

Relationship among Contraception, Abortion, and Fertility: Lessons Learned from Matlab, Bangladesh

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Abstract

Abortion was found to increase with contraception in some populations and decrease in other populations. The study investigated the reasons for this contradiction using selective measures limited by paucity of detailed data on abortion from the Matlab Demographic Surveillance System (DSS), Bangladesh, for the 1978-1998 period. A comparison of abortion, contraceptive prevalence rate (CPR), desired fertility, and total fertility rate (TFR) over time formed the basis of the study. The desired fertility declined over time. Fertility was found to be converging to the desired fertility, and the process of convergence was faster in the MCH-FP area. The relationship between the CPR and the total abortion rate (TAR) was positive, negative, and zero during the convergence. Magnitude of abortion depends on the quality of reproductive health services; and a comprehensive MCH-FP program is expected to bring down both fertility and abortions substantially by increasing contraception.

Both fertility and abortion are problems in Bangladesh and many other developing countries. About 50 million abortions occur each year in the world, of which about 25 million are illegal (Henshaw, Singh and Has, 1999). In Bangladesh, maternal death (about 4 per 1,000 live births) is one of the highest in the world; about 25 percent of these deaths occur due to abortion (Mohammad, 1986; Fauveau and Blanchet, 1989). Abortion is also a leading cause of maternal morbidity in Bangladesh (Khan et al., 1986). It is, therefore, important for Bangladesh and many other developing countries to know how both fertility and abortion can be reduced.

Abortion was found to increase with contraception in some populations, but decrease with contraception in some other populations. It was also found to increase in a population for a period, but decrease in the same population for a different period (Singh and Sedgh, 1997; Alan Guttmacher Institute, 1999; Senlet, Curtis, Mathis, and Raggars, 2001). This

contradiction may make the planners and policy makers confused. An understanding of the relationship of contraception, abortion, and fertility should, thus, help policy-makers take proper measures to reduce both fertility and abortion in a population.

Bongaarts and Westoff (2000) have developed an analytical model showing the relationship among contraception, abortion, and fertility. The model relates the total abortion rate (TAR), defined as the sum of the age specific abortion rates over all ages of the childbearing period, and the total fertility rate (TFR) to their different other direct determinants. It has the following equations:

$$TAR = Y_R(1-e*u)/I_A - TFR*I_B/I_A \quad (1)$$

$$p = TAR/(TAR+UITFR) \quad (2)$$

$$TAR = p*(Y_R*(1-e*u) - ITFR*I_B)/(p*I_A + (1-p)*I_B) \quad (3)$$

where,

Y_R is the average number of years in which women are both fecund and exposed to the risk of child bearing, u is the proportion of Y_R during which contraception is practiced, e is the average effectiveness of contraception, I_B is the birth interval, I_A is the abortion interval, p is the probability of abortion of an unintended pregnancy, $ITFR$ is the intended total fertility rate, and $UITFR$ is the unintended total fertility rate.

According to these equations, the TAR is inversely related to the prevalence and effectiveness of contraception and to fertility preference, but is directly related to the probability of abortion following an unintended pregnancy, and to the average duration of the fecund exposed reproductive years. The longer birth and abortion intervals are also associated with lower TAR. The authors have demonstrated from hypothetical examples how reduction in the abortion rates can be achieved by increases in the various determinants,

specifically by increases in contraceptive prevalence and effectiveness. Under the assumption of constant fertility, 100 percent effective contraceptive, and probability of abortion of an unintended pregnancy, $p = 1$, a rise in 10 percentage-point in contraceptive prevalence averts 1.6 abortions per woman at any given level of fertility. Of course, the number of abortions to be averted by a rise in contraceptive prevalence depends heavily on the level of p . Moreover, it is clear from equation 3 that an increase in contraceptive prevalence or effectiveness may be compensated (even overly) by an increase in p . The paper has investigated this relationship in Bangladesh from 1978 to 1998 when the country was passing through a demographic transition.

Data and Methods

Data for this study were drawn from Matlab where the ICDDR,B: Centre for Health and Population Research maintains a Demographic Surveillance System (DSS). Matlab is a typical rural area of Bangladesh. The DSS covers a population of about 200,000. In the DSS, the Community Health Workers (CHWs) collect data on deaths, marriages (since 1974), migrations, births and other pregnancy outcomes, including abortions (since 1978), since 1966. The CHWs collect these data through home visits at a two-weekly (monthly since 1997) interval. Their work is supervised and checked at different levels. Thus, a well-defined system of management and supervision to produce quality data exists in Matlab.

The ICDDR,B started an MCH-FP project in October 1977 in half of the DSS area, known as MCH-FP area, to test the hypothesis that a demographic change can be induced in a poor society through an intensive MCH-FP program without any intervention in socioeconomic status. The other half of the area, known as Comparison area, remained under the usual program of the Government of Bangladesh. Along other non-clinical contraceptives, injectables are delivered at door-step in the MCH-FP area, whereas the injectable users are required to visit Family Welfare Centres (FWCs) for it in the Comparison area. Regular supply of different types of contraceptives is ensured in the MCH-FP area, but it can not be done in the Comparison area. The MCH-FP project has a record keeping system (RKS) to record and monitor MCH-FP services routinely, but it is absent in the Comparison area. Besides, contraceptive-related side effects are better managed, and supervision is much

stronger in the MCH-FP area. As a result of all these, the contraceptive prevalence rates (CPR) in the two areas became very different from each other within a year of launching the MCH-FP project. The CPR was about 20 percentage points higher in the MCH-FP area than in the Comparison area (48% vs 68%) in 1996 (Razzaque, Nahar, Sarder, van Ginneken and Kashem, 1998).

Before the launching of the MCH-FP project in 1977, both the areas were demographically and socioeconomically same (Razzaque, Nahar, Sarder, van Ginneken and Kashem, 1998; LeGrand and Phillips, 1996). After the implementation of the MCH-FP program, the decline in both fertility and mortality was much faster in the MCH-FP area than in the Comparison area. The TFR remained one child less, and under-5 mortality was lower by about 20 percent in the MCH-FP area than that in the Comparison area for the most part during the last 20 years. All these suggest that the MCH-FP area received more improved health and family planning services than the Comparison area for this period.

Abortion is a sensitive issue in Bangladesh, and many women who have an abortion do not like to disclose this to others, particularly to outsiders. Because of this, it is extremely difficult to get a clear picture of abortions from survey data in this country. The situation is quite different in the Matlab DSS area where the CHWs have been visiting each household regularly for the last 30 years to collect vital events. If pregnancy of a woman is observed or reported during the routine visit of a CHW to either area, it is recorded. From 1966 to 1976, the outcome of a pregnancy was registered as one of the three events: live birth, stillbirth, or fetal wastage. From 1977 to 1998, however, fetal wastage was classified either as a spontaneous abortion or as an induced abortion. A CHW and her supervisor jointly fill up a pre-designed pregnancy outcome form. They know the correct definition of each of the outcome of a pregnancy, including spontaneous and induced abortions. Yet, some induced abortions were found to be reported as spontaneous abortions (Bhuiya, Aziz and Chowdhury, 1999), and the number of abortions in each area was found to be underestimated (Johnston, 1999). The proportion of misclassification and underestimation is thought to be constant over time and between areas, because the same procedures have been followed in each area (this point was checked from several sources) throughout the time. Thus, the trend in abortion over time and comparison between areas are not expected to be affected by misclassification or

underreporting. In this study, an abortion means an induced abortion, including menstrual regulation (MR). The MCH-FP project discontinued giving MR services since 1984. If a woman of the MCH-FP area needs to have a MR, she is advised to go to a FWC. Both MCH-FP area and Comparison area have FWCs. The desired family size (DF) was available for 1975, 1984, and 1999 from three sample surveys in the area. From these data, DF for 1979 and 1997 was estimated by linear interpolation.

A big increase in the number of abortions was observed in the MCH-FP area just after launching the program in the late 1977, mainly due to the MR service of the program. But, the MR service was withdrawn in 1984. As the facilities to have an abortion were the same since then (1984), the p was expected to be the same in both the areas. On the other hand, with the passes of time after 1984, the social and psychological taboos toward an abortion were eroding in the country throughout the study period, particularly by the end of the 1980s due to a strong desire for fertility control (Cleland et al., 1998), the p increased several times (Razzaque et al., 2001).

In addition to the fertility and abortion measures shown in equations 1-3, we have also used abortion ratio (AR) defined as the ratio of abortions to live births multiplied by 1,000 as a variable in our analysis. It is a well-known measure of abortion.

$$AR = A/B \quad (4)$$

where, A is the number of abortions, and B is the number of births in a population in a specific time period.

If in the right side in equation 4, the total number of pregnancies is used instead of B, it will be the probability of abortion of a pregnancy (p'), whereas (p) in equations 2 and 3 is the probability of abortion of an unintended pregnancy. The DSS did not have the required data on UITFR to calculate (p) for each year, but had data to calculate AR and (p').

There may be different measures of a demographic parameter. For example, fertility can be measured by crude birth rate (CBR), general fertility rate (GF) and total fertility rate (TFR).

Each one has some merits and demerits and is used on the basis of the purpose of the study and also on the availability of data for the particular measure. Some of the measures can be used interchangeably without affecting the interpretation of the results of a study. In this study, we have used DF and ITFR as a fertility measure interchangeably.

Results and Discussions

Fig. 1A presents the three-yearly moving average of CPR, TAR, AR, and TFR from 1978 to 1998 and of DF for 1979, 1984, and 1997 for the MCH-FP area. These values for the Comparison area for the same period are shown in Fig. 1B. We have also calculated (p') (not shown here), the probability of abortion of a pregnancy (intended or unintended) and found that its pattern and trend were almost the same as those of the AR.

The DF declined from 4 in 1979 to about 2.5 in 1997, but remained comparable between the two areas at any time. It is mentioned in the method section that p was increasing but was the same between the areas except for the period 1978-1984 when it was higher in the MCH-FP area due to abortion facilities of the MCH-FP program.

It may be noted from these figures that the TFR was converging to DF in each area. The rate of convergence was much higher in the MCH-FP than that in the Comparison area until 1990. This was mainly due to a much higher CPR in the MCH-FP area. Since 1990, the rate of convergence was higher in the Comparison area. A close examination of the figures reveals that since 1990, a relatively higher increase in the CPR and abortion ratio jointly caused the decline in the TFR more in the Comparison area than in the MCH-FP area, where the rate of increase in the CPR was lower and the abortion ratio was rather declining.

We will now examine the role of contraception in reducing the total abortion rate (TAR) in Matlab areas. The TAR declined in the MCH-FP area from 1979 to 1984 mainly due to the increase in the CPR. But, the TAR increased in the area during 1986-1990. This increase was the result of the over compensation of the effect of the increased CPR on the TAR by an increase in the p and decreased in ITFR as in equation 3. The TAR remained stable during 1990-1998, although the CPR increased during this time. This stable state in the TAR

suggests that the negative effect of the increased CPR on the TAR was just compensated by the positive effect caused by some increase in the p and decrease in the ITFR. Unfortunately, we did not have necessary data to separate out the effects of p and ITFR.

The TAR increased in the Comparison area from 1979 to 1990, while the CPR also increased. The rate of increase in the CPR was much lower in the Comparison area than in the MCH-FP area during this period. There was no doubt that the negative effect of the CPR on the TAR was over compensated by the positive effect of the increased p in the area resulting an increase in the TAR. During 1990-1997, the CPR increased at a higher rate, but the TAR remained almost stable. Here also, the positive effects of both p and ITFR most likely compensated the negative effect of the increased CPR.

It may be noted that, except at the beginning of the MCH-FP project when the MR facility was available in the project, the TAR was always higher in the Comparison area, and during 1990-1997, when the TAR was almost stabilized in both the areas, the TAR in the Comparison area was almost three times higher. This difference in the TAR between the areas can be easily explained by the equation 3.

As mentioned earlier, p in 1991 was much higher than that in 1984, and it was also same between the areas in other times except 1978-984 period, when the MCH-FP area had the MR facilities from the project.

It is reasonable to assume that Y_R and I_B between the areas were same at any time point. The I_A was found to be about a week shorter in the MCH-FP area (Bairagi and Ahmed, 1999). This small difference in I_A will have almost no effect on the TAR (Table 1 in Bongaarts and Westoff, 2001). The difference in contraceptive effectiveness (e) between the areas is also thought to be negligible. So, among all the parameters in the right side of the equation 3, the difference between the areas was only in u . It was almost 20 percentage points higher in the MCH-FP area in most of the time from 1979 to 1998. The higher value of u made the TAR much lower in the MCH-FP area than in the Comparison area. In other words, a comprehensive MCH-FP program is expected to bring down the TAR by increasing the CPR.

Conclusions

It appears from this study that fertility in a population converges to the desired fertility, which, however, depends on the level of development in a broad sense. Quite likely, a population uses different proximate determinants of fertility, including contraception and abortion, in this converging process. An MCH-FP program helps bring down fertility to the desired fertility or close to it quickly by increasing the CPR mostly, and this happened in Matlab, where the convergence was much faster in the MCH-FP area due to the higher CPR. If the CPR is not adequate, people will depend on abortion and/or other proximate determinants to reach the desired fertility. In this whole process, the relationship between contraception and abortion may be quite complex. The relationship between these two may be positive as found in the Comparison area during 1979-1990, negative as found in the MCH-FP area during 1979-1986, and may be zero as found in both the areas during 1991-1997. It depends on (p), DF, and effectiveness of contraception, and a trade off between the CPR and abortion depending on the relative cost (material, social, cultural, etc.). If someone desires to bring down the number of abortions by increasing the CPR, the level of increase should be high so that couples do not need to depend much on abortion to avoid an unintended pregnancy. Such a situation existed in the Matlab MCH-FP area during 1979-1986.

The stable state of TAR in both MCH-FP area and Comparison area during 1991-1997 with a much higher value in the Comparison area suggests that, under a certain level of cost for contraception and quality of MCH-FP service, the TAR will come down to a certain level. Certainly, contraception was less expensive in the MCH-FP area than the Comparison area throughout the time, including the 1991-1997 period. That is why the TAR was stabilized at a much higher rate in the Comparison area. The stable state of TAR in the MCH-FP area during 1991-1997 suggests that a minimum level of TAR will be unavoidable even under an optimum level of MCH-FP service or contraception to avoid any unintended pregnancies caused by contraceptive failure or other reasons.

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Figure 1A. Contraceptive prevalence rate(CPR), total abortion rate(TAR, multiplied by 10), abortion ratio(AR),desired fertility(TFR) in MCH-FP Area, 1978-98.

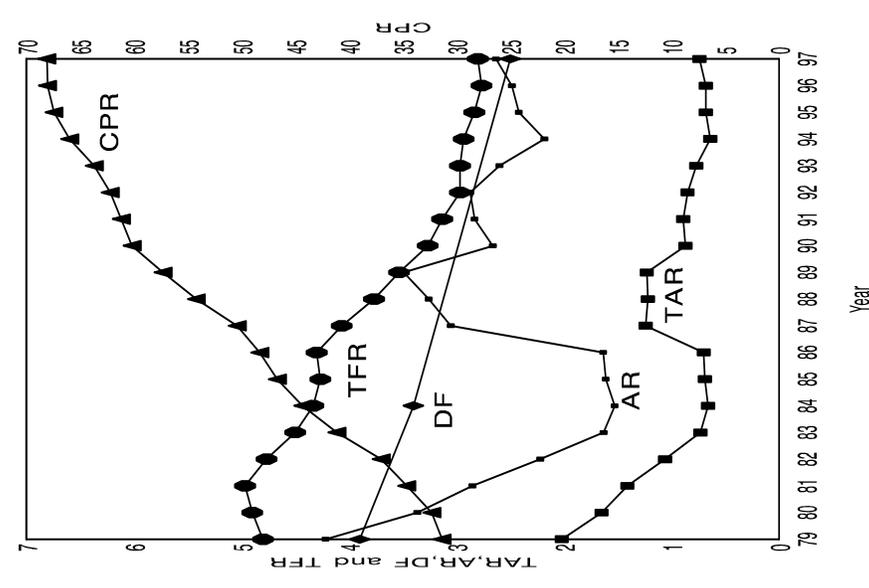


Figure 1B. Contraceptive prevalence rate(CPR), total abortion rate(TAR, multiplied by 10), abortion ratio(AR), desired fertility(TFR) in Comparison area, 1978-98.

