Do Family Planning Services Affect Choice of Abortion Method in Bangladesh?*

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Introduction

Among the benefits of improved family planning services are reductions in the number of abortions women might otherwise seek. Worldwide, there are more than 45 million abortions each year, of which nearly 20 million are illegal or clandestine; nearly all of the clandestine abortions are in developing nations (Wulf, 1999). Each year, about 80 thousand maternal deaths, or one in eight maternal deaths worldwide, result from illegal abortion, i.e., abortion "not provided through approved facilities and/or persons" (World Health Organization, 1997). Where family planning helps reduce the number of abortions, it presumably can also help reduce maternal mortality.

In earlier research (Rahman, DaVanzo, and Razzaque, 2001), we analyzed the effects of family planning services on rates of abortion in Matlab, a typical rural subdistrict of Bangladesh. In that work, we found that abortion rates were significantly lower in the area with better family planning services than in an otherwise-similar comparison area. Abortion of unintended pregnancies was similar in both areas, but the higher levels of contraceptive use in the area with better family planning services led to lower levels of unintended pregnancy there.

In this work we extend our research to analyze what effect family planning services may have on the choice of abortion methods among those terminating their pregnancies. In addition to examining overall rates of abortion by method in each area and how they changed over the 12-year time period we consider (1989-2000), we examine differences by age and education. We also conduct multivariate analyses in which we consider the effects of additional covariates (husband's education, the size of the dwelling unit, religion, whether the woman wanted to have an another child, and prior

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contraceptive use). We conclude with a discussion on what our results mean for family planning programs seeking to reduce abortion mortality.

Abortion in Bangladesh

Bangladesh is a poor, traditional, and religiously conservative nation, with a small geographic area but a large population (131 million) and one of the highest population densities in the world (1,007 per km^2) (World Bank, 2002). Since independence in 1971, Bangladesh has had a strong political commitment to reduce its high rate of population growth. In the past three decades, fertility in Bangladesh has fallen by nearly half, from 6.3 children per woman in the early 1970s to 3.3 children in the late 1990s (National Institute of Population Research and Training et al., 2001).

Early-gestation pregnancy termination is legal in Bangladesh if performed in a medical setting before the pregnancy is clinically confirmed. Such pregnancy terminations are done through manual vacuum aspiration by trained female paramedics at the government Health and Family Welfare Centers and are known as "menstrual regulations" or "MRs." Menstrual regulation can be performed only with the consent of the woman's husband and only within 8 weeks of the last menstrual period. Menstrual regulation has been available through government and other medical facilities in Bangladesh since the late 1970s when the government agreed to permit such pregnancy terminations in an effort to replace the practice of unsafe abortion.[1]

Abortion in a non-medical setting or after pregnancy is clinically confirmed is prohibited in Bangladesh except when done to save a woman's life. Nevertheless, research suggests that clandestine and unsafe abortion has been common. Illegal abortions are available from traditional healers, usually older women who perform the abortion by inserting herbal roots or other solid objects into the uterus. Such abortions have been found to be a leading cause of maternal mortality and short- and long-term maternal health complications. From the late 1970s to the early 1990s, about 15 percent of maternal deaths in Matlab were caused by induced abortion (Ronsmans et al., 1997). Patients with complications from abortion accounted for about half of the admissions to

[1] Abortion remains a very sensitive topic in Bangladesh; in fact, many of the restrictions for menstrual regulation, particularly its availability only before pregnancy is clinically confirmed, are to reinforce the perception of menstrual regulation as something other than abortion.

gynecology units of major urban hospitals in Bangladesh in the late 1970s, resulting in a huge burden on health service resources (Dixon-Mueller, 1988).

Recent data indicate that while abortion rates have increased in Bangladesh (Rahman, DaVanzo, and Razzaque, 2001), maternal mortality rates have decreased (National Institute of Population Research and Training and ORC Macro, 2002).[2] Abortion-related maternal mortality decreased during the 1980s in the area with better family planning services that we study (Maine et al., 1996). While part of this decrease may be associated with increased availability of organized maternal health care, including greater availability of post-abortion care and improved care for complications of abortions, it is also possible that there has been a change in methods of abortion used, and that the incidence of illegal methods has decreased despite the overall increase in the incidence of abortion. We investigate this possibility below.

Study Area

As noted, we use data from Matlab, which is well known for its Demographic Surveillance System (DSS), operated by the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) since 1966. Since 1977, Matlab has also been the site of a family planning initiative, in which the Maternal Child Health and Family Planning (MCH-FP) Project has provided one half of the area, the treatment area, with more accessible and higher-quality family planning services than the standard government services provided in the other half of the area, the comparison area. The comparison area is typical of much of Bangladesh in contraceptive practice (ICDDR,B, 2003), fertility (Mitra et al., 1994), abortion (Khan et al., 1986), and maternal mortality (Alauddin, 1986; Khan, Jahan, and Begum, 1986). The mean desired number of children in both areas has been similar and has decreased at similar rates, from about 4.5 in 1975 to 3.0 in 1990 to 2.5 in 2000 (Koenig et al., 1992; R. Bairagi, personal communication, 2000).

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[2] Much of the decrease in the maternal mortality rate is likely due to a decrease in pregnancies. Nevertheless, there also appears to have been a decrease in the maternal mortality ratio, i.e., the number of maternal deaths per 100,000 live births. Estimates of maternal mortality ratio by the direct sisterhood method "show a steady decline over a decade, from 514 (per 100,000 live births) for the period 1986 to 1991 . . . to 320 in the period 1998 to 2001," though, because of small sample sizes, this difference was not statistically significant (National Institute of Population Research and Training and ORC Macro, 2002, pp. 42-3).

From 1977 to 1998, specially trained female community health workers in the MCH-FP area visited married women of reproductive age (i.e., 15 to 49 years of age) every two weeks to provide counseling about family planning services and to deliver pills, condoms, and injectables at the doorstep. Because marriage is nearly universal and occurs at a young age, the focus of family planning programs on married women of childbearing age effectively targets all sexually-active women of childbearing age. In the comparison area, married women were supposed to receive the standard visits every two months from female welfare assistants of the government family planning program (though evidence suggests that these visits did not always occur). In 1999, visits by community health workers to married women in the MCH-FP area were reduced to once monthly. In 2000, family planning services in the comparison area were delivered from fixed-site clinics rather than from doorstep visits every two months. In 2001, visits by community workers to married women in the MCH-FP area were eliminated, and family planning services in both areas were provided from fixed-site clinics. In addition to the standard government Health and Family Welfare Centres, the MCH-FP area also has ICDDR,B sub-centres that provide maternal and child health and family planning services.

The MCH-FP area has been characterized by greater contact among clients, workers, and supervisors, as well as greater availability and a broader mix of contraceptive methods than are available in the comparison area. In 1990, women in the MCH-FP area reported greater accessibility and higher quality of family planning services than those reported by women in the comparison area (Koenig et al., 1992).

The difference in contraceptive services between the two areas has led to a difference in contraceptive practice, with women of childbearing age in the MCH-FP area more likely to use contraception (68.1 percent in 1996) than are women in the comparison area (46.9 percent).[3] These areas also differ in the contraceptives that are used (ICDDR,B, 2003). Users in the comparison area are more likely to use pills, for

[3] The ICDDR,B publishes annual estimates of contraceptive use in the MCH-FP area and less frequent estimates of contraceptive use in the comparison area. The most recent estimates show contraceptive use rates in the MCH-FP area of 69.5 percent in 2000 and 69.7 percent in 2001. ICDDR,B researchers estimated a contraceptive use rate of 45.0 percent in 2000 in the comparison area, a nominal decrease from the 1996 rate (of 46.9 percent), but noted this was likely an underestimate because of a change in data collection procedures. (See ICDDR,B, 2003.)

which inconsistent use may lead to unintended pregnancy. Users in the MCH-FP area are much more likely to use injectables such as depo-medroxyprogesterone acetate (DMPA), which have very low failure rates but sometimes cause side effects. These trends and differences in contraceptive use have resulted in consistently and significantly lower fertility rates in the MCH-FP area since the late 1970s.[4]

At its beginning in 1977, the MCH-FP project provided menstrual regulation services as backup in case of contraceptive failure, in addition to those offered by government clinics in both areas (Bhatia and Ruzicka, 1980). This was discontinued in 1983 when donors withdrew their support from that part of the program.

Data

Data from the Matlab Demographic Surveillance System (DSS)

To analyze rates of abortion by method, we use Matlab DSS data from 1989 through 2000. Because of the experimental variation in family planning services in Matlab, the DSS data allow much stronger tests of the influence of family planning programs on abortion than analyses that compare less similar areas or different time periods.

From 1977 to 1997, specially trained female community health workers employed by the DSS visited every household in both areas every two weeks to record the pregnancy status of women 15 to 49 years of age and any pregnancy outcomes occurring since the previous visit. Since 1998, these visits have occurred monthly. A recent analysis concluded that vital events have been accurately reported under both collection systems (Alam et al., 1999).[5] Since 1989 the data have distinguished whether pregnancy induced terminations occurred by menstrual regulation or another method. Between 1989 and 2000, the period we examine in this study, the DSS contain data for 79,540

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[4] The difference in fertility rates between the two areas has recently decreased. In 1990, the total fertility rate in the comparison area was 5.0 children per woman, while that in the MCH-FP area was 3.4 children per woman; in 2001, the total fertility rate in the comparison area was 3.4 children per woman, while that in the MCH-FP area was 3.1 children per woman. Nevertheless, as Rahman, DaVanzo, and Razzaque (2001) note, women in the comparison area have reduced their fertility through a greater use of abortion than have women in the MCH-FP area.

[5] An experiment was conducted in which the same women were sometimes asked about a two-week reference period and sometimes asked about a reference period of a month. It was concluded that data quality was good (and comparable) for both visitation cycles.

pregnancy outcomes and 2,864 abortions, including 1,576 abortions done by menstrual regulation. We consider 617,638 women-years in our analyses of abortion rates.

The Matlab data on pregnancy outcomes are likely to be of high quality and not to suffer from underreporting by women declining to report abortion for personal, familial, social, or religious reasons. In their many years of work in the community the female community health workers have established themselves as trustworthy and in a good position to collect reliable information on pregnancy and abortion. In addition, because of the frequency of their visits, they were likely to know pregnancy status and changes. Even if there is some underreporting, it should not differ between treatment and comparison areas or over time (Ahmed, Sarkar, and Rahman, 1996).

Data from the 1990 Matlab Knowledge, Attitudes, and Practice (KAP) Survey

For our multivariate analyses we match DSS data to data on married women aged 15-49 interviewed in the Matlab Survey on Knowledge, Attitudes, and Practice (KAP) of Contraception that was conducted mid-year in 1990. The 1990 survey had a participation rate of about 90% (Koenig et al., 1992). The KAP survey asked women whether they desired more children and whether they were using contraception and, if so, which method they were using, including permanent methods (i.e., the woman had a tubectomy or her husband a vasectomy). We match KAP data on women who were not pregnant and were not using permanent contraception to DSS data on their first pregnancy outcome in the subsequent 60 months to construct records for 6,327 pregnancies.[6]

Methods

We begin with descriptive analyses based on the DSS of trends in the *general abortion rate (GAR)*, the number of abortions per 1,000 women of reproductive age per year; we show the GAR for each year between 1989 and 2000. We then examine variations in the abortion rate by age and education. In all cases, we decompose the abortion rate into its MR and non-MR components and present data separately for the MCH-FP and comparison areas.

[6] The total KAP sample is 7,942 women. Our analysis excludes 885 women (11.4%) who were pregnant at the time of the survey and 734 (9.2%) who had tubectomies or their husbands had vasectomies.

To show changes over time in variations by age while maintaining adequate numbers of analysis, we consider general rates of abortion for five-year age groups (15-19, …, 45-49) in two periods of time, 1989 to 1994 and 1995 to 2000. Because age and education are correlated, with recent increases in education leading to a more educated younger population, to examine how the likelihood of abortion by type varies by education we use the *total abortion rate (TAR)*, which is defined as the number of total abortions a woman of child-bearing age would have in her lifetime if at each year of age she experienced the age-specific abortion rates during the time period considered. The total abortion rate allows us to control for age in examining the effect of education on abortion rates and the methods of abortion a woman may use. We look at how the TAR for the period 1995-2000 varies across three educational groups (no education, 1-5 years of schooling, 6 or more years of schooling). (We restrict the analysis of variations by education to the 1995-2000 period because our measure of education comes from a 1996 census in Matlab.)

A relatively high abortion rate for a subgroup can reflect either the fact that many women in that group become pregnant or that those women who do become pregnant are especially likely to have an abortion. To distinguish between these two possibilities, in the analysis of variations by age we also look at the pregnancy rate (the proportion of women who become pregnant) and the proportion of pregnancies that end in abortion; multiplied together, the pregnancy rate and the proportion of pregnancies that end in abortion produce the general abortion rate.[7]

In all of our descriptive analyses we test whether differences are statistically significant using t-tests.

We also conduct multivariate analyses, using the KAP data, to assess the effects of each of the variables we consider when the others are controlled. We estimate a logistic regression explaining whether the woman became pregnant over the next five years. For those who did become pregnant, we estimate a logistic regression explaining whether they terminated the pregnancy. For this same sample, we also estimate a

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[7] That is, (abortions / women) = (pregnancies / women) * (abortions / pregnancies), or
(abortion rate) = (pregnancy rate) * (proportion of pregnancies aborted).

In future analyses we will examine how these two components of the abortion rate have varied over the time subperiods and educational groups that we consider.

multinomial logit regression explaining whether the pregnancy was terminated by menstrual regulation, whether it was terminated by some other method, or the woman didn't have an abortion.[8] We also estimate logistic and multinomial logit equations for these same outcomes where women are the units of analysis. These three sets of dependent variables correspond to the pregnancy rates, abortions/pregnancies (by type of abortion), and abortions/woman (GAR) (by type of abortion) that we present in our descriptive analyses.

Descriptive Results

Overall Trends and Differences between Areas

General abortion rates have been consistently lower in the MCH-FP area than in the comparison area (Figure 1). Each year since 1989 the general abortion rate has been much larger (and by a statistically significant amount[9]) in the comparison area than in the MCH-FP area. The difference between the two areas has grown as well, since the GAR increased on average over the period shown in the comparison area but changed little in the MCH-FP area. In 1989, the abortion rate in the comparison area was just under 2.5 times that in the MCH-FP area; by 2000 it was more than 3.0 times that in the MCH-FP area.

[8] This last category also includes miscarriages and stillbirths.

[9] T-test scores for the difference between the two areas are greater than 5.0 in each year ($p<0.001$).

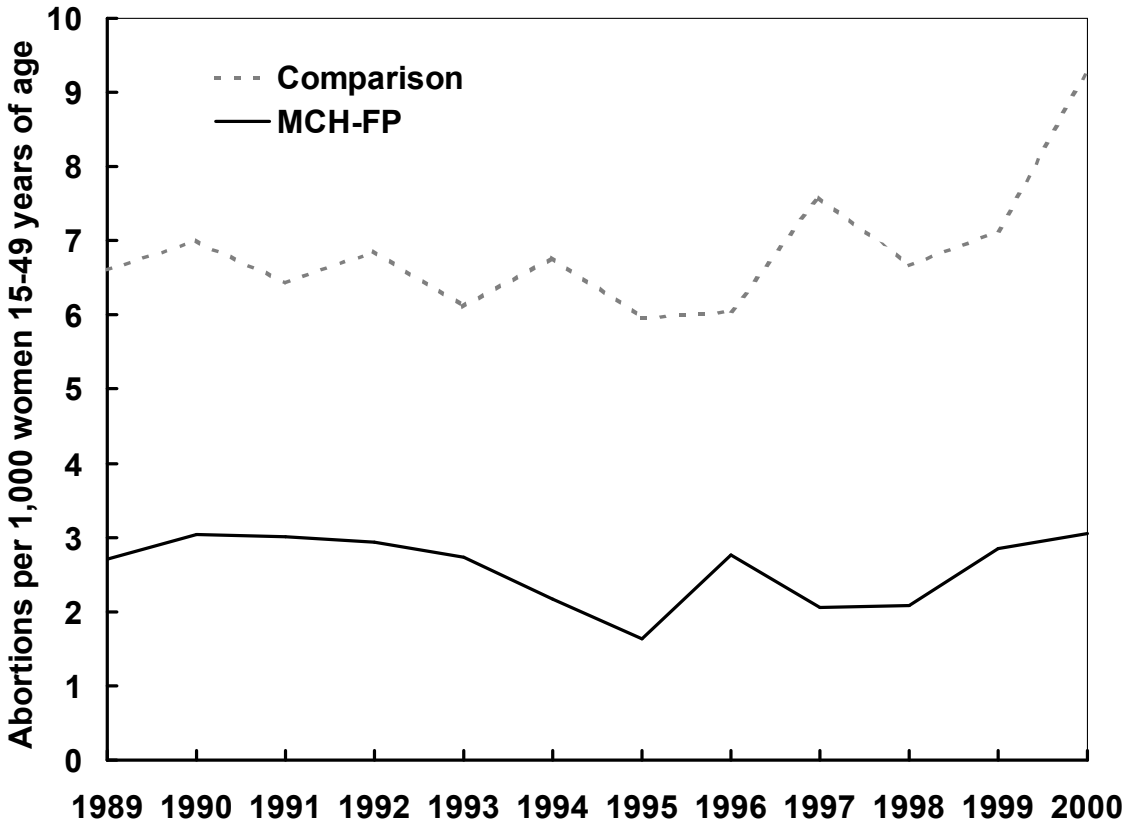
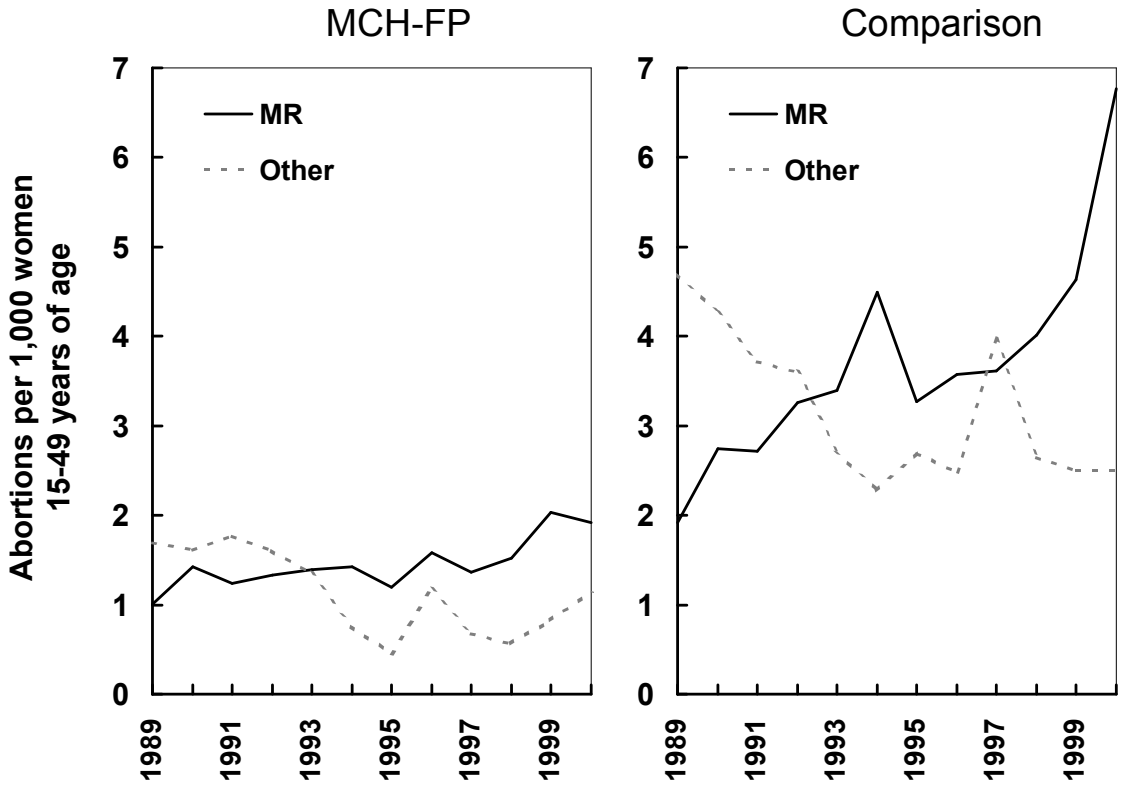


Figure 1—General Abortion Rates by Area, 1989 to 2000

The lower general abortion rates in the MCH-FP area are matched by lower rates of abortion of each type, particularly for those done by means other than menstrual regulation (Figure 2). In each year, rates of abortion by each method are significantly[10] lower in the MCH-FP area. At the same time, there has been a shift in abortions in both areas toward those done by menstrual regulation and away from those done by other methods. Between 1989 and 2000, the proportion of abortions done by menstrual regulation increased from 37 to 63 percent in the MCH-FP area, and from 29 to 74 percent in the comparison area. Both changes are statistically significant.

[10] T-test scores for the difference between the two areas in abortion by menstrual regulation are at least 2.7 in each year ($p<0.01$) while those for abortion done by other methods are greater than 5.0 in each year ($p<0.001$).



Data: Matlab DSS

Figure 2 — General Abortion Rates by Type and Area, 1989 to 2000

Between 1989 and 2000, the general rate of abortion by menstrual regulation increased from 1.00 per 1,000 women to 1.92 in the MCH-FP area and from 1.91 to 6.76 in the comparison area. As a result, the proportion of abortions done by menstrual regulation increased from 37 to 63 percent in the MCH-FP area and from 29 to 73 percent in the comparison area. (The difference between the areas in the proportion of abortions done by menstrual regulation is only statistically significant in 1995 and 1997). Since 1993, most abortions in both areas have been done by menstrual regulation.

Given the amount of U.S. aid for family planning programs in Bangladesh ($40 million in 2001[11]), we find it intriguing that there is a marked change in the mix of types of abortion after 1992, because there was a significant change in U.S. policy regarding

[11] The $40 million spent on "integrated family planning and health" in 2001 represented nearly one-third of the U.S. foreign aid budget in Bangladesh that year and nearly one tenth of all USAID money spent that year for population programs (United States Agency for International Development, 2001, 2003).

permissible family planning advice by programs receiving U.S. funds at that time. In early 1993, shortly after taking office, the Clinton Administration rescinded the "Mexico City" policy, requiring nongovernmental organizations to agree, as a condition of their receipt of U.S. government funds for international family planning programs, that they will neither perform nor actively promote abortion, even with their own funds. (The Reagan Administration had instituted this policy at the time of the Second International Conference on Population sponsored by the United Nations in Mexico City in 1984; the George W. Bush Administration reinstituted it in 2001.[12]) In the four years before this policy change, the proportion of abortions done by menstrual regulation was 43 percent in the MCH-FP area and 40 percent in the comparison area. In the eight years following this policy change, the proportion of abortions done by menstrual regulation was 64 percent in the MCH-FP area and 61 percent in the comparison area. Both these increases are statistically significant ($p<0.001$ in each area). At the same time, the general abortion rate decreased from 2.9 to 2.4 in the MCH-FP area, a statistically significant change, and increased from 6.7 to 7.0 in the comparison area, a change that was not statistically significant. This suggests that the ability to discuss abortion did not lead to an increase in the number of abortions but did reduce the likelihood that women choosing to have an abortion would use an unsafe method.

Type of Abortion by Age

General Abortion Rates

Data on abortion by age can help identify the women most likely to have an abortion and those most at risk for an unsafe abortion. In both areas, rates of abortion overall, and for each type, increase with women's age until 30 to 39 years of age (reaching a maximum at either 30-34 or 35-39), then decrease with age thereafter (Figure 3, Panels A and B). This pattern may be a result, in part, of women in their thirties having both a relatively high pregnancy rate and a relatively higher likelihood of aborting if pregnant. Women less than 20 years or age or at least 40 years of age have relatively low rates of abortion, perhaps because they have lower overall pregnancy rates (possibly

[12] When data from 2001 and subsequent years become available, it will be interesting to see whether the pattern reverts to that before 1993.

because of lower levels of fecundity or sexual activity) or are less willing to obtain an abortion if pregnant. Women at least 40 years of age are also most likely to be using permanent contraception and thus not at risk of pregnancy.[13] We examine these possibilities below.

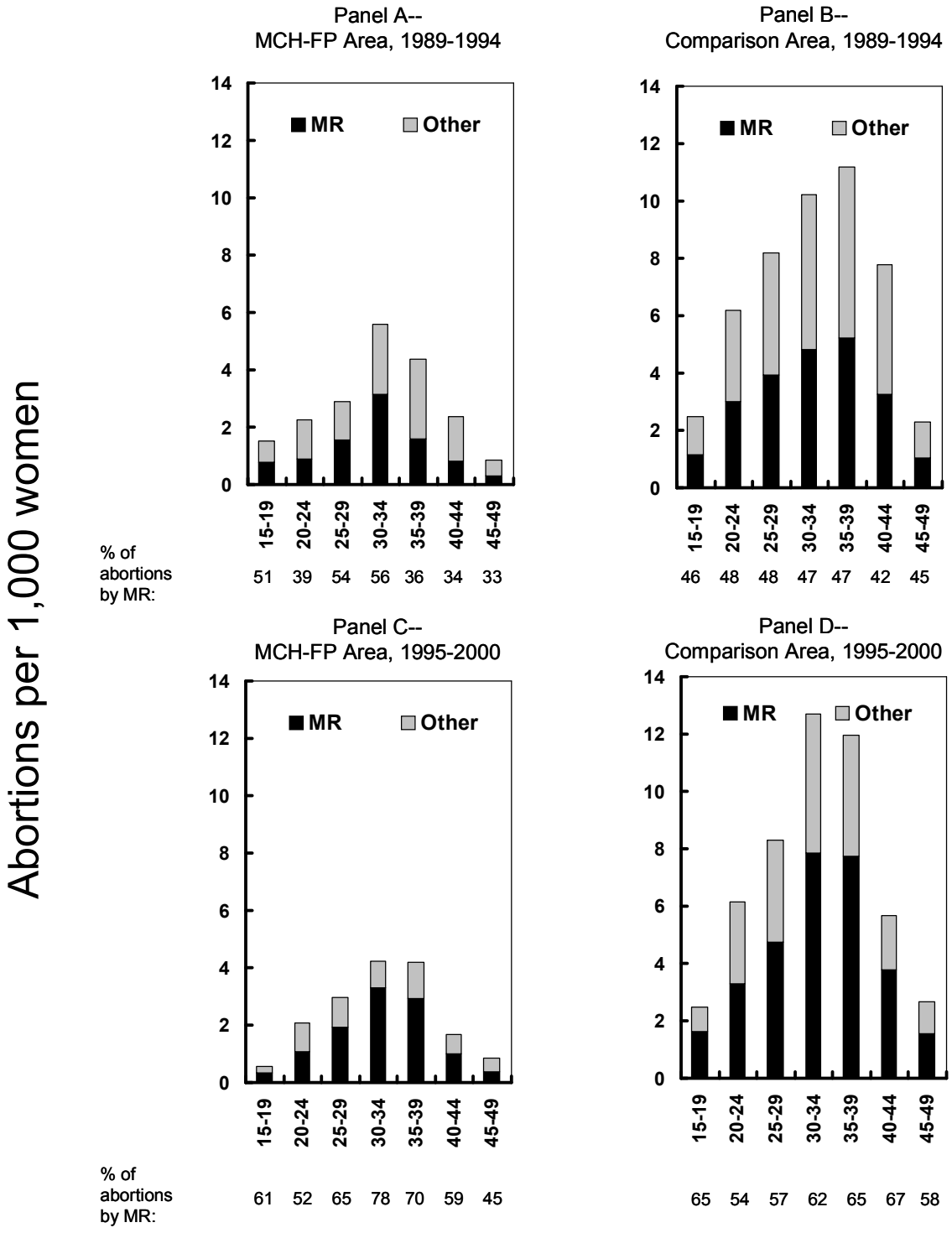
In both time periods, the rates of abortion by each type were lower in the MCH-FP area than in the comparison area for every age group. While the proportion of abortions done by means other than menstrual regulation in the first time period is higher in the MCH-FP area than in the comparison area for four of seven age groups, these differences are not statistically significant, but the rates of abortion by these less safe methods are still much lower in the MCH-FP area because of the much lower overall rates of abortion there.[14]

[13] Among currently married women in the MCH-FP area, use of tubectomy increases with age, as the following table shows:

	Under 20	20-24	25-29	30-34	35-39	40-44	45+
None	56%	44%	39%	31%	21%	15%	13%
Pill	19%	21%	22%	23%	22%	21%	18%
IUD	2%	2%	1%	1%	1%	1%	1%
Injectable	16%	27%	31%	33%	35%	32%	28%
Condom	8%	5%	7%	7%	9%	9%	7%
Tubectomy	0%	0%	1%	2%	7%	15%	22%
Vasectomy	0%	0%	0%	1%	2%	1%	1%
Other, including traditional	0%	1%	1%	1%	3%	7%	11%

Source: ICDDR,B, 2003

[14] T-scores of the differences in rates of abortion by other methods in the both time periods indicate statistically significant differences for all age groups except women 45-49, where the tests fall just short of statistical significance (with $p<0.10$ but $p>0.05$).



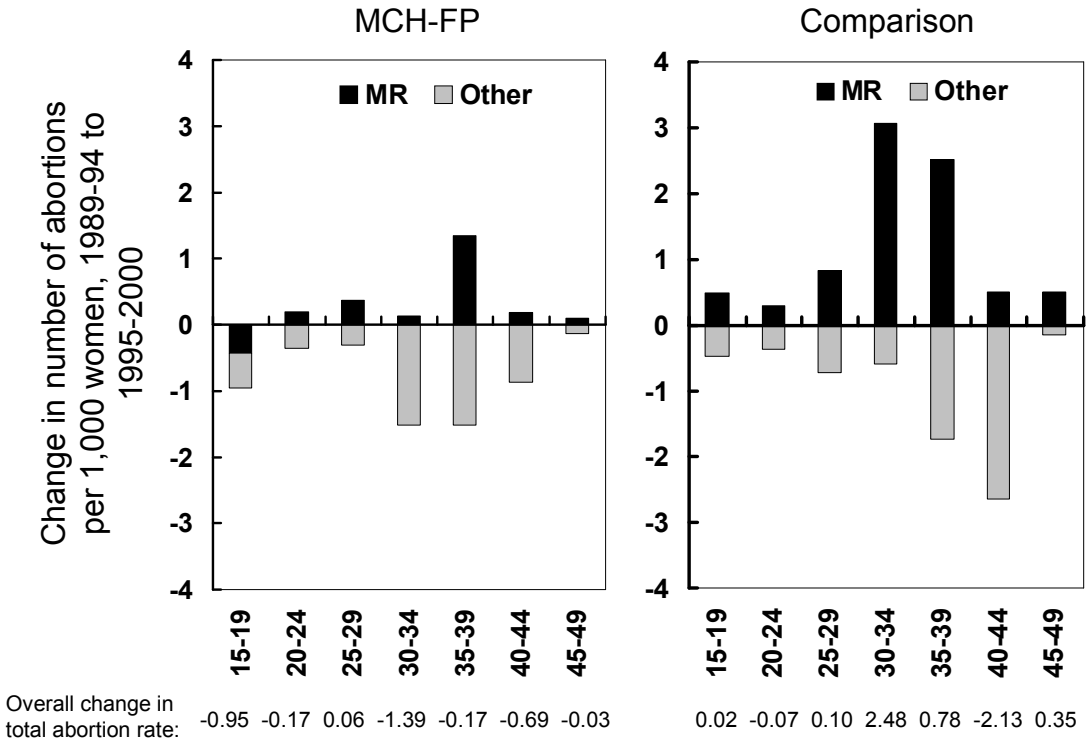
Data: Matlab DSS

Figure 3 —General Abortion Rates by Area, Age, Type, and Time Period

The proportion of abortions done by MR increased by statistically significant amounts between the two time periods for every age group of women in both areas.[15] By the late 1990s (Figure 2, Panels C and D), among those terminating pregnancy, majorities of women in all age groups in the comparison area and in all of but one age group (age 45-49) in the MCH-FP area used menstrual regulation to do so.

In the MCH-FP area, overall abortion rates decreased by statistically significant amounts for women 15-19 and 30-34 and increased (by a nonsignificant amount) only for women 25-29. (Decreases for all other age groups were not statistically significant.) In the comparison area, abortion rates decreased by a statistically significant amount for women 20 to 24 and 40 to 44 while increasing by a statistically significant amount for women 30-34. Rates of abortion by means other than menstrual regulation decreased by statistically significant amounts for women 15 to 19, 30 to 34, 35 to 39, and 40 to 44 for women in the MCH-FP area, and for women 35 to 39 and 40 to 44 in the comparison area; they did not increase for any age group (Figure 4). Rates of abortion by menstrual regulation changed by statistically insignificant amounts for most groups, though decreasing by a statistically significant amount for women 15 to 19 in the MCH-FP area and increasing by a statistically significant amount for women 35-39 in the MCH-FP area and women 15 to 19, 30 to 34, and 35 to 39 in the comparison area.

[15] The increases are statistically significant for women aged 30-34 and 35-39 in the MCH-FP area and for women 15-19, 30-34, 35-39, and 40-44 in the comparison area.



Source: Matlab DSS

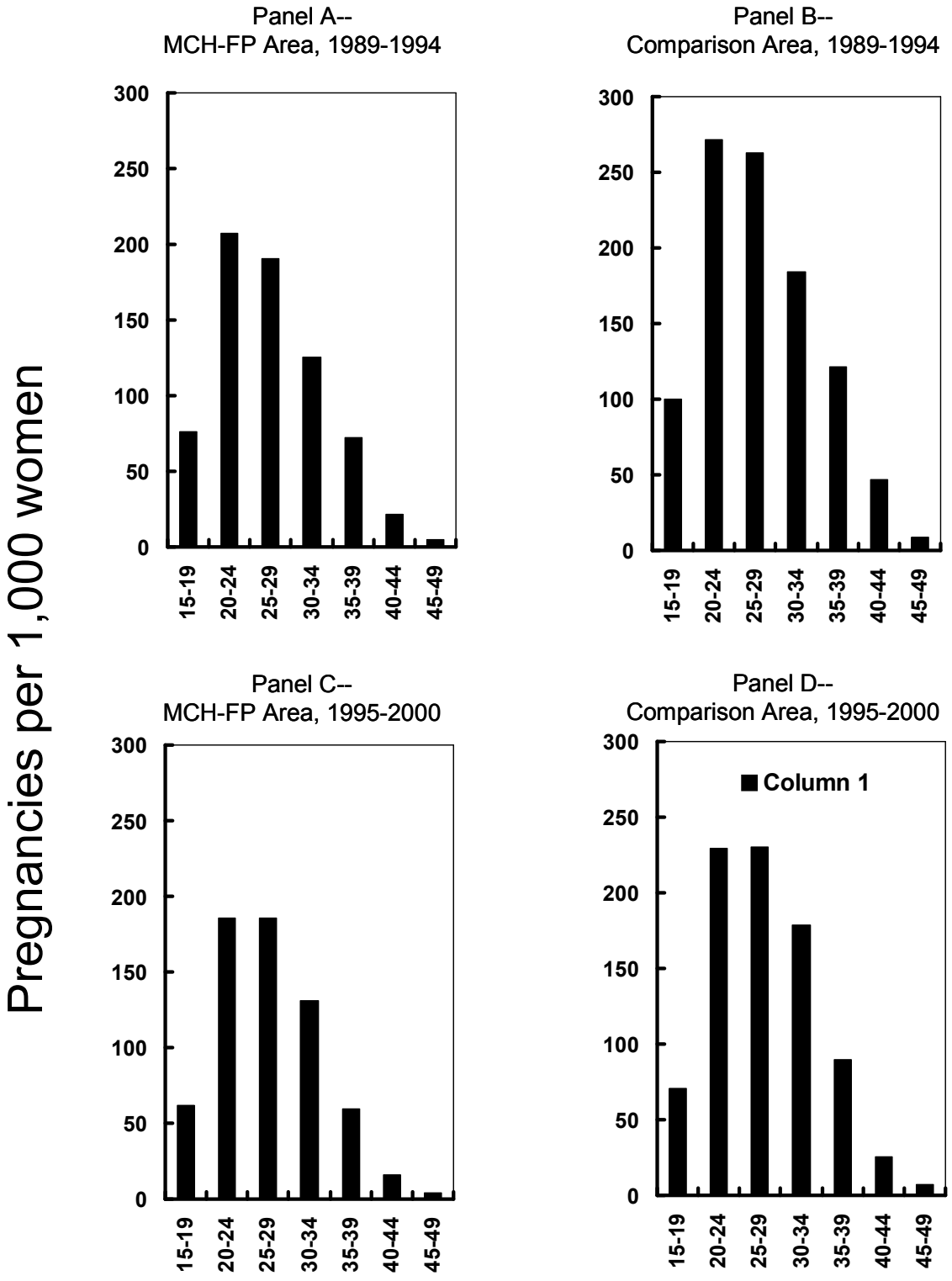
Figure 4—Change in Rate of Abortion by Area, Age, and Type, 1989-1994 to 1995-2000

Variations by Age in Pregnancy Rates and in the Probability that Pregnancies are Aborted

In Figures 5 and 6 we investigate whether the age patterns we see in abortion rates in Figure 3 are due to differences by age in pregnancy rates or in the probability that pregnancies are aborted. In both 1989-1994 and 1995-2000, pregnancy rates are highest for women in their 20s, while those for women in their 30s are higher than those for women in their 40s or those under 20 (Figure 5). For every age group in both periods pregnancy rates are significantly higher in the comparison area than in the MCH-FP area, undoubtedly a result of the lower contraceptive use rates in the comparison area. For most age groups in the MCH-FP area and all age groups but one in the comparison area, pregnancy rates decreased significantly between the two time periods.[16] The greatest

[16] The decrease in the pregnancy rate among women 25 to 29 and 45 to 49 in the MCH-FP area and among women 45 to 49 in the comparison area was not statistically significant, nor was the increase in the pregnancy rate among women 30 to 34 in the MCH-FP area.

decrease in the MCH-FP area was among women 20 to 24 (22 per 1,000); in the comparison area, the greatest decrease was among women 35 to 39 (27 per 1,000).



Data: Matlab DSS

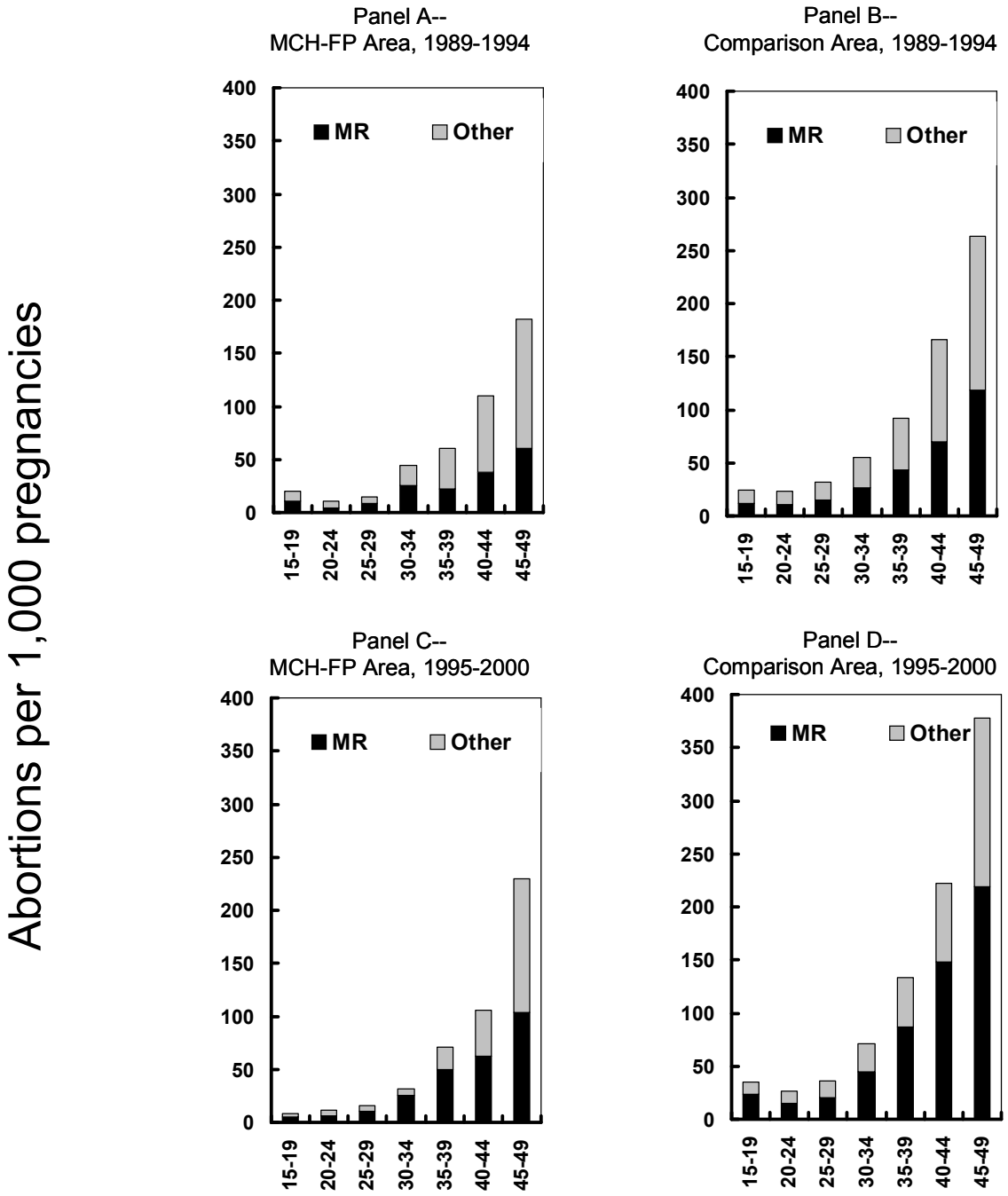
Figure 5—Pregnancy Rates by Age, Area, and Time Period

The relationship between age and the proportion of pregnancies that are aborted, shown in Figure 6, is nearly monotonic, with women in their late 40s (who are those most likely to have achieved their desired fertility) most likely to abort if pregnant, and those in their 20s (who are less likely to have achieved their desired fertility) least likely to, though rates in the 1989-94 period in the MCH-FP area and in the 1995-2000 period in the comparison area rates are significantly higher for women aged 15-19 than for those aged 20-24, presumably reflecting the fact that pregnancies may have come at too early an age for these youngest women. In the comparison area between 1995 and 2000 around three in eight pregnancies to women 45 to 49 were aborted. For most age groups in the first time period and for all age groups in the second time period the proportion of pregnancies that are aborted is higher in the comparison area than in the MCH-FP area.[17] This most likely reflects better spacing of pregnancies in the MCH-FP area and is consistent with a finding in research in progress (DaVanzo et al., 2004) that pregnancies that follow short interpregnancy interval are especially likely to be aborted.

For most age groups (15 to 19, 30 to 34, 35 to 39, and 40 to 44) in the comparison area, the proportion of pregnancies that are aborted increased significantly between the two time periods, while for women 15 to 19 and 30 to 34 in the MCH-FP area such proportions decreased significantly. (Changes for other age groups in both areas were not statistically significant.) These changes roughly parallel our earlier findings that showing since the early 1980s an increasing percentage of pregnancies aborted in the comparison area but relatively unchanged proportions of pregnancies aborted in the MCH-FP area (Rahman, DaVanzo, and Razzaque, 2001).

Thus the low rates of abortion that we see in Figure 3 for women under age 20 are due to both to their lower rates of pregnancy but especially to their low likelihood of aborting if pregnant. The low rates of abortion for the oldest women (those aged 45-49) are exclusively due to their very low rates of pregnancy; this age group has the highest likelihood of aborting if pregnant.

[17] The one exception in both time periods is women 45-49. Nevertheless, given the magnitude of the difference in percentage of pregnancies that are aborted for these women, it appears likely the lack of statistical significance is due to the low number of pregnancies for these women.



Data: Matlab DSS

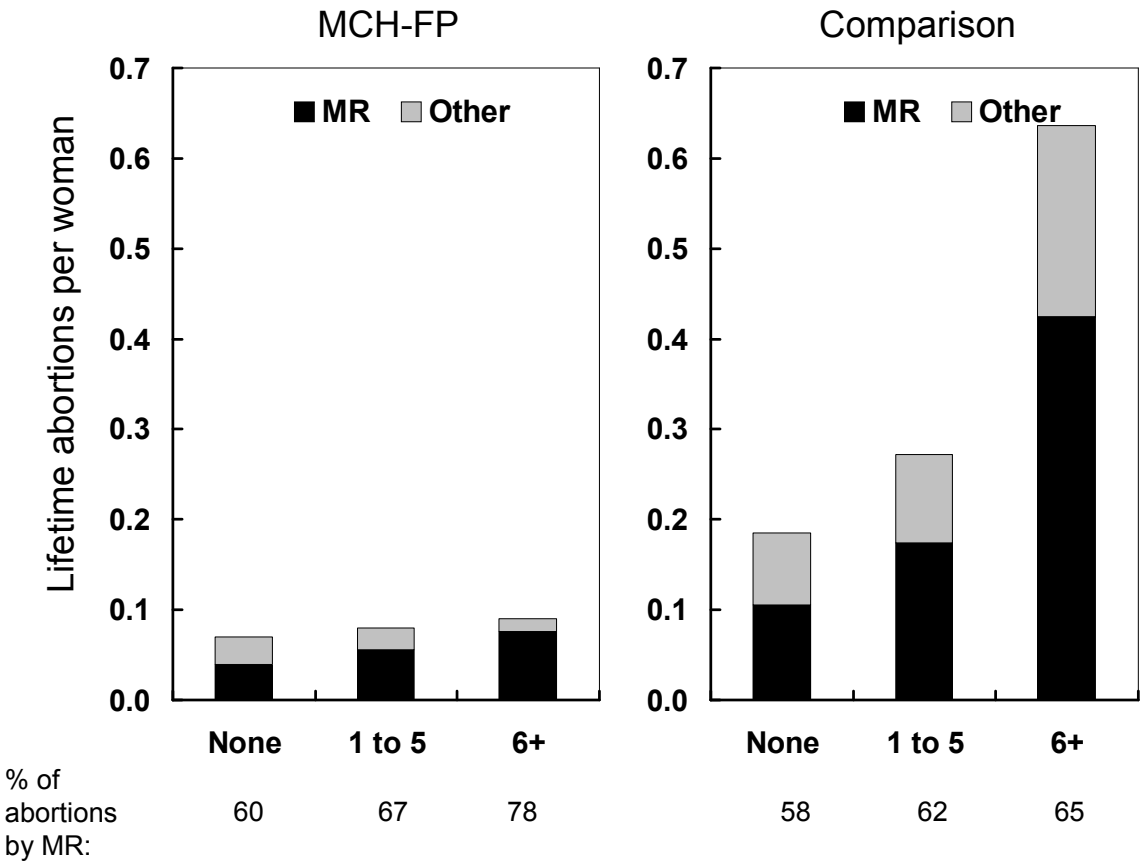
Figure 6—Proportion of Pregnancies Aborted by Method, Age, Area, and Time Period[18]

[18] The percent of pregnancies that are aborted by menstrual regulation are the same as given in Figure 3.

Type of Abortion by Education

In both areas, total abortion rates are higher for women with higher levels of educational attainment, particularly in the comparison area (Figure 7).[19] In the comparison area, the total abortion rate for women with primary (i.e., 1 to 5 years) education is nearly 1.5 times higher than that for women with no education, while the total abortion rate for women with secondary or higher (more than 5 years) education is nearly 3.5 times higher than that for women with no education and nearly 2.5 times higher than that for women with primary education. In the MCH-FP area, the total abortion rate for women with primary education is 1.1 times higher than that for women with no education, while the total abortion rate for women with secondary or higher education is 1.3 times higher than that for women with no education and 1.1 times higher than that for women with primary education.

[19] We are not able to test that statistical significance of educational differences in these synthetic rates. However, as will be seen below, educational differences are statistically significant in our multivariate analyses.



Source: Matlab DSS

Figure 7—Total Abortion Rates by Area, Years of Education, and Type of Abortion, 1995-2000

A positive relationship between education and abortion rates may arise because educated parents want to invest more in their children. As a result, the "costs" of an unintended child will be higher for them, with such higher costs making them more likely to terminate an unintended pregnancy if they experience one. Educated women in Matlab in 1990 were also more likely to use temporary methods of contraception (e.g., pills and traditional methods) that have higher rates of discontinuation and use failure, which may lead to more unintended pregnancies which are more likely to be aborted (Figure 8).[20]

[20] The patterns in Fig. 8, in part, reflect the fact that more educated women are younger on average than those with less education, and younger women are less likely to use permanent methods of contraception. Nonetheless, for women aged 25-34, use of permanent methods of contraception is generally inversely related to the woman's education. For example, among women aged 25-29, 1.1% of women with 6 or

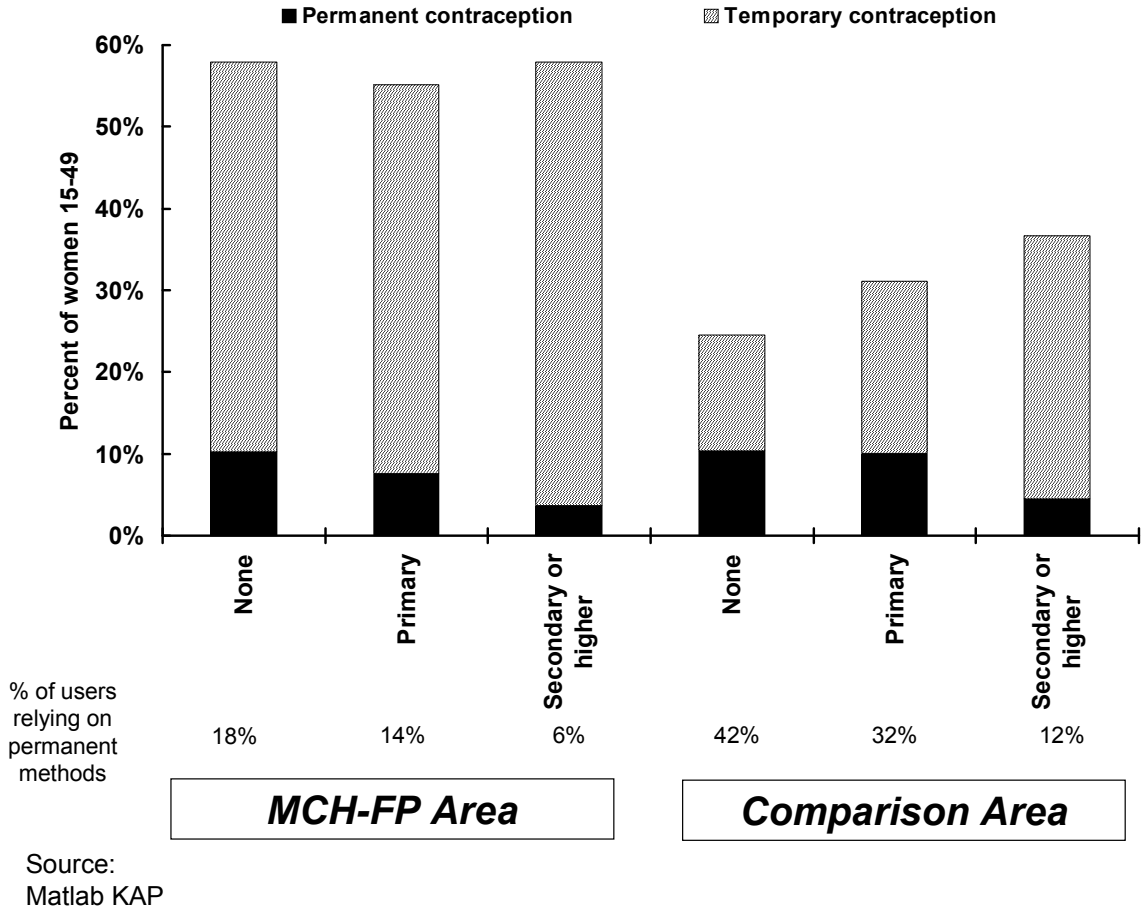


Figure 8—Contraceptive Use by Area, Education, and Type, 1990

While total abortion rates increase with education, the percentage of abortions in the MCH-FP area done by menstrual regulation increases even more (Figure 7). As a result, in the MCH-FP area total rates of abortion by means other than menstrual regulation decrease as education decreases, from 0.030 with no education to 0.015 for women with secondary or higher education. The percentage of abortions by menstrual regulation also increases with education in the comparison area but not to the same extent. As a result, unlike the MCH-FP area, the total rate of abortion by other methods in the comparison

more years of schooling used permanent methods, compared to 4.3% each for women with no education and those with 1-5 years of schooling. The comparable statistics for women aged 30-34 are 6.6%, 13.7%, and 12.1%. There are few educational differences in the use of permanent contraception among women in their forties (and use is very rare before age 25).

area increases with education, from 0.080 for women with no education to 0.211 for women with secondary or higher education

Overall total abortion rates for each education group are lower in the MCH-FP area than in the comparison area. The probability that a woman will use menstrual regulation if terminating her pregnancy is higher for each educational group in the MCH-FP area than it is for women in the corresponding educational group in the comparison area, with the greatest differences occurring among the most educated women.

Much of the reason for higher rates of abortion by more educated women is due to their higher levels of pregnancy termination by menstrual regulation. That is, although educated women have a higher rate of abortion, relatively more of their abortions are by the early-gestation, safer method. There are two likely explanations for these patterns. First, educated women may be more likely to realize they are pregnant and to act before it is too late for menstrual regulation. Second, more educated women may be more likely to know the risks of differing methods of abortion, and avoid the riskier ones. If more educated women continue to have different patterns of abortion, then increases in women's education, such as those occurring in Bangladesh, may lead to changes in abortion rates.

Multivariate Analyses

To further test how the variables just discussed and others affect abortion and pregnancy, we conducted several multivariable analyses. The first of these (Table 1) presents a logistic regression indicating which married women are most likely to become pregnant. Explanatory variables include age, the wife's and husband's education, socioeconomic status, religion, whether the woman wants to have more children, and prior contraceptive use. The second (Table 2) presents a logistic regression, featuring the same variables as our first analysis, indicating which pregnant women are most likely to obtain an abortion; it also presents multinomial logit analysis of which pregnant women are most likely to have an MR abortion, another type of abortion, or not to have an abortion (which in the majority of cases means seeing the pregnancy to term). The third (Table 3) presents logistic regressions for the individual-level analog to the general

abortion rate -- whether a woman obtains an abortion. It also presents multinomial logit regressions for whether a woman obtains an MR abortion or another type of abortion.

For each analysis we present five different specifications, or models. The first of these includes variables for age (in quadratic form, to allow the effect of age to be non-linear), education of the woman and her husband, two dichotomous indicators of socioeconomic status (i.e., whether a woman lives in a "medium" dwelling space of 253 to 349 square feet or a "large" dwelling space of more than 349 square feet; women who live in dwellings of less than 253 square feet are the reference group), and dichotomous indicators for religion (Muslim or not) and for whether the woman lives in the MCH-FP area. All of these variables are likely to be exogenous to decision making about pregnancy and pregnancy termination; hence Model 1 can be viewed as reduced-form regression. The next specification, Model 2, adds the number of living children, and Model 3 adds to Model 2 an indicator, based on the 1990 KAP survey, indicating whether a woman wanted no more children. Model 4 adds to Model 3 an interaction term for MCH-FP residence and desire for no more children to determine whether the effect of each of these varies by the presence or absence of the other. Model 5 adds to Model 4 variables for contraceptive method used at the time of the 1990 KAP survey. We recognize that these may be jointly determined with decisions about pregnancy and abortion and may reflect otherwise unobserved differences between women who do and do not use contraception and among the women using various contraceptive methods. We also present (in the Appendix) means for all variables in the multivariate analyses.

Multivariate Analyses Explaining the Likelihood that a Woman Becomes Pregnant (Table 1)

Age is strongly and significantly related to the likelihood that a woman becomes pregnant. The first model, controlling only for education, dwelling space, religion, and area, shows likelihood of pregnancy peaking at age 14, but at around age 18 when we control for desire for more children.[21]

[21] The much earlier peak than in Fig. 5 reflects the fact that the sample for our multivariate analysis includes only currently married women, while that in Fig. 5 is all women, regardless of their marital status.

Table 1. - Influences on pregnancy rates: Logistic regressions on demographic and socioeconomic variables associated with pregnancy, Sample = All women (n=6,323)

	Model -1	Model - 2	Model -3	Model - 4	Model - 5
Age	0.124 ***	0.122 **	0.196 ***	0.200 ***	0.226 ***
Age squared	-0.00452 ***	-0.00450 ***	-0.00543 ***	-0.00548 ***	-0.00598 ***
Woman's education	-0.0456 **	-0.0453 **	-0.0419 **	-0.0421 **	-0.0449 **
Husband's education	-0.0433 ***	-0.0433 ***	-0.0403 ***	-0.0399 ***	-0.0412 ***
Dwelling space					
Medium	0.216 **	0.215 **	0.206 **	0.207 **	0.199 **
High	0.278 **	0.277 **	0.290 ***	0.290 ***	0.285 **
Non-Muslim	-0.186 *	-0.185 *	-0.183 *	-0.196 *	-0.206 *
MCH-FP area	-0.523 ***	-0.521 ***	-0.534 ***	-0.298 ***	-0.110
No. of living children		0.00637	0.174 ***	0.165 ***	0.175 ***
Want no more children (WNMC)			-1.271 ***	-0.986 ***	-1.010 ***
WNMC*MCH-FP area				-0.483 ***	-0.383
Contraceptive use					
Pill/IUDs					-0.349 ***
Injectables					-0.593 ***
Condoms/others					0.394 **
Constant	1.047	1.080	-0.163	-0.354	-0.639
-2LL	6958.800 ***	6958.727 ***	6704.104 ***	6688.396 ***	6619.160 ***

*** p<.001, ** p<.01, * p<.05, + p<.10

All of the other variables in Model 1 also significant affect the likelihood that a woman becomes pregnant. Greater education for both wives and husbands are each associated with a significantly lower likelihood of pregnancy; the magnitudes of the effects are similar for husbands' and wives' education and do not change when other variables are controlled. The likelihood of pregnancy is positively related to the amount of dwelling space. Non-Muslims (almost entirely Hindus) are less likely to become pregnant. Women living in the MCH-FP area of Matlab have a substantially lower rate of pregnancy, undoubtedly due to the better family planning services offered in that area.

The number of living children is insignificant in our second model but becomes a significantly positive influence on the likelihood of pregnancy after we control, in Model 3, for whether the woman wants to have more children. This may be an effect of

fecundity; i.e., once we control for whether a woman wants more children, a greater number of children may indicate that she becomes pregnant more easily.

Not wanting more children is associated with a substantially and significantly lower likelihood of becoming pregnant. Hence, stated fertility intentions do indeed predict subsequent behavior (as in DaVanzo, Peterson, and Jones, 2003, and the literature reviewed therein).

The interaction between not wanting more children and living in the treatment area is negative and very significant. Women who do not want more children and live in the MCH-FP area are especially unlikely to become pregnant. The difference in the likelihood of pregnancy between women who want more children and those who don't is much greater in the MCH-FP area than in the comparison area. Women in the MCH-FP area who do not want more children are better able to act on that preference than those in the comparison area.

When we control, in Model 5, for the contraceptive method used in 1990, the coefficient of the MCH-FP variable and its interaction with not wanting more children are no longer statistically significant. This indicates that the ability of women in the MCH-FP area to act on their preference for no additional children stems from their greater use of contraceptives, particularly of injectable methods, which have the lowest failure rates of the methods whose use we analyze.

Multivariate Analyses Explaining the Likelihood that a Pregnant Woman Has an Abortion (Table 2)

The effects of age are less significant on the likelihood that a pregnant woman will have an abortion than they are on the likelihood a woman will become pregnant. In Model 1, in which few other variables are controlled, age has a strong, positive, and nearly linear relationship with the likelihood that a pregnant woman chooses to have an abortion. This is consistent with our bivariate analyses (Figure 5) and is much stronger for abortion by menstrual regulation than by other means. In models controlling for additional variables, however, this relationship is much weaker.

Table 2. - Influence on Abortions/Pregnancy: Logistic and multinomial logit coefficients of demographic and socioeconomic variables associated with abortion, Sample = Pregnant women (n=3,249)

	Model - 1			Model - 2			Model - 3			Model - 4			Model - 5		
	Abortion	MR	Non-MR	Abortion	MR	Non-MR	Abortion	MR	Non-MR	Abortion	MR	Non-MR	Abortion	MR	Non-MR
Age	0.276 **	0.448 *	0.156	0.149	0.353 +	-0.0140	0.0107	0.253	-0.201	0.0112	0.254	-0.203	0.0081	0.253	-0.217
Age squared	-0.0020	-0.0045	-0.0006	-0.0008	-0.0037	0.0014	0.0010	-0.0024	0.0038 +	0.0010	-0.0025	0.0038 +	0.0010	-0.0024	0.0040 +
Women's education	0.123 ***	0.217 ***	0.0293	0.143 ***	0.237 ***	0.0489	0.143 ***	0.236 ***	0.0507	0.138 ***	0.232 ***	0.0473	0.126 ***	0.221 ***	0.0354
Husband's education	0.0492 ***	0.060	0.0380 +	0.0521 ***	0.0629 ***	0.0413 *	0.0528 ***	0.0629 ***	0.0427 *	0.0562 ***	0.0663 ***	0.0457 *	0.057 ***	0.0669 ***	0.0465 *
Dwelling space															
Medium	-0.284	-0.575	-0.0407	-0.349	-0.633	-0.111	-0.316	-0.598	-0.0843	-0.309	-0.591	-0.0794	-0.309	-0.598	-0.0687
High	0.437 +	0.206	0.673 *	0.325	0.108	0.541 +	0.346	0.125	0.561 +	0.331	0.114	0.545 +	0.318	0.105	0.537 +
Non-Muslim	0.544 +	0.649	0.542	0.589 *	0.677	0.607	0.617 *	0.697	0.638 +	0.676 *	0.758 +	0.685 +	0.687 *	0.762	0.715 +
MCH-FP area	-0.618 **	-0.730 *	-0.589 *	-0.488 *	-0.614 *	-0.437 +	-0.457 *	-0.606 *	-0.375	-1.180 *	-1.246 *	-1.053 +	-1.278 **	-1.288 *	-1.215 *
No. of living children				0.241 ***	0.214 *	0.284 **	0.121 +	0.113	0.148	0.132 +	0.128	0.155 +	0.128 +	0.124	0.154
Want no more children (WNMC)							1.331 ***	0.963 **	1.731 ***	0.930 **	0.580	1.375 **	0.870 **	0.546 *	1.290 **
WMNC*MCH-FP area										1.038 *	0.998	0.915	1.006 *	0.970	0.892
Contraceptive use															
Pill/IUDs													0.564 *	0.401	0.602 +
Injectables													0.369	0.125	0.636
Condoms/others													0.608 *	0.434	0.803 *
Constant	-9.777	-13.591	-8.256	-7.942	-12.243	-5.789	-5.834	-10.653	-3.042	-5.591	-10.462	-2.760	-5.654	-10.512	-2.692
-2LL	968.756 ***	999.407***		954.84 ***	1049.306***		926.76 ***	1035.380***		920.79 ***	1030.505***		912.839 ***	1029.495***	

The first column of each model shows logistic regression results for whether the pregnant women had an abortion.
The second and third columns for each model show multinomial logit results explaining whether a pregnant woman had an MR or non-MR abortion.

*** p<.001, ** p<.01, * p<.05, + p<.10

In all the models, higher education levels for both a woman and her husband are positively related to the likelihood that a pregnancy will be aborted. The effects of women's educational levels on this likelihood are more than twice those for their husbands. Higher levels of husbands' education increase the likelihood of both types of abortion, especially the likelihood of abortion by MR. Women's educational levels have even stronger positive effects on the likelihood of abortion by MR than do their husbands' education, but they do not significantly affect the likelihood of abortion by other methods.

Household dwelling space has little effect on the likelihood of abortion among pregnant women, though those in the largest dwellings are more likely, if aborting, to use methods other than menstrual regulation. Non-Muslims are more significantly more likely to terminate their pregnancies; the effects of religion are quite similar for the two types of abortion.

The likelihood that pregnancies will be aborted is significantly smaller in the MCH-FP area. Living in this area is associated with lower probabilities of both types of abortion, especially abortions by MR. These differences decrease somewhat, but are still substantial, when controlling for number of living more children and desire for additional children in Models 2 and 3.

The probability that pregnancies are aborted, both overall and by each type of method, increases with the number of living children, though the size of this effect decreases considerably when controlling for desire for no additional children, as in Model 3.

Pregnant women who want no additional children have a much higher likelihood of terminating their pregnancies, both overall and by each type of method, than women who do want more children, and they are especially likely to use methods other than MR. When we consider the interaction specification, in Model 4, we see that the likelihood that pregnant women will terminate their pregnancies is lowest for women in the MCH-FP area who want more children. This suggests that the pregnancies that do occur among such women are especially likely to be intended. Such women are much less likely to terminate their pregnancies than their counterparts in the comparison area, who, even though they want to have more children, may be less able to achieve their desired timing of pregnancies. The differences in abortion between pregnant women who want and do

not want more children are much greater in the MCH-FP area than in the comparison area.

Prior contraceptive use, especially of pills, IUDs, and condoms and other non-injectable methods is associated with a greater likelihood that pregnancies are aborted (particularly by methods other than MR), presumably because women who use contraception have a stronger desire to regulate their fertility and avoid unintended births. Controlling for previous contraceptive use has little effect on the other coefficients in the model.

Multivariate Analyses Explaining the Likelihood that a Woman Has an Abortion (Table 3)

In Table 3 we look at influences on the likelihood that a woman has an abortion – the individual-level equivalent of the general abortion rate. This enables us to see the combined effects of the influences on the likelihood of pregnancy and on the likelihood of abortion among pregnant women that we have just discussed.

The likelihood a woman will have an abortion has a nonlinear relationship with age. It increases until the mid 30s and then decreases. The relationship with age has a similar shape for the two types of abortion, but it is stronger and more significant statistically for MR abortions. The effect of age becomes somewhat weaker, and its peak occurs earlier (around age 30), when we control for the number of living children and whether the woman wants more children, suggesting that some of the effect of age in Model 1 in Table 1 is reflecting age differences in these other variables. The strong age effects we see for abortion rates largely reflect the effects of age on pregnancy rates seen in Table 1, given that, as Table 2 indicates, the likelihood that pregnancies are aborted does not vary significantly by age once number of children and fertility preferences are controlled.

Table 3. - Influence on Abortions/Woman: Logistic and multinomial logit coefficients of demographic and socioeconomic variables associated with abortion, Sample = All women (n=6,323)

	Model - 1			Model - 2			Model - 3			Model - 4			Model - 5		
	Abortion	MR	Non-MR	Abortion	MR	Non-MR	Abortion	MR	Non-MR	Abortion	MR	Non-MR	Abortion	MR	Non-MR
Age	0.506 ***	0.679 ***	0.360 **	0.398 ***	0.585 **	0.234 +	0.315 **	0.555 **	0.0921	0.315 **	0.555 **	0.0928	0.314 **	0.560 **	0.0832
Age squared	-0.0073 ***	-0.0099 ***	-0.0051 *	-0.0064 ***	-0.0091 **	-0.0041 *	-0.0053 **	-0.0087 **	-0.0023	-0.0054 **	-0.0087 **	-0.0023	-0.0054 **	-0.0089 **	-0.0022
Women's education	0.0623 +	0.148 **	-0.0238	0.0792 *	0.166 ***	-0.0085	0.0749 *	0.164 ***	-0.0138	0.0730 *	0.162 ***	-0.0149	0.0611 +	0.155 **	-0.0279
Husband's education	0.0423 **	0.0543 **	0.0294	0.0449 **	0.0567 **	0.0324	0.0453 **	0.0568 **	0.0326	0.0468 **	0.0584 **	0.0333	0.0455 **	0.0568 **	0.0315
Dwelling space															
Medium	-0.220	-0.493	0.0163	-0.300	-0.561	-0.0724	-0.299	-0.558	-0.0797	-0.299	-0.558	-0.0798	-0.302	-0.556	-0.0812
High	0.538 *	0.335	0.750 *	0.422 +	0.233	0.617 *	0.418 +	0.232	0.608 *	0.414 +	0.228	0.605 *	0.390 +	0.213	0.582 +
Non-Muslim	0.205	0.258	0.240	0.235	0.280	0.276	0.219	0.271	0.257	0.224	0.273	0.261	0.217	0.274	0.259
MCH-FP area	-0.868 ***	-0.940 **	-0.845 **	-0.755 ***	-0.845 **	-0.708 **	-0.760 ***	-0.850 **	-0.706 **	-1.162 **	-1.203 *	-1.032 +	-1.062 **	-1.067 *	-0.984 +
No. of living children				0.250 ***	0.218 *	0.289 ***	0.202 **	0.197 *	0.221 *	0.205 **	0.200 *	0.224 *	0.203 **	0.199 *	0.220 *
Want no more children (WNMC)							0.641 *	0.237	1.078 **	0.443	0.0518	0.923 *	0.392	0.0334	0.851 *
WNMC* MCH-FP area										0.548	0.519	0.422	0.615	0.616	0.465
Contraceptive use															
Pill/IUDs													0.0837	-0.119	0.175
Injectables													-0.359	-0.611	-0.0672
Condoms/ others													0.651 **	-0.449	0.875 **
Constant	-12.230	-15.989	-10.373	-10.681	-14.654	-8.570	-9.383	-14.169	-6.446	-9.256	-14.037	-6.344	-9.196	-14.040	-6.191
-2LL	1236 ***	1179***		1218 ***	1279***		1211 ***	1290***		1210 ***	1289***		1201 ***	1303***	

The first column of each model shows logistic regression results for whether the women had an abortion.
The second and third columns for each model show multinomial logit results explaining whether the woman had an MR or non-MR abortion.

*** p<.001, ** p<.01, * p<.05, + p<.10

Consistent with our bivariate results, the likelihood of abortion increases with a woman's educational attainment, and this is entirely due to her greater likelihood of having an MR abortion. The effect of education on non-MR abortion is slightly negative, but not statistically significant. The effect of husbands' education on abortion is smaller (though it is actually more significant statistically) than that of wives' education, with a stronger positive relationship with MR abortion than with other types of abortion. The effects of both educational variables persist in models with additional controls, though the effect of women's education increases somewhat when the number of children is controlled and decreases somewhat when contraceptive use is controlled. These education patterns in abortion rates are completely the result of the fact that the likelihood a pregnancy is aborted has a strong positive relationship with education, more than offsetting the fact that pregnancy rates are inversely related to education.

Large household dwelling space is associated with a modest increase in the likelihood of abortion, particularly non-MR abortion. This reflects the positive relationship between dwelling space and pregnancy rates and the positive relationship between the largest category of household space and the likelihood that pregnancies are aborted by methods other than MR.

Religion does not significantly affect the likelihood that a woman will have an abortion. The lower pregnancy rates of non-Muslims offset their higher likelihood of aborting once pregnant.

Women who live in the MCH-FP area have a substantially and significantly lower likelihood of having an abortion. They are somewhat more likely to have an MR than a non-MR abortion, but the differences between the two types are not large. Women living in the MCH-FP area are both less likely to become pregnant and less likely to have an abortion if they do become pregnant.

The likelihood of an abortion increases with the number of children that a woman has, and this relationship is somewhat stronger for the less safe type of abortion. This reflects both the result we saw in Table 1 that such women are more likely to become pregnant and that, as seen in Table 2, once pregnant they are more likely to abort their pregnancies. Not surprisingly, the effects of the number of living children are somewhat lower in the model including the variable indicating desire for no more children, which is

consistent with the decrease we saw in abortions/pregnancy when this variable was added to Table 2.

Women who do not want more children are much more likely to have an abortion, particularly by means other than menstrual regulation. Women who do not want more children are significantly less likely to become pregnant, as we saw in Table 1, but if they do become pregnant, they are significantly more likely to have an abortion, especially by methods other than MR, as we saw in Table 2. In Table 3 we see that their greater likelihood of an abortion if pregnant offsets their lesser likelihood of becoming pregnant, thus boosting their overall abortion rate.

The coefficient of the interaction between the variables for MCH-FP area and for not wanting more children, included in Model 4, is positive, meaning that the effect of not wanting more children is even larger in the MCH-FP area than in the comparison area, but it is not statistically significant. The coefficient on the MCH-FP variable alone becomes larger in absolute magnitude when the interaction term is added, meaning that that the likelihood of seeking an abortion is especially low among women in the MCH-FP area who want to have more children. As noted above, this likely reflects the fact that such women are especially likely to have intended pregnancies.

Finally, in Model 5, we add variables for the contraceptive method being used at the time of the KAP survey in 1990. Significant effects are seen only for condoms. If condoms were used in 1990, the woman is more likely to have an abortion. This is entirely due to her significantly greater likelihood of having a non-MR abortion. Women who used any type of contraception in 1990, especially injectables, are much less likely to become pregnant over the next five years. Nevertheless, if they do become pregnant, they are much more likely to terminate their pregnancy, especially by methods other than MR, and this is particularly true for those who used condoms, leading to the positive effect we see for condoms in Table 3.

Main Findings and Implications

One of the principal aims of our analyses was to identify the women most at risk for an unsafe abortion. Older women are more likely both to have an abortion if pregnant and to use unsafe means. Rates of abortion by means other than menstrual regulation

have been decreasing for many age groups, but they remain higher, and have not decreased as much, for women outside the MCH-FP area and its better family planning services. Less educated women are also more likely, if terminating pregnancies, to use unsafe methods of abortion. Though more educated women have a higher overall rate of abortion, relatively more of their abortions are by menstrual regulation.

We find that abortion rates did not increase following the lifting of the global gag rule in 1993, and that the incidence of abortion by less safe means (i.e., means other than menstrual regulation) fell. This suggests that the ability to discuss abortion did not lead to an increase in the number of abortions but did reduce the likelihood that women choosing to have an abortion would use an unsafe method.

Our multivariate analyses further help us identify the women most at risk of an unsafe abortion. They are women who have a larger number of children, who don't want more children, who have the most dwelling space, who live in the area that has standard government family planning services, and those whose husbands earlier used condoms. Even when all of the other variables just mentioned are controlled, more highly educated women and those with more educated husbands have a higher rate of abortion, but they use the safer MR method. The likelihood of both types of abortion is significantly less for women who live in the MCH-FP area, both because of their lower likelihood of pregnancy and their lower likelihood of aborting if pregnant. This most likely reflects better control of pregnancies in the MCH-FP area.

The desire of Bangladeshi couples to limit their family size may be even stronger in the near future with rapid social transformation and increased population crowding continuing. The most recent data indicate that unmet need for contraception is still high in Bangladesh—15 percent in 1999-2000 (National Institute of Population Research and Training et al., 2001). This unmet need could continue to lead to more abortions and higher abortion rates as pregnancies that might be prevented by contraception are instead aborted. To limit the number of abortions, two interrelated family planning program strategies seem to be in order: increasing contraceptive use and achieving an effective contraceptive mix. Although contraceptive use continues to increase in Bangladesh, its effectiveness is complicated by changing patterns in types of methods used. Use of voluntary sterilization and the IUD, which have no or few failures, is decreasing while

use of short-term methods is increasing. Nationally, 70 percent of contraceptive users rely on the pill, condoms, or traditional methods, which have high rates of discontinuation or failure, while just over 10 percent rely on injectables, which have low failure rates but, like pills, have high discontinuation rates due to side effects (National Institute of Population Research and Training et al., 2001). Within the MCH-FP area, reliance among users on the pill, condoms, or traditional methods increased from 29 to 45 percent between 1989 and 2001, while use of injectables decreased from 48 to 44 percent of contraceptive users (though such use has increased among all women), use of IUDs decreased from 7 to 2 percent, and use of permanent contraception decreased from 17 to 9 percent (ICDDR,B, 2003).[22]

Statistics on abortion by educational attainment in Matlab point to some special issues in encouraging contraceptive use so as to cut abortion. Just as they appear to be more likely to know the risks of clandestine abortion, so better educated women in Matlab appear to be more knowledgeable about various temporary methods of contraception and more likely to use such methods. The higher use of temporary methods by more educated Bangladeshi women may be one reason for their higher abortion rates. Another may be that they consider the costs of an unplanned child to be higher than their less educated counterparts do. It is encouraging, though, that when educated women terminate their pregnancies that they are more likely to use safer methods than their less educated counterparts.

Improving the mix of permanent and temporary contraception, and reducing failure rates of temporary methods and the side effects of otherwise reliable injectables, will require greater efforts by both public and private parties. Such efforts can and do succeed. Use of injectables throughout Bangladesh is increasing, for example, thanks to the efforts of government and NGO clinics to increase their availability (Use of injectables in increasing among all women, though not as a proportion of all users, in the Matlab area.) Cost-effectiveness calculations indicate that the national family planning program could expand to include a variety of reversible methods like those in the MCH-

[22] Considering all currently married women of childbearing age, use of the pill, condoms, or traditional methods has increased from 17 to 31 percent, use of injectables has increased from 29 to 31 percent, use of IUDs has decreased from 4 to 1 percent, use of permanent contraception decreased from 10 to 6 percent, and overall use of contraceptives of any type increased from 59 to 70 percent (ICDDR,B, 2003).

FP area without incurring an increase in the cost per birth prevented (Simmons, Balk, and Faiz, 1991).

Efforts to reduce abortion through contraceptive programs can also pay public health benefits by reducing the health problems and burdens on health services that result from illegal abortion in particular. It is encouraging that the incidence of clandestine abortion appears to be decreasing. This may explain why maternal mortality rates have decreased in Bangladesh despite an increase in abortion rates. It is also encouraging that the abortion by methods other than menstrual regulation is lowest among educated women in the MCH-FP area, suggesting that continued improvements in women's education and in the availability of contraception should further reduce the incidence of unsafe abortion.

Appendix

Mean values, KAP 1990 Sample = (n=6,323)

	Model-1
Abortions/woman	0.022
MR abortions/woman	0.010
Non-MR abortions/woman	0.011
Pregnancies/woman	0.514
Abortions/pregnancy	0.041
Age	30.25
Woman's education (yrs.)	1.85
Husband's education (yrs.)	3.73
Dwelling space	
Medium (253-349 sq. ft.)	0.27
High (350+ sq. ft.)	0.24
Non-Muslim	0.12
MCH-FP area	0.55
No. of living children	3.17
Want no more children (WNMC)	0.50
Contraceptive use	
Pill/IUDs	0.16
Injectables	0.20
Condoms/others	0.07

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