | 37.7 | 35.3 | - |
| 1996/97 | 36.7 | 34.4 | 37.7 | 38.8 | 38.1 | 35.1 |
| 1999/2000 | 40.6 | 36.3 | 39.6 | 45.5 | 41.4 | 34.8 |
| **Adolescent Pregnancy (%)** | | | | | | |
| 1993/94 | 33.6 | 25.1 | 33.7 | 34.9 | 41.0 | - |
| 1996/97 | 33.5 | 31.1 | 35.3 | 36.1 | 43.8 | 24.1 |
| 1999/2000 | 30.8 | 26.4 | 35.0 | 41.6 | 42.9 | 22.2 |
| CPR | | | | | | |
| 1996/97 | | | | | | |
| Any Method | 49.4 | 37.2 | 49.8 | 61.9 | 58.6 | 20.1 |
| Any Modern Method | 41.0 | 30.8 | 42.1 | 51.0 | 51.0 | 16.0 |
| % Modern | 83.0 | 82.8 | 84.5 | 82.4 | 87.0 | 79.6 |
| 1999/2000 | | | | | | |
| Any Method | 59.2 | 44.1 | 53.9 | 64.0 | 58.6 | 34.0 |
| Any Modern Method | 45.7 | 34.9 | 42.1 | 50.8 | 51.1 | 25.0 |
| % Modern | 77.2 | 79.1 | 78.1 | 79.4 | 87.2 | 73.5 |
| **Discontinuation (All Methods)** | | | | | | |
| 1996/97 | 0.52 | 0.56 | 0.50 | 0.45 | 0.43 | 0.44 |
| 1999/2000 | 0.51 | 0.51 | 0.51 | 0.46 | 0.48 | 0.53 |
| Discontinuation (Sp. Method) | | | | | | |
| 1996/97 | | | | | | |
| Condom | 0.61 | 0.67 | 0.62 | 0.63 | 0.68 | 0.48 |
| IUD | 0.30 | 0.36 | 0.51 | 0.36 | 0.41 | 0.51 |
| Injectables | 0.51 | 0.62 | 0.49 | 0.42 | 0.50 | 0.51 |
| Pill | 0.52 | 0.55 | 0.46 | 0.44 | 0.35 | 0.47 |
| PA | 0.33 | 0.56 | 0.47 | 0.30 | 0.41 | 0.18 |
| Withdrawal | 0.70 | 0.54 | 0.65 | 0.49 | 0.52 | 0.43 |
| 1999/2000 | | | | | | |
| Condom | 0.68 | 0.61 | 0.69 | 0.62 | 0.65 | 0.68 |
| IUD | 0.35 | 0.37 | 0.32 | 0.22 | 0.28 | 0.62 |
| Injectables | 0.41 | 0.50 | 0.54 | 0.49 | 0.48 | 0.60 |
| Pill | 0.50 | 0.51 | 0.47 | 0.44 | 0.43 | 0.49 |
| PA | 0.42 | 0.49 | 0.39 | 0.37 | 0.54 | 0.40 |
| Withdrawal | 0.62 | 0.44 | 0.56 | 0.38 | 0.53 | 0.75 |

(Contd.)

| Characteristics | Division | | | | | |
|---|---|---|---|---|---|---|
| | Barisal | Chittagong | Dhaka | Khulna | Rajshahi | Sylhet |
| Sterilization Regrets | | | | | | |
| 1996/97 | 10.4 | 11.6 | 9.5 | 8.7 | 10.2 | - |
| 1999/2000 | 9.5 | 7.4 | 10.0 | 23.2 | 9.5 | - |
| Median Age at First Marriage | | | | | | |
| 1993/94 | | | | | | |
| 20-49 | 14.4 | 15.0 | 14.3 | 14.1 | 13.9 | - |
| 20-24 | 15.3 | 16.0 | 15.1 | 15.6 | 14.5 | - |
| 1996/97 | | | | | | |
| 20-49 | 14.8 | 15.1 | 14.0 | 13.9 | 13.6 | 15.5 |
| 20-24 | 15.9 | 16.9 | 15.2 | 15.0 | 13.9 | 17.6 |
| 1999/2000 | | | | | | |
| 20-49 | 14.9 | 15.8 | 15.1 | 14.6 | 14.2 | 16.0 |
| 20-24 | 16.4 | 16.9 | 16.3 | 15.4 | 15.1 | 18.4 |
| Want No More Children | | | | | | |
| 1996/97 | 57.6 | 55.4 | 58.8 | 60.6 | 60.3 | 44.7 |
| 1999/2000 | 60.7 | 56.0 | 59.2 | 60.9 | 60.8 | 52.2 |
| Unmet Need | | | | | | |
| 1996/97 | | | | | | |
| For Spacing | 9.3 | 10.6 | 7.6 | 5.9 | 6.2 | 10.1 |
| For Limiting | 9.0 | 10.6 | 8.9 | 4.6 | 4.9 | 11.2 |
| Total Demand | 69.2 | 60.4 | 67.2 | 73.7 | 72.1 | 42.3 |
| % Demand | 73.6 | 64.9 | 75.4 | 85.6 | 84.5 | 49.6 |
| 1999/2000 | | | | | | |
| For Spacing | 9.0 | 9.9 | 7.6 | 5.9 | 6.9 | 12.6 |
| For Limiting | 6.3 | 9.5 | 7.9 | 4.8 | 5.9 | 9.8 |
| Total Demand | 76.0 | 65.2 | 71.3 | 76.4 | 73.1 | 57.5 |
| % Demand | 79.8 | 70.2 | 78.2 | 86.0 | 82.5 | 61.0 |
| Mean Ideal Children | | | | | | |
| 1996/97 | 2.5 | 2.8 | 2.4 | 2.3 | 2.3 | 2.9 |
| 1999/2000 | 2.5 | 2.8 | 2.4 | 2.3 | 2.5 | 3.0 |
| Wanted Fertility Rate | | | | | | |
| 1996/97 | 2.0 | 2.6 | 2.0 | 1.8 | 1.8 | 2.9 |
| 1999/2000 | 2.1 | 2.6 | 2.2 | 1.9 | 2.1 | 2.9 |
| **Infant and Child MortalityMortality** | | | | | | |
| 1996/97 | | | | | | |
| Neonatal Mortality | 53.1 | 42.0 | 52.0 | 51.8 | 64.3 | 85.2 |
| Postneonatal Mortality | 33.1 | 34.7 | 38.8 | 23.3 | 30.3 | 52.7 |
| IMR | 86.3 | 76.8 | 90.8 | 75.2 | 94.6 | 138.0 |
| Child Mortality | 36.4 | 59.0 | 43.8 | 12.5 | 34.9 | 47.8 |
| Under 5 Mortality | 119.5 | 131.3 | 130.7 | 86.8 | 126.2 | 179.1 |

(Contd.)

| Characteristics | Division | | | | | |
|---|---|---|---|---|---|---|
| | Barisal | Chittagong | Dhaka | Khulna | Rajshahi | Sylhet |
| 1999/00 | | | | | | |
| Neonatal | 47.5 | 40.8 | 51.8 | 47.1 | 49.7 | 81.7 |
| Postneonatal | 28.2 | 28.6 | 32.1 | 17.2 | 26.6 | 45.2 |
| IMR | 75.7 | 69.4 | 83.9 | 64.3 | 76.2 | 126.9 |
| Child Mortality | 35.7 | 43.6 | 34.1 | 15.7 | 26.7 | 40.1 |
| Under 5 Mortality | 108.7 | 109.9 | 115.1 | 79.1 | 100.9 | 161.9 |
| Perinatal Mortality | 39.4 | 46.9 | 55.0 | 58.1 | 63.5 | 92.3 |
| **Median Duration of Breastfeeding** | | | | | | |
| 1996/97 | 29.6 | 24.6 | 33.0 | 35.5 | 35.4 | 29.0 |
| 1999/2000 | 29.8 | 26.2 | 32.5 | 37.2 | 33.2 | 24.9 |

It is also noteworthy that the age at marriage is the lowest in the high performing regions like Khulna and Rajshahi, 14.6 years and 14.2 years, respectively. The mean age at marriage appears to be highest (16 years) in low performing region like Sylhet. However, the birth interval is the lowest in Sylhet, and it has declined in recent years with an increase in the age at marriage. In other words, there is an opposite pattern in Khulna/Rajshahi and Sylhet. With a low age at marriage and low age at first birth, the total fertility rate in Khulna/Rajshahi appears to be low but with a high age at marriage and a high age at first birth, the total fertility rate in Sylhet remains very high. The difference is made by birth interval. In Khulna/Rajshahi, women prefer longer birth intervals between two consecutive births but with a delayed age at marriage the women in Sylhet have their children in quick succession resulting in a higher total fertility rate.

One of the high performing regions, in terms of both achievements in family planning and fertility, Rajshahi demonstrated an increase in the overall twelve-month discontinuation rate which is true for Sylhet as well. Only Chittagong displays a slight improvement. In Rajshahi and Sylhet, the discontinuation of two major modern reversible methods, oral pill and injectables, show increase in the discontinuation during the recent past. In other words, the effectiveness of these methods have declined with increased level of contraceptive prevalence in the recent past. This is indicative of the fact that slight increase in the use of modern methods during the 1996-99 period could be offset by the increase in the discontinuation of most popular methods in high and low performing regions alike. This might have contributed to the plateauing of fertility to a small extent.

Another interesting point observed from Table 3.1 is that the median age at first marriage increased consistently over time, mean number of children ever born declined, mean age at first birth declined slightly during 1993-96 period but increased during 1996-99 period and birth intervals between successive births increased for all regions. In addition, mean duration of breastfeeding demonstrated decline in Dhaka, Rajshahi and Sylhet divisions during 1996-99 period. All these findings indicate that although some factors contributed to a decline in fertility but other factors played a role for offsetting the decline through contributing towards an increase in the level of fertility. Increase in mean age at marriage and birth intervals contributed to a decline but lowering mean age at childbirth and breastfeeding duration contributed to an increase in the level of fertility in

different regions of Bangladesh. Hence, we cannot make any conclusive remark on the basis of these findings. This is also evident from the estimates of wanted fertility rates that showed, surprisingly, an increase from the level of 1996/97 although the mean ideal number of children remained constant during 1996-99 period.

## 4. Role of Proximate Determinants

As human reproduction is a very complex process, it is governed by a number of biological, behavioural and cultural factors on the one hand and socio-economic and demographic factors on the other. Bongaarts (1978) termed the biological and behavioural factors as the *proximate determinants* of fertility, since they directly affect fertility; and all other social, economic and environmental factors affect fertility through these variables. If a proximate determinant – such as contraceptive use – changes, then fertility necessarily changes also (assuming the other proximate determinants remain constant), though this is not necessarily the case for socio-economic determinants. As a result, fertility differences among population and changes in fertility of a population over time can always be traced to variations in one or more of the proximate determinants.

Historical studies in fertility transition have shown that as societies begin to undergo the transformation from natural to deliberately controlled fertility, significant changes in the overall levels of total natural fertility, total marital fertility, and total fertility begin to occur (Bongaarts and Potter 1983). Such changes can be traced to one or several proximate determinants, such as an increase in contraceptive use for stopping and spacing purposes, a rise in age at first marriage, a decline in the proportion married, prolonged breastfeeding, and increased induced abortion.

Using data from 41 developed and developing nations, 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: 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 effects of the four major proximate determinants of fertility (i.e. marriage, contraception, postpartum infecundability and induced abortion) on Total Fecundity (TF), which is the maximum hypothetical fertility level in the absence of the influence of any proximate determinants, Bongaarts developed the following model:

$$TFR = C_m \times C_c \times C_i \times C_a \times TF \qquad (4.1)$$

Cm is the index of marriage which is intended to measure the effect on fertility of the proportion of women in a sexual union. The index $C_c$, measures the effect of contraception on the risk of conception. To estimate the Cc index we have used following method-specific use-effectiveness levels as suggested by Bongaarts and Potter (1983) for developing countries:

| Contraceptive Methods | Use-effectiveness |
|---|---|
| Pill | 0.90 |
| IUD | 0.95 |
| Injection | 0.99 |
| Sterilization | 1.00 |
| Others | 0.70 |

The index Ci measures the effects of postpartum amanorrhoea on fertility. The details of the estimation of the indices may be seen elsewhere (Bongarrts 1978). All these indices can only take values between 1 and 0, signifying no fertility inhibiting effects and complete fertility inhibiting effects, respectively. Due to lack of data on abortion, Ca is assumed to be 1 in this application. However, an attempt has been made to estimate the effect of induced abortion by an indirect manner. The Total Fecundity (TF) has been observed to vary from 13 to 17 births per woman, with an average of about 15.3 (Bongaarts 1982). In this application, we also assumed the TF to be 15.3.

This study provides estimates of the proximate determinants across the age groups and region of residence using the three BDHS since 1993/94. This differential analysis will help understand why the fertility level vary across the region and identify where the greatest reductive effects of each proximate determinants.

To improve our understanding of the fertility change, we critically examine the effect of the major direct determinants on fertility and their changing effects. 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**

Like in most Asian societies and Muslim communities, childbearing outside marriage is very rare in Bangladesh. Thus the age at which women marry and the proportions who remain single are potentially important factors influencing fertility levels. Figure 4.1 depicts that there is an appreciable rise in the proportion never married among women under age 25 since 1975. The most remarkable rise in the proportion of never married women has occurred in the 15-19 age group between 1975 and 1989, and after that the increase in proportion of single women becomes very slow. The proportion of single women has increased from 30 per cent in 1975 to 49 per cent in 1989 and then 52 per cent in 1999/2000. However, there is an steady increase in the proportion single among the women of age group 20-24 (Figure 4.1). The proportion single drops to less than one per cent by age 35 which indicates almost universal marriage among the female in Bangladesh.

Bangladesh has a long tradition of early marriage among the females (Maloney *et al*. 1981; Aziz and Maloney 1985) which is still prevailing. Table 4.1 shows the cohort trend in age at first marriage in Bangladesh. Overall, more than three-fourth (78 per cent) of women married by the time they were aged 18. The proportion of married by the age 18 falls steadily from the oldest to youngest age group. The proportion falls from 90 per cent for women aged 45-49 to 65 per cent for women aged 20-24. By age 20, almost 87 per cent were married and only 13 per cent were married after age 20. The 1999/2000 BDHS demonstrates higher proportion of marriage at higher ages compared to the 1993/94 BDHS. This indicates a rising age at first marriage in Bangladesh in recent years. The median age at first marriage among the women of age group 20-49 is 15 years in 1999/2000, an increase of one year since the 1996/97 BDHS. The rising trend in age at first marriage is confirmed by the higher age at first marriage among the young cohort than their older counterparts. The median age at marriage has increased from 13.8 years among the women currently aged 45-49 to 16.1 years for those aged 20-24 years.

Figure 4.1 **Trends in Proportion Never Married Among Women Ages 15-19 and 20-24, Bangladesh 1961-2000**

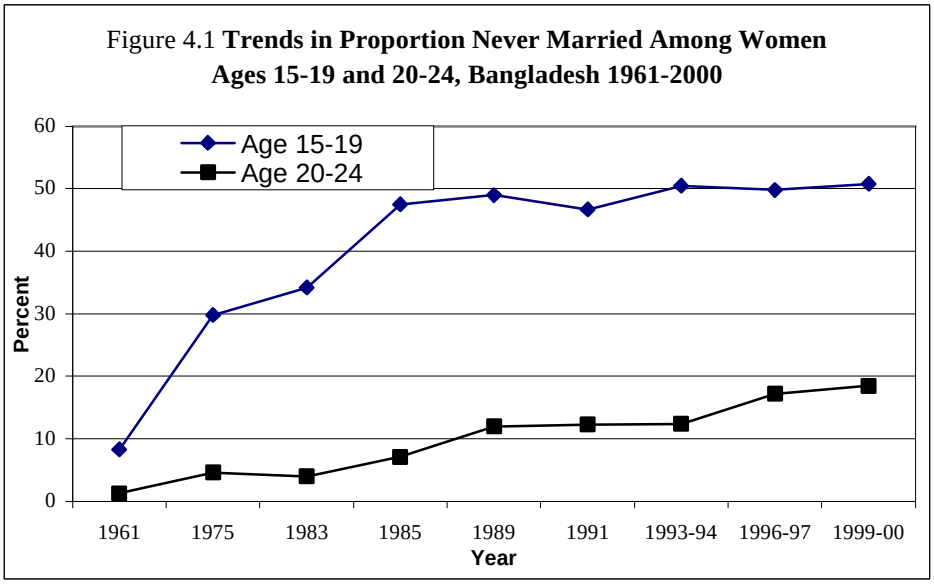



Table 4.1
**Percentage of Women Who Were First Married by Exact Ages and Median Age at First Marriage by Current Age, Bangladesh, 1999/2000**

| Current Age | Percentage Who Were Married by Exact Age | | | | | | Percentage Never Married | Number | Mean Age at First Marriage |
|---|---|---|---|---|---|---|---|---|---|
| | 12 | 15 | 18 | 20 | 22 | 25 | | | |
| 15-19 | 1.2 | 27.3 | NA | NA | NA | NA | 51.9 | 3,149 | a |
| 20-24 | 2.5 | 38.2 | 65.3 | 75.4 | NA | NA | 18.5 | 2,373 | 16.1 |
| 25-29 | 3.1 | 45.4 | 74.8 | 84.7 | 90.2 | 94.1 | 4.2 | 2,062 | 15.4 |
| 30-34 | 4.9 | 50.8 | 80.8 | 90.2 | 95.9 | 98.1 | 0.1 | 1,622 | 14.9 |
| 35-39 | 7.8 | 56.4 | 85.6 | 92.2 | 96.1 | 98.0 | 0.2 | 1,338 | 14.5 |
| 40-44 | 8.5 | 65.1 | 89.4 | 95.1 | 97.5 | 98.4 | 0.0 | 1,126 | 14.0 |
| 45-49 | 13.3 | 69.2 | 90.4 | 95.4 | 97.6 | 98.4 | 0.0 | 853 | 13.8 |
| 20-49 | 5.5 | 50.6 | 78.2 | 86.6 | 91.0 | 93.1 | 5.7 | 9,373 | 15.0 |

NA= Not Applicable
[a] Omitted because less than 50 per cent of the women in the age group 15-19 were first married by age 15
**Source**: 1999/2000 BDHS (Mitra et al. 2001:80).

## Contraception

The family planning programme in Bangladesh has been considered as an example of success story in a country without a high level of socio-economic development, often considered as a necessary precursor to the successful family planning (Koenig *et al.* 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 success in a short period of time, attaining a current contraceptive prevalence rate (CPR) of 53.8 per cent in 1999/2000. Results of the 1999/2000 BDHS show that among the currently married women of age 15-49, knowledge about at least one family planning

method is universal. Three-fourths (75 per cent) of ever-married women reported ever having used any family planning method (Mitra *et al.* 2001:48).

Figure 4.2 depicts the levels and trends of contraceptive use in Bangladesh during the last two and half decades. More than half (54 per cent) of the currently married women were using contraceptive methods during 1999/2000. Modern methods are most popular (43 per cent) than traditional methods (10 per cent). Other commonly used methods are injectables (7.2 per cent), female sterilization (6.7 per cent), periodic abstinence (5.4 per cent), condoms (4.3 per cent) and withdrawal (4 per cent). Although modern methods account for nearly 81 per cent of overall use, traditional methods still remain a major means of contraception accounting 19 per cent of the total use. The substantial contribution of traditional methods to overall CPR deserves special attention by the family planning programme managers.

The contraceptive prevalence rate has increased more than six folds, from 8 per cent in 1975 to 54 per cent in 1999/2000. This increase is maily due to increased use of pills and traditional methods. Use of modern reversible methods like injectables and condoms have also increased but marginally, while use of long-term methods such as sterilization and IUD have declined. Among the traditional methods, use of periodic abstinence and withdrawal have also increased. Thus, the proportional share that each method contributes to the overall use of contraceptive – known as the "method mix" - has changed over time (Table 4.2). For example, the pill accounts for 43 per cent of all contraceptive use, compared to 39 per cent in 1993/94 and 35 per cent in 1991. On the other hand, the share contributed by female sterilization has dropped from 23 per cent in 1991 to 18 per cent in 1993/94 and 13 per cent in 1999/2000.

Although there is an appreciable rise in the magnitude of the CPR, the method-mix that has been developed over the period losing its effectiveness due to dominant use of less effective methods like pills and traditional methods. In a recent study, Islam and others (2001) argued that the increased use of sterilization and other clinical methods during the late 1980s and early 1990s might have significant impact on steep decline in fertility during early 1990s, and its decline in the subsequent period might have contributed to the plateauing of fertility during the recent past.

Contraceptive use varies widely among the six administrative divisions. Khulna division shows highest level of contraceptive use (64 per cent), closely followed by Rajshahi (58.9 per cent) and Barisal (59.2 per cent) divisions, while it is lowest in Sylhet (34.0 per cent) division (Mitra *et al.* 2001: 56). Except Rajshahi division, contraceptive use rate has increased in all other divisions since the 1996/97 BDHS.

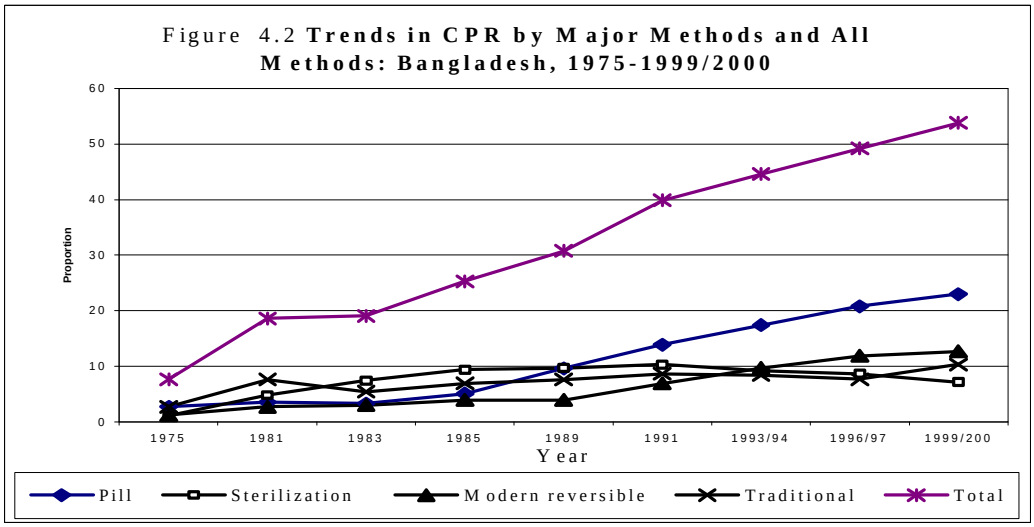



**Table 4.2**
**Relative Share of Modern Method-mix in Bangladesh, 1975-1999/2000**

| Modern Method | BFS 1975 | CPS 1981 | CPS 1983 | CPS 1985 | BFS 1989 | CPS 1991 | BDHS 1993/94 | BDHS 1996/97 | BDHS 1999/00 |
|---|---|---|---|---|---|---|---|---|---|
| Pill | 35.0 | 17.0 | 20.0 | 31.0 | 41.4 | 35.0 | 39.0 | 42.0 | 43.0 |
| IUD | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 5.0 | 4.0 | 2.0 |
| Injection | - | 1.0 | 2.0 | 2.0 | 2.6 | 7.0 | 10.0 | 13.0 | 13.0 |
| Condom | 9.1 | 8.0 | 7.0 | 6.0 | 7.8 | 6.0 | 7.0 | 8.0 | 8.0 |
| Tubectomy | 8.0 | 32.0 | 31.0 | 28.0 | 36.7 | 23.0 | 18.0 | 15.0 | 12.0 |
| Vasectomy | 6.0 | 6.0 | 6.0 | 4.0 | 5.2 | 3.0 | 2.0 | 2.0 | 1.0 |
| Vaginal Method | - | 2.0 | 1.0 | - | 0.4 | - | - | - | - |
| Abstinence | 12.0 | 13.0 | 15.0 | 13.0 | - | 12.0 | 11.0 | 10.0 | 10.0 |
| Withdrawal | 6.0 | 7.0 | 4.0 | 6.0 | - | 5.0 | 6.0 | 4.0 | 7.0 |
| Other Traditional | 17.0 | 9.0 | 9.0 | 6.0 | - | 5.0 | 2.0 | 2.0 | 2.0 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

**Source**: Mitra *et al.* 2001:53.

### Breastfeeding and Post-partum Infecundability

Information on breastfeeding in the BDHS 1999/2000 was collected for all children born during the last five years preceding the survey date. A total of 6,939 women provided information of whom 97.1 per cent were reported to have ever breastfed their children. This indicates the universality of breastfeeding in Bangladesh.

According to the 1999/2000 BDHS, the median duration of breastfeeding for Bangladesh is 30.5 months. Various studies during the last two decades have reported average duration of breastfeeding in Bangladesh in the vicinity of two and half years. The variation in the estimates partly comes from the type of data used and partly from the methodologies applied. The last three BDHS results demonstrate that there has been a declining trend in the duration of breastfeeding since 1993/94. The median duration of breastfeeding has declined from 36 months in 1993/94 to 33 months in 1996/97 and to 31

months in 1999/2000. There are some regional differentials in the duration of breastfeeding. Sylhet and Chittagong divisions show shorter duration of breastfeeding (median of 24.9 and 26.2 months, respectively) than those in Rajshahi and Khulna divisions (33.2 and 37.2 months, respectively).

There is a sharp difference in the estimated median and mean duration of post-partum amenorrhea period . The median duration of post-partum amenorrhea was estimated to be 8.0 months in 1999/2000, while the mean duration was 9.5 months. In this study we have considered mean duration of post-partum amenorrhoea period. It is to 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 BFS 1975 reported a mean post-partum amenorrhea of 14.6 months (Singh and Ferry 1984) which declined to 9.5 months in 1999/2000. Salway and her colleagues (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 in the period 1978-1983. Thereafter, a sharp decline occurred, with the duration falling from 13.5 months for 1982/1983 cohort to 9.4 months for the 1988/1989 cohort. Salway *et al.* also observed that the increased use of contraception is one of the important factors for the declining trend in post-partum amenorrhea in Bangladesh.

**Fertility Inhibiting Effects of the Major Proximate Determinants**

To estimate the fertility inhibiting effects of the three important proximate determinants, marriage, contraception and postpartum infecundability, we applied the Bongaarts proximate determinant model given by the equation 4.1. The summary measures which are needed for the application of the model are presented in the first panel of Table 4.3. Owing to unavailability of information on the sensitive issue of induced abortion, we assume that the overall total induced abortion rate is zero. However, the effect of this will automatically subsummed in the estimation of the total fecundity.

The second panel of Table 4.3 presents the estimated values of the indices of the four principal proximate determinants of fertility. 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 $C_m$ represents the proportion by which Total Fertility Rate (TFR) is smaller than the Total Marital Fertility Rate (TMFR) as a result of marital pattern. Similarly, the index $C_c$ gives the proportion by which TMFR is smaller than TN (Total Natural Fertility) with the level and effectiveness of contraceptive use and the index $C_i$ gives by how much TN is smaller than TF (Total Fecundity) due to the effect of postpartum infecundability.

**Table 4.3**
**Estimates of Selected Reproductive Measures and Derived Indices of Proximate Determinants, Bangladesh, 1975 – 1999**

| | BFS 1975 | BDHS 1993/94 | BDHS 1996/97 | BDHS 1999/00 | Per cent Change 1975-93 | Per cent Change 1975-99 | Per cent Change 1993-99 |
|---|---|---|---|---|---|---|---|
| **A. Reproductive Measures** | | | | | | | |
| TFR | 6.33 | 3.44 | 3.27 | 3.31 | - | - | - |
| TMFR | 7.01 | 3.92 | 3.81 | 3.94 | - | - | - |
| CPR | 7.7 | 44.6 | 49.2 | 53.7 | - | - | - |
| Contraceptive use-effectiveness | 0.829 | 0.883 | 0.883 | 0.870 | - | - | - |
| Mean PPa | 14.6 | 11.8 | 10.9 | 9.5 | - | - | - |
| **B. Model Indices** | | | | | | | |
| $C_m$ | 0.903 | 0.878 | 0.858 | 0.843 | -2.77 | -6.64 | -3.99 |
| $C_c$ | 0.931 | 0.575 | 0.531 | 0.495 | -38.24 | -46.83 | -13.91 |
| $C_I$ | 0.604 | 0.660 | 0.680 | 0.714 | +9.30 | +18.71 | +8.18 |
| $C_m \times C_c \times C_I$ | 0.508 | 0.333 | 0.310 | 0.298 | -36.22 | -41.14 | - 10.51 |

The model indices show that in 1999/2000, contraception has the highest fertility reducing effect, accounting for 51.0 per cent ($C_c$ = 0.495) reduction of TN relative to TMFR. Postpartum infecundability is the second most important fertility reducing factor, reducing the total fecundity rate (TF) by 29.0 per cent ($C_i$=0.714). The marriage pattern has the lowest fertility reducing effect, accounting for 16 ($C_m$=0.843) per cent reduction in actual fertility levels below marital fertility (Table 4.3).

The indices of marriage and contraception show declining trends since 1975, while the index of postpartum infecundability increased over the period. This indicates that the fertility reducing effects of marriage and contraception has been increased over the period 1975–1999/2000. On the other hand the fertility reducing effects of postpartum infecundability has declined during the same period.

During the period 1975-1993/94, the index of marriage declined by 2.8 per cent and the index of contraception declined by 38.2 per cent, but the index of postpartum infecundability increased by 9.3 per cent. Thus, the decline in the total fertility rate (from 6.33 to 3.44) between 1975 and 1993/94 is caused primarily by the reducing effect of contraception. The reducing effect of marriage pattern is offset by a reduction in duration of postpartum infecundability. The combined fertility limiting effect of the three proximate determinants ($C_m$ X $C_c$ X $C_i$) was 0.508 in 1975 and 0.333 in 1994, indicating a decline of about 34.0 per cent in fertility during the period 1975-1993/94.

The changing patterns of indices remain same for the period 1993/94 – 1999/2000, but their intensity have increased over the period. During this period, the fertility reducing effect of marriage becomes more pronounced due to rise in proportion single. The fertility reducing effect of postpartum infecundability declined further during this period due to more rapid decline in the duration of postpartum amenorrhoea period. Thus, postpartum infecundability has more offseting effect on marriage during this period. The combined fertility limiting effect of the three proximate determinants is 10.5 per cent during the period 1993/94 – 1999/2000 (Table 4.3).

Table 4.4 exhibits the magnitude of the total inhibiting effect being accounted for by each proximate fertility determinant at different time points starting from 1975 to 1999/2000. The difference between the total fecundity (TF, taken as 15.3) and the estimated TFR is attributed to the result of the inhibitory effect of each determinant. The total inhibiting effect is prorated by the proportion of the logarithm of each index to the sum of logarithm of all indices (Wang *et al.* 1987). The results indicate that of a total of 10.73 births in 1999/2000 being inhibited, 1.52 births (or 14.2 per cent) are due to the effect of marriage variable, 6.25 births (or 58.2 per cent) are due to contraception and 2.96 births (or 27.6 per cent) are due to postpartum infecundability. Similarly, in 1993/94, the three proximate variables (marriage, contraception, postpartum infecundability) inhibited 10.21 births, are distributed as 1.19 births (or 11.6 per cent), 5.08 births (or 49.8 per cent), and 3.94 births (or 38.6 per cent) respectively.

**Table 4.4**
**Magnitude of the Total Fertility-inhibiting Effect being Accounted for Each Proximate Fertility Determinants, Bangladesh 1975 – 1999**

| Proximate determinants | Fertility-inhibiting effect | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Births per woman | | | | Percentage | | | |
| | 1975 | 1993 | 1996 | 1999 | 1975 | 1993 | 1996 | 1999 |
| Marriage | 1.13 | 1.19 | 1.38 | 1.52 | 15.0 | 11.6 | 13.1 | 14.2 |
| Contraception | 0.79 | 5.08 | 5.70 | 6.25 | 10.5 | 49.8 | 54.0 | 58.2 |
| Infecundability | 5.61 | 3.94 | 3.48 | 2.96 | 74.5 | 38.6 | 32.9 | 27.6 |
| Total: [TF – TFR(est.)] | 7.53 | 10.21 | 10.56 | 10.73 | 100.0 | 100.0 | 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 $C_m/(\log C_m+\log C_c+\log C_i)$.

Table 4.5 presents the magnitude of the fertility-inhibiting effects of marriage, contraception and postpartum infecundability by age and region of residence in 1993/94 and 1999/2000. It shows that the fertility-inhibiting effects of the three proximate determinants vary with the age. The overall effect is higher at ages 25-44. Marriage shows highest fertility-inhibiting effect (more than 4 births) at the youngest ages, that is 15-19, while the effect of contraception is highest at the middle ages i.e. 20-44. The effect of postpartum infecundability increases with age with some fluctuation. The effect of marriage pattern is almost diminished after age 30. Over the period, the age specific effect of marriage and contraception shows increasing trends, while the effect of postpartum infecundability decreased.

**Table 4.5**
**Fertility Inhibiting Effect of Proximate Determinants by Age and Region, Bangladesh, 1993/94 and 1999/2000**

| | Effect of Marriage | | Effect of Contraception | | Effect of Postpartum infecundibility | | Total Effect | |
|---|---|---|---|---|---|---|---|---|
| | No. of births | Per cent | No. of births | Per cent | No. of births | Per cent | No. of births | Per cent |
| DHS 1993/94 | | | | | | | | |
| Age | | | | | | | | |
| 15-19 | 4.17 | 42 | 2.45 | 25 | 3.22 | 33 | 9.84 | 100.0 |
| 20-24 | 0.75 | 8 | 4.29 | 46 | 4.31 | 46 | 9.35 | 100.0 |
| 25-29 | 0.10 | 1 | 5.94 | 56 | 4.56 | 43 | 10.60 | 100.0 |
| 30-34 | 0.02 | 0 | 7.03 | 65 | 3.75 | 35 | 10.80 | 100.0 |
| 35-39 | 0.04 | 0 | 7.15 | 65 | 3.90 | 35 | 11.01 | 100.0 |
| 40-44 | 0.04 | 0 | 6.24 | 60 | 4.12 | 40 | 10.40 | 100.0 |
| 45-49 | 0.01 | 0 | 3.67 | 49 | 3.82 | 51 | 7.50 | 100.0 |
| Division | | | | | | | | |
| Barisal | 1.44 | 14 | 5.45 | 52 | 3.49 | 34 | 10.38 | 100.0 |
| Chittagong* | 45 | 15 | 3.19 | 34 | 4.79 | 51 | 9.43 | 100.0 |
| Dhaka | 1.08 | 11 | 5.03 | 49 | 4.13 | 40 | 10.24 | 100.0 |
| Khulna | 1.26 | 12 | 6.42 | 60 | 3.06 | 28 | 10.74 | 100.0 |
| Rajshahi | 0.94 | 8 | 6.37 | 58 | 3.73 | 34 | 11.04 | 100.0 |
| Total | 1.19 | 11 | 5.08 | 50 | 3.94 | 39 | 10.31 | 100.0 |
| DHS 1999/00 | | | | | | | | |
| Age | | | | | | | | |
| 15-19 | 4.46 | 42 | 3.83 | 36 | 2.39 | 22 | 10.68 | 100.0 |
| 20-24 | 1.21 | 12 | 5.56 | 57 | 3.04 | 31 | 9.81 | 100.0 |
| 25-29 | 0.21 | 2 | 7.16 | 68 | 3.15 | 30 | 10.52 | 100.0 |
| 30-34 | 0.02 | 0 | 7.97 | 72 | 3.02 | 27 | 11.01 | 100.0 |
| 35-39 | 0.01 | 0 | 8.36 | 72 | 3.28 | 28 | 11.65 | 100.0 |
| 40-44 | 0.00 | 0 | 7.32 | 65 | 3.88 | 35 | 11.20 | 100.0 |
| 45-49 | 0.00 | 0 | 5.24 | 56 | 4.11 | 44 | 9.35 | 100.0 |
| Division | | | | | | | | |
| Barisal | 1.63 | 16 | 5.24 | 52 | 3.28 | 32 | 10.15 | 100.0 |
| Chittagong | 1.67 | 21 | 5.09 | 64 | 1.20 | 15 | 7.96 | 100.0 |
| Dhaka | 1.56 | 18 | 6.17 | 70 | 1.05 | 12 | 8.78 | 100.0 |
| Khulna | 1.25 | 13 | 7.46 | 77 | 0.98 | 10 | 9.69 | 100.0 |
| Rajshahi | 1.26 | 13 | 7.03 | 75 | 1.13 | 11 | 9.42 | 100.0 |
| Sylhet | 2.62 | 35 | 3.71 | 49 | 1.26 | 16 | 7.59 | 100.0 |
| Total | 1.52 | 14 | 6.25 | 58 | 2.96 | 28 | 10.73 | 100.0 |

**Note**: * Chitagong+Sylhet

The fertility inhibiting effects of marriage and postpartum infecundability are higher in Barisal and Chittagong divisions, while the effect of contraception is highest in Khulna division followed by Rajshahi division. Thus, the lowest level of fertility in Khulna division is mainly due to the increased use of contraception.

From the foregoing analysis it is noted that in the recent years contraception has emerged as the highest fertility reducing factor in Bangladesh. Until the early 1990s, the postpartum infecundability was considered to be the most important and highest fertility reducing factor in Bangladesh, but by 1993/94 contraception has emerged as the highest fertility reducing factor and its fertility inhibiting effect is steadily increasing. The increasing

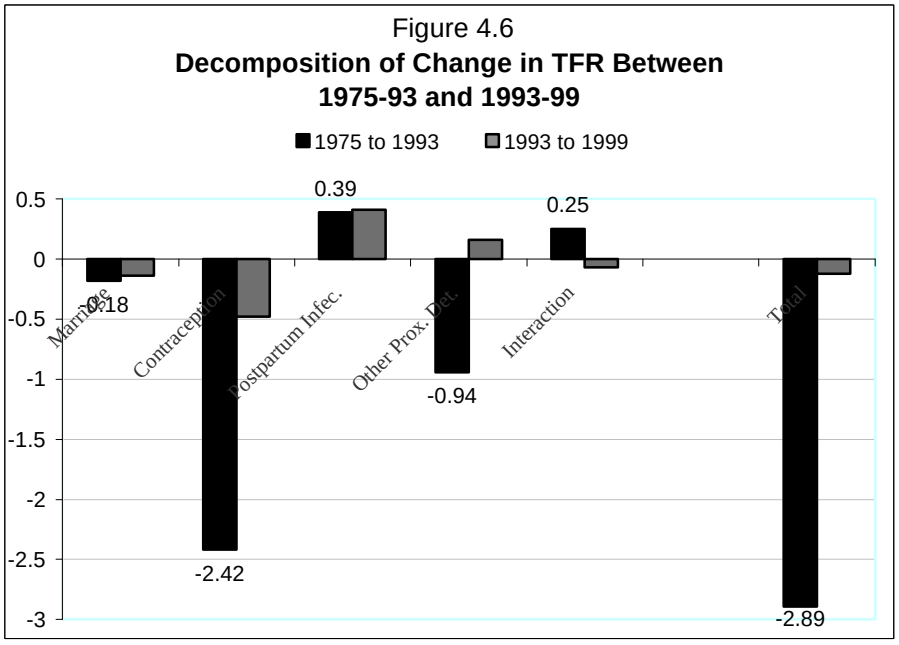
effect of contraception is evident from the declining trend in the values of the index $C_c$ from 0.931 in 1975 to 0.495 in 1999/2000. On the other hand, the fertility reducing effect of postpartum infecundability is gradually decreasing due to declining trend in the postpartum amenorrhic period.

It is to be mentioned here that although there is an increasing trend in the impact of the marriage component, reflecting the effect of increased proportion non-married and/or increased age at marriage, the rate of change is very slow. The prevailing cultural and social norm in Bangladesh is unlikely to permit a change in the proportion non-married beyond a certain limit and the prospect for an immediate rise in age at marriage for females does not seem to be very bright. It is to be noted that the joint effect of marriage and postpartum infecundability did not change much over the period 1993/94 – 1999/2000, because the declining effect of postpartum infecundability has been offset by the increasing effect of marriage. This leads to the conclusion that the future reduction in fertility in Bangladesh may largely depend on increased use of effective contraception.

**Decomposition of the Change in TFR Between Two Time Points**

The decomposition of the change in TFR between 1975 and 1993/94 and between 1993/94 and 1999/2000 is presented in Table 4.6. The decomposition was done through application of the Bongaarts model. It indicates that TFR declined during the period 1993/94 - 1999/2000 by 3.8 per cent (or in absolute terms 0.13 births per woman) from 3.44 births in 1993/94 to 3.31 births in 1999/2000. This total decrease in TFR is attributable to a 3.98 per cent (or 0.14 birth per woman) decline due to marriage pattern, a 13.91 per cent (or 0.48 births per woman) decline due to an increase in contraceptive use, a 11.86 per cent (or 0.41 births per woman) increase due to decrease in the duration of postpartum infecundability. The change in TFR due to change in other proximate determinants is 4.52 per cent (or 0.16 births per woman) decline in fertility. From the fore going results it is evident that contraception played the main role in the reduction of fertility during the period 1993/94-1999/2000.

Figure 4.6
**Decomposition of Change in TFR Between 1975-93 and 1993-99**



## 5. Analysis of Birth Intervals

It is observed from previous sections that birth interval plays a major role in determining the total fertility rate. In the high performing regions of Bangladesh, where high performance is defined in terms of achievements in family planning and fertility, the total fertility rate is low mainly due to long birth intervals. However, in the low performing regions, although the age at marriage is substantially higher as compared to that of the high performing regions, the total fertility rate is high mainly due to shorter birth intervals.

Table 5.1 summarizes the differential patterns of the mean birth intervals by selected characteristics. The mean birth intervals are computed by using the Product-Limit (P-L) method to take into account the censoring present in the birth intervals (open birth intervals) for the periods 1989, 1993/94, 1996/97 and 1999/2000. It is surprising that the birth intervals increased sharply for all the selected characteristics during 1989-93 period, and since 1993, the birth intervals increased only slightly. This has a major implication on fertility. In other words, the factors favouring acceleration in the birth intervals ceased to influence in enhancing birth intervals since 1993. However, the most notable findings are summarized below:

(a) If the previous child dies during infancy then the birth interval still remains very short (32 months), 18 months shorter than those who have a surviving child during infancy. During 1989-93 period, there was an increase of 8.5 months for those who had child death in infancy. However, since 1993 there is a slight but steady declining trend in birth interval among those mothers who experienced a child death during infancy. This shows that infant deaths are causing higher level of fertility at an increasing speed than that of the past. This might be attributable to slow pace of decline in the level of infant mortality during the recent past.

(b) The role of sex preference does not show any remarkable impact on the birth interval. The sex of previous child seems to have little influence on the birth interval.

The important finding revealed from the analysis of birth intervals is that the birth intervals appear to have not changed much in the recent past (1993-1999). However, it would be difficult to reach to a conclusive decision on the basis of birth intervals at aggregate level. However, if the age at marriage and age at first birth remain same then without an increased birth spacing the fertility level may not change. The current plateauing of the level of TFR appears to be at par with this situation. Because, although there was a sharp increase in the birth intervals for all categories of the selected variables during 1989-93 period, favouring a sharp decline in the level of fertility, but during 1993-99 period there was no remarkable change in the birth intervals favouring stagnation in the level of TFR. It is also noteworthy that infant death still remains as a strong barrier to increasing the birth interval in Bangladesh. In addition, the role of sex preference does not seem to have any visible impact on birth interval.

**Table 5.1**
**Mean Birth Intervals (in months) by Different Demographic and Socio-Economic Characteristics Based on P-L Method, Bangladesh 1993/94, 1996/97 and 1999/2000**

| Characteristics | BFS 1989 | BDHS 1993/94 | BDHS 1996/97 | BDHS 1999/00 |
|---|---|---|---|---|
| **Mothers Age at Birth** | | | | |
| <25 | 37.4 | 45.0 | 45.1 | 45.8 |
| 25-34 | 40.7 | 48.4 | 51.4 | 48.8 |
| 35+ | 47.9 | 54.2 | 47.3 | 46.9 |
| **Residence** | | | | |
| Rural | 37.7 | 47.5 | 47.3 | 47.7 |
| Urban | 37.8 | 48.1 | 53.0 | 49.4 |
| **Mothers Education** | | | | |
| None | 38.8 | 46.6 | 46.7 | 45.4 |
| Primary | 39.3 | 47.2 | 49.2 | 47.0 |
| High School+ | 41.2 | 50.7 | 51.4 | 53.1 |
| **Survival Status of Index Child** | | | | |
| Died During Infancy | 25.3 | 33.8 | 32.6 | 31.8 |
| Survived Infancy | 39.2 | 49.1 | 49.8 | 49.9 |
| **Parity** | | | | |
| <=2 | 36.8 | 45.1 | 45.4 | 46.7 |
| 3-5 | 37.6 | 48.3 | 50.4 | 48.2 |
| 6+ | 39.6 | 49.7 | 49.8 | 47.0 |
| **Sex of Index Child** | | | | |
| Boy | 38.4 | 47.7 | 47.2 | 49.4 |
| Girl | 37.2 | 47.1 | 48.0 | 46.6 |
| **Total** | **37.8** | **47.8** | **48.4** | **48.7** |

## 6.b Quantum and Tempo Effect

The total fertility rate (TFR) is a very useful technique to measure the change in human reproduction. The total fertility rate is a hypothetical measure but it is used so extensively because it provides a measure of the current fertility level and gives up-to-date information about demographic trends and levels in fertility. This measure is easy to interpret and hence it is widely used by the policymakers. However, this measure is not free from limitations. Bongaarts and Feeney (1998) reported that the total fertility rate involves several common problems: the problems posed by changes in the timing of childbearing, the relationship between period and cohort measures, the nature and validity of period measure interpreted as hypothetical cohorts, and the extent to which fertility measures should embody controls not only for age but also for such variables as parity, duration of marriage, or other demographic variables. At this backdrop, Bongaarts and Feeney proposed an alternative measure on the basis of the fact that the conventional TFR can be considered to consist of a *quantum* and a *tempo* component. Due to the presence of these components, TFR produces results that might be misleading sometimes. According to Bongaarts and Feeney, *quantum* component can be defined as the TFR that would have been observed in the absence of changes in the timing of childbearing during the period in which the TFR is measured. The *tempo* component equals the distortion that occurs due to timing changes. According to

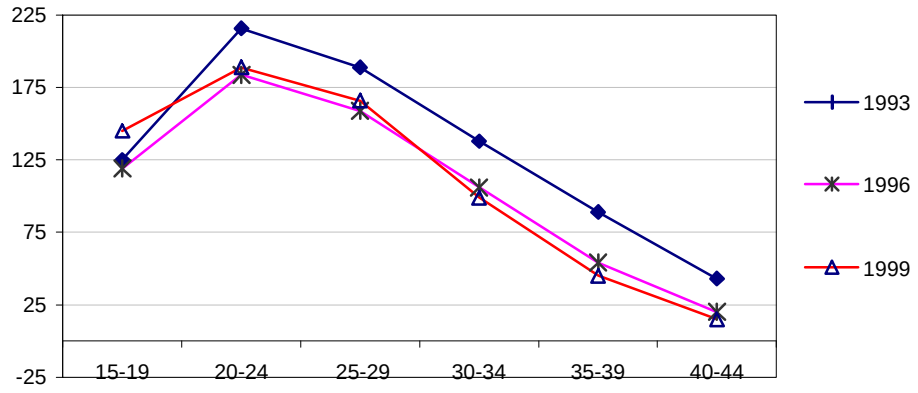
Pressat (1985) *quantum* refers to the average number of children born to women in a cohort, and *tempo* to the timing of birth by age of mother within the cohort. Although tempo is usually measured by mother's mean age at childbearing, but Bongaarts and Feeney measured tempo by the mean ages at childbearing at each birth order. The absence of *tempo* effect means that there is no change in the mean age at childbearing at each birth order over time. In other words, if there is change in the mean ages at childbearing then the interpretation of TFR can be misleading. In this section, the adjusted measures of TFR are presented in order to provide TFR which is independent of timing changes before or after the reference period.

Figure 6.1 summarizes the characteristics of fertility patterns during the period 1991-1999. This table reveals some interesting features of change in the fertility behaviour of the women during the recent past. Median age of fertility has steadily declined from 26.06 years in 1991-93 to 24.42 years in 1997-99 period. The decline in the interquartile range indicates that the fertility pattern is now less dispersed than in the past. In other words, most of the child births take place within a shorter span now than in the past and the central tendency is shifting towards younger age. The fertility curve is less skewed than in the past.

## Changes in Birth Spacing

To gain further insight into the declining nature of fertility, birth spacing patterns are explored in Table 6.1 by means of 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 5 years of i*th* birth; and finally, the conditional mean (trimean) among those who do experience the next birth within 60 months. The conditional mean is a more refined measure of the tempo or speed of reproduction than the median, while 60 month progression ratio indicates the quantum of reproduction.

Figure 6.1 **:Agespecific Fertility Rates for Different Time Periods Bangladesh, BDHS 1999/2000**




| Characteristics of Age Specific Fertility | 1991-93 | 1994-96 | 1997-99 |
|---|---|---|---|
| First Quartile | 21.23 | 20.73 | 20.04 |
| Median | 26.06 | 25.30 | 24.42 |
| Third Quartile | 32.03 | 30.94 | 29.39 |
| Inter Quartile Range | 5.40 | 5.10 | 4.68 |
| Skewness | 0.107 | 0.104 | 0.064 |
| Coefficient of Quartile Deviation | 0.203 | 0.196 | 0.189 |

It may be seen that first birth interval i.e. interval between marriage to first birth has been shortened more for the younger cohorts than their older counterparts (Table 6.1). On the other hand, the proportion of women who have a first child within five years has increased, and among them, the mean length has reduced from about 26 months in the early 1980s to 19 months in the mid 1990s. This reflects higher fecundability among the women of recent cohorts as a result of 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. This pattern of marriage to first birth interval implies that the median age at first birth has risen less than the median age at marriage.

**Table 6.1 Changes in Birth spacing Pattern, 1999/00 BDHS**

| Interval | Period at Start of Interval | | | |
|---|---|---|---|---|
| | 1979-83 | 1984-88 | 1989-93 | 1993+ |
| **Marriage to 1st Birth** | | | | |
| Median | 30.0 | 26.0 | 24.0 | 23.0 |
| 60-month Progression Ratio | 0.81 | 0.86 | 0.88 | 0.91 |
| Conditional Mean (trimean) | 25.5 | 23.5 | 22.7 | 19.2 |
| **First to Second Birth** | | | | |
| Median | 32.0 | 35.0 | 41.0 | 43.0 |
| 60-month Progression Ratio | 0.85 | 0.78 | 0.71 | 0.71 |
| Conditional Mean (trimean) | 29.5 | 30.7 | 32.7 | 29.5 |
| **Second to Third Birth** | | | | |
| Median | 35.0 | 35.0 | 43.0 | 54.0 |
| 60-month Progression Ratio | 0.79 | 0.77 | 0.65 | 0.57 |
| Conditional Mean (trimean) | 30.7 | 30.7 | 32.5 | 31.7 |
| **Third to Fourth Birth** | | | | |
| Median | 35.0 | 36.0 | 46.0 | 58.0 |
| 60-month Progression Ratio | 0.77 | 0.73 | 0.60 | 0.51 |
| Conditional Mean (trimean) | 29.7 | 30.5 | 30.5 | 30.2 |
| **Fourth to Fifth Birth** | | | | |
| Median | 38.0 | 38.0 | 45.0 | 54 |
| 60-month Progression Ratio | 0.72 | 0.67 | 0.60 | 0.54 |
| Conditional Mean (trimean) | 31.0 | 29.7 | 30.7 | 30.0 |
| **Fifth to Sixth Birth** | | | | |
| Median | 35.0 | 38.0 | 49.0 | 52.0 |
| 60-month Progression Ratio | 0.75 | 0.65 | 0.54 | 0.56 |
| Conditional Mean (trimean) | 30.2 | 29.2 | 29.5 | 28.0 |

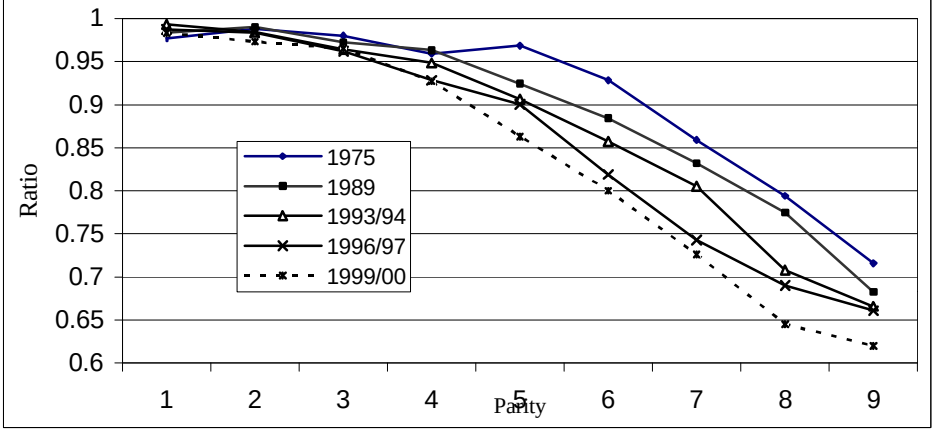
**Note:** The trimean (conditional mean) T, as suggested by Tukey (1977 ), is obtained as $T = (q_1+2q_2+q_3)/4$, where $q_i$ is the ith quartile of the distribution of the birth interval.

Another very important finding is that the birth intervals increased consistently over the last two decades irrespective of the parity indicating a declining trends in fertility. The declining trends in fertility is also evident from reduction in the proportion of women who have another birth within five years of a previous birth. The conditional mean, however, remains more or less constant except for the most recent cohorts (1993 onward).

Fertility change can also be traced by examining the cohort Parity Progression Ratios (PPRs). The PPR is defined for parity i as the proportion of women who proceed to the next birth, i + 1, among those who have had an ith birth. PPRs show the proportion of women who proceed from one event in the childbearing sequence to the next (Feeney

1991). Older women (45-49) are chosen so that their PPR will be closer to their final PPR. However, for 1975, the oldest group is omitted because of evidence of omission of births by them. As depicted by Figure 6.2, there is a decline in the PPRs since late 1980s, except in 0-1 parity. The decline is more pronounced after third parity. This indicates that the proportion of women who go on to higher birth orders has been declining.

Figure 6.2**: Parity Progression Ratios, Bangladesh 1975 - 1999/2000**




Why are high parity progression ratios so widespread in Bangladesh? This is because women want more children. To achieve a replacement level of fertility of 2.1 children per woman, the desired fertility level should converge to 2.1 or less. However, in Bangladesh the desired fertility level is much higher than the required 2.1 births per woman. More than one-third of the ever-married women consider more than 2 children as ideal, with an average of 2.5 children (Table 6.2). In 1993/94, 56 per cent of women reported a 2-child ideal. In 1999/2000, this proportion had increased to 59 per cent. But the ideal family size remained unchanged since 1993/94. In 1999/2000, every 3 women out of 5 with 2 living children state that they want no more children. The corresponding figures for 1993/94 and 1996/97 were 50 per cent and 55 per cent respectively. One-third of those who have already had 2 children state that they want another child. The simplest explanation for observed high parity progression ratio and slow pace of converging towards replacement level of fertility among Bangladeshi women is that women have more children because they want them, or at least, because they are not strongly motivated to stop at 2.

It may be concluded that based on age-specific fertility rates, mean number of children ever born and PPR, fertility level has indeed declined in Bangladesh between 1993/94 and 1999/00. However, this is not reflected in TFR of 1993/94 to 1999/2000. We should not forget that TFR is a period measure, which is affected by many factors including young age structure (or population momentum), proportion currently married, and change in other direct determinants of fertility.

**Table 6.2**
**Ideal Number of Children and Fertility Intention for Ever-married Women Aged 10-49, Bangladesh, 1993/94 to 19999/2000**

| Fertility Intention | BDHS 1993/94 | BDHS 1993/94 | BDHS 1993/94 |
|---|---|---|---|
| Mean Ideal No. of Children | 2.5 | 2.5 | 2.5 |
| Ideal No. of Children | % | % | % |
| 1 | 2.1 | 1.9 | 2.6 |
| 2 | 56.2 | 59.6 | 59.0 |
| 3 | 23.5 | 20.8 | 21.7 |
| 4+ | 18.2 | 17.7 | 16.7 |
| Have 2 & Ideal=2 Children | 64.8 | 69.8 | 69.2 |
| Have 2 & Want No More | 49.8 | 55.1 | 60.0 |
| Have 2 & Want More than 2 | 40.1 | 34.8 | 32.9 |

## Adjustment for Tempo Effect

The *tempo* effect cannot be measured with the overall measure of central tendency of age at childbirth because with a decline in the level of fertility the higher order births are excluded and hence the mean age at childbirth fails to indicate the change in the *tempo* effect. Bongaarts and Feeney (1998) reported that changes in the mean age at childbearing of aggregate cohorts do not accurately capture *tempo* effects when cohort fertility is declining because cohorts reduce their fertility primarily by reducing childbearing at higher birth orders. Table 6.3 shows the mean ages at childbirth by birth order and the birth-order specific total fertility rates, TFRs, for the periods 1991-93, 1994-96 and 1997-99. In order to compute *tempo* and *quantum* effects, three periods are considered: January, 1991 – December 1993, January 1994 – December 1996, and January 1997 – December 1999. All the births during these reference periods were taken into account to compute birth-order specific TFRs. The number of births as obtained from the BDHS 1999/2000 for the reference periods 1991-93, 1994-96 and 1997-99 are 4211, 3855 and 4171, respectively. It is noteworthy that in order to avoid bias, we applied weights (proportion married by age) from BDHS 1993/94, BDHS 1996/97 and BDHS 1999/2000 to compute birth cohorts/periods 1991-93, 1994-96 and 1997-99, respectively. Adjusted TFRs represent the quantum effect free from the distortion of timing changes over time. As we observe an increasing trend in the shifting of the mean age at childbirth for all the parities except a slight decline for the birth order 7, particularly during the recent past (1997-99), we expect a substantial distortion is caused by the *tempo* effect. These computations are based on the birth history data from the 1999/2000 BDHS. Adjusted parity specific TFRs appear to be very high up to birth order 3 in 1997-99 as compared to that of birth orders 4 and above. A comparison between birth order specific fertility rates for the periods 1994-96 and 1997-99 show that lower parity (3 or lower) fertility rates are higher during 1997-99 but the higher parity (4 or higher) fertility rates are generally higher (or equal) during 1994-96 with an exception for parity 5. The adjusted TFRs for the periods 1994-96 and 1997-99 are 3.76 and 3.91 respectively as compared to the conventional estimates of TFR of 3.28 during 1994-96 and 3.32 during 1997-99. These results imply that if we adjust the TFR for *tempo* effect then there is a small rise in the level of fertility during the recent past after controlling for a slight increase in the

parity specific mean age at birth. In other words, the tempo effect has increased from 0.5 births during 1993/94 period to 0.6 births during 1996-99 period. In the absence of *tempo* effect, the level of TFR would be higher by 0.5 child in 1993/94 as compared to that of 0.6 child in 1999/2000. This demonstrates that an increased effort to widen the spacing of births can effectively reduce the level of fertility in the future.

**Table 6.3**
**Adjusted TFR for Different Periods Using Bongaarts and Feeney Method, BDHS 1999/00**

| Birth Order (i) | 1997-99 | | 1994-96 | | 1991-93 | | Adjusted TFR | |
|---|---|---|---|---|---|---|---|---|
| | TFRi | MACi | TFRi | MACi | TFRi | MACi | 1999/00 | 1996-97 |
| 1 | 0.7375 | 18.897 | 0.6274 | 18.554 | 0.6013 | 18.399 | 0.8327 | 0.6616 |
| 2 | 0.7986 | 22.098 | 0.6717 | 21.895 | 0.7118 | 21.494 | 0.8566 | 0.7754 |
| 3 | 0.5987 | 25.007 | 0.5482 | 24.365 | 0.6316 | 23.911 | 0.7617 | 0.6460 |
| 4 | 0.3733 | 27.473 | 0.4311 | 26.981 | 0.4992 | 26.115 | 0.4465 | 0.6061 |
| 5 | 0.2866 | 29.680 | 0.2975 | 28.765 | 0.4582 | 28.481 | 0.4124 | 0.3286 |
| 6 | 0.1932 | 31.428 | 0.2305 | 30.768 | 0.3579 | 30.688 | 0.2477 | 0.2368 |
| 7 | 0.1371 | 33.065 | 0.2201 | 33.066 | 0.2770 | 33.076 | 0.1370 | 0.2194 |
| 8+ | 0.1949 | 36.488 | 0.2577 | 36.251 | 0.4571 | 35.975 | 0.2116 | 0.2838 |
| **TFR** | **3.32** | | **3.28** | | **3.99** | | **3.91** | **3.76** |

Table 6.4 shows some revealing patterns in the factors that attribute to a change in the level of TFR during the two consecutive periods 1993-96 and 1996-99. The factors that are known to have major impact on the level of TFR are age at marriage, age at first birth, birth interval, duration of breastfeeding and continued use of contraception. We do not observe any major change in age at marriage or age at first birth. On the contrary, birth intervals increased consistently during 1993-99. However, duration of breastfeeding decreased persistently during the same period. The continuation rate of contraception for 36 months showed an increase during the period 1993-96 but then declined during the period 1996-99 for the two major modern methods, oral pills and condom. Only injectables registered a steady increase in the continuation. It should be noted here that oral pills and condom account for almost two-thirds of the current use of modern methods. It is also noteworthy that about 27 per cent of the users of oral pills and only 13 per cent of the users of condom continue to use for 36 months. In terms of impact on the level of TFR, the role of contraception becomes increasingly less effective. It may be remembered here that the continuation rates for oral pills and condom at 36 months were much higher in 1985, 34 per cent and 41 per cent, respectively. In other words, these two modern methods have become increasingly popular over the recent past but the effective use of these methods lost their effectiveness during the same period. This implies that the current mix, with a very high prevalence of overall contraceptive use, became less efficient in relative terms.

**Table 6.4**
**Some Selected Indicators**

| Indicator | CPS 1985 | BDHS 1993/94 | BDHS 1996/97 | BDHS 1999/2000 |
|---|---|---|---|---|
| Median Age at First Marriage (Years) | - | 14.4 | 14.2 | 15.0 |
| Median Age at First Birth (Years) | - | 17.7 | 17.4 | 18.0 |
| Median Birth Interval (Months) | - | 34.7 | 36.6 | 38.8 |
| Median Duration of Breastfeeding (Months) | - | >36 | 32.8 | 30.5 |
| Continuation of Contraceptives at 36 Months | | | | |
| Oral Pill | 0.340 | 0.274 | 0.290 | 0.269 |
| Condom | 0.410 | 0.140 | 0.150 | 0.131 |
| Injectables | - | 0.197 | 0.279 | 0.291 |

**Reversal of Impact on Level of Fertility During 1993-96 and 1996-99**

We can summarize the findings from the above Table as follows:

| | 1993-96 | 1996-99 |
|---|---|---|
| Age at Marriage | Decreased | Increased |
| Age at First Birth | Decreased | Increased |
| Birth Interval | Increased | Increased |
| Duration of Breastfeeding | Decreased | Decreased |
| Continuation of Contraceptives | Increased | Decreased |

The reversal of impact of these factors caused a temporary plateauing of TFR during 1993-99. Now if we summarize the findings from Table 6.4, then a contrasting scenario emerges. Three of the major components, age at marriage, age at first birth and 36-months use of oral pills and condom, displayed decrement during the period 1993-99 while slight increment was registered during the period 1996-99. However, median duration of breastfeeding decreased consistently while birth interval displayed a consistent rise over these periods. The impact on TFR from the down-turn in age at marriage, age at first birth, duration in breastfeeding favour a higher TFR but at the same time the impact of increased birth interval and increased continuation of oral pills and condom favour a lower TFR during 1993-96. This shows clearly that the impact of increased birth interval and continuation of two major contraceptives in decreasing the level of TFR was essentially offset by decreases in age at marriage, age at first birth and duration of breastfeeding which favoured an unchanged TFR during 1993-96. However, the reasons for unchanged level of fertility during 1996-99 were completely opposite in nature. Increased continuation of contraceptives, increase in age at marriage, age at first birth and birth intervals contributed to decrease the level of TFR while lower duration of breastfeeding and decrease in the continuation of oral pills and condom contributed to increase the level of TFR.

**7. Multivariate Analysis of Parity Progression**

The parity progression during the recent past can provide some insights into the problem of plateauing in the level of fertility. For this purpose, we have used eight logistic regression models, four for parity progression from first to second birth and four for second to third birth. For each parity progression, two models are considered, one for birth interval less than

30 months and another for birth interval of 30 months or higher. Two sets of models are constructed, one for the parity progressions during the period 1991-95 and another for the period 1995-99. If a woman moves from parity one to parity two or parity two to parity three during the reference period, then we consider that an event has occurred. Some selected variables are included in the model, such as age at marriage, education of female respondent, division, place of residence (urban/rural), and survival status and sex of index child.

**Progression from First to Second Birth**

Two sets of models are constructed for the parity progression from first to second birth during 1991-95 and 1995-99 periods, respectively. Using BDHS 1999/2000 data, we observed 3162 first parity women during the period 1991-95. Among these women, 538 moved to parity two within 30 months, 921 moved to parity during 30-59 months and the remaining 1619 did not have second birth during the period 1991-95. On the other hand, using the same data set, we observed 3643 first parity women during the period 1995-99. Among these women, 538 women moved to parity two within 30 months, 1177 moved to parity two during 30-59 months and the remaining 1928 women did not move to second parity during the period 1995-99.

**Table 7.1**

**Logistic Regression Estimates for Explaining the Parity Progression from First to Second Births for the Periods 1995-1999 and 1991-1995**

| Variables | Progression from First to Second Birth | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1995-99 | | | | 1991-1995 | | | |
| | Beta | SE Beta | p-value | OR | Beta | SE Beta | p-value | OR |
| **Birth Interval <30 Months** | | | | | | | | |
| Intercept | -0.125 | 0.169 | 0.458 | - | 0.463 | 0.172 | 0.007 | - |
| Age at Marriage >15 | -0.061 | 0.081 | 0.452 | 0.941 | -0.096 | 0.088 | 0.277 | 0.908 |
| **Education** | | | | | | | | |
| No Education (Reference) | | | | | | | | |
| Primary | -0.295 | 0.095 | 0.002 | 0.745 | 0.178 | 0.103 | 0.083 | 0.837 |
| Secondary or Higher | -0.517 | 0.095 | 0.000 | 0.596 | -0.366 | 0.107 | 0.001 | 0.693 |
| **Division** | | | | | | | | |
| Dhaka (Reference) | | | | | | | | |
| Barisal | 0.113 | 0.146 | 0.440 | 1.120 | 0.023 | 0.164 | 0.889 | 1.023 |
| Chittagong | 0.162 | 0.115 | 0.160 | 1.176 | 0.169 | 0.127 | 0.183 | 1.184 |
| Khulna | -0.060 | 0.114 | 0.599 | 0.942 | -0.255 | 0.131 | 0.051 | 0.775 |
| Rajshahi | -0.152 | 0.112 | 0.175 | 0.859 | -0.136 | 0.126 | 0.283 | 0.873 |
| Sylhet | -0.347 | 0.149 | 0.020 | 0.707 | 0.207 | 0.156 | 0.185 | 1.230 |
| **Urban** | -0.177 | 0.083 | 0.034 | 0.838 | 0.080 | 0.092 | 0.385 | 1.084 |
| Sex of Index Child | | | | | | | | |
| **Child Died (Reference)** | | | | | | | | |
| Girl | 0.079 | 0.158 | 0.615 | 1.083 | 0.076 | 0.160 | 0.636 | 1.079 |
| Boy | -0.019 | 0.158 | 0.902 | 0.981 | 0.133 | 0.159 | 0.402 | 1.143 |

| Variables | Progression from First to Second Birth | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1995-99 | | | | 1991-1995 | | | |
| | Beta | SE Beta | p-value | OR | Beta | SE Beta | p-value | OR |
| **Birth Interval >30 Months** | | | | | | | | |
| Intercept | 0.088 | 0.174 | 0.611 | - | -0.030 | 0.167 | 0.856 | - |
| Age at Marriage >15 | 0.059 | 0.109 | 0.584 | 1.061 | -0.048 | 0.102 | 0.641 | 0.954 |
| **Education** | | | | | | | | |
| No Education (Reference) | | | | | | | | |
| Primary | -0.031 | 0.124 | 0.804 | 0.970 | -0.006 | 0.115 | 0.959 | 0.994 |
| Secondary or Higher | -0.434 | 0.132 | 0.001 | 0.648 | -0.546 | 0.132 | 0.000 | 0.579 |
| **Division** | | | | | | | | |
| Dhaka (Reference) | | | | | | | | |
| Barisal | 0.230 | 0.202 | 0.256 | 1.258 | 0.143 | 0.194 | 0.459 | 1.154 |
| Chittagong | 0.531 | 0.155 | 0.001 | 1.700 | 0.416 | 0.149 | 0.005 | 1.516 |
| Khulna | -0.014 | 0.164 | 0.930 | 0.986 | -0.168 | 0.158 | 0.288 | 0.846 |
| Rajshahi | -0.003 | 0.158 | 0.983 | 0.997 | 0.086 | 0.148 | 0.560 | 1.090 |
| Sylhet | 0.337 | 0.179 | 0.060 | 0.140 | 0.390 | 0.178 | 0.029 | 1.478 |
| **Urban** | -0.188 | 0.114 | 0.101 | 0.829 | -0.291 | 0.114 | 0.011 | 0.747 |
| Sex of Index Child | | | | | | | | |
| **Child Died (Reference)** | | | | | | | | |
| Girl | -1.498 | 0.150 | 0.000 | 0.224 | -0.842 | 0.147 | 0.000 | 0.431 |
| Boy | -1.600 | 0.151 | 0.000 | 0.202 | -1.007 | 0.148 | 0.000 | 0.365 |
| **Model Chi-square** | **233.93 (p=0.000)** | | | | **142.35 (p=0.000** | | | |

The odds of making a progression from first to second birth for birth interval less than 30 months reduces increasingly with level of education. The role of education seems to be strengthened during 1995-99 than that in 1991-95. However, secondary or higher level of education appears to have significant negative association with progression to second birth irrespective of the length of birth interval. As compared to Dhaka, Khulna showed significantly lower progression during 1991-95 for birth intervals less than 30 months but there is no difference between Dhaka and Khulna during recent past. First to second birth occurred at a lower proportion in Sylhet than that in Dhaka in the 1995-99 period for birth interval less than 30 months. On the other hand, both Chittagong and Sylhet demonstrated significantly higher likelihood of transition to second birth for birth intervals of more than 30 months during the periods 1991-95 and 1995-99 periods. Interestingly, survival status and sex of child do not show any significant association with progression to second birth for birth interval less than 30 months. However, for birth intervals more than 30 months, surviving child decreases the progression from first to second birth sharply. This decline appears to be more pronounced during 1995-99 than that of 1991-95. This is a very important finding implying that the improvement in survival status of a child can reduce the progression from first to second birth resulting in a reduced level of TFR irrespective of the sex of the surviving child. This finding supports our previous explanations that without remarkable reduction in the level of infant mortality, it would be difficult to reduce the level of fertility further. On the contrary, if the child survival for boy or girl is improved rapidly, then the progression to subsequent birth can be reduced sharply as a potential impact. It is encouraging to know that the progression to second birth does not vary with the sex of the

previous child. This implies that the sex preference has declined substantially during the recent past.

**Progression from Second to Third Birth**

Two sets of models are constructed for analyzing progression from second to third birth, one set for the period 1991-95 and another set for the period 1995-99. According to the BDHS 1999/2000 data, among 2651 women with parity two, 486 women moved to parity three within 30 months and 644 moved to parity three during 30-59 months and the remaining 1521 women did not have third child during the period 1991-95. Similarly, out of 3236 second parity women during the period 1995-99, 316 women moved to parity three within 30 months, 826 moved to parity three during 30-59 months and the remaining 2094 did not have third child during the period 1995-99.

Those who were married at a relatively younger age (15 years or less) appear to have increased likelihood of making a progression from second to third birth at a birth interval of less than 30 months during both the periods 1991-95 and 1995-99. However, age at marriage does not show any association with progression from second to third birth at longer birth intervals (30 months or higher). This implies that the women marrying at young ages are likely to have their third birth at a shorter space. Secondary or higher level of education appears to be negatively associated with such progression only during the recent past irrespective of the length of birth intervals but there was no such significant association during 1991-95. In other words, we observe a stronger role of higher education on the progression from second to third birth during the recent past resulting in lower proportion of

**Table 7.2**
**Logistic Regression Estimates for Explaining the Parity Progression from Second to Third Births for the Periods 1995-1999 and 1991-1995**

| | Progression from Second to Third Birth | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1995-1999 | | | | 1991-1995 | | | |
| Variable | Beta | SE Beta | p-value | OR | Beta | SE Beta | p-value | OR |
| **Birth Interval <30** Months | | | | | | | | |
| Intercept | -0.122 | 0.315 | 0.698 | - | -0.756 | 0.358 | 0.034 | - |
| Age at Marriage >15 | -0.305 | 0.090 | 0.001 | 0.737 | -0.200 | 0.101 | 0.049 | 0.819 |
| Education | | | | | | | | |
| No Education (Reference) | | | | | | | | |
| Primary | -0.148 | 0.101 | 0.143 | 0.863 | 0.110 | 0.113 | 0.330 | 1.117 |
| Secondary or Higher | -0.681 | 0.114 | 0.000 | 0.506 | -0.193 | 0.132 | 0.143 | 0.825 |
| Division | | | | | | | | |
| Dhaka (Reference) | | | | | | | | |
| Barisal | 0.241 | 0.161 | 0.135 | 1.273 | -0.037 | 0.182 | 0.839 | 0.964 |
| Chittagong | 0.516 | 0.130 | 0.000 | 1.675 | 0.051 | 0.147 | 0.727 | 1.053 |
| Khulna | -0.245 | 0.137 | 0.074 | 0.783 | -0.437 | 0.158 | 0.006 | 0.646 |
| Rajshahi | -0.124 | 0.131 | 0.343 | 0.884 | -0.161 | 0.145 | 0.265 | 0.851 |
| Sylhet | 0.215 | 0.164 | 0.190 | 1.240 | 0.050 | 0.176 | 0.776 | 1.051 |
| Urban | -0.344 | 0.098 | 0.000 | 0.709 | -0.360 | 0.112 | 0.001 | 0.698 |
| Sex Composition at Index Child | | | | | | | | |
| All died (Reference) | | | | | | | | |
| One Girl | -0.339 | 0.338 | 0.316 | 0.712 | 0.755 | 0.375 | 0.044 | 2.128 |
| One Boy | -0.194 | 0.331 | 0.557 | 0.823 | 0.368 | 0.370 | 0.320 | 1.445 |
| Two Girls | -0.349 | 0.318 | 0.272 | 0.705 | 0.269 | 0.362 | 0.457 | 1.309 |
| Two Boys | -0.635 | 0.316 | 0.045 | 0.530 | 0.015 | 0.359 | 0.967 | 1.015 |
| One Girl One Boy | -0.988 | 0.312 | 0.002 | 0.372 | 0.127 | 0.351 | 0.717 | 1.136 |

| Variable | Progression from Second to Third Birth | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1995-1999 | | | | 1991-1995 | | | |
| | Beta | SE Beta | p-value | OR | Beta | SE Beta | p-value | OR |
| **Birth Interval >30** Months | | | | | | | | |
| Intercept | -0.694 | 0.404 | 0.086 | - | -0.170 | 0.303 | 0.575 | - |
| Age at Marriage >15 | -0.181 | 0.131 | 0.167 | 0.835 | -0.050 | 0.113 | 0.656 | 0.951 |
| Education | | | | | | | | |
| No Education (Reference) | | | | | | | | |
| Primary | -0.109 | 0.144 | 0.448 | 0.897 | -0.304 | 0.127 | 0.017 | 0.738 |
| Secondary or Higher | -0.910 | 0.176 | 0.000 | 0.403 | -1.002 | 0.163 | 0.000 | 0.367 |
| Division | | | | | | | | |
| Dhaka (Reference) | | | | | | | | |
| Barisal | -0.376 | 0.276 | 0.173 | 0.686 | 0.002 | 0.216 | 0.992 | 1.002 |
| Chittagong | 0.651 | 0.179 | 0.000 | 1.917 | 0.363 | 0.162 | 0.025 | 1.437 |
| Khulna | -0.463 | 0.211 | 0.028 | 0.630 | -0.423 | 0.185 | 0.022 | 0.655 |
| Rajshahi | -0.490 | 0.205 | 0.017 | 0.613 | -0.301 | 0.172 | 0.080 | 0.740 |
| Sylhet | 0.701 | 0.204 | 0.001 | 2.016 | 0.545 | 0.183 | 0.003 | 1.725 |
| Urban | -0.330 | 0.146 | 0.023 | 0.719 | -0.195 | 0.127 | 0.123 | 0.823 |
| Sex composition at index Child | | | | | | | | |
| All died (Reference) | | | | | | | | |
| One Girl | -0.345 | 0.433 | 0.426 | 0.708 | -0.050 | 0.324 | 0.878 | 0.951 |
| One Boy | -0.227 | 0.424 | 0.593 | 0.797 | -0.430 | 0.317 | 0.174 | 0.650 |
| Two Girls | -0.474 | 0.408 | 0.246 | 0.623 | -0.331 | 0.305 | 0.277 | 0.718 |
| Two Boys | -1.057 | 0.412 | 0.010 | 0.348 | -0.881 | 0.304 | 0.004 | 0.414 |
| One Girl One Boy | -1.030 | 0.398 | 0.010 | 0.357 | -0.890 | 0.293 | 0.002 | 0.411 |
| **Model Chi-square** | **283.86 (p=0.000)** | | | | **176.18 (p=0.000)** | | | |

third parity births among women with secondary or higher level of education. Compared to Dhaka, Chittagong and Sylhet demonstrate higher likelihood of transition from second to third birth irrespective of length of birth intervals during 1995-99. The same pattern is observed for birth intervals of 30 months or more during 1991-95 as well. Khulna showed lower likelihood of progressing to third birth irrespective of length of birth intervals but this is true for Rajshahi only for birth intervals longer than 30 months. Compared to both the children died, mothers with two surviving boys or one surviving girl and one surviving boy appear to have significantly lower likelihood of progressing to third birth irrespective of the length of birth interval for the period 1995-99. However, these relationships are not significant for the period 1991-95. The odds ratios indicate that these negative associations have become more pronounced during the recent past. It is noteworthy that the women who experienced death of one child make progression to have third child at the same manner as that of the women having both the children dead. In other words, death of one child, leaving another child alive, does not make any significant difference in making progression to have third birth. This implies that the infant mortality remains a strong barrier to the reduction of level of fertility in the foreseeable future in Bangladesh.

The multivariate analyses are performed to understand the role of some important factors in the progression of parity, particularly from first to second and second to third births. The purposes of the multivariate analyses are to: (a) examine the relative importance of the factors under consideration controlling for other variables, and (b) investigate the change in the impact of the selected factors during the period from 1991-95 to 1995-1999. We can list the main features from the findings as mentioned below:

(i) Higher age at marriage significantly restricts short birth intervals for progressing from second to third births. The impact of higher age at marriage in restricting births has been more pronounced during 1995-1999 than that of 1991-1995. This finding implies that recent increment in the age at marriage favours lower progression to third birth, however, the increase in age at marriage is very small resulting in a negligible impact in decreasing the overall level of fertility.

(ii) As compared to the women with no schooling, women having primary or secondary or higher level of education showed significantly lower odds of progressing from either first to second or second to third births. The odds of progressing to the next births are substantially reduced during the period 1995-1999. This implies that the role of some schooling as compared to that of no schooling have been strengthened in restricting short birth intervals, this is more so for women having secondary or higher level of schooling. This finding indicates that a substantial increase in the enrolment of female students at secondary or higher levels can produce longer birth intervals and thus in declining the level of fertility. Primary level of schooling do not contribute that much in this regard.

(iii) In general, progression to next parity occurs at short intervals in Sylhet and Chittagong, while progression occurs at long intervals in Khulna and Rajshahi. The policymakers need to formulate necessary strategies to widen the birthspacing in Sylhet and Chittagong divisions. These patterns appear to be more pronounced in the period 1995-1999 than that of the period 1991-1995.

(iv) The urban women prefer to have children at wider spaces. This pattern is seemed to have strengthened during the recent past favouring further spacing of births during the recent past than that of 1991-95.

(v) The death of previous child during infancy does not accelerate the progression to the next birth at short intervals, however, the parity progression is reduced significantly if the child survives for first to second birth and if both the children survive for second to third births. Apparently, the sex preference does not make any substantial difference in these progressions. However, the important message emerging from this finding is that child survival status remains to be a very strong barrier to widening the birthspacing in Bangladesh. In other words, without substantial and rapid improvement in child survival, the level of fertility cannot be reduced further at a rapid pace. Hence, the attainment of replacement level in near future will be a far cry.

## 8. Impact of Population Momentum

The process of population momentum has already begun in Bangladesh due to a declining trend in the level of fertility during the past decades. An increasingly large size of the young women are entering into the childbearing phase every year and this will continue until the population stabilizes. However, the eventual size of the stable population will depend on the time of attaining the replacement level fertility. If the attainment of replacement fertility is delayed, the size of population will be even higher. During the process of population momentum, the total fertility rate is expected to fluctuate with rise in the level of fertility occasionally. In this section, an attempt is made to examine the demographic transition in Bangladesh with special reference to the consequence of current status on the size of future

population. This section will provide some insights about the role of fertility in Bangladesh in the process of population momentum and it's relative impact and contribution to the overall growth of population.

The future trajectories of the population size will be determined by future trends in fertility, mortality, migration and the prevailing age-sex composition of population. On the basis of some hypothetical projections, we can quantify the contributions attributable to the different factors. The sole objective of these projections is not to test the accuracy of projections but to evaluate the role and relative contributions of different factors in the process of population momentum. Bongaarts and Bulatao (1999) proposed a technique to measure the contributions of different components of population growth: (i) immigration; (ii) fertility; (iii) mortality; and (iv) momentum. The contribution of these factors can be estimated on the basis of four hypothetical projections: (i) Standard (Ps): this variant is characterized by young age structure, rising life expectancy, fertility above replacement level, net immigration; (ii) Natural (Pn): this variant of projection includes young age structure, rising life expectancy and fertility above replacement level; (iii) Replacement (Pr): this variant represents young age structure and rising life expectancy; and (iv) Momentum (Pm): this variant includes young age structure only. In these projections, the influence of one factor is removed at each successive step. We have made projections for the period 2000-2025. It may be mentioned here that to complete the demographic transition, it would take a longer time. However, we can still estimate the contributions of different factors on the basis of short-term projections. The trend in the relative contributions would be evident from the estimates of the contributions of the underlying factors.

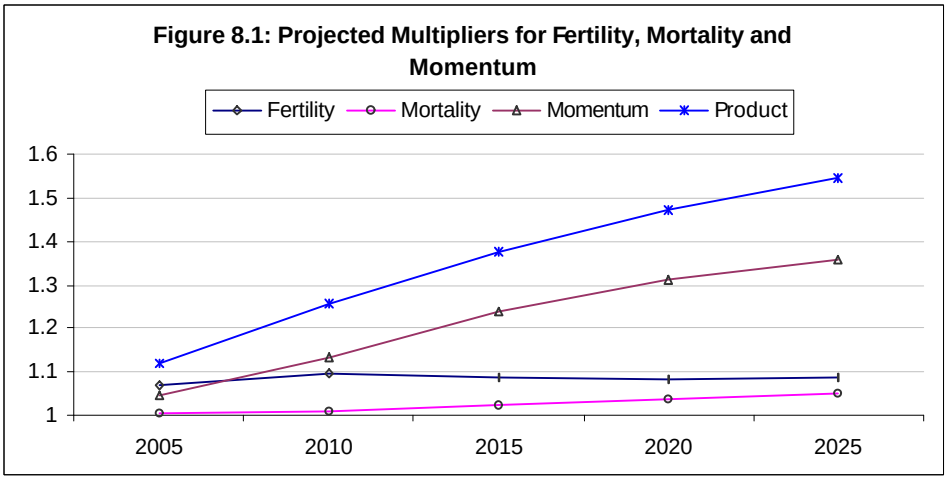
In order to estimate contributions of different components, Bongaarts and Bulatao proposed four multipliers: (i) immigration multiplier: Mi= (Ps/Pn); (ii) fertility multiplier: Mf=(Pn/Pr); (iii) mortality multiplier: Md=(Pr/Pm); and (iv) momentum multiplier: Mm=(Pm/P), where P represents the population size in 2000. The standard set of projection can be obtained as the combined effect of all factors such that Ps= Mi x Mf x Md x Mm x P.

Table 8.1 displays the contribution of different components of population growth for the period 2000-2025. We assumed that there will not be substantial impact of the immigration on the future growth of population and that is why immigration multiplier is assumed to be 1. This implies that there is no variation between the projection variants standard and natural, i.e. Ps=Pn. Under the natural variant of population projection, the population 132.1 millions in 2000 will be 203.9 millions in 2025. The fertility component appears to be most dominant until 2005 (1.068) in the growth of population, higher than that of mortality (1.003) and momentum (1.045). Fertility multiplier of population growth increases until 2010 (1.097) and then declines slightly and seems to be stabilized thereafter. Mortality factor steadily increases to 1.05 in 2025. However, this factor remains small as compared to other factors. It is evident with time momentum multiplier becomes overwhelmingly the major component of population growth since 2010.

**Table 8.1**
**Population Projections for 2000, 2005, 2010, 2015, 2020 and 2025 and Corresponding Factor Multipliers for Fertility, Mortality and Momentum**

| Year | Projected Population | Factor Multipliers | | | | |
|---|---|---|---|---|---|---|
| | | Migration | Fertility | Mortality | Momentum | Product |
| 2000 | 132.1 | - | - | - | - | - |
| 2005 | 148.0 | 1.00 | 1.068 | 1.003 | 1.045 | 1.119 |
| 2010 | 166.1 | 1.00 | 1.097 | 1.011 | 1.133 | 1.257 |
| 2015 | 181.7 | 1.00 | 1.087 | 1.023 | 1.237 | 1.376 |
| 2020 | 194.6 | 1.00 | 1.081 | 1.037 | 1.313 | 1.472 |
| 2025 | 203.9 | 1.00 | 1.085 | 1.050 | 1.355 | 1.544 |

Findings from Table 8.1 suggest that the 70 per cent (using logarithmic scale) of the growth of population during 2000-2025 can be attributable to the effect of population momentum. Fertility will be a major contributor of the growth until 2006/2007 and the contribution of fertility will be 58 per cent in 2005. According to the natural variant of projection, the total fertility rate will be around 3.2 until 2005. Hence, these findings supplement the information gap from the analysis presented in other sections. It may be stated that due to the initiation of population momentum, there will be shift of large proportion of women to the childbearing ages. The level of fertility will remain high at the initial stage (pre-momentum stage) due to the *tempo* effect attributable to the shift in the mean age at childbearing. The effect of momentum can be reduced by delaying the first birth as well as by widening the space between births. The effect of momentum will be enhanced by reducing the birth intervals. Table 6.5 shows that the median age at childbirth has either declined slightly or remained same and birth intervals have not increased appreciably during the period 1993-96. This might have resulted in offsetting impact on the level of fertility, the impact of slight increase in birth interval is being offset by a lower median age at childbirth.



## 9. Current Status of Plateauing and Lessons Learned

The decline in the level of total fertility rate during 1989-93 was very fast. The TFR declined from 5.1 in 1989 to 3.4 in 1993 (NIPORT 2001). Since 1993, the level of TFR appears to have remained unchanged although the contraceptive prevalence rate has been increasing steadily. This paper examines different aspects of the trend and level of fertility and provides some specific suggestions regarding current status and future directions. Some of the important features are summarized in this section.

The most important finding revealed in this study is that the fertility pattern has been shifted towards a central tendency of younger age of childbirth during the recent past. The births occur with a slightly lower spread and the skewness of the fertility curve has been reduced substantially during the recent past.

The birth intervals have been increased sharply during the period 1989-93 and we observe a corresponding decline in the level of total fertility rate as well. This indicates that the decline in the level of fertility during that period could be attributed mainly to the sharp increase in birth intervals. This implies that the increase in the level of contraceptive prevalence rate showed an effective correspondence with spacing of births.

The birth interval increased slightly during the 1993-99 period. In other words, the contraceptive prevalence rates could not effectively widen the spacing of births. This can be attributed to discontinuation of contraceptive methods at different duration. Although the twelve-month continuation rates appear to be similar, it is observed that the continuation rate at duration longer than twelve months is lower in recent times for modern methods, such as oral pills and condom that constitute almost two-thirds of the modern method users.

Delayed age at marriage is expected to reduce the level of fertility. The regional differentials suggest an opposite view in Bangladesh. The high performing regions in Bangladesh, in terms of decline in fertility and increase in the level of CPR, Khulna and Rajshahi displayed consistently relatively lower age at marriage. On the other hand, despite the highest mean age at marriage in Sylhet and Chittagong, the performance in both reducing the level of fertility and in increasing the level of CPR is lagging far behind Khulna and Rajshahi. The difference is made by wider spacing of births in Khulna and Rajshahi while shorter spacing in Sylhet and Chittagong.

The contribution of the total fertility inhibiting effects indicate that during the 1975-1999 period the share of contraception increased steadily from 10.5 per cent into 58.2 per cent in 1999, and the contribution of postpartum infecundability reduced from 74.5 per cent in 1975 to 27.6 per cent in 1999. The share of the contribution of marriage varied within a modest range of 11-15 per cent during these years. Hence, it is clearly evident that contraception contributed to the decline in the level of total fertility at an increasingly important way. We can relate this finding with the increase in birth intervals during the recent past.

The *tempo* effect has declined consistently from mid-eighties to mid-nineties for all parities. The *quantum* has either increased or remained similar for lower parities but declined steadily for higher parities. Since 1993, we observe an erratic pattern. The *tempo* effect showed an increase in the 1992-94 period than that in period 1994-96. The increased *tempo* effect can be attributed to the slight increase in birth intervals for each parity. In the absence of *tempo* effect the total fertility rate would be about 3.9 during 1999/2000 which is

slightly higher than that of 1996/97 (3.8). Hence, the total fertility rate could be reduced at a faster rate by widening the space between consecutive births.

It is estimated that 65.0 per cent of the growth of population during the period 2000-2025 will be attributable to the current young age structure of the population. The high level of fertility will be the major contributor to the growth of population around 2005. Since then, population momentum will cause the growth of population at an increasingly rapid pace. The three most feasible approaches to reduce the impact of population momentum are: (i) delayed age at marriage; (ii) delayed age at first birth; and (iii) wider spacing of successive births. The last point is the most successful proven approach for Bangladesh which has been observed in Khulna and Rajshahi divisions. Remaining two factors need long term change in the socio-economic and demographic behaviour and practice, while wider spacing of successive births can be attained through improving the service delivery system of the prevailing family planning programmes.

The wanted fertility rate has increased slightly during the recent past. In the highest performing region, Khulna, the sterilization regrets has increased from 8.7 per cent in 1996/97 to 23.2 per cent in 1999/2000. Most of those who regret for sterilization mentioned that they wanted to have more children. The infant mortality rate has not declined rapidly during the recent past. Hence, it is likely that without improving the survival of children a further decline in the level of TFR would be a formidable task. Our multivariate analysis results confirmed this assertion.

The issue of child survival needs to be given a very high priority. If the child survival situation cannot be improved within a short span of time, then a further decline in the level of fertility will be a challenging task. It is observed from the analysis that the role of infant mortality has been playing an increasingly important role as the level of fertility is approaching the replacement level. This is not quite unexpected. Because when the women give birth to four or higher number of children then they are still left with children above the ideal size after infant and child mortality. But when the actual number of children is three or less then it is likely that with a prevailing high infant and child mortality the number of children would be eventually less than the ideal size. The situation in Khulna strongly supports this view. The total fertility rate in Khulna is 2.7, the ideal number of children is 2.3, the wanted fertility rate is 1.9, but the under five mortality is 87 per thousand live births. In other words, close to 1 child dies, out of 10 births, before reaching their fifth birthday. It reveals that 10 per cent of the births occurred to a mother, on an average, approximately 0.3, do not reach their fifth birthday. This implies that the women are left with 2.4 children with age five.

Experience from Khulna and Rajshahi reveals the major barriers;r to a further decline in fertility.

- During 1993-99, TFR increased from 2.5 to 2.7 in Khulna.
- Adolescent pregnancy increased from 36 per cent to 42 per cent during 1993-99.
- Mean ideal children remained constant at 2.3 during 1996-99.
- Almost 1 out of 10 births does not reach fifth birthday (0.25 out of 2.5).
- Number of survived children of 5 years of age/woman = 2.5-0.25=2.25 which is lower than mean number of ideal children (2.3).
- This caused an increase in the level of TFR to 2.7 in Khulna during 1996-99.

- The same reversal is taking place in Rajshahi (number of survived children = 2.4 < mean number of ideal children =2.5).

If we consider the survival beyond 25 years since birth, the number of children would be lower that of the mean ideal children. Hence, a surprising increase in the sterilization regrets provides us a very clear and strong message. We have to remember that mean number of ideal children is above 2 for women of different age groups as well as irrespective of the level of education. So the 'guarantee number' of ideal children is expected to be not less than a minimum number of 2 for every mother. In other words, the dispersion of this measure is very small. To ensure at least two surviving children for every woman is a precondition to attain replacement level fertility in the present socio-economic setting of Bangladesh. It may be noted here that the mean number of ideal children has not declined during the past with a decline in the TFR, while the wanted fertility rate showed a slight but meaningful rise.

We can summarize our findings as follows: The fertility had declined sharply during the period 1989-93, as a result of rapid increase in birth intervals. Since 1993, the rise in birth interval is very small and hence the level of fertility remains unchanged. As the TFR is approaching the replacement level, without similar decline in infant and child mortality rates, the TFR shows an upturn in high performing areas, Khulna and Rajshahi. This implies that a guarantee number of ideal children should be ensured in order to achieve a replacement level fertility. Without a rapid improvement in child survival, it would be difficult to achieve replacement level fertility in near future.

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## 10. Conclusion and Policy Recommendations

This paper focused on the exploration of the reality underlying the plateauing of fertility level during the recent past. The exploratory work was based on several analyses in relation to the levels and trends of the measures of fertility. Our analyses revealed some very interesting features that highlight the reasons underlying the apparent plateauing of fertility during the recent past in Bangladesh. The important findings are summarized below:

(i) The results indicates that since 1993/94 the TFR has stalled in the vicinity of 3.3 due to population momentum effects, shifting of childbearing towards younger ages, shifting towards adoption of a less effective method mix, no substantial improvement in child survival status and reduction in postpartum infecundability period.

(ii) Unlike the situation in countries where fertility decline followed socio-economic development, the level of fertility plateaued at the pre-momentum phase in Bangladesh, while in Taiwan, the plateauing occurred after attaining replacement level. The plateauing in Taiwan has been observed at a level much below the level of replacement, while in Bangladesh, the plateauing has occurred at a level much higher than the replacement level.

(iii) The actual level of fertility in Bangladesh in 1999/2000, after adjusting for *tempo* effect, would be close to 4, more precisely 3.9, as compared to that of 3.8 in 1996/97. In other words, there is a slight increase in the level of fertility during the recent past. The conventional TFR appears to be lower due to an upward shifting in

the parity specific birth intervals. An increase in the parity specific birth intervals causes a decline in the level of conventional TFR.

(iv) It is alarming that the mean age at marriage has been playing a role in Bangladesh which is just opposite to what happened in countries like Taiwan. In Taiwan, during the demographic transition, delayed marriage contributed substantially in declining the level of fertility, while in Bangladesh, the regions that are approaching the replacement level are characterized by low age at marriage. On the contrary, the regions that are lagging behind in achieving the replacement level fertility are characterized by higher age at marriage. However, regions with low level of TFR in Bangladesh have longer birth intervals, which is just reverse in the regions with high level of TFR. In other words, delayed age at marriage does not contribute, apparently, to the decline in the level of fertility, but from the multivariate analysis we observed that lower age at marriage can be linked with increased progression to next birth at short intervals. This implies that although the delayed marriage is not directly associated with reduction in the level of fertility, it can act through increasing birth intervals to reduce the level of fertility. This means that in the lagging regions like Sylhet and Chittagong, in the absence of delayed marriage, the level of fertility would be even higher. On the contrary, instead of lower age at marriage in the leading regions like Khulna and Rajshahi, if the age at marriage could be delayed then the decline in the level of fertility would be much faster.

(v) We observe that during the recent past, there is a reversal in the role of major contributors of fertility, resulting in offsetting effect on the overall level of fertility. During 1993-96 period, the median age at first marriage, median age at first birth and median duration of breastfeeding declined favouring a higher TFR, while during the same period, increase in the continuation of oral pills, injectables and condoms and median birth interval contributed to a decline in TFR. Hence, during the period 1993-96, the stagnation occurred due to offsetting effects of these factors. Surprisingly, the stagnation of the level of fertility during the period 1996-99 can be attributed to the same factors acting in opposite direction. During the period 1996-99, we observed increase in median age at marriage, median age at first birth and median birth interval all contributing to a lower TFR, but a decrease in the continuation of two major contraceptives, oral pills and condoms, that constitute almost two-thirds of the modern method users, and a further decrease in the duration of breastfeeding contributed to an increase in TFR. Hence, we observed another stagnation, during the period 1996-99. The two periods of stagnation, opposite in direction, during a short span of six years, can be characterized as follows: (a) the stagnation during 1993-96 period can be attributed to the fact that the continued success of family planning programme in spacing births was offset by reversal in the socio-demographic factors, such as age at marriage and age at first birth; and (b) the stagnation during 1996-99 period appears to be due to set-back in the continuation of two major modern methods of the family planning programmes although socio-demographic factors registered an upturn.

(vi) The statistical characteristics, as revealed from location, dispersion and skewness of age specific fertility rates, indicate an emerging pattern: (a) the fertility is tending towards young age during the recent past, (b) the births are occurring at a relatively

lower span in recent times, that is, the births are taking place at shorter distance from the central tendency of fertility, and (iii) the fertility curve is now less skewed to the right, indicating that more births are taking place within a shorter span now than before.

(vii) It has been observed that the role of son-preference has been diminished to a large extent during the recent past. This means that the level of fertility is not high due to son preference according to the findings of this study. However, the emerging issue is the high infant and child mortality rates. From various indicators, we can reach to the conclusion that unless the child survival is improved to a great extent, it will act as a strong barrier to attain the replacement level fertility in Bangladesh. These indications are clear from the recent fertility patterns in the regions where the fertility is approaching replacement level at a rapid pace.

(viii)A review of age at marriage pattern shows that over the last few decades there has been little improvement in the age at marriage. Teenage childbearing is also very high in Bangladesh. According to the 1999/2000 Demographic and Health Survey, more than 90 per cent cases marriage occurred at an age below 20 years. As long as marriage and children are universal goals, no society can reasonably expect to achieve replacement level of fertility by only postponing union and spacing births. Permanent fertility reduction largely depends on desired completed family size at the end of the reproductive life span.

(ix) Our analysis suggests that in recent years contraception has emerged as the highest fertility reducing factor in Bangladesh. Until early 1990s, postpartum infecundability was the most important and strongest fertility reducing factor in Bangladesh, but by 1993/94 contraception had become 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 values of the index $C_c$ from 0.931 in 1975 to 0.495 in 1999/2000. 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 *et al.* 1992). It is to be mentioned here that although there is an increasing trend in the impact of the marriage component, reflecting the effect of increased proportion non-married and/or increased age at marriage, the rate of change is very slow. The prevailing cultural and social norm in Bangladesh is unlikely to permit a change in the proportion non-married beyond a certain limit and the prospect for an immediate rise in age at marriage for females does not seem to be very bright. It is to be noted that the joint effect of marriage and lactational infecundability did not change much over the period 1975 – 1994 as the declining effect of lactational infecundability has been offset by the increasing effect of marriage. This leads to the conclusion that the future reduction in fertility in Bangladesh may be largely dependent on increased use of effective birth control methods. However, the problem with the Bangladesh family planning programme (FPP) is that the current method mix is losing its effectiveness due to decline in the use of permanent or semi permanent methods, and increased use of pills and traditional methods with high failure rates.

(x) As the projection shows that the contribution of fertility to the future growth of population will continue until 2005/6, then the growth of population will be largely attributable to the population momentum. The present status of plateauing may

continue for another four or five years if the past trends continue in the near future. However, it is observed from number of children ever born that the level of fertility will decline eventually, once the pre-momentum impact of young age structure moves towards the middle ages.

The current problem of plateauing of fertility needs special attention. If the problem continues for a long time, then the process of attaining the replacement level of fertility will be delayed further and the population momentum after attaining the replacement level of fertility will produce a much larger size of the population than expected before the population is stabilized. Some policy options are mentioned below:

(i) The most important policy options for reduction of fertility as well as for reduction of potential impact of population momentum are to delay marriage and increase birth intervals, particularly the first birth interval.

(ii) Improved education and opportunities for females in income generating activities can accelerate the process of economic development and thus the role of economic development can be strengthened for a further decline in the level of TFR.

(iii) Delay in marriage can be ensured through, at least, high school education for girls. Opportunities for income generating activities for girls need to be created at all levels in the society. Teenage marriage and teenage fertility need to be socially discouraged due to high risks involved with both health and fertility.

(iv) To improve the child survival in Bangladesh, immunization programmes need to be extended effectively in order to increase the extent of full coverage of essential vaccines to an optimum level. However, immunization alone cannot prevent all these deaths. A large proportion of under 5 children appear to be malnourished in Bangladesh and hence they become easy prey to severe diseases. To reduce the impact of malnutrition, the programmes on alleviation of poverty need to be strengthened. Education for all the children is one step forward to provide these children adequate knowledge about their health and nutrition.

(v) The method-mix of contraception can be made more effective through encouraging longer-acting methods. The current status of longer acting methods, particularly sterilization, is discussed by Islam and Chakraborty (2001). It is essential to improve the quality of care, because the major reason for discontinuation of methods, such as oral pills, injectables and IUD is side-effects. The birth space can be effectively widened through improving quality of care in the family planning programmes. There is still unmet need for limiting child births among a moderately large proportion of women, hence, the programmes for sterilization need to be given renewed priority to improve the effectiveness of the method-mix.

(vi) The most recent reversal in the causes of stagnation in the level of TFR indicates that the continuation of some modern methods have declined during the recent past. This might be attributed to, among other reasons, the recent change in the door-steps services at the grassroots levels to one-stop service being implemented through the HPSP. The impact of the change in the service delivery system on the long-term use of contraception in rural areas of Bangladesh needs to be examined very carefully in order to resolve the concerns of different groups of users.

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