Do Better Family Planning Services Reduce Abortion? Evidence from Matlab, Bangladesh

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Summary

Background

Fertility decline is often associated with an increase in contraception and abortion, but the causal relationships are difficult to examine with non-experimental data. High-quality longitudinal data on otherwise similar areas differing in the availability and quality of family planning services help us examine the effects of better family planning services on abortion.

Methods

We examine trends in overall abortion rates as well as rates for intended and unintended pregnancies in two comparable areas typical of rural Bangladesh—a comparison area receiving standard government family planning services and a treatment area receiving better family planning services. We analyze Matlab Demographic Surveillance System (DSS) data on pregnancy outcomes between 1979 and 1998 in these areas, matching them to survey data on fertility preferences, enabling us to identify pregnancies as intended or unintended.

Results

Abortion of unintended pregnancies is similar in both areas, but the higher levels of contraceptive use in the treatment area have led to lower levels of unintended pregnancy and abortion. The likelihood that an unintended pregnancy will be aborted has increased in both areas but the decrease in unintended pregnancies was sufficiently large in the treatment area to offset this increase.

Interpretation

These experimental data enable observation of the effects of family planning services while implicitly controlling for other variables. Abortion rates are significantly lower in the area with better family planning services. Abortion may increase during the fertility transition in developing countries as the desire to limit family size increases unless there is widespread availability of quality family planning services.

Key words

Abortion, induced; Bangladesh; Contraception; Demography; Family planning knowledge, attitudes, practice; Population control

Introduction

In a number of populations that have undergone a recent demographic transition there has been an inverse relationship between fertility rates on the one hand and abortion and contraception rates on the other. As fertility has fallen, contraception and abortion rates have risen.[1 2 3] Fertility declines typically follow a reduction in desired family size, with modernization leading couples to want to invest more in the health and education of their children. This raises the "costs" of each child. As these costs increase, couples become more interested in regulating their fertility. Worldwide, fertility rates have fallen from an average of about six children per woman to less than three today,[4 5] as contraceptive use rates among women of reproductive age have increased from 10% in 1965 to well over 50% in 1999.[6]

If contraceptive use is inadequate to enable couples to achieve their desired fertility, then women may seek an abortion if they find themselves with an unintended pregnancy. This may be even more likely when the "costs" of an unintended pregnancy are high, as when another child would reduce the resources available to other family members or restrict the woman's life choices or endanger her health or make her subject to severe social sanctions. Contraceptive inadequacy can cause particular problems in developing countries with high rates of clandestine or illegal abortion, which carries a high risk of maternal mortality and morbidity. Globally, about 80,000 maternal deaths, or one in eight of all maternal deaths, result from unsafe abortion, i.e., one "not provided through approved facilities and/or persons."[7]

While it might otherwise seem that better family planning services should reduce the incidence of abortion and its health problems by reducing the number of unintended pregnancies, the fact that abortion rates can increase as family planning programs develop makes this difficult to confirm. It is difficult to examine the effect of family planning services on abortion because of the lack of good data on abortion and because other factors can affect the availability of family planning services, contraceptive use, and the incidence of abortion and thus confound the relationship.

In this study we use experimental data from two otherwise-similar areas in Matlab, Bangladesh, that allow us to control for other factors when examining the effects of better family planning services on the incidence of abortion in a nation that has undergone a rapid demographic transition. In the past two decades, fertility in Bangladesh has fallen by nearly half, from about 6.5 to 3.3 births per woman, a historic record in rapid fertility transition, and contraceptive use among women of reproductive age has tripled, to 55%.[8] In one typical rural area the incidence of abortion has tripled, to about 50 per 1,000 live births.[9] The high-quality longitudinal data available from Matlab include information on nearly 150,000 pregnancy outcomes, as well as data on desire for additional children for more than 10,000 women. These data allow us to examine the effects on abortion rates of providing better family planning services to one of two otherwise-similar areas typical of the nation as a whole.

Methods

Setting

Bangladesh is poor, traditional, religiously conservative, and socio-economically disadvantaged. A country with a small geographic area but a large population, it has had a strong political commitment since independence in 1971 to tackle its high rate of population growth.

The rural Bangladeshi subdistrict of Matlab is well known for its Demographic Surveillance System (DSS), operated by the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). The DSS has collected data on pregnancy outcomes in two otherwise-similar areas—the "treatment" and "comparison" areas—since 1966. The comparison area is typical of much of Bangladesh in contraceptive practice,[10] fertility,[11] abortion,[12] and maternal mortality.[13 14]

Since 1977, the Maternal Child Health and Family Planning (MCH-FP) Project in the treatment area has provided more accessible and higher-quality family planning services than the standard government services provided in the comparison area. Using DSS data from 1979 to 1998 on pregnancies and induced abortions in both areas allows analysis of the effects of better family planning services on abortion during a period of remarkable fertility decline in these areas. Because of the experimental variation in family planning services, the Matlab 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.

Married women in the comparison area were supposed to receive the standard visits every two months from female welfare assistants of the government family planning program who provide counseling and supply pills and condoms. In the treatment, or MCH-FP, area, community health workers visited married women of reproductive age every two weeks to provide counseling about family planning services and to deliver injectables, pills, and condoms at the doorstop. (Because marriage among women in Bangladesh is nearly universal and occurs at a young age, the focus on married women of childbearing age effectively targets all sexually active women of childbearing age in both areas.)

In addition to the standard government Health and Family Welfare Centres available in both areas, the treatment area also has ICDDR,B sub-centres that provide maternal and child health and family planning services. The MCH-FP area is characterized by greater contact among clients, workers, and supervisors as well as greater availability and a broader mix of contraceptive methods than is available in the comparison area. Women in the MCH-FP area reported greater accessibility and higher quality of family planning services than reported by women in the comparison area. MCH-FP area women were more likely to report receiving family planning service visits, to spend more time with family planning workers on such visits, and to believe they would receive good care at a health or family planning clinic.[15] While the better family planning services in the MCH-FP area have higher service delivery costs, about three times more services per eligible woman are delivered there than in the comparison area.[16]

These differences in the availability of contraceptive services have led to a difference in contraceptive practice, with women of childbearing age in the MCH-FP area being more likely to

use contraception than are women in the comparison area (Table 1). These areas also differ in contraceptive methods that are used. Users in the MCH-FP area, for example, are much more likely to use injectables such as depo-medroxyprogesterone acetate, or DMPA, which have very low failure rates but sometimes cause side effects.

<Table 1 about here>

The mean desired number of children in both areas has been similar and declined at similar rates, from about 4.5 in 1975 to 3.0 in 1990[15] to 2.5 in 2000.[17] Increases in contraception led to a decrease in unmet contraceptive need in both areas, but unmet contraceptive need, measured by the percent of married women who at the time of the survey did not desire more children but were not practicing contraception, remained higher in the comparison area (Table 1). The trends and differences in contraceptive use have resulted in consistently and significantly lower fertility rates in the MCH-FP area since the late 1970s (Figure 1).

<Figure 1 about here>

<Caption: General Fertility Rates by Area, 1979-1998>

In both areas, pregnancy termination by manual vacuum aspiration, commonly known as "menstrual regulation," is available from trained female paramedics at the government Health and Family Welfare Centres. In the late 1970s, the Bangladesh government agreed to permit such abortions in an effort to replace the practice of unsafe abortion. Menstrual regulation can be performed only with the consent of the woman's husband, only up to 10 weeks after the last

menses, and before pregnancy is clinically confirmed. Illegal abortions are available from traditional healers, usually older women performing the procedure through insertion of herbal roots or other solid objects. Such abortions have contributed significantly to maternal mortality as well as short- and long-term health complications; about 15% of maternal deaths during the 1970s and 1980s in Matlab have been attributed to abortion.[18 19 20] Patients with complications from abortion occupied about half the beds in gynecology and obstetric departments of hospitals located in towns and cities of Bangladesh in the late 1970s.[21] Recent data indicate that abortion-related maternal deaths have declined in the Matlab MCH-FP area.[22]

At its beginning in 1977 the MCH-FP project also provided menstrual regulation services, as backup in case of contraceptive failure, in addition to those offered by government clinics in the treatment area,[23] but this was discontinued in 1983 when donors withdrew their support from that part of the program. DSS data indicate that in the past decade induced abortions were about equally divided between menstrual regulations and others.[24]

Data

To analyze the effects of the better family planning services in the MCH-FP area, we examine DSS data on pregnancy outcomes since 1979, comparing statistics for women in the two areas. Prior to 1979, induced abortions were reported with miscarriages and not distinguished separately. Between 1966 and 1997, female community health workers employed by the DSS visited each household every two weeks in both areas to record the pregnancy status of women

and any pregnancy outcomes occurring since the previous visit. Since late 1997, workers have visited every household monthly to gather these data. All told, we analyze 147,753 pregnancy outcomes between 1979 and 1998, including 4,100 abortions.

The Matlab abortion data 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 they visited each household every two weeks until late 1997, and every month since then, they were likely to know pregnancy status and changes, since more frequent interviews are likely to elicit more accurate information. Even if underreporting exists, it should not differ between the treatment and comparison areas or over time.[25]

We use DSS data to calculate trends in the general abortion rate, i.e., the annual number of abortions per 1,000 women 15 to 49 years of age, between 1979 and 1998. In addition, we analyze data on married women aged 15-49 interviewed in the Matlab Surveys on Knowledge, Attitudes, and Practice (KAP) of Contraception, conducted mid-year in 1984 and 1990. The survey response rates were high; the 1990 survey, for example, had a participation rate of about 90%.[15] The KAP asks women whether they desire more children and whether they are using contraception, and, if so, which method they were using, including permanent methods (i.e., tubectomies or vasectomies). We match survey 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 prospective records for more than 10,000 women (3,912

women in 1984 and 6,327 in 1990). These matched data enable us calculate pregnancy rates separately for women who wanted more children ("intended" pregnancies) and women who didn't ("unintended" pregnancies) as well as the percentages of each of these types of pregnancies that were aborted.

We calculate relative risks and their 95% confidence intervals to show the differences between the MCH-FP and comparison areas and between the two time periods (1984-89 and 1990-95). Chi-square tests were used to determine the significance levels of differences.

Results

In the late 1970s and early 1980s, the general abortion rate was similar in the MCH-FP and comparison areas (Figure 2). The slightly, but statistically significantly ($p<0.05$), higher rate of abortion in the MCH-FP area in 1979 is likely attributable to the greater availability of menstrual regulation then available there. Since 1983 the general abortion rate has increased in the comparison area while decreasing slightly in the MCH-FP area. In the comparison area, the correlation coefficient (r) between time and the general abortion rate is 0.78 ($p<0.001$), while in the MCH-FP area the correlation is –0.65 ($p<0.01$). As a result, while there was no difference in general abortion rates between the two areas in the early 1980s, by the late 1990s there were on average 5 fewer abortions per 1,000 women in the MCH-FP area than there were in the comparison area. The comparison area now has a general abortion rate more than three times higher than that in the MCH-FP area. The difference between the two areas has been statistically significant in every year since 1983 ($p<0.05$ in every year).

<Figure 2 about here>

<Caption: General Abortion Rates by Area, 1979-1998>

In both areas in 1984 and 1990, about half the non-pregnant women not using permanent contraception said they wanted more children, and about half said that they did not want more (Table 2, Panel A). In both areas, about three in four women who said in 1984 or 1990 that they wanted more children became pregnant in the next five years (Panel B of Table 2).

<Table 2 about here>

There was much greater variation in unintended pregnancy between areas and years. Nearly half the women in the comparison area who, in 1984, said they did not desire more children nonetheless became pregnant at least once in the subsequent five years (Panel C of Table 2). Unintended pregnancies declined in both areas between the two time periods, but in both time periods the rate of unintended pregnancy was significantly lower in the MCH-FP area. The decline in unintended pregnancies was also greater in the MCH-FP area. The percentage of all pregnancies that were unintended declined over time in each area (Panel D of Table 2), and in both time periods it was significantly lower in the MCH-FP area. Within Matlab, it appears that the more accessible and higher-quality family planning services in the MCH-FP area better enabled women there who did not want more children to avoid becoming pregnant.

In both areas and in both time periods, abortion was much more likely for unintended (Panel F of Table 2) than for intended (Panel E of Table 2) pregnancies. Abortion of "intended" pregnancies is a relatively rare event that may occur because women subsequently change their mind about wanting more children or because the pregnancy was mistimed or not intended at the time it occurred. It is noteworthy that in both time periods the likelihood an "intended" pregnancy was aborted was significantly lower in the MCH-FP area than in the comparison area. This difference probably results from in the greater ability of women in the MCH-FP area to time and space their births.

In the earlier period, unintended pregnancies in the comparison area were aborted at a rate more than twice that for those in the MCH-FP area, although the difference was not statistically significant at $p<0.05$ (it is significant at $p<0.10$). Abortion of unintended pregnancies increased significantly between the two time periods in both areas, especially the MCH-FP area, to the point that, by the early 1990s, there was very little difference between the two areas.

Although abortion rates for unintended pregnancies were similar for both areas in the later period, the lower rate of unintended pregnancy in the MCH-FP area, together with the much smaller likelihood that "intended" pregnancies were aborted, meant it continued to have a lower overall percentage of pregnancies ending in abortion (Panel G of Table 2). In both areas the percentage of pregnancies aborted increased significantly between the two time periods, but in both time periods this percentage was significantly lower in the MCH-FP area than in the comparison area.

Differences between the areas are also evident in the percentage of pregnancies aborted annually as calculated from the entire DSS database (Figure 3). The proportion of MCH-FP pregnancies ending in abortion was significantly higher than those in the comparison area in 1979 ($p<0.001$) and in 1981 ($p<0.05$), likely because of the greater availability of menstrual regulation then available in the MCH-FP area. The proportion of pregnancies that were aborted nearly tripled in the comparison area, however, between the early 1980s and the late 1990s—the correlation coefficient (r) between time and the proportion of pregnancies aborted there is 0.95 ($p<0.001$)—while in the MCH-FP area the proportion of pregnancies aborted declined in the early 1980s and has remained fairly static since. As a result, in every year since 1984, the percentage of

pregnancies aborted has been significantly lower ($p<0.05$ or lower in every year) in the MCH-FP area than in the comparison area.

<Figure 3 about here>

<Caption: Percentage of Pregnancies Aborted by Area, 1979-1998>

Discussion

This study illustrates how erroneous conclusions about contraception and abortion can be drawn from analyses of changes over time, particularly in settings of fertility transition, where the "costs" of additional children resulting from unintended or mistimed pregnancies are perceived to be increasing. If we were to consider only the comparison area of Matlab, typical of rural Bangladesh in fertility, contraceptive practice, and abortion, we would see that between 1984-86 and 1996-98, when fertility declined by one third, contraceptive use more than tripled and the abortion rate increased by 30% (first row of Table 3). Since this was a period of increased family planning program activity, some might conclude that the increase in abortion was caused by such activity, rather than by changes in other variables such as couples' desired family size and the "costs" they associate with an unintended pregnancy. [26]

<Table 3 about here>

Yet similar changes in couples' desired family size, and presumably in the costs of unintended pregnancies, did not lead to increases in abortion in the MCH-FP area. Instead, a stable trend in the general abortion rate there reflects the offsetting effects of (1) a falling number of unintended pregnancies due to greater and more effective use of contraception and (2) increasing probabilities that both intended and unintended pregnancies will be aborted because of the stronger desire to space and limit births. The better family planning services in the MCH-FP area helped keep the abortion rate stable despite the rising costs of unwanted pregnancies and stronger

desires of couples for smaller families, while in the comparison area the abortion rate rose in response to such changes.

Abortion can increase during the fertility transition in developing countries as the intensity of desire to limit family size increases. Widespread availability of quality family planning services, however, helps couples to space and limit their births and can result in much lower rates of abortion than would otherwise be the case and can keep abortion rates from rising, as it has in the MCH-FP area

Between the mid 1980s and the late 1990s fertility declined by nearly one third in both areas, but these declines were achieved in different ways. Couples in the MCH-FP area have been more likely to use contraception to regulate their fertility. Those in the comparison area, lacking the same family planning services available in the MCH-FP area, had more unintended pregnancies, and more abortions. Despite similar desired family sizes in both areas, fertility remains about 20% higher in the comparison area, indicating the greater effectiveness of contraception over abortion in regulating fertility in Matlab.

The remarkable fertility declines that have occurred throughout Bangladesh have been achieved with much less abortion than in other countries with similar fertility declines. The political priority that the Bangladesh government has placed on fertility reduction and family planning services has helped to accomplish this. While abortion rates are very low in the MCH-FP area, even in the comparison area there were only 0.15 to 0.25 lifetime abortions per woman between 1979 and 1998. This is comparable to rates in Tunisia (0.26) and the Netherlands (0.20), among

the lowest such rates in the world, and far below those for nations like Cuba (2.33) and Russia (2.96), which are among the highest in the world.[27] It is very likely that abortion in the comparison area would have been higher were it not for the family planning services that the government provided.

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. This could lead to further increase in the perceived "cost" of unintended pregnancies. The most recent data available indicate that unmet contraceptive need is still high in Bangladesh (15% in 1999-2000).[28] 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: further increasing contraceptive use and achieving a more effective contraceptive mix. Although contraceptive use has been increasing in Bangladesh, its effectiveness is complicated by the changing mix of methods. Use of voluntary sterilization and the IUD, which have no or few failures, is declining, while use of short-term methods is increasing. Seventy percent of users rely on the pill, condoms, or traditional methods, such as periodic abstinence, withdrawal, or herbal methods, which have high rates of failure. Just over 10% of users rely on injectables, which have low failure rate but, like pills, have high discontinuation rates due to side effects.

Reversing the trends in the mix of permanent and temporary contraception, as well as 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 is increasing, for example, thanks to the efforts of government and NGO clinics to increase their availability. Cost-effectiveness calculations indicate that the national family planning program could expand to include a variety of reversible methods like those in the MCH-FP area without incurring an increase in the cost per birth prevented.[16] Efforts to reduce abortion through contraceptive programs in Bangladesh and elsewhere can also pay public health benefits by reducing the health problems and burdens on health service resources that result from illegal abortions in particular.

Contributors

Mizanur Rahman and Julie DaVanzo designed the study, analyzed the data, and wrote the paper. Abdur Razzaque implemented the study at ICDDR,B and supervised data management and analysis.

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Table 1--Contraceptive Use and Unmet Need by Area, 1984 and 1990

		Area	
		Comparison	MCH-FP
Contraceptive use by married women of childbearing age			
	1984	14,3%	35,4%
	1990	28,1%	59,1%
	1996	46,9%	68,1%
Unmet contraceptive need			
	1984	42,7%	26,5%
	1990	27,4%	11,1%
	1996	Not available	

Source: Koenig et al., "Contraceptive use in Matlab: levels, trends, and explanations," Studies in Family Planning 1992, ***23****(6);352-64; ICDDR,B: Centre for Health and Population Research, 2000, "Health and Demographic Surveillance System—Matlab: Registration of Demographic and Contraceptive Use 1998," Scientific Report No. 87, Dhaka, Bangladesh.*

Table 2--Childbearing Intentions, Pregnancy, and Abortion, by Area, 1984-89 and 1990-95

	Area					
	Comparison	*(n)*	MCH-FP	*(n)*	*Relative Risk (MCH/FP Area : Comparison Area)*	*(95% Confidence Interval)*
A. Desire no more children*						
1984	54,7%	*(1,473)*	48,7%	*(2,439)*	*0,88*	*(0.82-0.95)*
1990	50,7%	*(2,838)*	49,1%	*(3,489)*	*0,97*	*(0.92-1.02)*
Relative Risk (1990 : 1984)	*0,93*		*1,01*			
(95% Confidence Interval)	*(0.87-0.98)*		*(0.95-1.06)*			
B. Pregnancies per 1,000 women desiring more children*						
1984-89	772,7	*(667)*	742,7	*(1,251)*	*0,96*	*(0.91-1.01)*
1990-95	762,7	*(1,398)*	701,4	*(1,779)*	*0,92*	*(0.88-0.96)*
Relative Risk (1990-95 : 1984-89)	*0,99*		*0,94*			
(95% Confidence Interval)	*(0.94-1.04)*		*(0.90-0.99)*			
C. Pregnancies per 1,000 women not desiring more children*						
1984-89	457,0	*(806)*	336,8	*(1,188)*	*0,74*	*(0.66-0.82)*
1990-95	384,6	*(1,440)*	222,0	*(1,710)*	*0,58*	*(0.52-0.64)*
Relative Risk (1990-95 : 1984-89)	*0,84*		*0,66*			
(95% Confidence Interval)	*(0.76-0.93)*		*(0.58-0.74)*			
D. Unintended pregnancies as percent of all pregnancies						
1984-89	41,7%	*(884)*	30,1%	*(1,331)*	*0,72*	*(0.64-0.81)*
1990-95	34,2%	*(1,662)*	23,4%	*(1,627)*	*0,68*	*(0.61-0.76)*
Relative Risk (1990-95 : 1984-89)	*0,82*		*0,78*			
(95% Confidence Interval)	*(0.74-0.91)*		*(0.69-0.87)*			
E. Percent of intended pregnancies aborted						
1984-89	2,00%	*(515)*	0,26%	*(930)*	*0,15*	*(0.04-0.54)*
1990-95	2,39%	*(1,067)*	0,84%	*(1,247)*	*0,38*	*(0.19-0.76)*
Relative Risk (1990-95 : 1984-89)	*1,10*		*2,73*			
(95% Confidence Interval)	*(0.54-2.21)*		*(0.77-9.77)*			
F. Percent of unintended pregnancies aborted						
1984-89	5,60%	*(369)*	2,44%	*(401)*	*0,51*	*(0.21-1.04)*
1990-95	10,77%	*(555)*	10,09%	*(380)*	*0,95*	*(0.65-1.39)*
Relative Risk (1990-95 : 1984-89)	*1,99*		*3,74*			
(95% Confidence Interval)	*(1.22-3.25)*		*(1.94-7.20)*			
G. Percent of all pregnancies aborted						
1984-89	3,50%	*(884)*	0,92%	*(1,331)*	*0,30*	*(0.15-0.57)*
1990-95	5,25%	*(1,622)*	3,00%	*(1,627)*	*0,59*	*(0.42-0.83)*

Relative Risk (1990-95 : 1984-89)	*1,49*	*2,92*
(95% Confidence Interval)	*(1.00-2.24)*	*(1.62-5.26)*

*Among married women not currently pregnancy and not using permancent contraception. Pregnancy data refer only to first (if any) pregnancy in five year period.

Data sources: Matlab Demographic Surveillance System;

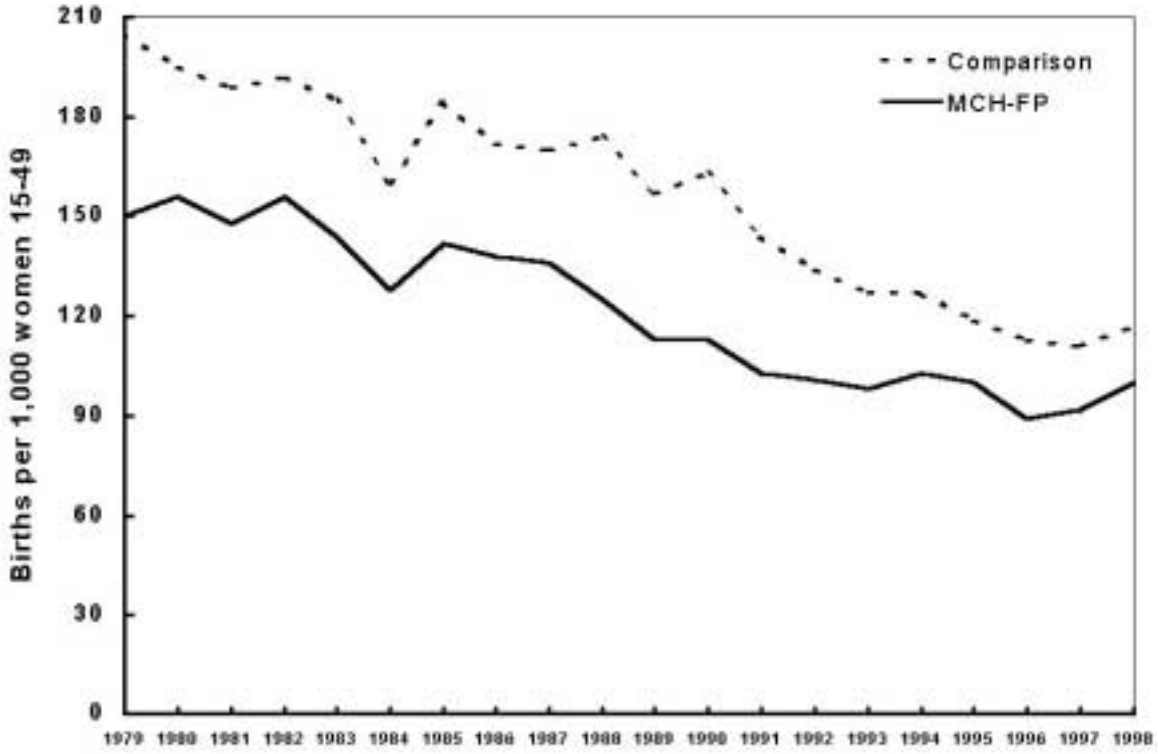
Matlab Knowledge, Attitude, and Practice Surveys of Contraceptive Use

Table 3--Contraception, Abortion, and Fertility in MCH-FP and Comparison Areas, 1984-86 and 1996-98

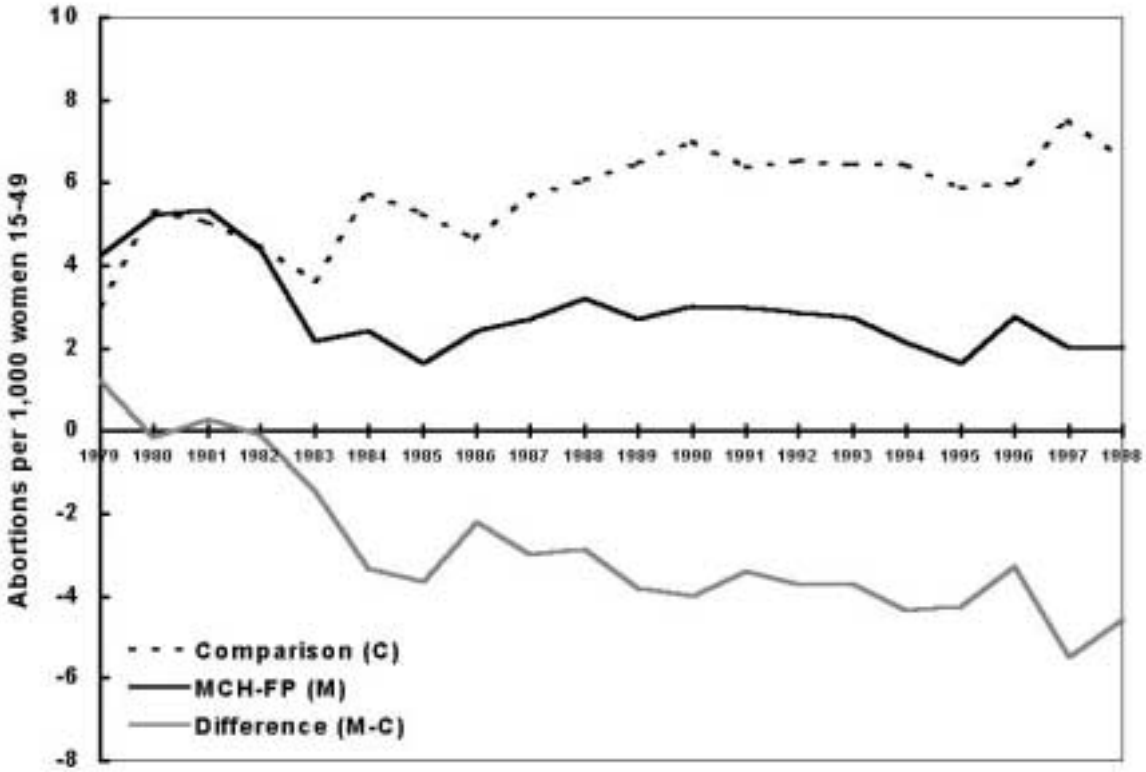
	General Fertility Rate (per 1,000 women)			Contraceptive Use			General Abortion Rate (per 1,000 women)		
	1984-86	1996-98	Change	1984	1990	Change (in % pts)	1984-86	1996-98	Change
Comparison Area	171,8	113,7	-58,1	14,3%	46,9%	32,6%	5,2	6,8	1,6
MCH-FP Area	136,0	93,6	-42,4	35,4%	68,1%	32,7%	2,2	2,3	0,1
Difference between MCH-FP and Comparison areas	-35,8	-20,1		21,1%	21,2%		-3,0	-4,5	

Contraceptive use data from Table 1.

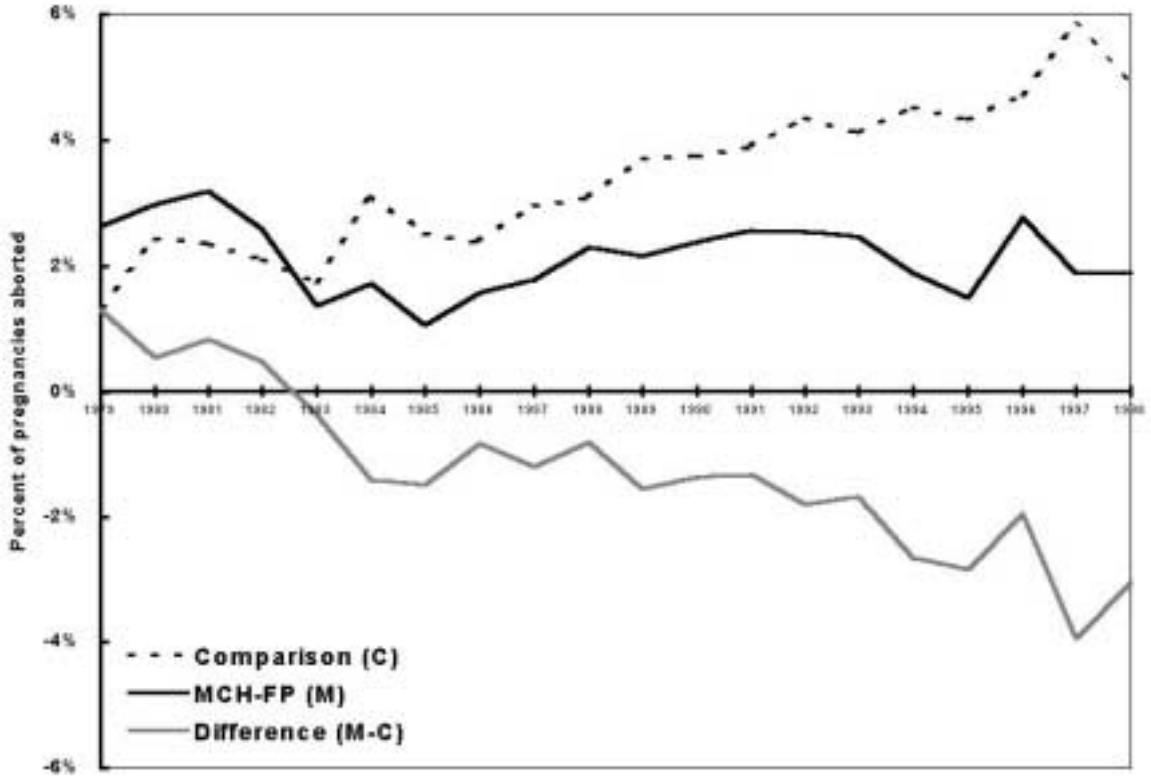
Abortion and fertility data from Matlab Demographic Surveillance System.



Source: Matlab DSS



Source: Matlab DSS



Source: Matlab DSS