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## THE CAUSES OF STALLING FERTILITY TRANSITIONS

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## **Abstract**

Since the 1960s many developing countries have experienced rapid fertility declines. It is widely expected that countries that are currently in transition will continue their declines until fertility reaches the replacement level. However, an examination of recent fertility trends in countries with multiple DHS surveys found that in the late 1990s fertility stalled in mid-transition in five countries: Bangladesh, Dominican Republic, Ghana, Kenya and Turkey. In each of these countries fertility was high (>6 births per woman) in the 1950s and then declined to fewer than 5 births per woman in the early or mid 1990s, before stalling in the late 1990s. The level of stalling varied widely from 4.7 births per woman in Kenya to 2.5 births per woman in Turkey. An analysis of trends in the determinants of fertility in these five countries revealed a systematic pattern of stalling in most determinants, including contraceptive use, the demand for contraception, and the desired family size. The stalling countries did not experience significant increases in unwanted fertility or in the unmet need for contraception during the late 1990s and program effort scores improved slightly except in the Dominican Republic. These findings suggest no major deterioration in contraceptive access in recent years, but levels of unmet need and unwanted fertility are relatively high in the stalling countries and improvements in access to family planning methods would therefore be desirable. The stalls appear to be attributable at least in part to a lack of recent progress in socioeconomic development in Ghana and Kenya.

Since the 1960s many developing countries have experienced rapid fertility declines. By 2000, a number of these countries had reached the replacement level of 2.1 births per woman and it is widely expected that countries that are still in transition will continue their declines until fertility also drops to or even below replacement. This assumption has been incorporated into past population projections made by the United Nations and World Bank. However, estimates from recent surveys indicate that fertility in the late 1990s declined less rapidly than projected earlier in a number of countries and in a few cases fertility stalled in mid-transition. This surprising development has important implications for future population growth, because this growth is very sensitive to minor variations in fertility trends.

An extensive literature on fertility transitions and their causes exists, but stalling is a neglected issue. There is little existing research on the topic even though a few earlier studies have discussed past stalls in fertility (Gendell, 1985) or contraceptive use (Ross, 2004). The objective of this study is to examine the causes of stalling in five mid-transitional countries in which fertility did not decline between the two most recent Demographic and Health Surveys (DHS). This analysis focuses on the roles of different levels of explanatory variables including the proximate determinants (e.g., use of contraception), the demand for contraception and reproductive preferences (e.g., desired family size), socioeconomic factors and access to family planning methods. The study concludes with a brief discussion of policy options to end ongoing stalls.

### **Analytic framework**

The empirical analysis of the causes of stalling fertility will be guided by the analytic framework summarized in Figure 1. This framework summarizes the main factors that determine fertility, and the chain of causation that links these determinants. A full explanation of the framework and a discussion of the large literature on the different relationships is beyond the scope of this study, but the main forces driving the fertility transition can be summarized briefly as follows.

Socioeconomic development is considered the main cause of a decline over time in the benefits of children and a rise in their costs. These changes in the cost/benefit ratio lead parents to want fewer children and mortality decline raises child survival so that

families need fewer births to achieve the desired number of surviving children. These trends raise the demand for birth control (i.e., contraception and induced abortion) and to the extent this demand is satisfied it leads to lower fertility. Family planning programs facilitate this transition by reducing the cost of birth control (broadly defined to include social costs) thus raising the level of implementation of the demand for contraception. Higher levels of socio economic development also reduce the cost of birth control and raise the level of satisfaction of demand.

This study attempts to provide a comprehensive explanation of recent stalls in fertility by analyzing as many layers of determinants as is possible with available data from DHS surveys. For each layer, trends in the determinants in the five stalling countries are examined and compared with trends in non-stalling countries. The discussion below follows the general outline of the analytic framework, starting with fertility and the use of contraception. Considerable attention is then given to the demand for contraception and to reproductive preferences and their implementation. Unfortunately, DHS surveys do not collect information on the cost/benefits of children and the cost of birth control and these items therefore cannot be measured directly. The last section of the study discusses the role of socioeconomic factors, including real GDP per capita, child survival and level of education, as well as the role of family planning programs as measured by a program effort index.

## **Data**

The primary sources of data for this study are DHS surveys conducted in many developing countries since 1985. The present analysis will examine the group of 38 countries with more than one nationally representative survey because two successive surveys are required to estimate trends in fertility and its determinants:

- Asia*: Bangladesh, India, Indonesia, Kazakhstan, Nepal, Philippines, Vietnam.
- Latin America*: Bolivia, Brazil, Colombia, Dominican Republic, Guatemala, Haiti, Peru.
- Near East/North Africa*: Egypt, Jordan, Morocco, Turkey, Yemen.
- Sub-Saharan Africa*: Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana,

Kenya, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Senegal, Tanzania, Togo, Uganda, Zambia, Zimbabwe.

From each survey custom tabulations of various measures were obtained with the STAT compiler program available at the DHS web site [www.measuredhs.com](http://www.measuredhs.com). In a few countries with very recent surveys estimates were taken from published first country reports.

### **Recent fertility trends**

Table 1 presents fertility estimates from the two most recent DHS surveys in 38 countries. The first two columns give the year of the last survey and the estimated total fertility rate (TFR) for the preceding three years. These 38 surveys were conducted in years ranging from 1997 to 2003 (average 2000.2). The observed TFRs average 4.5 births per woman with a range from 7.2 births per woman in Niger to 1.9 births per woman in Vietnam. Columns three and four of Table 1 give the year of the next to last survey and the corresponding TFR. This second set of 38 surveys took place on average in 1994.5 and the average period between the surveys therefore was 5.7 years.

The annual rate of decline in the TFR between the two most recent surveys is given in column 5 of Table 1. The average annual decline equaled 0.052 births per woman per year (i.e., about half a birth per decade), but the pace varied widely among countries and in several countries no decline was observed<sup>1</sup>:

- fertility decline in 28 countries (at an average rate of 0.09 per year)
- no change in fertility in 3 countries (Bangladesh, Ghana, Uganda)
- fertility increase in 7 countries (Burkina Faso, Dominican Republic, Kenya, Mali, Mozambique, Niger, Turkey)

The absence of significant change in fertility or minor fluctuations (including a slight rise) in fertility is not surprising in countries that have not yet entered the transition. In contrast, a stall in fertility after the transition is underway has been rare in the past. For present purposes a country will be considered to have stalled if its fertility (TFR) failed to decline between the two most recent surveys while the country is in mid-transition. Any country will be considered mid-transitional if its TFR is between 2.5 and

5 births per woman. By this definition a total of 20 DHS countries were mid-transitional, and five of these countries meet the criteria for stalling: Bangladesh, Dominican Republic, Ghana, Kenya, and Turkey. Fertility failed to decline in five other countries (Burkina Faso, Mali, Mozambique, Niger, and Uganda) but these countries will not be considered to have stalled because they are still in the pre- or early transition stages.

Figure 2 plots the fertility trends over time in these five countries, starting with estimates from the World Fertility Survey ca. 1980 to the three most recent DHS surveys.<sup>2</sup> For simplicity, the labels ca. 2000, ca. 1995 and ca. 1990 will be used to refer to the last, next to last and second to last DHS surveys, respectively, in the discussion below. In each of these countries fertility declined during the 1980s, but stalled in the mid 1990s. The level of stalling varies considerably among countries from a high of 4.7 births per woman in Kenya to a low of 2.5 in Turkey. The average annual change in fertility in the five countries was a very slightly positive 0.03 births per year between the last two surveys. In contrast, the remaining 15 mid-transitional countries experienced an average annual change of  $-0.09$ , i.e., a decline at a rate of nearly 1 birth per decade.

It should be emphasized that the process used here for selecting stalling countries does not identify all countries that have stalled in the 1990s or before. Only the two most recent DHS surveys available in early 2005 were used and stalls may have occurred in earlier years in some countries. Fertility could also have stalled in countries that have only one DHS surveys or none. In addition, the strict criteria for stalling applied here do not identify countries that have come very close to stalling. For example, DHS surveys in Egypt indicated that this country experienced a near-stall because the TFR declined by only 0.1 births per woman (from 3.6 to 3.5) between 1995 and 2000. However, the five countries selected for in-depth analysis here provide a large enough sample to provide valuable insights into the stalling process. These recent cases of stalls are also most relevant to current policy considerations.

Before proceeding it is necessary to comment on potential measurement errors in fertility trends. Fertility estimates from DHS surveys contain inaccuracies due to sampling, design, data collection and reporting errors. Sample sizes in DHS are large—usually several thousand respondents—and, as a result, sampling errors in the TFR of mid-transitional countries are relatively small with typical standard errors around 0.1

births per woman. In well-implemented surveys non-sampling errors should also be small, but their magnitude is not easily measured. The sampling error in the difference between two successively measured TFRs is larger than the error in a single TFR estimate (by approximately the square root of 2). Estimates of fertility declines therefore may contain non-trivial errors and it is possible that a country identified as stalling may actually be experiencing a slow change in fertility while other countries with observed slow declines may be stalling. It should also be noted that trends in fertility measures other than the total fertility rate (e.g., parity progression ratios) could lead to a somewhat different assessment of which countries are stalling and which ones are not. The total fertility rate has been used here because it is the most widely accepted measure of fertility.

### **Use of contraception and other proximate determinants of fertility**

Previous research has established that a rise in contraceptive use is the main proximate cause of decline in fertility (Bongaarts and Potter, 1983). In pre-transitional societies fertility is high and deliberate use of contraception to limit family size is rare, while in countries at the end of their transition fertility is low and the large majority of couples practice some form of contraception. This strong correlation between contraceptive prevalence and fertility is confirmed in Figure 3 which plots the TFR by contraceptive prevalence (among women in union) for the 38 countries included in this study. The five stalling countries are indicated in this figure with circles and they seem to have no unusual features that distinguish them from non-stalling countries in this figure.

In view of this well established relationship one would expect that countries with stalling fertility also experience stalls in contraceptive use. Figure 4 plots trends in contraceptive prevalence over time from four successive surveys, from ca. 1980 to ca. 2000. During the 1980s and early 1990s the trend is clearly upward, but during the late 1990s the pace of increase drops sharply and approaches zero. During the most recent period (between the two latest surveys ca. 1995 and ca. 2000) prevalence changes were as follows: +4.5% in Bangladesh, +0.8% in DR, +3.2% in Ghana, +2.0% in Kenya and +1.3% in Turkey. The average annual rate of increase in contraceptive prevalence in the five stalling countries is 0.6 percent per year which is less than half of the pace in the

non-stalling mid-transitional countries where prevalence rose on average at a rate of 1.3 percent per year ( $p=0.02$ ).

Given the measurement errors in the TFR and in the prevalence estimates, these trends in prevalence are roughly consistent with the absence of fertility change in Dominican Republic, Ghana, Kenya and Turkey, but the rise in prevalence in Bangladesh is not as small as one might expect at first. This result for Bangladesh may be attributable to measurement error, but there is another plausible partial explanation, relating to the role of other proximate determinants. Fertility is directly determined by a set of behavioral and biological variables called the proximate determinants. Contraceptive use is the most important of these, but there are a number of others including contraceptive effectiveness, incidence of induced abortion, proportions married, postpartum infecundability and frequency of intercourse. Over the course of the fertility transition changes in some of these determinants have positive effects on fertility (e.g., declines in the duration of postpartum insusceptibility), and changes in others have negative effects (e.g., delays in age at marriage). These positive and negative effects usually offset one another at least partially, and their net impact is usually relatively small compared with the effect of rising contraceptive use (Bongaarts and Potter, 1983). However, the net effect of these other factors is not necessarily zero. In fact, as shown in an Appendix, in Bangladesh the combined effect of changing postpartum insusceptibility and marriage pattern between 1996 and 1999 is to raise fertility slightly. In the absence of any changes in other proximate determinants one would expect a stall in contraceptive prevalence to accompany a stall in fertility. This is not exactly observed in Bangladesh because a slight rise in contraceptive prevalence is needed to counteract the net positive fertility effect of the other proximate determinants. It is also possible that a rise in contraception is compensating for a reduction in the rate of induced abortion which is fairly common in Bangladesh as menstrual regulation is widely available. A small increase in contraceptive prevalence may therefore be consistent with stalling fertility in this country.

### **Demand and unmet need for contraception to limit family size**

Increases in contraceptive use are driven by a rising demand for contraception. However, observed levels of use always fall somewhat short of demand. Couples whose



demand is not satisfied have an “unmet need” for contraception (Westoff and Ochoa, 1991; Westoff and Bankole, 1995). While the measurement of current use is straightforward, the estimation of demand or unmet need is complex and controversial. The analysis in this section of the study will focus on the demand for contraception to limit rather than to space births for several reasons: a) The DHS method for estimating the demand for spacing probably contains a substantial upward bias which is not easily corrected (Bongaarts, 1991). DHS estimates of demand for limiting do not suffer from this bias; b) As will be demonstrated below, the analysis of the relationship between the demand for contraception and fertility preferences is simplified by focusing on use and fertility among women who have reached their desired family size, and c) Measurements of limiting demand are available for WFS surveys from the 1970s, thus permitting an examination of long-range trends. It should also be noted that the prevalence of contraception for limiting is a strong predictor of fertility because it is as highly correlated with the TFR as the overall prevalence of contraception (data not shown).

Figure 5 plots estimates of demand for contraception by prevalence of contraceptive use for limiting for 38 countries in the most recent survey. The strong correlation between these two measures is evident, as is the fact that actual use falls short of demand in all cases. On average, unmet need for limiting (i.e., the difference between demand and use) equals 9.4 percent. The five stalling countries show no features that distinguish them from the non-stallers in this figure, which implies that their level of unmet need is not significantly higher or lower than expected.

Trends in demand and use for limiting are provided in Figure 6. Figures 6a and 6b show that demand and use rose rapidly in the 1980s but then leveled off in the 1990s in the stalling countries. The ratio of contraceptive use to contraceptive demand measures the proportion of demand that is satisfied. As shown in Figure 6c this level of satisfaction has followed a similar trend: a rise, followed by a plateau. It is interesting to note that the order of five stalling countries in the latest survey is the same in Figures 6a, 6b and 6c: the Dominican Republic has the highest demand (60%), the highest use (55%) and the highest satisfaction of demand (92%) among the five countries. Turkey, Bangladesh and Kenya are next in order and Ghana has the lowest demand (22%), lowest use (10%) and lowest satisfaction (45%).

As shown in Figure 6d the unmet need for contraception to limit (i.e., the difference between demand and use) changed little in the late 1990s. Trends in this variable exhibit no consistent trend in the 1980s. During that decade unmet need for limiting dropped in the Dominican Republic, Turkey and Bangladesh. This is as expected from the corresponding large increase in the satisfaction of demand. In contrast, unmet need in Ghana and Kenya rose during the 1980s. The explanation for this finding in these two countries is that demand for contraception was very low ca. 1980 (8% in Ghana and 12% in Kenya), so that even with a very low level of satisfaction, the unmet need remained low. The unmet need for spacing (data not shown) also showed little change between the most recent DHS surveys in Bangladesh, Dominican Republic, Kenya, and Turkey (data for Ghana show implausible fluctuations since the 1993 DHS survey<sup>4</sup>).

These results confirm that stalling fertility is accompanied by near stalling of demand for, the use of, the satisfaction of demand for and the unmet need for contraception to limit family size.

As expected, an examination of the pace of change in these determinants in Table 2 shows clear differences between stalling and non-stalling mid-transitional countries. The average annual increase in contraceptive use for limiting is considerably higher in stalling than in non-stalling countries: 0.35 vs. 1.15 percent of couples per year ( $p=0.03$ ). A similar difference is observed in the rate of increase in demand for limiting: 0.30 in the stalling vs. 0.95 percent per year in the non-stalling countries ( $p=0.07$ ) and in the satisfaction of demand for limiting (0.28 vs. 1.31 percent per year,  $p=0.02$ ). The very slight increase in demand and use in stalling countries is probably attributable to measurement error or to the offsetting effect of other proximate determinants as discussed above.

### **Fertility Preferences**

Moving further back in the chain of causation summarized in Figure 1 the role of fertility preferences is addressed next. To examine this topic several indicators are available which each provide a different insight:

### *Desired family size*

The most widely used indicator of preferences is the desired or ideal family size (DFS). This variable is relatively easy to interpret, but some care needs to be taken with conventional estimates because they may contain biases due to rationalization and non-response. To minimize these biases only estimates of desired family size for age group 20-24 will be used. Furthermore, countries are excluded if the non-response rate exceeds 10% in either of the two most recent surveys.<sup>3</sup> This leaves 24 countries with at least two surveys and low non-response rates for the present analysis of this measure.

Figure 7 plots country specific estimates of the TFR by average DFS in the most recent survey. These two measures are highly correlated, which is consistent with the key role played by preferences in the our analytic framework. Given this correlation one would expect desired family size to have leveled off in countries in which fertility has stalled. Figure 8 confirms that this is indeed the case. In all 5 stalling countries the rate of decline in DFS has slowed down over time. In four countries the DFS stalled completely or even increased in the late 1990s (Bangladesh, Ghana, Kenya, Turkey), and in the Dominican Republic the decline slowed to just 0.1 births per woman.

Table 3 summarizes recent average trends in desired family size between the two most recent DHS surveys for stalling and non-stalling mid-transitional countries. The annual absolute change in stalling countries is very small -- an increase of 0.001 children per woman per year. In contrast, in the non-stalling mid-transitional countries desired family size declined at an average pace of 0.03 children per woman per year (i.e., 0.3 per decade)

Further insight into the temporal relationship between DFS and TFR is presented in Figure 9 which plots trends in these variables from all available surveys since ca. 1980 for the five stalling countries. In general both the DFS and the TFR declined until the 1990s. Although trends in DFS are broadly consistent with trends in the TFR, the results in figures 7 and 9 demonstrate that in most countries the TFR substantially exceeds the DFS. The main explanation for this finding is that the TFR includes both wanted and unwanted births while the DFS obviously only includes wanted births. The crucial distinction between wanted and unwanted components of fertility will now be examined further.

### *Wanted fertility*

To explore the observed differences between desired family size and fertility it is useful to introduce a second preference measure, the so-called wanted total fertility rate (WTFR). The WTFR is calculated with the same standard procedure that is used to calculate the TFR from the age specific fertility rates, but to obtain the WTFR births in excess of desired family size are excluded from the numerators of these rates. Figure 10 plots estimates of the two preference indicators, DFS and WTFR, for 24 countries (circles for stalling countries). As expected, these indicators are highly correlated and nearly equal to one another in most countries, but in a few instances differences are significant.

The reasons for the difference between the DFS and the WTFR are fairly complex and only a brief summary will be provided here (Bongaarts, 1990, 2001):

- *Involuntary infertility*: A couple may want a certain number of children, but if one of the partners becomes infecund or the marriage ends early due to divorce or death, then the desired family size may not be achieved. Most individuals who never marry or are permanently infecund also fail to reach their desired family size. When such involuntary limitation of fertility occurs, it reduces wanted fertility below the desired family size.

- *Infant and child mortality*: Desired family size is measured in terms of surviving children, while wanted fertility refers to births. Other things being equal, the latter will exceed the former to the extent that deceased children are replaced with additional births. Child deaths that are replaced are counted once in measures of family size and twice in measures of wanted fertility.

- *Gender preference*: If, in specifying a family size preference, a woman also has a particular composition of boys or girls in mind, then her wanted fertility may exceed her desired family size. For example, if a woman wants a two-child family, including at least one son, she may decide to have a third (wanted) child if her first two children are girls.

- *Changes in the timing of childbearing*: The wanted total fertility rate is a period measure, while desired family size is a cohort indicator. Changes in the average age at childbearing therefore affect the former but not the latter. A trend toward later age at childbearing tends to reduce period fertility (both wanted and unwanted), independent of the level of desired family size. This fertility depressing effect (“tempo effect”) ends

when changes in the timing of childbearing end (Bongaarts and Feeney, 1998; Bongaarts, 1999).

- *Competing preferences:* In most fertility surveys small proportions of women report that they do not want any more children even though they have not yet attained their desired family size. A plausible partial explanation is that competing preferences (e.g., for a career, income, freedom from child care responsibilities) cause some women to want to stop childbearing before they have reached their desired number of offspring. In that case, stated desired or ideal family size overestimates the current demand for children.

Observed differences between desired family size and wanted fertility are the net results of these five effects (and measurement errors). Involuntary infertility, a rising age at childbearing, and competing preferences lead to a wanted fertility level below the desired family size, while child mortality and compositional preferences have the opposite effect. The fact that in most countries wanted fertility and desired family size are similar (as shown in Figure 10) implies that these positive and negative effects largely offset one another. However, in some countries this is not the case. For example, Jordan (DFS=4.0 and WTFR=2.6) is an outlier. The DHS does not collect sufficient information on all the confounding factors to examine this issue in detail, but the unusually late age at marriage in this country (25.1 years on average for women) and the rapidly rising mean age at first birth are two likely contributing factors to Jordan's relatively low wanted fertility.

Despite these differences between the two preference indicators, it is clear from Figure 9 (WTFR as dashed lines) that the stalls in the TFR and DFS are accompanied by stalls in wanted fertility. In contrast, and as expected, the pace of decline in the DFS and WTFR in the non-stalling countries is substantial (see Table 3).

#### *Unwanted fertility*

The unwanted total fertility rate (UTFR) is estimated as the difference between the observed TFR and the wanted total fertility rate. On average for the 38 countries the unwanted fertility equaled 0.9 births per woman which represents 20 percent of the average TFR of 4.5 births per woman. The direct cause of unwanted childbearing is an

unmet need for contraception to limit family size. One would therefore expect a positive correlation between the level of unmet need for limiting and the observed unwanted total fertility rate. Figure 11 confirms this association. On average, a 1% increase in unmet need for limiting raises the unwanted fertility by 0.09 births per woman.

Figure 12 plots trends in unwanted fertility for the five stalling countries. In the latest available survey the UTFR ranged from 1.4 births per woman in Kenya to 0.7 births per woman in Turkey and the Dominican Republic. As expected the UTFR is more or less stable in the period between the two most recent surveys (ca. 1995- ca. 2000).

A surprising finding in Figure 12 is that unwanted fertility rose sharply from very low levels during the 1980s in Ghana and Kenya (and to lesser extent in Bangladesh). This rise occurred despite a rapid increase in contraceptive use during this period as shown in Figure 6b. The explanation for this finding is straightforward (Bongaarts, 1997): Kenya and Ghana were still in the early stage of the fertility transition ca. 1980. Unwanted fertility is typically low at the beginning of this transition because desired family size is high. Consequently, women then need most of their reproductive lives after marriage to reach the large number of children they wish to have. Women who do reach their desired family size have little reproductive time left during which unwanted births can occur even if contraceptive use is low. Unwanted fertility is low because exposure to the risk of unwanted childbearing is limited. However, this exposure rises once the desired family size declines as the transition gets underway. Unwanted fertility then can increase if a significant proportion of women who want no more children do not practice effective contraception. Finally, in the later stages of the transition the implementation of preferences (through the use of effective contraception) rises to sufficiently high levels that unwanted fertility stops rising or declines.

The main conclusion from this examination of fertility preferences is that the desired family size, as well as wanted and unwanted fertility show little or no change in the stalling countries during the late 1990s. The levels of unwanted fertility and unmet need for contraception are substantial, but there is no evidence that they rose during the late 1990s when fertility stalled.

## **Socioeconomic determinants**

The role of socioeconomic factors in bringing about a fertility transition remains controversial. Despite decades of research there is little agreement on how and under what conditions social and economic changes affect reproductive behavior. A brief review of the main findings from past research will be presented before commenting on the relevance of current trends for stalling.

### *Key findings from past research*

Notestein (1953) formulated what is now generally called classical demographic transition theory. According to this highly influential statement of the causes of fertility decline, fertility is high in traditional agricultural societies to offset high mortality and thus to insure population survival. As a society develops (modernizes) socioeconomic changes such as industrialization, urbanization, rising education and investments in public health lead to a decline in mortality and to a change in the costs and benefits of children. The rise in child survival together with the rising cost and declining economic value of children are considered to be the fundamental driving forces of the fertility transition. The desire for smaller families leads in turn to a demand for birth control and hence to lower actual fertility. Elaborations and variants of this theory can be found in Becker 1991; Bulatao and Lee 1983; Caldwell 1982; Easterlin 1975.

In the 1970s a team of researchers led by Ansley Coale set out to test this theory in Europe. This study used provincial level data from European countries for the period 1870-1960, during which fertility transitions occurred in most of Europe. Two main conclusions emerged from this work (Watkins, 1986, 1987) : 1) socioeconomic conditions were only weakly predictive of fertility decline and transitions started at widely differing levels of development, and 2) once a region or a country had started a fertility decline neighboring regions with the same language or culture followed after short delays even if they were less developed. These findings were unexpected and were not predicted by classical transition theory.

A similar absence of a tight link between development indicators and fertility decline has been documented in recent studies of this topic in contemporary developing countries (Bongaarts and Watkins, 1996; Cleland and Wilson, 1987; Watkins, 1987). Although a highly significant correlation exists between a number of development

indicators and fertility, the transition onset and the pace of decline in the early phases of the transition are poorly predicted by these indicators.

The most widely accepted explanation for these unexpected findings is the role played by diffusion and social interaction processes. An extensive literature exists on this topic (Bongaarts and Watkins 1996; Caldwell 2001; Casterline 2001a, 2001b; Cleland 2001; Cleland and Wilson 1987; Knodel and van de Walle 1979; Kohler 2001; Montgomery and Casterline 1996; National Research Council 2001; Watkins 1986, 1987). Diffusion refers to the spread of information ideas and behaviors among individuals, communities and countries and social interaction refers to the process whereby the reproductive attitudes and behaviors of individuals influence one another. These processes are believed to be the source of resistance to the adoption of birth control behavior in pre-transitional societies. This resistance keeps fertility more or less unchanged even as the country begins to develop and the demand for children declines. However, once this obstacle is overcome fertility can decline very rapidly (and largely independent from socioeconomic indicators) as pent-up demand for birth control is increasingly satisfied and the cost of birth control (broadly defined to include social costs) declines. This explanation is consistent with the rapid fertility declines that have occurred in many developing countries in recent decades, even in some countries with low levels of development. In many countries family planning programs have facilitated the diffusion of knowledge about contraception and provided access to contraceptive methods.

A review of the literature on the fertility transition by Hirschman (1994) concluded: "The dilemma is that there is no consensus on an alternative theory to replace demographic transition theory.... So the debate continues with a plethora of contending theoretical frameworks, none of which has gained wide adherence" (p.214). This unsatisfactory state of affairs largely continues until today despite further efforts by a number of researchers. In particular, more recent research argues again for a tighter association between socioeconomic change and fertility decline. For example, Potter, Schertman and Cavenaghi (2002) undertook a detailed analysis of the fertility transition in Brazil and found "strong and consistent relationships between decline in fertility and changes in social and economic circumstances." Galloway et al. (1994, 1998) question



some of the conclusions of the historical study of Europe. Bongaarts (2002) examines alternative explanations for fertility trends in developing countries since 1960 and concludes that the classical and the diffusion perspectives are both important, but that their roles change over the course of the transition. Specifically he concludes that “...diffusion/social interaction are important in the early phases of the transition. Once this process has largely run its course, fertility late in the transition becomes more closely tied to level of socioeconomic development.” This conclusion has implications for the stalling phenomenon as discussed next.

### *Stalling development and stalling fertility*

If the conclusion about the central role of development in the later stages of the transition is correct then one would expect (1) a high level of correlation between fertility and various indicators of social and economic development and (2) a stalling of these indicators in countries in which fertility has stalled. These propositions will now be examined with data from the 38 countries included in this study. The following socioeconomic indicators were used:

- Real GDP per capita (\$ in 1996 constant prices) from Heston et. al. 2002.
- Child survival, as measured in the DHS by the proportion of births that survives to age 5.
- The proportion schooled, measured in the DHS by the average proportion of women aged 15-49 who have more than zero years of schooling.

Figures 13a, 13b and 13c plot the TFR by each of these three indicators for the 38 countries at the time of the most recent DHS. The correlations are statistically significant and fairly strong for GDP per capita ( $r=0.87$ ) and for child survival ( $r=0.87$ ) but considerably weaker for proportion schooled ( $r=0.59$ ). The five stalling countries are not outliers in any of these associations, although Bangladesh has a rather low level of GDP per capita for its relatively low level of fertility.

Trends in the three development indicators for the five stalling countries are plotted in Figures 14a,b,c. The results are summarized in Table 4 which indicates for each country whether the different indicators have stalled. The most notable finding is that all

three development measures stalled in Ghana and Kenya. In the Dominican Republic two out of the three indicators stalled, but this country is relatively well off and scores highest (for child survival and proportion schooled) or second highest (for GDP per capita) among the five countries. In Turkey and Bangladesh development is still proceeding according to these three indicators, although Turkey has reached much higher levels than Bangladesh. These trends paint a rather discouraging picture of the situation in Ghana and Kenya and suggests that the lack of progress in different dimensions of development is a key cause of stalling fertility in these two countries.

Table 5 compares the average pace of change in socioeconomic variables in stalling and non-stalling mid transitional countries. None of the differences are statistically significant, but the rate of increase in the proportion schooled and in child survival were higher in the non-stalling than in the stalling countries.

### **Role of family planning programs**

Since the 1960s governments of many developing countries have implemented voluntary family planning and reproductive health programs. These programs provide information about and access to contraception to permit women and men to take control of their reproductive lives and avoid unwanted pregnancies. Only in rare cases, most notably in China, has coercion been used. Successful implementation of such programs in a few countries in the early 1960s (for example, in Taiwan and Korea) encouraged other governments to follow this programmatic approach and newly available contraceptive methods, such as the pill and IUD, greatly facilitated the delivery of family planning services.

The choice of voluntary family planning programs as the principal policy instrument is based largely on the documentation of a substantial unsatisfied demand for contraception. When questioned in surveys, large proportions of married women in the developing world report that they do not want a pregnancy soon. Some of these women want no more children because they have already achieved their desired family size, while others want to wait before having the next wanted pregnancy. A substantial proportion of these women are not protected from the risk of pregnancy by practicing effective contraception (including sterilization) and, as a result, unintended pregnancies

are common. In the mid 1990s, 36% of all pregnancies in the developing world were unplanned and 20% ended in abortion (Alan Guttmacher Institute, 1999). The existence of this unmet need for contraception was first documented in the 1960s, and it convinced policymakers that family planning programs were needed and would be acceptable and effective.

In the 1960s and 1970s the main rationale for these efforts was to curb rapid population growth by reducing high birth rates, but the health and human rights rationales for family planning and reproductive health programs have become more prominent over time. This policy approach was strongly endorsed at the 1994 United Nations International Conference on Population and Development in Cairo. The Programme of Action adopted by the participating governments encourages the expansion of reproductive health and voluntary family planning programs as a means to improve women's reproductive freedom and health.

*The impact of family planning programs on reproductive behavior*

While wide agreement exists on the desirability and rationale for family planning and reproductive health programs, there has been considerable debate and disagreement about their impact on fertility. The most trenchant critique of these programs is provided by Pritchett (1994) who concludes that to achieve low fertility, "...it is fertility desire that matters and *not* contraceptive access (Pritchett 1994: 39, emphasis in the original). A rebuttal of this view is provided in Bongaarts (1994, 1997) who finds strong evidence for a significant fertility effect of family planning programs and estimates that a strong program can reduce fertility by approximately one birth per woman below the level that would have been observed without the program (see also Tsui, 2001).

The issues addressed in this controversy are complex and will not be summarized here, but it is useful to note the main reason why it has proven difficult to measure the fertility impact of family planning programs.

*-Lack of a robust indicator of program strength.* The best available measure is a "program effort" index developed by Lapham and Mauldin (1972) which is available for various years from 1982 to 1999 (Mauldin and Ross, 1991; Ross 2002; Ross and Stover 2001). Although unique and widely used, this measure has weaknesses, in particular its

reliance on a few informants per country who provide mostly subjective assessments of various dimensions of a country's family planning program.

*-The nonlinear relation between program effort and unwanted fertility and unmet need for limiting.* There is only a weak correlation between program effort score and the level of unmet need for limiting or unwanted fertility in cross-country studies. Pritchett's critique relied heavily on this point: "...if improved family planning programs were driving fertility declines, they should be accompanied by a reduction in excess fertility. This is not the case." (Pritchett 1994:34). As noted by Bongaarts (1994), there is a serious flaw in this argument: In countries with high desired family size, unwanted fertility is low regardless of the strength of the program because women need most of their reproductive lives to achieve their desired family and there is little reproductive time left to bear unwanted children. A preferable indicator is the index of satisfaction of demand introduced above which does not suffer from this shortcoming.

*- Lack of experiments.* The most direct and convincing evidence of the impact of well-designed family planning services is provided by controlled experiments. Unfortunately, these experiments are expensive and time consuming and too few of them have been conducted. A highly influential example of a large experiment is the one conducted in the Matlab district of rural Bangladesh (Cleland et al. 1994). When this experiment began in the late 70s, Bangladesh was one of the poorest and least developed countries, and there was considerable skepticism that reproductive behavior could be changed in such a setting. Comprehensive family planning and reproductive health services were provided in the treatment area of the experiment. A wide choice of methods was offered, the quality of referral and follow-up was improved and a new cadre of well-trained women replaced the traditional birth attendants as service providers. The results of these improvements in the quality of services were immediate and pronounced with contraceptive use rising sharply. No such change was observed in the comparison area. The differences between these two areas in contraceptive use and fertility have been maintained over time. The success of the Matlab experiment demonstrated that appropriately designed services can reduce unmet need for contraception even in very traditional settings. A broadly similar experiment conducted recently in Northern Ghana also shows a clear effect on reproductive behavior (Debpuur, C. et al., 2002, Phillips et

al., 2003). These experiments leave no doubt that well-designed programs can have substantial impact on contraceptive use and fertility.

#### *The role of family planning programs in stalling fertility*

A plausible hypothesis for one of the causes of stalling fertility is that program effort has faltered. If this were the case one would expect the program effort score to have stalled or declined and unwanted fertility and unmet need to be stable or rising in the late 1990s.

Figure 15 plots the program effort index over time for all available years (i.e., 1982, 1989, 1994 and 1999) in the five stalling countries. These trends show that program effort rose during the 1980s in these countries except in the Dominican Republic. In the 1990s this upward trend slowed with considerable variation among countries. No firm conclusions can be drawn but there is no evidence for a systematic erosion of program effort in the late 1990s when fertility stalled. In fact the index is rising in four of the five countries. The exception is the decline in the Dominican Republic which left its 1999 score well below that of the other countries. There are no significant differences between trends in program effort scores of stalling and non-stalling mid-transitional countries in the late 1990s.

As shown earlier in Figures 6d and 12 the stalling countries did not experience increases in unwanted fertility or in the unmet need for limiting during the late 1990s. This finding also suggests no major deterioration in the supply environment compared to earlier levels. These observations of course do not mean that the access to family planning services is adequate, because levels of satisfaction of demand and program effort scores are low for some countries, in particular in Ghana and Kenya.

#### **Policy options**

Two general options are available to policymakers in countries where fertility has stalled at an undesirable level: strengthen the family planning program or encourage social and economic development. The former is aimed primarily at reducing unplanned pregnancy and the latter at reducing the demand for children. A decision on which of these options should be emphasized requires an analysis of several key indicators.

*Family planning program:* The crucial first step in any policy assessment is to examine the level of unmet need for contraception or degree to which reproductive preferences are implemented (Casterline and Sinding, 2000). Several DHS measures shed light on this issue, including the level of unmet need for spacing or limiting births and the proportion of births that is unwanted or mistimed. Another very useful indicator is the percent of demand for contraception that is met. Satisfying the existing demand for contraception is one of the main stated objectives of family planning programs.

Table 5 lists the percent of demand that is satisfied at the time of the most recent DHS survey (spacing and limiting demand are combined). The 38 countries in this table are ordered from lowest to highest score. The range is very wide with the highest satisfaction of demand in Columbia (92.8%) and Vietnam (91.6%) and the lowest in Mozambique (20%) and Mali (22.1%). These results indicate that even in the highest scoring countries some demand is left unsatisfied. The reason for this presumably is that nonuse can be caused not only by lack of access or lack of information, but also by other factors such as fear of side effects of contraception and lack of support from husbands which are not readily addressed by programs.

The stalling countries -- indicated in bold in Table 5 -- have levels of demand satisfaction that fall well short of the highest observed levels of around 90%. Dominican Republic (85.6%) and Turkey (86.6%) have fairly high scores, Bangladesh is intermediate with a score of 78.3%, and Kenya (62.8%) and especially Ghana (42.5%) have low scores. In all of these countries strengthening of the family planning program could reduce unmet need and raise the level of contraceptive prevalence. This would in turn reduce the incidence of unwanted pregnancies.

In countries with high levels of demand satisfaction, unwanted fertility typically equals only about 0.5 births per women. This finding gives an indication of the improvements that are possible in other countries. For example, unwanted fertility in Kenya (1.3 births per woman) and Bangladesh (1.1 births per woman) could probably be reduced by more than half. In contrast, in the Dominican Republic and Turkey unwanted fertility is already fairly low (0.7 births per woman) and the potential for further reductions is smaller.

It is important to note that a rise in the level of demand satisfaction does not necessarily lead to a reduction in the level of unwanted fertility in countries where the desired family size is also declining. For example, Ghana's relatively low level of unwanted fertility (0.7 births per woman) is in part due to its high desired family size (3.8 children per woman). Without improvements in demand implementation Ghana's unwanted TFR is likely to rise in the future when desired family size drops from current high levels, because the exposure of women to the risk of unwanted births rises as the age at last wanted birth declines.

*Development.* As noted, development is considered the main policy option available to reduce high desired family size and to raise the level of preference implementation. In countries where desired family size substantially exceeds two, further socioeconomic development is likely to be essential for the country to complete its fertility transition to near the replacement level. This is especially true for countries in which desired family size has stalled at a high level.

In the five stalling countries desired family size ranges from less than three in Bangladesh (2.4), Turkey (2.3) and the Dominican Republic (2.6) to significantly above three in Ghana (3.8) and Kenya (3.4). An examination of trends in socioeconomic development indicators in Table 4 revealed that they are stalled at relatively low levels in Kenya and Ghana. (The AIDS epidemic may be contributing to these trends). In contrast, in Bangladesh, the Dominican Republic and Turkey, these indicators are still rising or already have reached relatively high levels. It is not possible to predict future trends in fertility preferences in these countries, but it would not be surprising if countries with rising or high socioeconomic development would see a resumption of fertility declines in the near future. (A preliminary report from the 2004 Bangladesh DHS survey indicates a slight further decline to 3.1 births per woman). In contrast, in Ghana and Kenya it seems likely that desired family size will not decline much further without progress in socioeconomic conditions. This suggests that in some countries fertility stalls may be brief and temporary while in others the stalls may continue for many years, depending on trends in socioeconomic conditions.

It should be noted that even if fertility preferences and fertility resume their downward trend in stalled countries, there is no guarantee that their TFRs will drop to

below the replacement level. This assumption is widely accepted among demographers and it is built into the most recent population projections made by the United Nations (2002). This view is based on the fertility trajectories followed by developing countries that have completed the fertility transition in the past few decades. Most of these countries currently have fertility below replacement and in some cases below 1.5 births per woman (e.g., in Hong Kong, Korea, Singapore, Taiwan). While it may seem reasonable to assume that countries that are still in transition will follow a similar trajectory in the future this conclusion is by no means certain. It is quite possible that countries differ substantially in their fertility response to development. If that is the case then countries that have completed their transitions not only have experienced development more rapidly than average, but they are also a selected group because their fertility is more responsive than average to changes in development. It is difficult to prove that such heterogeneity among countries exists, but the countries that have not yet finished their transitions could well be less responsive than average to improvements in development. This in turn could imply that these countries will stay above replacement for some time even if fertility drops below current levels.

Finally, a brief comment on the issue of which dimension of development is most important for fertility decline. It is widely believed that fertility is most responsive to improvements in human development, in particular in female education and child survival (Bongaarts, 2001; Caldwell, 1980; Jejeebhoy, 1995; Sen 1999). This conclusion is strongly supported by the fact that replacement fertility has been achieved in some very poor societies such as Sri Lanka and the state of Kerala in India. Although poor, these populations have high levels of literacy and female empowerment and low infant and child mortality. It is, however, premature to conclude that standards of living as measured by real GDP per capita have no impact. Kenya is an example of a country where fertility has stalled at near five births per woman despite relatively high levels of literacy and schooling. It would be surprising if the low and deteriorating living standards are not partly responsible for this stall in Kenya.



## **Conclusion**

The past record of fertility trends in countries that have completed their fertility transitions indicates that once a fertility decline is underway it tends to continue without interruption until the replacement level of around two births per woman is reached. This historical pattern is observed in both developed and developing countries with low fertility. It is therefore plausible to assume that this same pattern of uninterrupted transition will be observed in developing countries in which the transition is still underway.

An examination of recent fertility trends in countries with multiple DHS surveys reveals, however, that fertility as measured by the total fertility rate has stalled in mid-transition in five countries: Bangladesh, Dominican Republic, Ghana, Kenya and Turkey. In each of these countries fertility was high (>6 births per woman) in the 1950s and then declined to fewer than 5 births per woman in the early or mid 1990s, before stalling in the late 1990s. The level of stalling varied widely from 4.7 births per woman in Kenya to 2.5 births per woman in Turkey.

An analysis of trends in the determinants of fertility in these five countries showed a systematic pattern of stalling in most determinants, including contraceptive use, the demand for contraception, and the desired family size. In addition, the stalls seem to be attributable at least in part to a lack of recent progress in socioeconomic development in Ghana, Kenya, and the Dominican Republic. Ghana and Kenya have experienced a deterioration in already low levels of real GDP per capita, child survival and proportion schooled in recent years. In the Dominican Republic these indicators are much higher, but small declines occurred recently in child survival and the proportion schooled. In contrast, in Bangladesh and Turkey social and economic change appears to be uninterrupted.

In contrast to the near absence of change in the stalling countries, the non-stalling countries showed substantial changes in fertility and its various determinants and these changes were all in the expected direction. That is, fertility and fertility preferences declined, while contraceptive use, the demand for contraception and socioeconomic development indicators rose during the period between the two most recent DHS surveys.

A plausible hypothesis is that fertility stalled because investments in family planning programs have declined, thus limiting access to contraceptive methods. Several variables, including the program effort score and the level of unmet need and unwanted fertility, shed light on this issue. Program effort scores rose between 1994 and 1999 in Bangladesh, Ghana, Kenya and Turkey, but declined in the Dominican Republic. Similarly, measures of unmet need and unwanted fertility showed no significant recent trend in the stalling countries, although Kenya experienced a slight increase in unwanted fertility. Taken together this evidence provides little support for the hypothesis of declining access as a main cause of stalling fertility.

Any policy response to address stalling fertility should be tailored to the circumstances of the individual country. A crucial first step is determining the degree of implementation of reproductive preferences. Any country with a relatively low degree of demand satisfaction and high unmet need and unwanted fertility would benefit substantially from further investments in family planning programs. It should be noted, however, that returns on such investments tend to decline as the supply environment improves. It is difficult to remove all unwanted childbearing or to reach 100% demand satisfaction because reasons other than access (e.g., fear of side effects and lack of spousal support) also play a role. Improvements in family planning are most needed in countries such as Bangladesh, Ghana and Kenya with the highest levels of unmet need and unwanted fertility.

Investments in family planning can reduce unwanted fertility but their effect on desired family size is apparently weak or non-existent (Freedman, 1997). The implication of this finding is that countries in which desired family size has stalled well above the replacement level will need declines in preferences to complete the fertility transition. Such declines are usually achieved by improvements in socioeconomic conditions. Among the five stalled countries, Kenya and Ghana have relatively high average desired family size (3.4 and 3.8 respectively) and low and stalled levels of development as measured by real GDP per capita, child survival and proportion schooled. In these two countries improvements in development will almost certainly be needed for desired family size and actual fertility to fall substantially below current levels. In Bangladesh, the Dominican Republic and Turkey desired family size has already dropped to between

2 and 3 children per woman but these preferences have also stalled. Further improvements in development will therefore also be needed to complete their fertility transitions.

## Endnotes

1) The 1999 survey for Nigeria has been excluded because its TFR estimate of 4.7 seems implausibly low compared with the surveys in 1990 and 2003.

2) The years for the latest three surveys for which first country reports were available in February 2005 are as follows: Bangladesh, 1993/94,1996/97, 1999/2000; Dominican Republic, 1996, 1999, 2002; Ghana 1993,1998, 2003; Kenya, 1993,1998, 2003; Turkey, 1993,1998.

3) Rationalization refers to the upward adjustment of ideal family size among women who have had unwanted children. This is one reason why desired family size rises with age and parity. Estimates of average desired family size are based only on responses from women who answered the survey question about ideal family size. The desired family size of women who do not respond to this question is presumably higher than average, and the observed DFS is therefore biased downward in countries where nonresponse rate is high (over 25% in some cases).

4) The unmet need for spacing among married women in the Ghana DHS surveys in 1993, 1998 and 2003 is reported as 24.7% in 1993, 11.4 % in 1998 and 21.7 % in 2003. This large fluctuation in unmet need is likely due in part to measurement error.

## Appendix. Effects of the proximate determinants on fertility trends in Bangladesh

Fertility trends are the net result of changes in proximate determinants. The DHS surveys collect data on three principal proximate determinants: contraceptive prevalence, proportions married and postpartum infecundability, but they do not provide direct measures of other proximate variables such as contraceptive effectiveness, levels of induced abortion, and frequency of intercourse. It is therefore not possible to undertake a full analysis of the impact of these determinants. Instead, this appendix will focus on the effects of changes in marriage pattern and postpartum infecundability.

The fertility effects of each proximate variable are estimated with the Bongaarts model (Bongaarts and Potter, 1983). This model calculates multiplicative indexes to quantify the role of the different proximate variables. Each index ranges from 0 to 1 with lower values indicating more fertility reduction.

Table A1: Analysis of proximate variables in Bangladesh 1996/97- 1999/2000

	Marriage index $C_m$	Postpartum infecundability Index, $C_i$	Product $C_m \times C_i$
1996/97	0.850	0.664	0.565
1999/2000	0.843	0.696	0.587

Table A1 presents estimates of the index of marriage which is calculated from age specific proportions currently married or in union observed in the DHS surveys conducted in 1996/1997 and 1999/2000. These results indicate that the fertility inhibiting effect of marriage increased slightly due to lower proportions married in a number of age groups. The next column gives the index of postpartum infecundability which rose because the duration of postpartum non-susceptible period declined. The final column in this table gives the combined inhibiting effect of marriage and postpartum infecundability. This product rose between the surveys. The implication of this finding is that fertility would have risen in these countries if all other proximate variables (including the use of contraception) had remained constant. In reality this expected rise in fertility has been averted by a rise in contraceptive use. Using the Bongaarts model it is possible to estimate the increase in contraceptive prevalence needed to offset the combined fertility enhancing effects of marriage and postpartum infecundability. For Bangladesh this offsetting rise in prevalence is 2.2 percent. This explains about half of the observed increase in prevalence of 4.5 percent between the two surveys.

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TABLE 1: Estimates of total fertility rate for two most recent DHS surveys in 38 countries

	Most recent DHS		Next most recent DHS		Annual rate of decline	Trend
	Year	TFR	Year	TFR		
Bangladesh	1999.5	3.3	1996.5	3.3	0.00	STALL
Benin	2001	5.6	1996	6	0.08	Decline
Bolivia	2003	3.8	1998	4.2	0.08	Decline
Brazil	1996	2.5	1986	3.4	0.09	Decline
Burkina Faso	2003	6.8	1998.5	6.4	-0.09	TFR>5
Cameroon	1998	4.8	1991	5.8	0.14	Decline
Colombia	2000	2.6	1995	3	0.08	Decline
Cote d'Ivoire	1998.5	5.2	1994	5.3	0.02	Decline
Dominican Rep.	2002	3	1999	2.7	-0.10	STALL
Egypt	2003	3.2	2000	3.5	0.10	Decline
Ghana	2003	4.4	1998	4.4	0.00	STALL
Guatemala	1998.5	5	1995	5.1	0.03	Decline
Haiti	2000	4.7	1994.5	4.8	0.02	Decline
India	1998.5	2.8	1992.5	3.4	0.10	Decline
Indonesia	2002	2.6	1997	2.8	0.04	Decline
Jordan	2002	3.7	1997	4.4	0.14	Decline
Kazakhstan	1999	2	1995	2.5	0.13	Decline
Kenya	2003	4.9	1998	4.7	-0.04	STALL
Madagascar	1997	6	1992	6.1	0.02	Decline
Malawi	2000	6.3	1992	6.7	0.05	Decline
Mali	2001	6.8	1995.5	6.7	-0.02	TFR>5
Morocco	2003.5	2.5	1992	4	0.13	Decline
Mozambique	2003	5.5	1997	5.2	-0.05	TFR>5
Nepal	2001	4.1	1996	4.6	0.10	Decline
Niger	1998	7.2	1992	7	-0.03	TFR>5
Nigeria	2003	5.7	1990	6	0.02	Decline
Peru	2000	2.8	1996	3.5	0.18	Decline
Philippines	1998	3.7	1993	4.1	0.08	Decline
Rwanda	2000	5.8	1992	6.2	0.05	Decline
Senegal	1997	5.7	1992.5	6	0.07	Decline
Tanzania	1999	5.6	1996	5.8	0.07	Decline
Togo	1998	5.2	1988	6.4	0.12	Decline
Turkey	1998	2.6	1993	2.5	-0.02	STALL
Uganda	2000.5	6.9	1995	6.9	0.00	TFR>5
Vietnam	2002	1.9	1997	2.3	0.08	Decline
Yemen	1997	6.5	1991.5	7.7	0.22	Decline
Zambia	2001.5	5.9	1996	6.1	0.04	Decline
Zimbabwe	1999	4	1994	4.3	0.06	Decline
Average	2000.2	4.5	1994.5	4.8	0.052	

Table 2: Average annual change in demand for and use of contraception for limiting family size and proportion of demand satisfied in mid-transitional countries

	Average annual change (%/year)		
	Contraceptive use for limiting	Contraceptive demand for limiting	Satisfaction of demand for limiting
Stalling countries (N=5)	0.35	0.30	0.28
Non-stalling countries (N=13)	1.15	0.95	1.31
Significance	*	NS	*

\* p<0.05, \*\* p<0.01 (1-tailed t-test)

Table 3: Average annual change in desired family size and wanted total fertility rate in mid-transitional countries

	Average annual change (births/woman)	
	Desired family size	Wanted fertility
Stalling countries (N=5)	0.001	0.04
Non-stalling countries (N=8)	-0.03	-0.06
Significance	*	**

\* p<0.05, \*\* p<0.01 (1-tailed t-test)

Table 4: Stalling status of real GDP per capita, child survival and proportion schooled in five countries with stalling fertility

	GDP per capita	Survival to age 5	Proportion schooled
Bangladesh			
Dominican Republic		stalled	stalled
Ghana	stalled	stalled	stalled
Kenya	stalled	stalled	stalled
Turkey			

Table 5: Average annual change in socioeconomic variables in mid-transitional countries

	Average annual change (%/year)		
	GDP per capita	Survival to age 5	Proportion schooled
Stalling countries (N=5)	2.6	1.0	0.6
Non-stalling countries (N=15)	1.3	1.8	0.9
Significance	NS	NS	NS

Table 6 : Percent of demand for contraception that is satisfied, married women, most recent DHS survey

	% of demand satisfied
Mozambique	20.0
Mali	22.1
Rwanda	27.1
Senegal	27.1
Burkina Faso	31.5
Niger	33.0
Yemen	35.0
Cote d'Ivoire	35.2
Uganda	39.7
Benin	40.6
Haiti	41.4
Togo	42.1
<b>Ghana</b>	<b>42.5</b>
Madagascar	43.2
Nigeria	46.6
Cameroon	49.5
Malawi	50.8
Tanzania	53.7
Zambia	55.5
Nepal	58.6
<b>Kenya</b>	<b>62.8</b>
Guatemala	62.9
Bolivia	65.0
Morocco	69.3
Philippines	73.0
India	75.3
Zimbabwe	77.2
<b>Bangladesh</b>	<b>78.3</b>
Jordan	80.1
Egypt	84.3
<b>Dominican Rep.</b>	<b>85.6</b>
Indonesia	86.4
<b>Turkey</b>	<b>86.6</b>
Peru	87.6
Kazakhstan	88.5
Brazil	91.5
Vietnam	91.6
Colombia	92.8

Figure 1: Analytic framework for the determinants of fertility

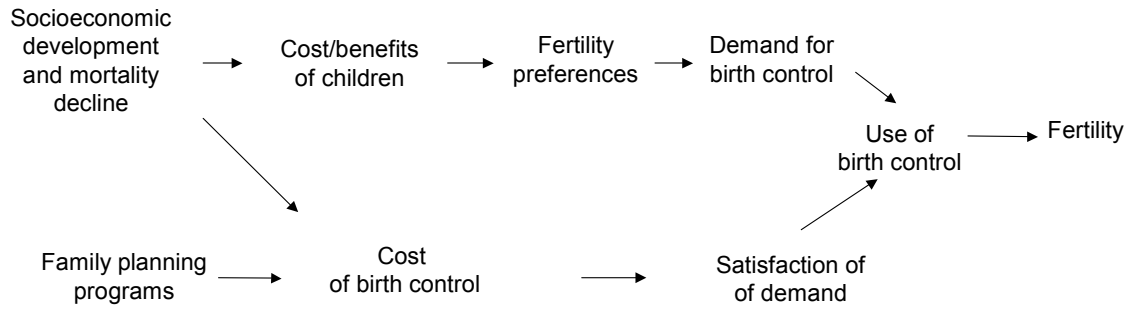


Figure 2: Trend in total fertility rate for countries with stalling fertility

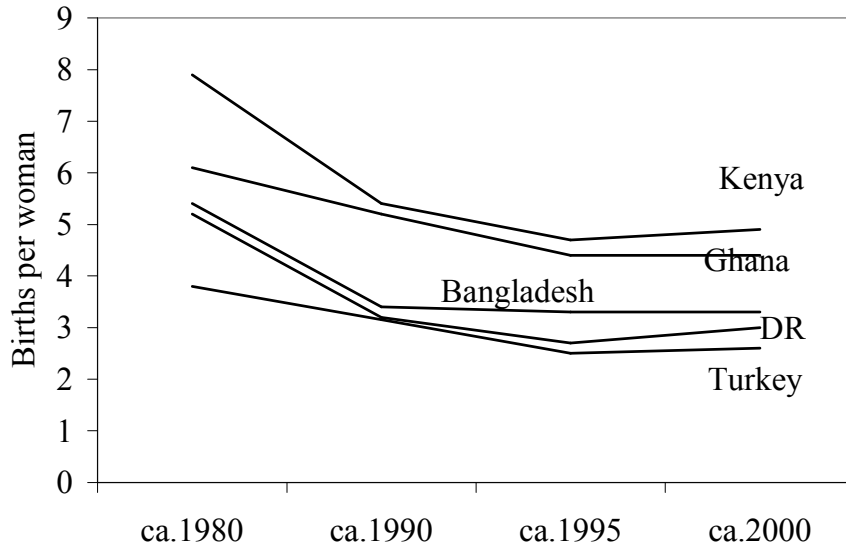


Figure 3: Total fertility rate by contraceptive prevalence, 38 DHS countries (circles for stalling countries)

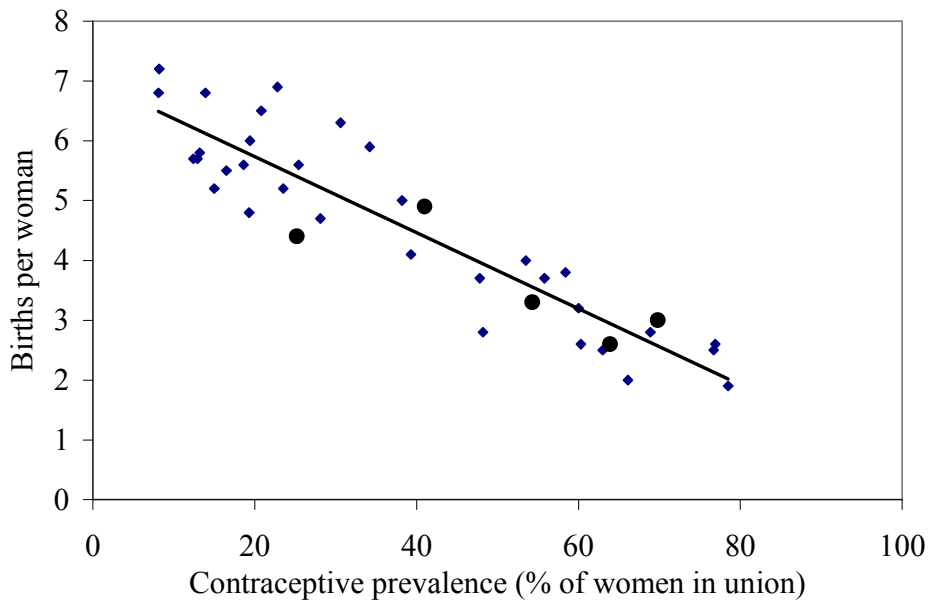


Figure 4: Trends in contraceptive prevalence in countries with stalling fertility

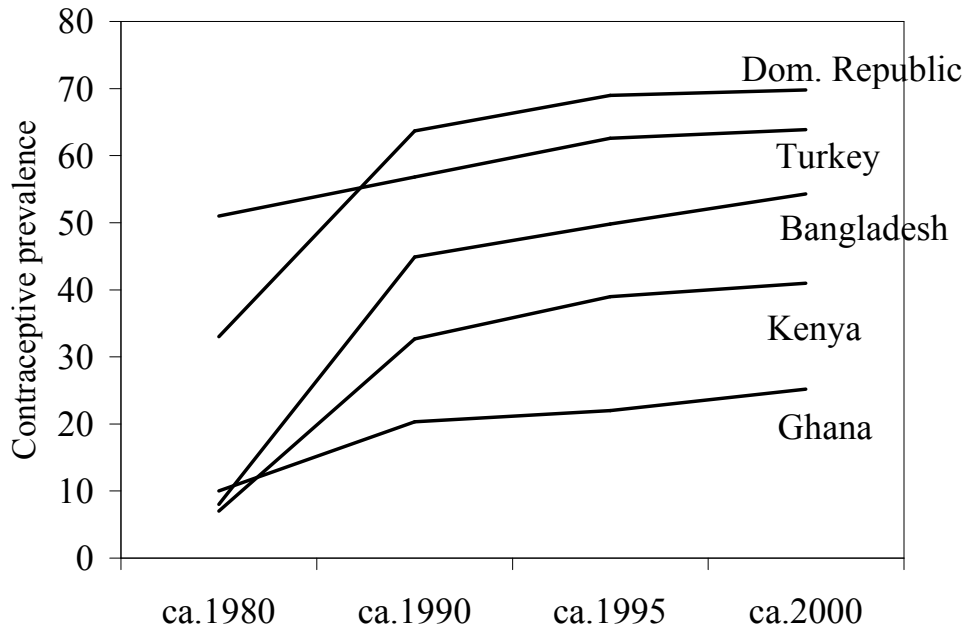


Figure 5: Demand for contraception by current use to limit fertility, 38 DHS countries (circles indicate stalling countries)

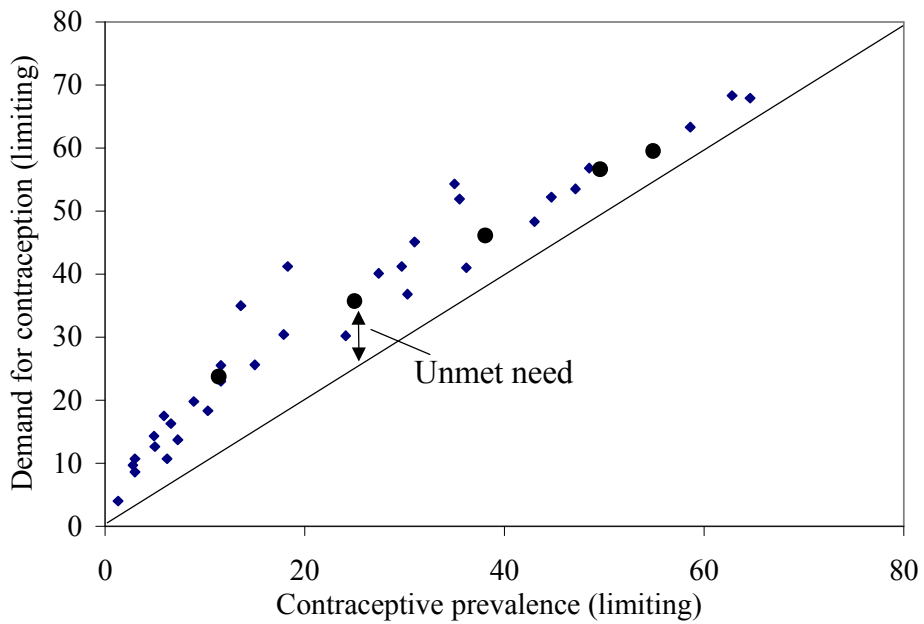




Figure 6a: Trends in demand for contraception to limit fertility

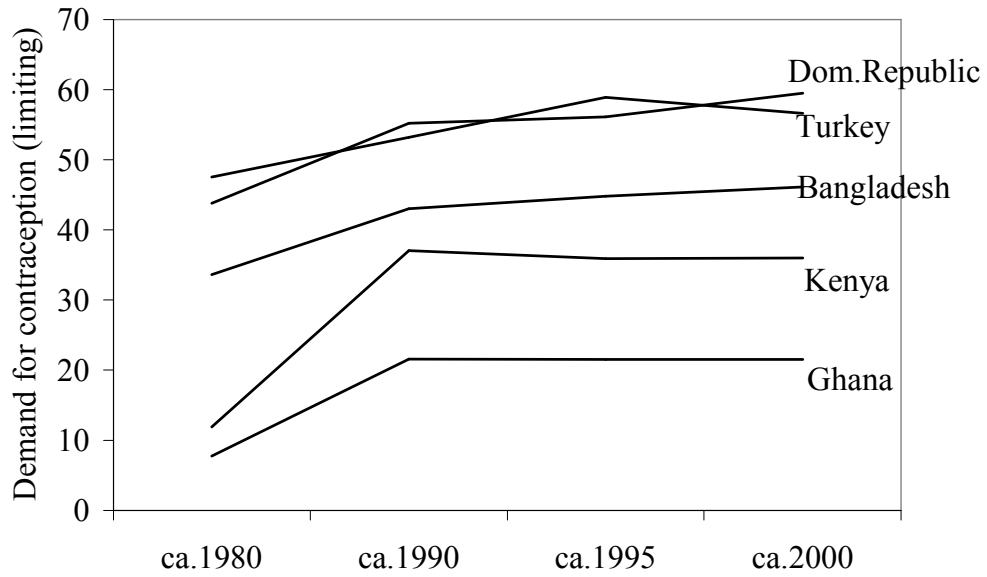


Figure 6b: Trends in use of contraception to limit fertility

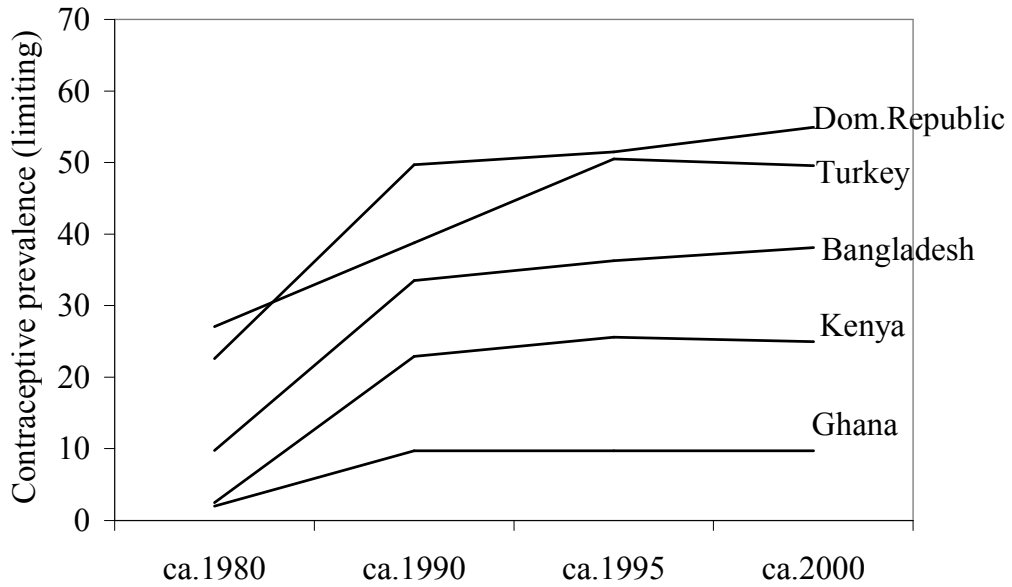


Figure 6c: Trends in satisfaction of demand for contraception to limit fertility

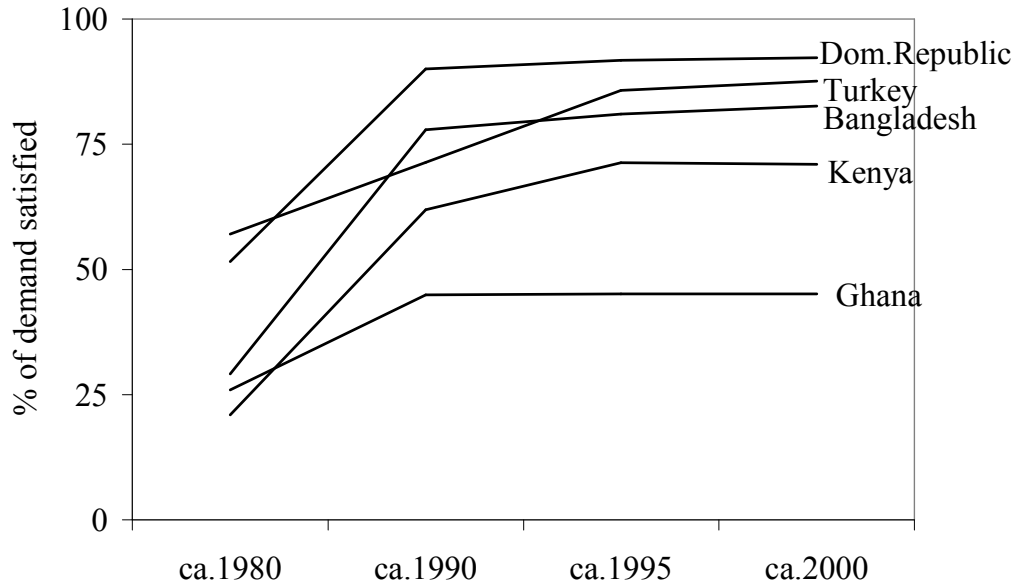


Figure 6d: Trends in unmet need for contraception to limit fertility

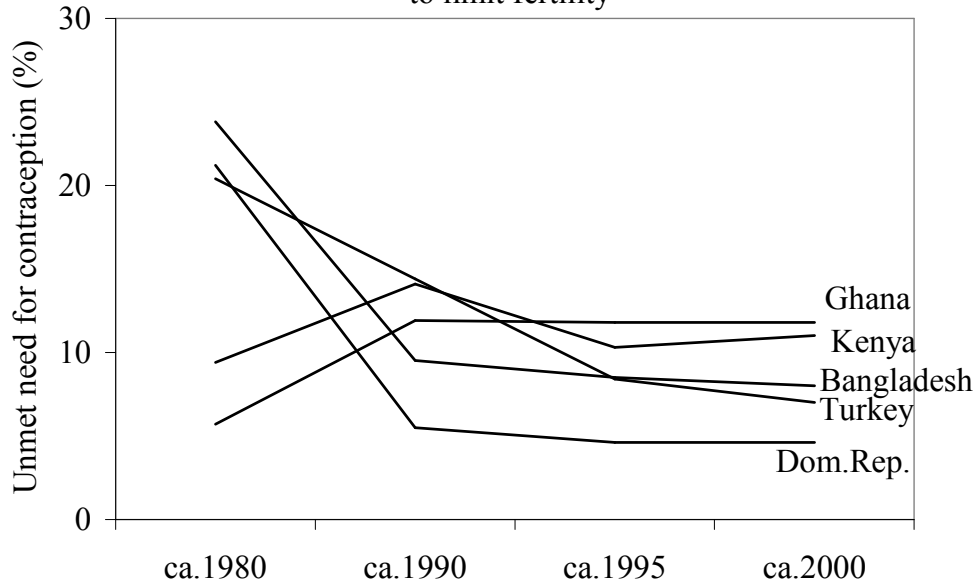


Figure 7: Total fertility rate by average ideal family size, 24 countries (circles for stalling countries)

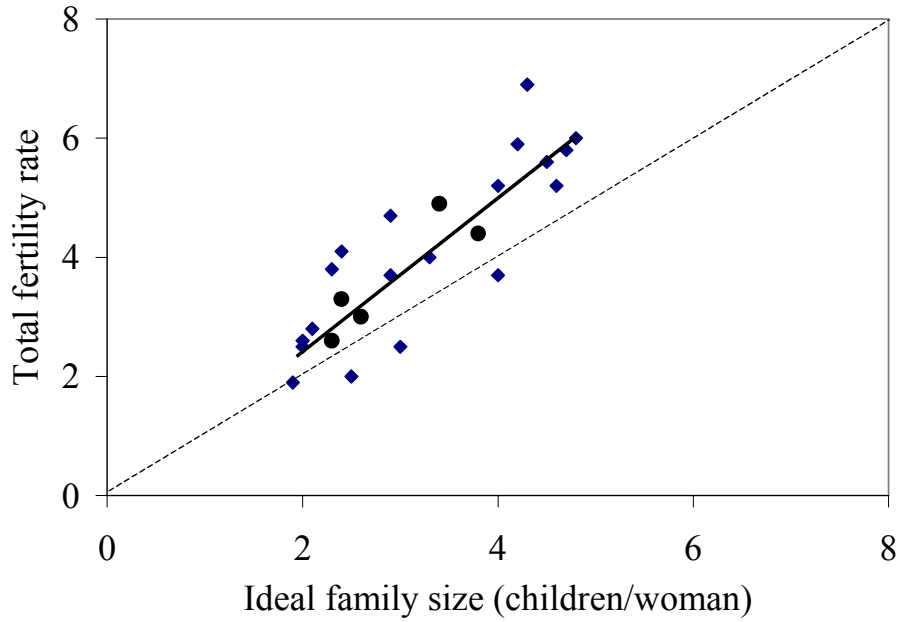


Figure 8: Trends in ideal family size in five countries with stalling fertility

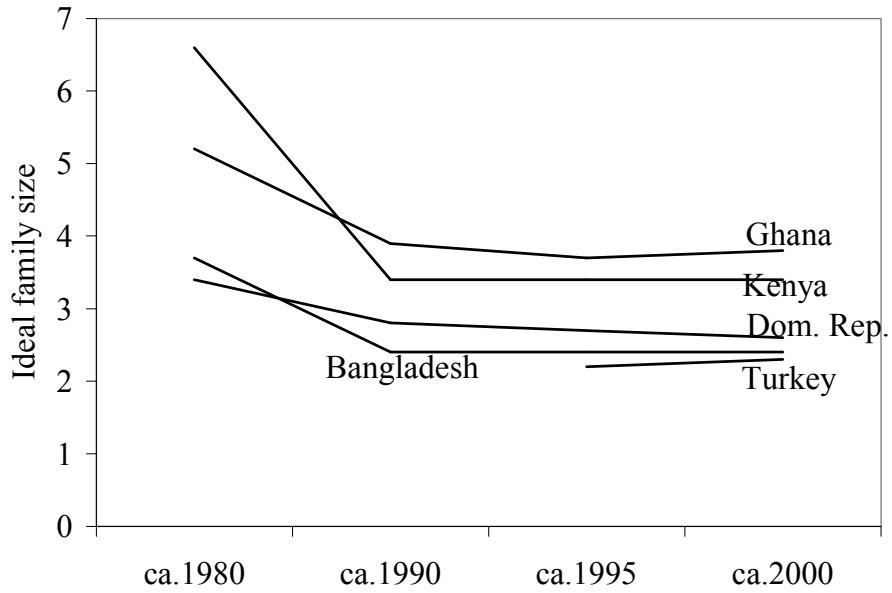


Figure 9: Trends in the total fertility rate (TFR), ideal family size (DFS), and wanted total fertility rate (WTFR) for five countries with stalling fertility.

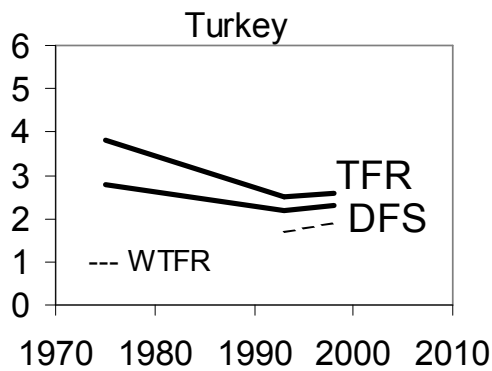
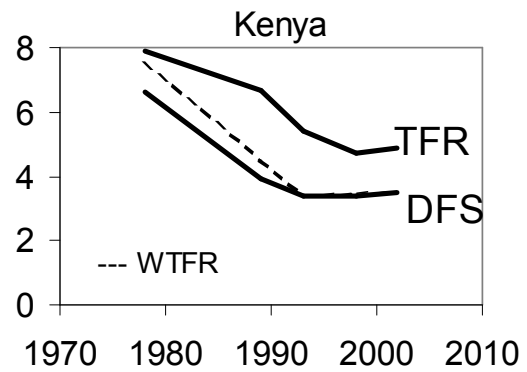
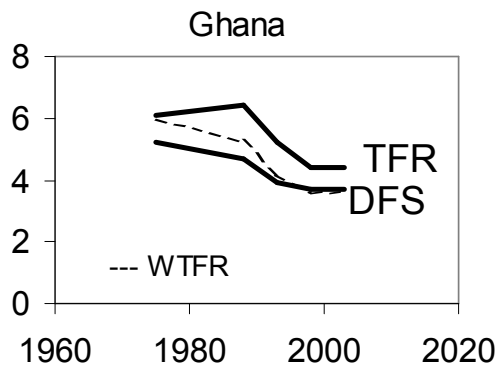
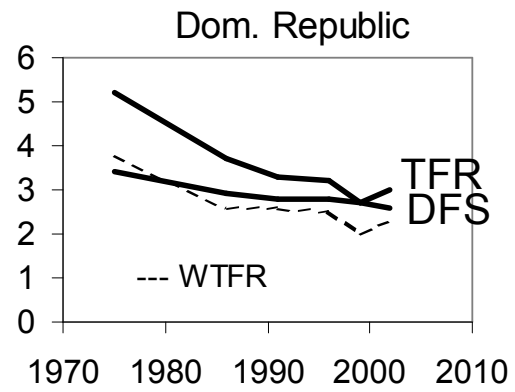
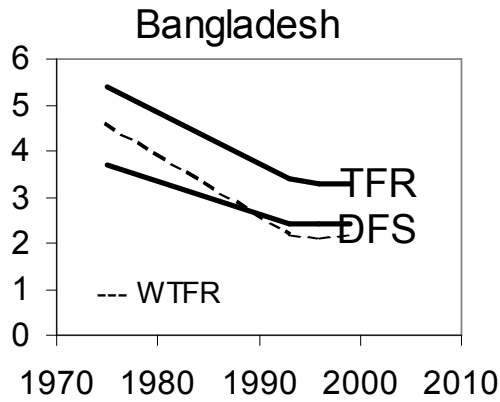


Figure 10: Wanted total fertility rate by average ideal family size, 24 countries (circles for stalling countries)

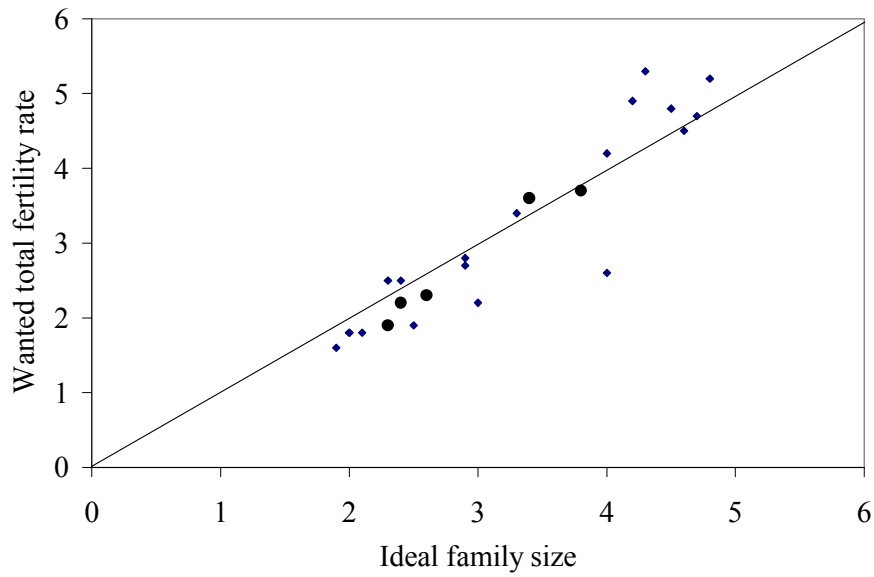


Figure 11: Unwanted total fertility rate by unmet need for contraception to limit family size, 24 countries

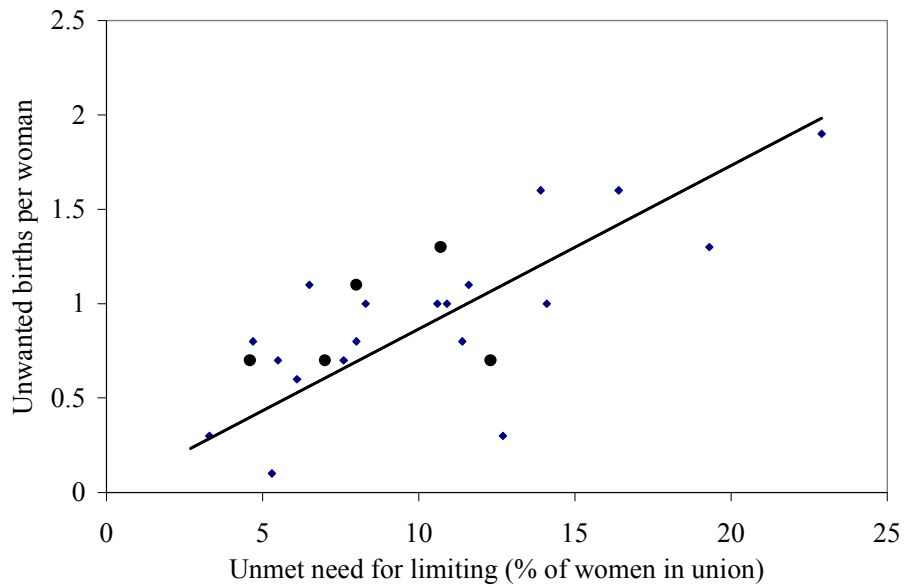


Figure 12: Trends in unwanted total fertility rate in stalling

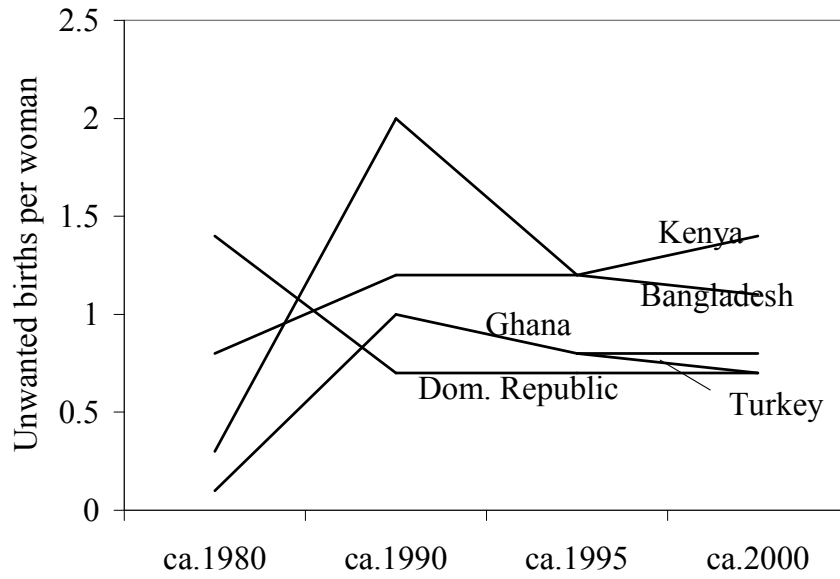


Figure 13a: Total fertility rate by real GDP per capita (\$) for 38 countries

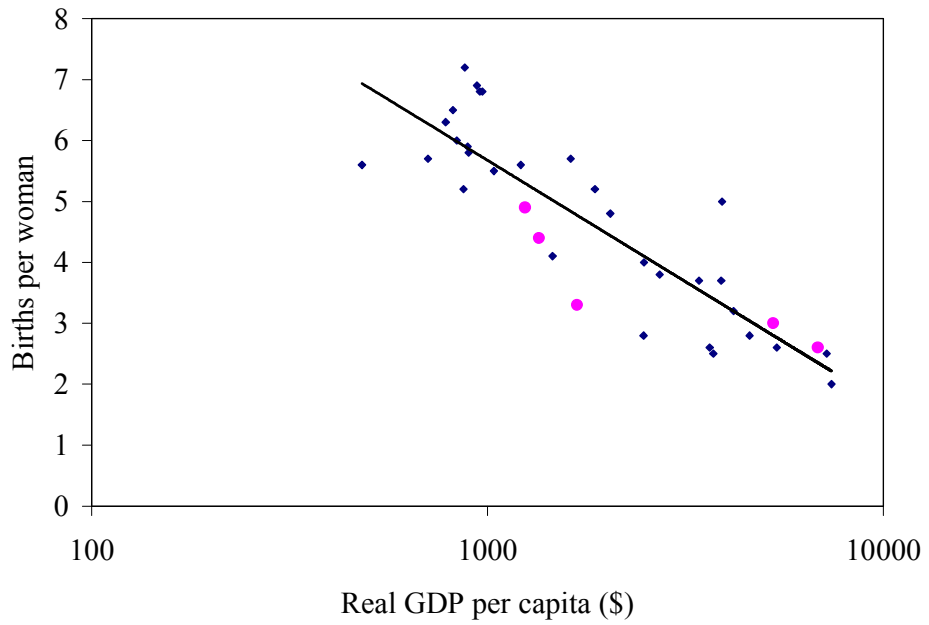


Figure 13 b: Total fertility rate by proportion surviving to age 5 for 38 countries

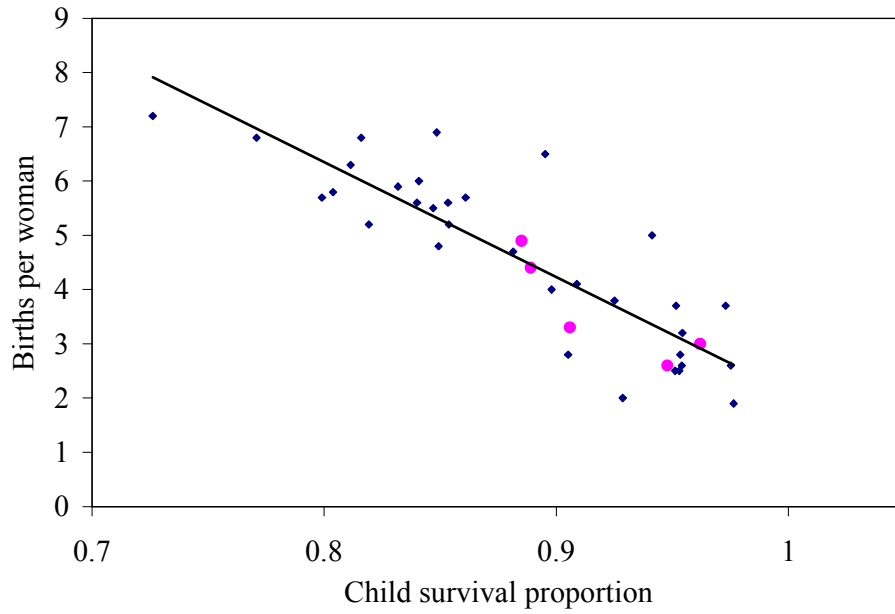


Figure 13c: Total fertility rate by proportion schooled among women aged 15-49 for 38 countries

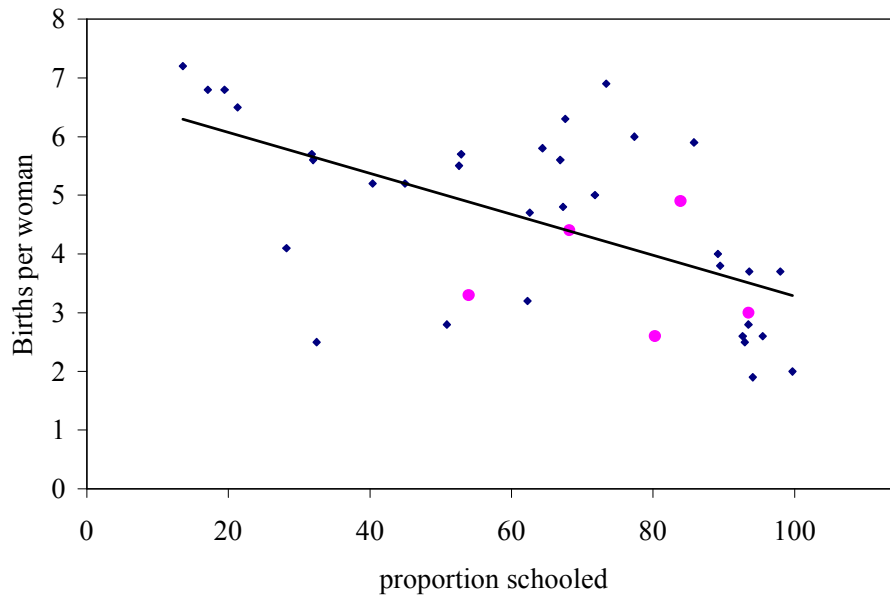


Figure 14a: Trend in real GDP per capita in five stalling countries

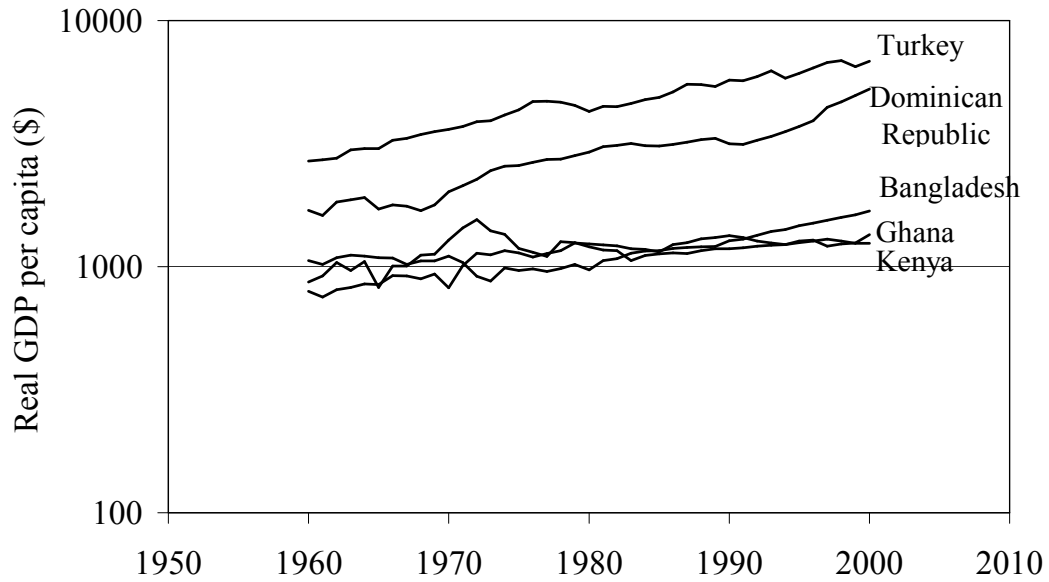


Figure 14b: Trends in child survival proportion for five stalling countries

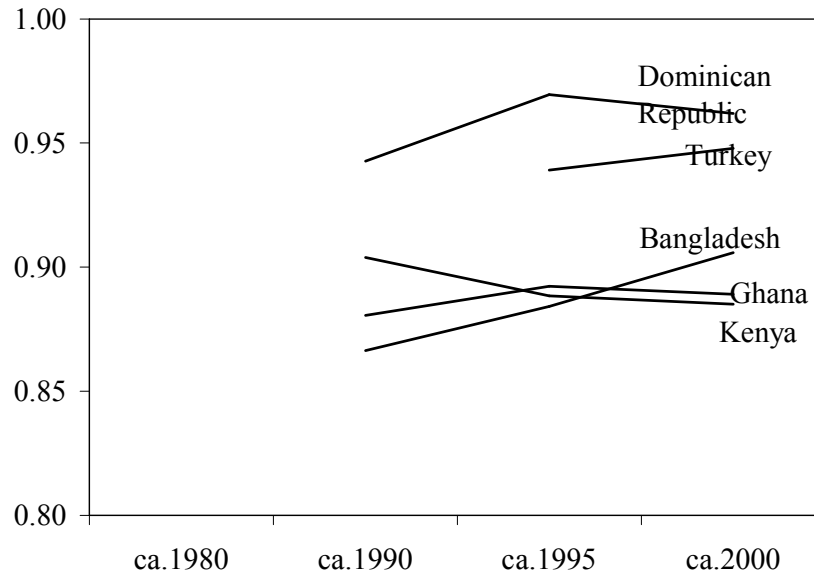




Figure 14c: Trends in proportion schooled among women aged 15-49 for five stalling countries

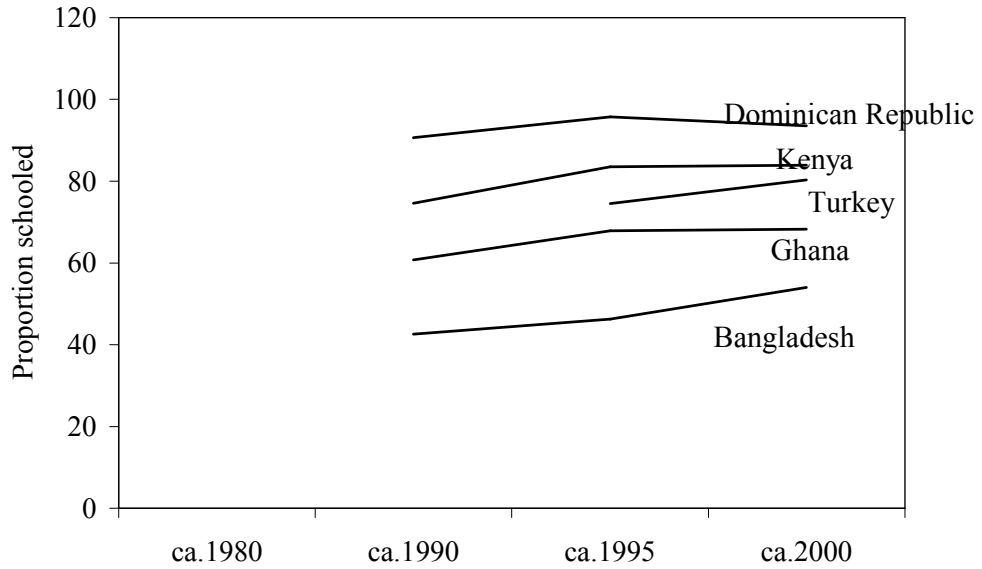


Figure 15: Trend in family planning program effort score in five stalling countries, selected years from 1982 to 1999

