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CAN FAMILY PLANNING PROGRAMS AFFECT HIGH DESIRED FAMILY SIZE IN SUB-SAHARAN AFRICA?

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Abstract
Fertility levels in sub-Saharan Africa are on average double those in Latin America and Asia. One contributing factor is that governments in sub-Saharan Africa have generally devoted low priority to family planning programs. But even if unwanted fertility could be reduced by implementing such programs the high desired family size that prevails in this continent represents an obstacle to fertility decline. This study examines the potential role of family planning programs in reducing preferences for large families. Two kinds of evidence support such an effect: 1) a cross-sectional regression analysis of country variation in desired family size finds a significant effect for program effort after controlling for socio-economic indicators; 2) Paired case studies of countries with similar levels of development document lower wanted and unwanted fertility when well organized programs exist. A concluding section discusses possible mechanism for this program impact, including the lower cost of contraception and the role of media campaigns.

Over the past half century fertility declines have been pervasive in Asia and Latin America. Between the early 1950s and the early 2000s fertility dropped from 5.7 to 2.5 births per woman (bpw) in Asia and from 5.9 to 2.5 bpw in Latin America (United Nations,2009). Only a handful of countries in these regions still have fertility exceeding 4 bpw. In contrast, in sub-Saharan Africa fertility remains high in the large majority of countries. Some declines have occurred, but the average TFR remains at 5.4 in 2000-2005 which is more than double the level observed in Asia and Latin America.

Several factors likely contribute to high fertility in sub-Saharan Africa. Compared with Asia and Latin America, the continent is on average poorer, less educated and child mortality is higher. These factors contribute to a desire for large families which in turn results in high fertility. In addition with, few exceptions, government in sub-Saharan Africa have generally devoted low priority to family planning programs (Blanc and Tsui 2005; Cleland et al. 2006). Continued high fertility combined with a less than previously expected impact of the AIDS epidemic are producing very rapid population growth. By 2050 sub-Saharan Africa is expected to have a billion more inhabitants according to the UN medium projections (United Nations 2009).

These trends pose a dilemma for policy makers. The first and most obvious step to address high fertility is to implement family planning programs to provide women with access to and information about contraception. The level of unmet need for contraception is high throughout the region and large numbers of unintended pregnancies occur (Casterline and Sinding 2000; Singh et al 2009; Westoff 2001). Avoiding these pregnancies would benefit women, their families and bring social benefits as well.

However, the high desired family size that prevails in much of sub-Saharan Africa is an obstacle to fertility decline. Even if the existing unmet need for contraception could be addressed fertility would remain at levels well above replacement. This fact raises the question as to whether and how fertility preferences can be influenced (Robinson and Cleland 1991). The issue has been of low priority in Asia and Latin America because desired family size has declined to near the replacement level in most countries in these regions. But sub-Saharan Africa is different. In the long run, social and economic development will likely bring about declines in its high desired family size but this is a slow process that will last decades, thus making massive population growth inevitable.

The main objective of this study is to assess the potential role of family planning services and messages in changing fertility preferences. The evidence on this topic is inconclusive. A review by Freedman (1997) yielded mixed results: an effect on preferences was found in a few studies but not in others. He concluded that " ..family planning programs sometimes do not affect preferences." Unfortunately he "found few studies of merit to cite or discuss" because most evaluations focused on the role of family planning in addressing unsatisfied demand rather than on fertility preferences themselves.

This study begins with a discussion of alternative measures of fertility preferences and then relies on cross-country analysis to examine the potential role of family planning programs. Significant effects are found and the discussion reviews the processes that might be responsible for these effects.

Measures of fertility preferences

Contemporary surveys such as the DHS ask several questions of female respondents to permit an assessment of their preferences for childbearing (Bankole and Westoff 1995; Bongaarts, Casterline and El-Zeini. 2007, Lightbourne 1985,1987; Westoff 2010):

-*Ideal or desired family size(DFS)*. In the DHS women are asked "If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life, how many would that be?" Estimates of average ideal or desired family size based on this type of question are widely used in part because they are straightforward to interpret. However, there are two potential sources of bias: non-response and rationalization. The proportion of women who report a non-response (e.g. up to God) was often substantial in some countries in surveys in the 1970s but non-response has declined over time and in majority of DHS surveys it is now less than 5%. The stated ideal number of children can also be subject to "rationalization" when a woman is reluctant to provide an ideal family size that is smaller than their current number of living children. Rationalization is typically greatest among older women with large numbers of living children.

-*Wanted fertility (WTFR)*. The standard DHS procedure for estimating the wanted status of births divides observed births into those that occur before and after the desired family size is reached; the former are considered wanted (even though some may be mistimed), the latter unwanted. The wanted total fertility rate is then is obtained with the same standard procedure used to calculate the overall *TFR* from age-specific fertility rates, but only wanted births are included in the numerators of these rates. The *WTFR* is useful because it estimates the fertility that would be observed if all unwanted childbearing could be eliminated. However, the *WTFR* is problematic as an indicator of preferences for several reasons. First, it is derived from the *DFS* so it incorporates any biases in the *DFS*. Second, the *WTFR* can substantially deviate from the *DFS* for multiple reasons that are unrelated to preferences. For example, *WTFR* will fall short of *DFS* if a significant proportion of women never maries or becomes infecund before reaching their desired fertility. Alternatively, *WTFR* can exceed the *DFS* when women replace births that have died with additional births to reach the desired number of surviving children.

Wanted status of recent births. In principle the simplest way to estimate wanted fertility is to ask women whether or not recent births were wanted. For example, the DHS asks women for each of their births in the last five years "Just before you became pregnant with ----, did you want to

have more children then, did you want to wait longer or did you want no more children?". The problem with this approach is that women are reluctant to admit that a child (which is likely living with her) was not wanted. The DHS does not use this information to calculate wanted fertility rates because it is assumed that this approach provides an underestimate of wanted fertility.

Desire for more children. Asking women whether or not they want more children is straightforward and there is no obvious reason why the answer would be biased. However there are two problems with the information collected. First, there is no simple way to turn estimates of proportion wanting more by age and/or parity into a life cycle estimate that can be compared with the *DFS* or *WTFR* (see Bongaarts 1990 and Casterline and El-Zeini 2007 for examples). Second, the proportion wanting more children is affected by factors other than family size preferences. In particular, for a given *DFS* a population with wide birth spacing will have a higher proportion wanting more than a population with the same *DFS* and short birth intervals.

In sum, all of these options for estimating fertility preferences have some drawbacks. In the analysis that follows the *DFS* will be the primary indicator used because it is least problematic for present purposes. To minimize bias due to rationalization and non-response the average estimate of *DFS* will be based on women aged 20 to 35.

Levels and trends in desired family size

Estimates of trends in DFS are available for the following 43 countries which two or more DHS surveys have been conducted (date of latest survey in parentheses)[1]:

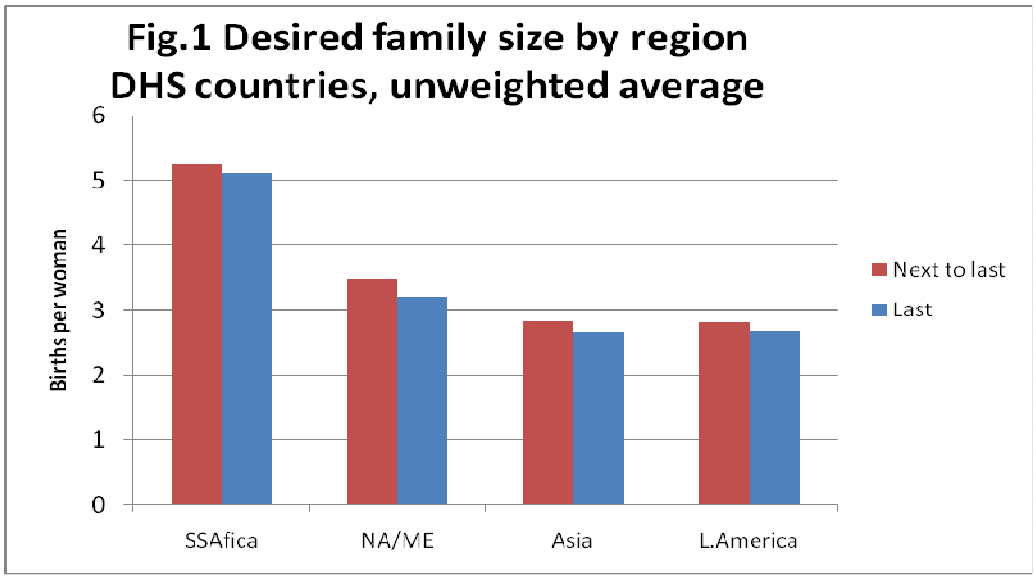
-*Sub Saharan Africa*: Benin (2006), Burkina Faso (2003), Cameroon (2004), Chad (2004), Cote 'Ivoire (1998-99),Ethiopia (2005), Ghana (2008), Guinea (2005), Kenya (2003), Madagascar (2003-04), Malawi (2004), Mali (2006), Mozambique (2003), Namibia (2006-07), Niger (2006), Nigeria (2008), Rwanda (2005), Senegal (2005), Tanzania (2004-05), Uganda (2006), Zambia (2007), Zimbabwe (2005-06).

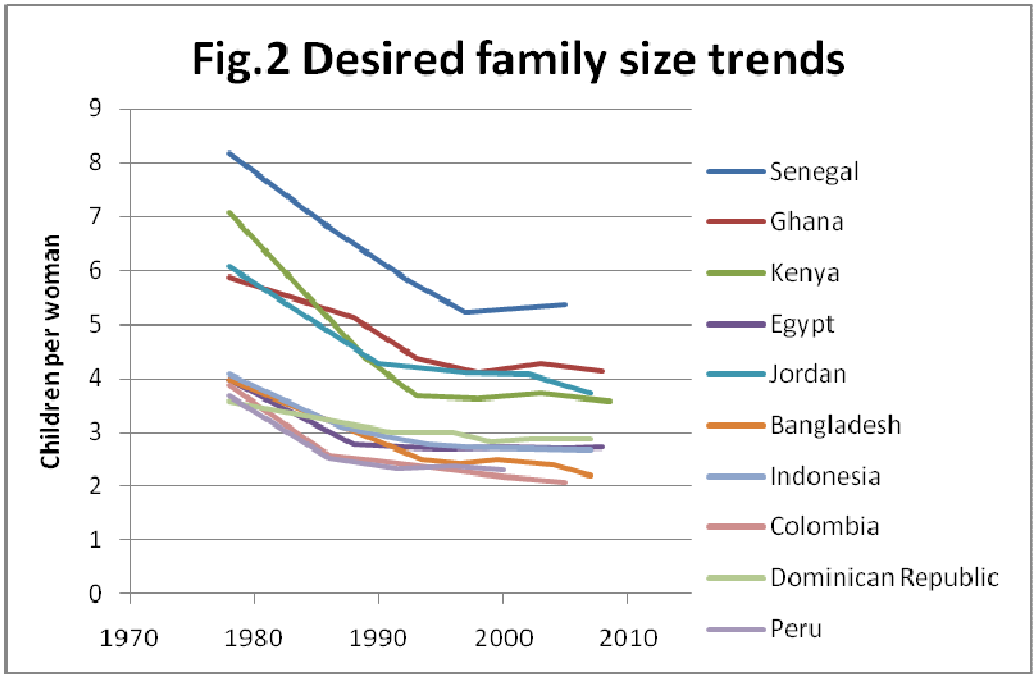
-*N.Africa/Middle East:* Egypt (2005), Jordan (2007), Morocco (2003-04), Turkey (1998), Yemen (1997)

-*Asia:* Bangladesh (2007), Cambodia (2005), India (2005-06), Indonesia (2007), Nepal (2006), Pakistan (2006-07), Philippines (2003), Vietnam (2002).

-*Latin America:* Bolivia (2003), Colombia (2005), Dominican Republic (2007), Guatemala (2002), Haiti (2005-06), Nicaragua (2001), Paraguay(2004), Peru (2004).

Figure 1 presents the trend in the (unweighted) average *DFS* for the two most recent DHS surveys by region. At the time of the last survey the sub-Saharan average (5.1) is much higher than in N.Africa/W.Asia (3.2), Asia (2.7) and Latin America (2.7). Declines in these averages between surveys were very modest. In particular the decline in Sub-Saharan African countries averaged just 0.13 in the approximately half decade between the two surveys. At this slow pace it will take over a century to reach a desired family size of 2.





To provide a longer range perspective Figure 2 plots trends in DFS for 10 countries for which 5 successive surveys are available. The first survey is the WFS in the late seventies and the remaining four are DHS surveys circa 1990,1995, 2000 and 2005, respectively. The most notable finding is that desired family size declines were fairly steep before the 1990s but have slowed or stalled since the mid 1990s. One would expect the pace of decline in *DFS* to slow down as countries approach the end of the fertility transition, but the near stalling of *DFS*s in mid transition in Kenya, Ghana, Senegal, and Jordan are a surprise.

For obvious reasons, trends in preferences have important implications for trends in fertility. A full discussion of the complex relationship between *DFS* and *TFR* is beyond the scope of this paper, but a few points should be noted. With the near constant and high desired number of children in sub-Saharan Africa one would expect the *TFR* to also be high and fairly stable. A recent analysis of fertility trends in sub-Saharan Africa confirmed this and concluded that more than half of countries did not experience a significant decline in fertility between the most recently available surveys (Bongaarts 2008). Although a reduction of unwanted fertility could reduce the *TFR* significantly, the fertility transition in this region cannot proceed to the replacement level unless large declines in *DFS* occur. The high and nearly stable *DFS* is therefore an obstacle to further fertility decline. In the other regions preferences are much lower but the pace of declines has also slowed over time, suggesting that further reductions in the TFR will likely occur at a very modest pace.

Determinants of desired family size

Conventional demographic theory holds that socio-economic development reduces desired family size over the course of the transition from traditional agricultural to modern industrial societies (Notestein 1945,1953). As countries develop the cost of children rises and their benefits decline, thus leading parents to want fewer children. In addition, declines in child mortality reduce the number of births needed to achieve a given family size and they remove the uncertainty surrounding the survival of children, thus enabling parents to plan their families with more confidence.

It is therefore not surprising that preferences are negatively correlated with many measures of socio- economic development. For example for the 62 DHS countries with at least one survey the correlation between *DFS* and the following three indicators is inverse and highly significant:

Percent of women schooled ($p<0.000$)
Child survival, % at age 5 ($p<0.000$)
GDP per capita (constant $) ($p<0.000$)

Unfortunately multi-collinearity precludes drawing conclusions about causality from these results. Further insight can be gained with a multivariate regression in which desired family size is the dependent variable and the above three development indicators are the explanatory factors.

In addition a dummy variable for countries in sub-Saharan Africa is included. All variables are estimated from the DHS except GPD per capita which is taken from (Heston et al 2009). Results are presented in Table 1.

Table 1 : Regression analysis (OLS) of effects of socioeconomic variables on desired family size in 59 countries

Variable	Effect (st. error)	
Percent of women schooled	-0.018	(0.006) ***
Child survival (% at age 5)	-0.085	(0.039) **
GDP per capita (log, constant $)	-0.126	(0.479)
Sub-Saharan Africa dummy variable	1.094	(0.292) ***
Intercept	12.71	(3.227) ***
R^2	0.706	
N	59	

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

The effects of the socio-economic indicators are in the expected direction, i.e. more schooling and higher survival and higher incomes are associated with lower desired family size. The schooling and survival effects are statistically significant ($p<0.05$ and $p<0.01$ respectively), but the effect of GDP per capita is not significant and the coefficient is very small. This finding suggests that poor countries can reach low desired family size by raising education and survival levels. There are in fact a number of countries that have followed this development path e.g. SriLanka and Kerala.

The large and highly significant dummy variable for sub-Saharan Africa indicates that desired family size in this region is on average higher than elsewhere in the developing world at a given level of development. This effect equals 1.1 children per woman after controlling for socioeconomic variables. This result is expected from earlier research which demonstrated that African societies are particularly pro-natalist due to special cultural conditions on the continent (Caldwell and Caldwell 1987)

These findings from the regression analysis are largely consistent with the conventional wisdom on the determinants of desired family size. But there is more to the story as will be demonstrated next.

Family Planning programs and desired family size

Family planning programs provide women with information about and access to contraception. Many governments of developing countries have implemented such programs with the goal of reducing high birth rates, lowering maternal and infant mortality and supporting women's rights to freely choose the number of children they have. The choice of voluntary family planning programs as the principal policy instrument is based largely on the documentation of a substantial level of unwanted childbearing and unsatisfied demand for contraception. As a result 76 million unplanned pregnancies occur each year; about half of these pregnancies end in abortion and the other half end in births (Singh et al. 2009). The existence of an unmet need for contraception, first documented in the 1960s, convinced policymakers that family planning programs were needed and would be acceptable and effective. The effectiveness of this approach was supported by controlled experiments such as the one conducted in the Matlab district of rural Bangladesh starting in the late 1970s (Cleland et al. 1994).

Family planning programs vary widely in the coverage and quality of their services. In some countries services are minimal and funding and political commitment is lacking while in other countries high quality services reach into the rural areas across the country and providers are well trained. Unfortunately, the measurement of a country's family planning program effort is not straightforward. In particular it is not very useful to gather information about family planning programs from individual women in surveys such as the DHS. Women can answer questions about their contraceptive practice and their sources of supplies, but it is not possible to extract a complete and unbiased picture of the supply environment from this information. The preferred approach therefore is to gather information directly from sources of supply of contraceptives by interviewing and observing providers. Unfortunately such surveys of the service environment are expensive and are not available for most developing countries

An alternative approach to measuring family planning program effort was proposed in the early 1970s when interest in monitoring these programs first developed (Lapham and Mauldin 1972; Ross and Stover 2001). In this approach a few knowledgeable observers in each country are identified and they are asked to answer questions on about 125 items dealing with a variety of program characteristics. The answers to these questions are then combined to yield an overall Family Planning Program Effort Score (*PE*) which is usually expressed as a percent of its maximum possible score (in 1999, the highest score was 82 for Indonesia and the lowest 35 in Congo). Since 1972 five rounds of this approach have been implemented, with the latest cycle in 1999.

An advantage of the expert-respondent method is its relatively low cost which is essential to permit the collection of this information in a large number of countries. But there are also disadvantages. In some countries only two or three experts provide input and it is not clear how well informed or unbiased they are. In addition, the experts consulted in successive rounds are often not the same individuals. As a result estimates of program effort likely contain errors and potential biases of unknown magnitude. A number of studies have assessed the validity and reliability and generally found it to index to be useful (Ross and Stover 2001).

Past studies have shown that family planning programs (as measured by the *PE* score) have an impact on fertility and/or contraceptive use after controlling for socioeconomic variables (Bongaarts 1997; Freedman and Berelson 1976; Ross and Stover 2001). For present purposes we are interested in conducting the same type of analysis but using desired family size rather than fertility or contraceptive use as the dependent variable.

Table 2 presents the results of OLS regression analysis that is similar to the one in Table 1, except that program effort score is added as an explanatory variable. The effects of the socio-economic variables and the dummy for sub-Saharan Africa are not significantly different from those estimated in the earlier regression. The main finding in Table 2 is that program effort has a strong and highly significant effect on desired family size.

Table 2 : Regression analysis of effects of socioeconomic variables and family planning effort on desired family size in 59 countries

Variable	Effect (st. error)	
Percent of women schooled	-0.018	(0.006) ***
Child survival (% at age 5)	-0.077	(0.037) **
GDP per capita (log, constant $)	0.011	(0.433)
Sub-Saharan Africa dummy variable	1.028	(0.283) ***
Family planning effort score (%)	-0.039	(0.012) ***
Intercept	13.66	(2.959) ***
R^2	0.768	
N	50	

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

Case Studies

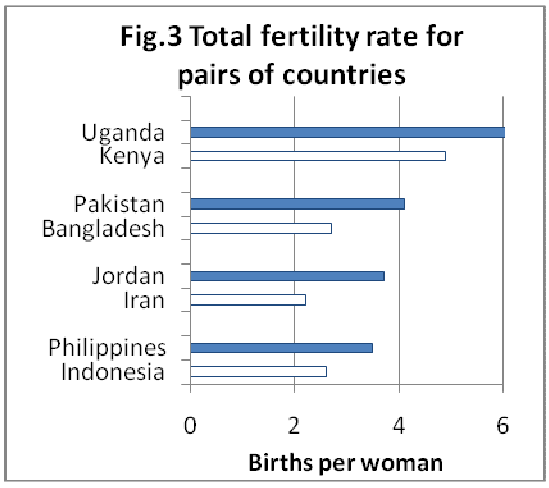
Further evidence on the potential impact of family planning programs on fertility preferences will now be provided by comparing the experience of a number individual countries. Specifically, four pairs of countries will be examined : Bangladesh and Pakistan, Iran and Jordan, Kenya and Uganda, and Indonesia and the Philippines. The countries in each pair have very similar social, economic, and cultural characteristics but one country in each pair has implemented a strong family planning program and the other has not. These pairings therefore represent natural experiments to assess the impact of family planning programs on reproductive behavior.

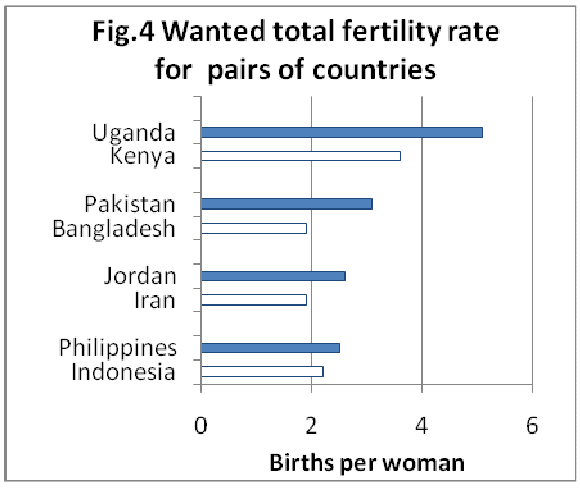
Table 3 presents the program effort score for each country pair. Governments in Bangladesh, Kenya, Iran and Indonesia have implemented strong well funded programs which provide subsidized contraceptive services throughout the country and vigorous IEC campaigns

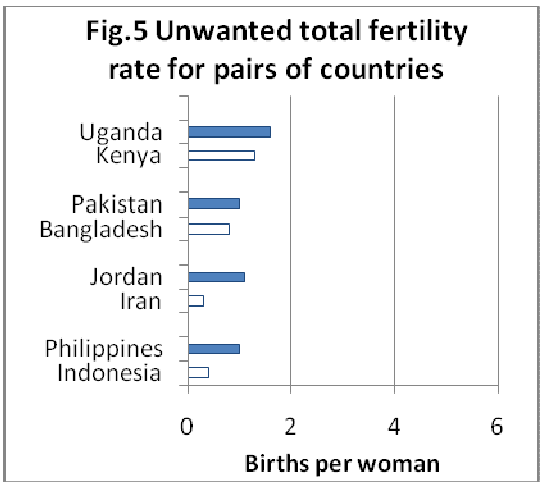
communicate the benefits of contraception and small families (However over the past decade Kenya's program has deteriorated). In contrast, in Pakistan, Jordan, Uganda and the Philippines, family planning programs are relatively weak and lack funding and political commitment. As a result the PE score in the countries with strong programs exceed that of the countries with weak programs with average score of 72 to 53 respectively. In contrast, the level of development as measures by the Human Development Index (*HDI*) is similar within each pair and on average the strong program countries have the same *HDI* as the weak program countries (0.64) (UNDP 2009)

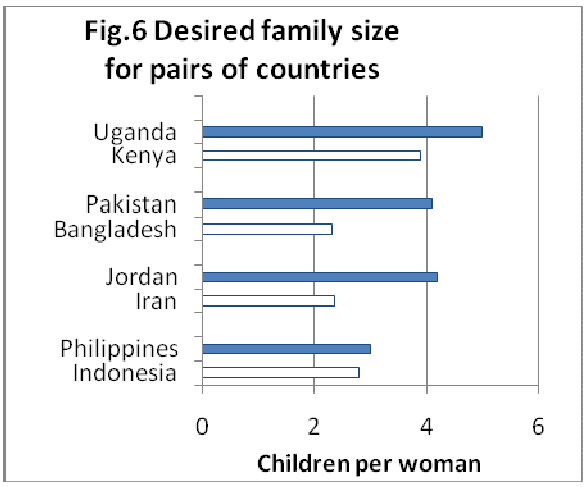
Table 3 : Program effort score and Human Development Index for four pairs of countries

Country Pairs	Program effort (1999)	HDI(2000)
Bangladesh - Pakistan	74- 57	0.53-0.56
Kenya- Uganda	62-54	0.53-0.49
Iran -Jordan	71-47	0.77-0.76
Indonesia- Philippines	82-54	0.72-0.74
Average	72-53	0.64-0.64









Figures 3-6 present several fertility and preference indicators for each of the pairs of countries. The solid bars represent the countries with weak programs. The results are in the expected direction in all comparisons and in all four pairs.

First, although fertility itself is not the focus of this study it provides a useful reference point. As shown in Figure 3 the *TFR* of the program countries exceeds the *TFR* in the weak program countries by a significant margin. On average the difference is 1.4 births per woman. Figures 4 and 5 show that the difference in the *TFR* is the result of a combination of lower unwanted fertility and lower wanted fertility. Finally figure 6 compares the desired family size which averages 2.8 in the strong program countries and 4.1 in the weak programs. The *DFS* difference is largest for the Jordan-Iran and the Pakistan-Bangladesh pairs. The difference is smallest in the Philippines-Indonesia pair, possibly because women's status and level of education is higher in the Philippines than in Indonesia.

These results are consistent with the regression findings presented in Table 2 and support the claim that family planning programs affect desired family size. Unfortunately, it is not possible to rule out a role for unobserved confounding factors so the results from such natural experiments are not conclusive.

A puzzle: The Matlab experiment

One of the best known and most influential controlled family planning experiments was undertaken in the Matlab district of Bangladesh. Matlab's population of 173 thousand in 1977 was divided into roughly equal experimental and control areas. Starting in 1977 the quality of family planning services (including access to home visits, access to a array of methods, and follow-up care) were greatly improved in the experimental half of the district while no additional services (other than much less intensive country wide services) where provided in the control half of the district. The impact of the new services was large and immediate (Cleland et al 1994): Contraceptive use jumped from 5 to 33 % in the experimental area in the first 18 months and it remained about 25% higher than in the control area in subsequent years. As a result, fertility declined in the experimental area and the difference between the areas of about 1.5 births per woman was maintained over time. The Matlab experiment demonstrated that family planning

programs can succeed even in very traditional societies. The success of this intervention led the Bangladesh government to apply the lessons of the experiment to its national program.

To understand the reasons for this decline Koenig et al. (1989) examined available evidence on trend in preferences during the first seven years of the experiment (1977-1984). Unfortunately this assessment was hampered by a lack of consistent measures of fertility preferences over time. Nevertheless the authors concluded that family size preference had declined by 1984 in Matlab, but that the decline was no larger in the experimental than in the control area. This finding implies that the observed uptake in contraception and the corresponding decline in fertility in the intervention area was due mostly to a rise in implementation of latent or unsatisfied demand for contraception (Freedman 1997, Koenig et al. 1987).

How can this result from the Matlab experiment be reconciled with the earlier evidence for the impact of family planning programs on preferences? The answer to this puzzle is likely found in the IEC program implemented nationwide in Bangladesh since the 1970s. Its messages emphasizing the benefits of smaller families and contraception reached and affected the control and intervention areas equally. This media effort has been extensive and involves political and religious leaders; according to Khuda et al. 2001:

"Since 1975 Radio Bangladesh has assigned 65 minutes daily to population and family planning issues on its national service and 30 minutes on its regional programmes while television currently allocates 120 minutes weekly" and " *The information, Education and Motivation Unit of the Directorate of Family Planning has had information courses for leaders at all levels, including imams. In fact imams have regularly been paid lecture fees for making statements about family planning at the Friday Mosque"(p.364)*

These efforts aimed to affect fertility preferences and they likely contributed substantially the decline of desired family size Bangladesh from about 4.1 in the mid 1975 to 2.8 in the early 1993. Modest improvements in development indicators may also have contributed to declining preferences, but Bangladesh in 1993 was still one of the poorest and least developed countries in the world.

Possible mechanisms

The existing literature on the fertility impact of family planning programs generally assumes that this impact is the result of meeting an existing demand for contraception (Bongaarts 2007; Cleland et al. 2006; Casterline and Sinding 2000; Singh et al. 2009)). This assumption is no doubt correct, because by reducing the cost of practicing contraception (monetary, travel, social), unmet need is satisfied thus raising contraceptive use and reducing fertility. But there may be another pathway and the present study examines the potential role family planning programs may have in affecting fertility by reducing fertility preferences. The very limited literature on this subject has yielded two hypotheses about the underlying mechanism for such a link:

1) *Preferences are affected by the cost of contraception*. According to widely used framework for the determinants of fertility proposed by Easterlin (1975,1978) the demand for children and the costs of contraception both affect fertility, but they are assumed independent from one another. The former is determined by social and economic factors as well as mortality while the latter is affected by a range of separate factors (e.g. lack of knowledge, monetary cost of contraceptive commodities, travel and providers, objections from husbands or family, fear of side effects). Robinson and Cleland (1992) examine this issue and conclude that this assumption of independence is not plausible. Instead they argue that when regulation costs are high the demand for fertility limitation is weak because there is little point in aiming for a goal that cannot be implemented without great difficulty (e.g. by abstinence). In contrast, when costs are reduced parents reassess their preferences, which are now more readily implemented, and preferences that are ambivalent become more firmly held. Although this conclusion seems reasonable and plausible, Robinson and Cleland do not provide direct empirical evidence in support of their claim.

2) *Information Education and Communication programs. IEC* efforts made by family planning programs are generally aimed at providing women with information about birth control methods and where and how to obtain them. This information increases the social acceptability of birth control and counters unfounded rumors or negative perceptions of methods. IEC messages often go beyond providing information about methods by discussing the advantages of small families. Such messages, especially on radio and television, appear to have a significant impact on fertility preferences (Cleland et al 2006; Hornik and McAnany 2001; Westoff 1999; Westoff and Bankole 1997; Westoff and Rodriguez 1995). This impact seems to be strengthened by strong and visible support from government officials as in the case studies noted above.

Unfortunately available data from surveys do not allow the accurate estimation of the contribution of these alternative mechanism to declines in preferences across many countries.

Implications for sub-Saharan Africa

[section to be completed]

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