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From Fertility Preferences to Reproductive Outcomes in the Developing World

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A revolution in reproductive behavior has swept through the developing world over the past half century. In the 1950s, fertility in Africa, Asia, and Latin America exceeded five births per woman and in some countries was as high as seven births per woman, and contraceptive use was limited to small groups of elites. Today, nearly all developing countries have entered the fertility transition (United Nations 2017). The transition started first in North Africa, Asia, and Latin America in the 1960s and proceeded rapidly by historical standards of the West; by 2000 these continents were approaching replacement fertility. In contrast, fertility decline in sub-Saharan Africa began later and has been slower, with fertility in 2010 to 2015 still above five births per woman (Bongaarts and Casterline 2013; United Nations 2017).

A vast literature on the causes of these fertility trends exists and a number of issues are still actively debated, but there is wide agreement on two general points. The first is that a decline in couples' desired family size is an essential precondition for the fertility transition to take place. Whether this decline in preferences is caused by social and economic development (e.g., increased schooling, urbanization, economic transformations, cultural modernization, and declining mortality) as argued by classical demographic theory (Davis 1945; Notestein 1945, 1953; Kirk 1996) or partly by the diffusion of new ideas about fertility limitation and the costs and benefits of children, or by still other factors remains a matter of debate (Watkins 1986, 1987; Cleland and Wilson 1987; Bongaarts and Watson 1996; Casterline 2001; National Research Council 2001; Bryant 2007; McNicoll 2009). The second point of general agreement is that a rise in contraceptive use by couples (including abstinence) is the main proximate determinant of fertility decline in most contemporary societies (Bongaarts and Potter 1983). Other proximate determinants such as delayed marriage and abortion were important in some settings but overall made small contributions to the fertility declines in these regions as compared to the impact of adoption of

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modern contraception. In all developing countries with fertility at or near the replacement level, a substantial majority of women in union practice contraception (United Nations 2015).

However, much of this foundational theory assumes, explicitly or implicitly, tight linkage between fertility desires and realized fertility. The possibility of substantial discrepancy between the two is commonly ignored in conventional demographic and economic theories of the fertility transition. A key exception is the work of Richard Easterlin who in the 1970s proposed a more encompassing framework for understanding fertility levels and trends (Easterlin 1975, 1978; Easterlin and Crimmins 1985). Easterlin's framework enlarged the prevailing social and economic theory by adding two critical elements. First, it acknowledged the role of biology in childbearing outcomes. Specifically, without efforts to control conception, women who are sexually active will bear large numbers of children, because a pregnancy takes only nine months and women have reproductive capacity for decades. Couples who wish to have a small family must successfully practice birth control for a large number of years to avoid exceeding their desired number of children. From an economic point of view, this fact makes the "acquisition" of children fundamentally different from the purchase of durable goods. Second, Easterlin recognized that the costs of birth control can be substantial. These costs are broadly defined to include economic, health, psychological, and social obstacles. As a result, significant numbers of unplanned pregnancies can occur among women who confront substantial obstacles to use.

While the existence of unplanned fertility is now widely recognized, its role in the fertility transition is sometimes asserted to be of little consequence. Most notably, Pritchett (1994: 623) examined variation in wanted and unwanted fertility in a large number of countries at different levels of fertility and concluded that "countries move from high fertility to low fertility not because unwanted fertility goes down but because desired fertility goes down." He further argued that the limited and supposedly nearly fixed incidence of unwanted fertility left little scope for family planning programs to accelerate a fertility decline. These conclusions were soon questioned on both conceptual and empirical grounds (Bongaarts 1997), and recent empirical analyses refute Pritchett's claim that reductions in unwanted fertility make a negligible contribution to fertility decline. Both Lam (2011) and Gunther and Harttgen (2016) conclude that decline in unwanted fertility accounts for roughly half of fertility decline in the period since the mid-1970s (Lam 2011; Gunther and Harttgen 2016). On the issue of the impact of family planning programs on fertility, a recent review of existing rigorous evaluations by Miller and Babiarz (2016) concludes that the impact can be substantial. The upshot from this recent empirical research is that reductions in desired fertility and unwanted fertility have both made large

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and approximately equal contributions to contemporary fertility declines, a significant corrective to Pritchett's argument.

This article does not revisit the question of the impact of family planning programs, but instead examines in detail the incomplete implementation of preferences that results in a high incidence of unplanned pregnancies in societies at all stages of fertility transition. Unplanned pregnancies can disrupt desired life courses and can have adverse health and economic impacts on women, children, and their families (Gipson et al. 2008). A substantial proportion of such pregnancies end in abortion. The fact that there are an estimated 50 million abortions each year in the developing world is clear evidence of a lack of full control of the reproductive process by couples who wish to limit or space births through contraception (Sedgh et al. 2016). In addition, women of reproductive age, when questioned directly in surveys on a birth-by-birth basis, report substantial numbers of mistimed and unwanted births (Bankole and Westoff 1995; Sedgh et al. 2014). Indirect estimates yield if anything even higher rates of unwanted fertility (Casterline and El-Zeini 2007; Westoff 2010).

The main objective of this analysis is to examine the incidence of unintended reproductive outcomes across a set of societies that are presently at different stages of fertility transition. Decline in the desired number of children is assumed a principal driver of reproductive change, and therefore estimates of unplanned pregnancy are stratified by the level of desired fertility. The resulting portrait of the fit between desired and realized fertility addresses two questions: First, what is the relative incidence of the three outcomes of an unplanned pregnancy, namely induced abortion, mistimed birth, and unwanted birth? By including mistimed as well as unwanted births, the analysis acknowledges the importance of desires to space/postpone births; some scholars argue that the growth of such desires has made a substantial contribution to contemporary fertility declines, in particular early-stage declines in sub-Saharan Africa (Moultrie et al. 2012). Second, how does the incidence of these three outcomes vary according to the level of desired fertility? The analysis reveals that the incidence of unplanned pregnancy is high in societies at each stage of fertility transition. This in turn underscores the challenge of avoiding unplanned pregnancies over the full course of the reproductive career, as discussed in the conclusion.

The Methods section summarizes the main variables used to analyze the incidence of different reproductive outcomes. The Results section presents the empirical evidence, using country data from Demographic and Health Surveys (DHS surveys) conducted after 2000 in Africa, Asia, and Latin America, as well as country and regional data on abortion from the Guttmacher Institute (Sedgh et al. 2016).

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Methods

A number of indicators are available to measure demand for children. Perhaps best known is the desired family size (DFS), also called ideal family size. In the Demographic and Health Surveys (DHS) the item is: "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?" (Rutstein and Rojas 2006). A drawback of the conventional DFS estimate is that the stated ideal number of children can be subject to "rationalization bias" when a woman gives an ideal family size that is inflated because she is reluctant to provide a number smaller than her current number of living children (Lightbourne 1985; Casterline and El-Zeini 2007). Rationalization is more likely among older women who have been married many years and have large numbers of children. To minimize this source of bias, we present DFS country estimates for women who are in their first ten years of marriage (broadly defined to include consensual unions).[1] Another problem is that some women provide non-numeric responses (e.g., "up to God") to the ideal number of children item, however the prevalence of these responses has substantially declined over time (Frye and Bachan 2017) and is rare in the recent DHS surveys analyzed here.

The three main types of reproductive outcomes examined below are pregnancy, induced abortion, and birth.[2] Birth and pregnancy can be further divided into wanted and on time, mistimed (sooner than desired), and unwanted. Pregnancies that are either mistimed or unwanted are together labeled "unplanned" or "unintended." Unplanned pregnancies occur when contraception is not practiced (because of obstacles to use or because sexual activity was not anticipated) or when contraception fails. For example, a woman may want two children, but a pregnancy that occurs as a result of a contraceptive failure before she has two children is considered mistimed (but wanted). All pregnancies after reaching the desired family size are considered unwanted. A proportion of unplanned pregnancies end in abortion.

To quantify the population-level incidence of the different outcomes, we calculate various "total" rates. These rates measure the average number of pregnancy outcomes women would experience over a lifetime if they experienced the current age-specific rates of their population. The most familiar and widely used of such rates is the total fertility rate (TFR) which measures the lifetime number of births at current age-specific rates. Other total event rates estimated here are the total pregnancy rate (TPR) and the total abortion rate (TAR). The total pregnancy rate equals the sum of the total abortion rate and the total fertility rate: TPR = TAR+TFR.

The TFR has two main subcomponents: unwanted births (TFRunw) and wanted births (TFRw), so that TFR = TFRunw+TFRw. The wanted TFR can be divided further into mistimed (TFRmis) and planned (TFRpl)

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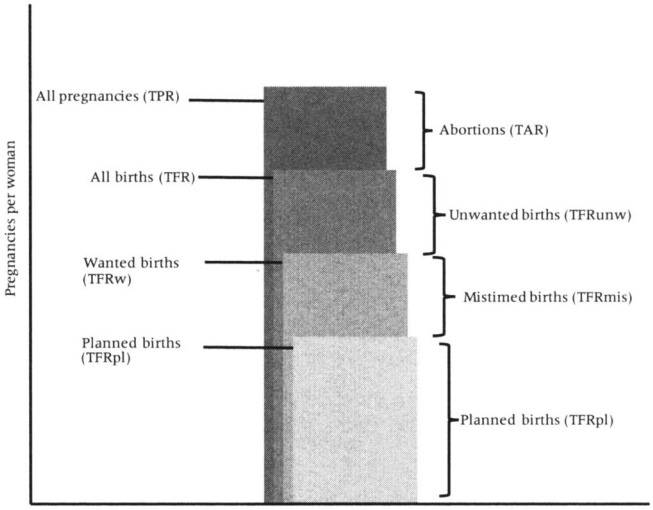
FIGURE 1 Total event rates for pregnancy outcomes



births with TFRw = TFRmis+TFRpl. Figure 1 summarizes the relationships among these different total rates. See the Appendix for further details on the method used for calculating each of these rates. The Appendix also includes the survey estimates used in this study.

With the exception of estimates of induced abortion, the data used in this study are obtained from DHS surveys that have employed a standardized questionnaire to collect comparable data from married women aged 15–49 in a large number of developing countries. The figures presented below are based on surveys conducted after 2000 in 53 countries that had a population size above 2 million in 2015 and have not been part of the Soviet Union (31 in sub-Saharan Africa, 15 in Asia and North Africa, and 7 in Latin America).

Valid estimates of rates of induced abortion are lacking for most developing countries. However, the Guttmacher Institute provides estimates for world regions and sub-regions (Sedgh et al. 2016). For example, in Africa separate estimates of abortion rates are provided for Eastern, Middle, Northern, Southern, and Western Africa. For present purposes, each of the 53 countries is assigned the abortion rate of the sub-region in which the country is located, except in the cases where country estimates are available (see Appendix for details). This is a rather crude approximation, but there is no alternative and the abortion results should therefore be used with caution.

Results

Figure 2 plots rates of the various outcomes observed at the time of the most recent survey as a function of desired family size for all countries included in this study. The DFS is used as a proxy for stage of fertility transition. The

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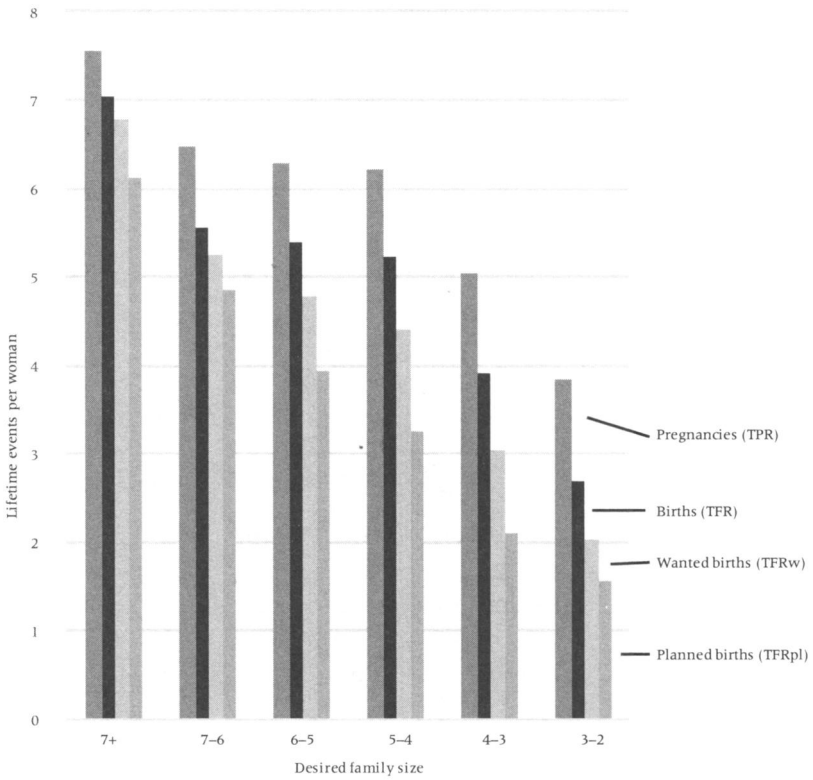
FIGURE 2 Total rates for pregnancies, births, wanted births, and planned births by desired family size



horizontal axis is reversed so that early transition countries with high desired family size are on the left and late transition countries with low desired family size are on the right, to correspond to a transition that moves from left to right with time.[3] The full set of estimates presented in the Appendix table is ordered from high to low desired family size (third column from left). An examination of the country ordering reveals a striking feature of these data: there is almost no overlap between sub-Saharan Africa and the other regions in the mean desired family size in these recent surveys. In sub-Saharan Africa, only one country (Lesotho) shows a desired family size less than 3.0, and outside of sub-Saharan Africa only three countries (Yemen, Pakistan, Jordan) show a desired family size greater than 3.0. The current bifurcation of the globe on this reproductive indicator is nearly perfect.

Four different sets of bars represent the averages of the corresponding country data points.

— The tallest bars (blue) in Figure 2 are total pregnancy rate (TPR), which equals the total fertility rate plus the total abortion rate. It declines from 7.6 pregnancies per woman for countries with DFS above 7 to 3.8 pregnancies per woman for countries with DFS between 2 and 3.

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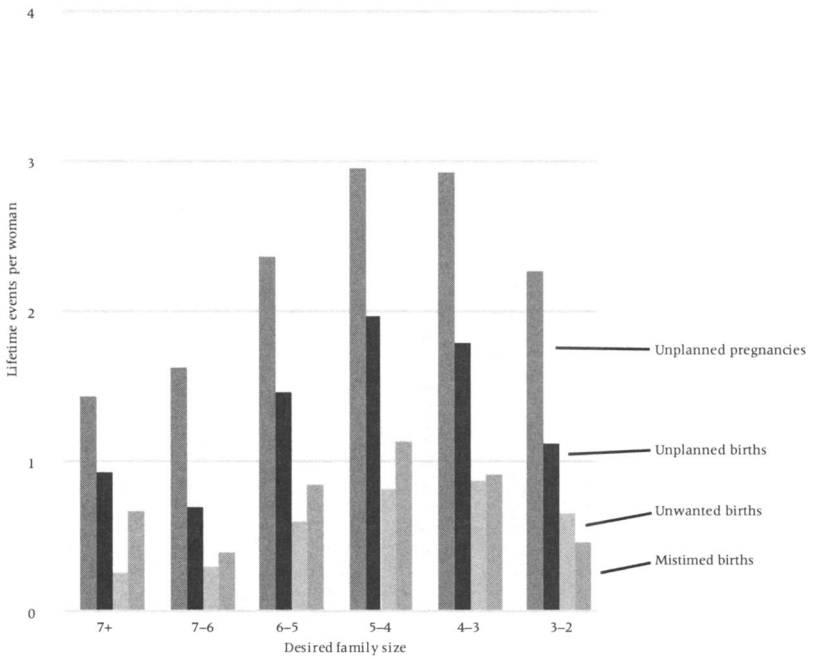
FIGURE 3 Total rates of unplanned pregnancies by desired family size



— The black bars present the average country values for TFR; it ranges from 7 to 2.7 births per woman between the highest and lowest DFS groups. The TFR includes planned, mistimed, and unwanted births.
— The third set of bars (grey) present the average estimates of the wanted total fertility (TFRw). At the highest DFS levels the TFRw is close to the TFR, but in countries at the end of the transition (DFS between 2 and 3) the average TFRw is 2.0 implying an average unwanted rate of about 0.7 births per woman (i.e., 2.7-2).
— The lowest set of bars (green) represents the planned total fertility rate (TFRpl), which reaches an average of 1.6 births per woman in the lowest DFS group.

The differences between the sizes of the bars in Figure 2 measures the incidence of various unplanned outcomes. The variation in these events with desired family size is clearer in Figure 3, which plots only the unplanned events. The tallest set of bars represents the total unplanned pregnancy rate. This total consists of three components: 1) abortions (TAR), 2) unwanted births (TFRunw), and 3) mistimed births (TFRmis). The bars for TFRunpl and TFRmis show a marked inverted-U-shaped pattern with the lowest values in countries with high or low desired family size. In countries with a DFS near 2, women average 2.3 unplanned pregnancies over their lifetimes, which equals the sum of 1.1 abortions, 0.6 unwanted births,

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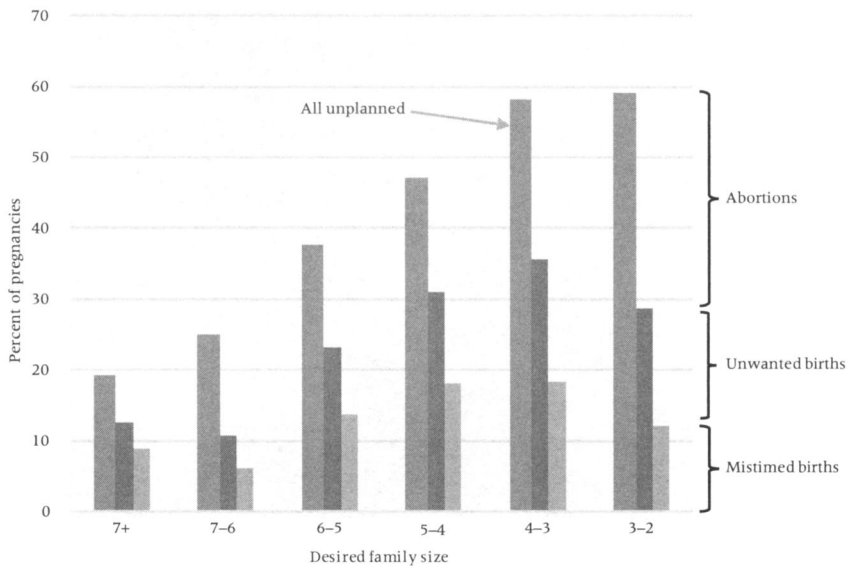
FIGURE 4 Percent of pregnancies unplanned



and 0.5 mistimed births. Mistimed births exceed unwanted fertility in most countries except in the latest transition stage.

The total abortion rate (the difference between the blue and black bars in Figure 3) in the earliest transition countries is about half the rate in the late transition countries. Abortion rates in the early transition countries are relatively low for several reasons, including 1) the demand for abortion is limited due to high DFS, 2) low availability of abortion methods and services, and 3) failure rates of contraception are low because prevalence is low. Later in the transition these factors all rise thus causing abortion rates to be higher.

Figure 4 provides another perspective by plotting various unplanned outcomes as a percentage of all pregnancies. The percentage of unplanned pregnancies is inversely related to DFS, and the differential by DFS group is large. Countries with high desired family size have relatively few unplanned pregnancies (around 20 percent) and the large majority of pregnancies are planned and consist of births. In contrast, in countries at the end of the transition with DFS between 2 and 3, on average 59 percent of pregnancies are unplanned (12 percent mistimed births, 16 percent unwanted births, and 30 percent abortions).

Discussion

The main findings from the preceding analysis is that unplanned pregnancy rates are substantial in all countries but are typically highest in mid-transition countries. Furthermore, the *fraction* of all pregnancies that is unplanned is highest in countries with the lowest desired family size.

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To explain the difficulty women face in controlling fertility it is useful to divide the fecund and sexually active reproductive years into three statuses.

1) *Bearing wanted children.* In pre- and early transitional countries (e.g., Chad and Niger) most of the reproductive years are used to bear wanted and planned children. There are few unplanned pregnancies because there is little time at risk of such pregnancies. In contrast, in countries at the end of the transition (e.g., Colombia), with a desired family size around two, only a small proportion of the reproductive years is needed to bear two wanted children. Women then face the challenging task of avoiding unplanned pregnancies during the other reproductive years. If women are sexually active both before and after the period of having wanted births, commonly they will face 20 or more years at risk of unplanned pregnancy. The rise in the number of years at risk of unplanned pregnancies over the course of the transition means that the period during which women must practice consistent and effective contraception lengthens considerably. In a hypothetical population with no practice of contraception or abortion and a desired family size of two, women can easily experience as many as 6 or 7 unplanned births in addition to the two wanted children. This theoretical outcome is avoided by the use of contraception and induced abortion.
2) *Low risk of unplanned pregnancy due to contraceptive use.* Most women who wish to avoid pregnancy practice contraception. The number of years of use of contraception per woman ranges from near zero in pretransitional societies to 20 years or more in contemporary societies with low fertility. In most societies, contraception is used to avoid unplanned pregnancies both before the desired family size is reached (e.g., before marriage or to space wanted births) and after achieving the desired family size. Unfortunately, contraceptive methods (except sterilization) have significant annual failure rates. The cumulative number of unplanned pregnancies over a lifetime due to contraceptive failure depends on the annual use failure rate of contraception and the number of years of contraception practice.

   To illustrate the magnitude of the risk of contraceptive failures we turn to a simple hypothetical illustration. Suppose a woman wants and has two births, say at ages 20 and 22 and did not have mistimed births before age 22. From age 22 onward this woman then faces roughly two decades of fecund years during which she does not want to get pregnant. To ensure no unplanned pregnancies occur, women must practice 100 percent effective contraceptive use during every menstrual cycle in which they are sexually active until menopause is reached—a daunting task.

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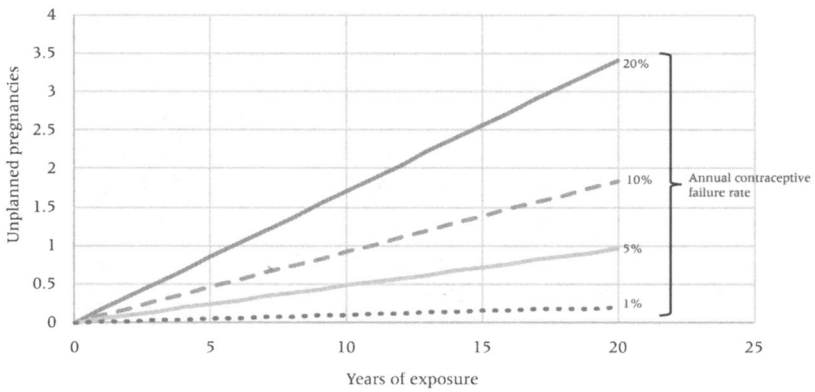
FIGURE 5 Cumulative unplanned pregnancies by years of exposure and contraceptive failure rate



In such a reproductive regime, the consequence of less than 100 percent consistent and effective contraception can be illustrated through simple calculations. Assume a woman uses contraception for 20 years (between ages of 22 and 42). During these 20 years she will experience 13 menstrual cycles per year, which amounts to 260 cycles at risk. A simple binomial model allows the calculation of the lifetime number of unwanted pregnancies that is expected to occur as a function of the contraceptive failure rate and the duration of exposure to risk. The model results are summarized in Figure 5. As expected, the average number of unwanted births rises with duration of exposure and with the annual failure rate. For example, with 20 years exposure a 20 percent failure rate would result in 3.4 unwanted pregnancies on average. This 20-year cumulative failure rate drops to 1.84 and 0.96 unwanted births with use failure rates of 10 and 5 percent, respectively. The average failure rate for a country depends on the mix of contraceptive methods. In the set of countries used in this study the country-specific average failure rate ranged from about 5 percent in countries with high levels of sterilization and low levels of traditional methods (e.g., Dominican Republic) to 37 percent in countries in which traditional methods dominate (e.g., Congo).[4] The average failure rate for all 53 countries is 12.8 percent.

The mix of methods and their overall effectiveness is affected by the timing of wanted childbearing. In most countries at more advanced stages of fertility transition, women postpone childbearing in order to complete their schooling and begin an employment career. The onset of sexual activity is typically not postponed, however, which means that increasing fractions of women in these countries find themselves beginning their sexually active years with an extended period during which they desire no children. Sterilization is not an option and many women find semi-permanent contraceptive methods less attractive because they

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wish to have children sometime later (possibly soon). As a result, average contraceptive effectiveness among these women tends to be lower than among women who have achieved their desired family size; this, in turn, raises abortion and unplanned birth rates.

3) *High risk of unplanned pregnancies while not using contraception.* Extensive analysis of survey data has documented that in all societies a substantial percentage of women who wish to avoid a pregnancy are not using contraception; this percentage typically falls between 10 and 30 percent. These women are referred to as having an unmet need for contraception. Research on the causes of this unmet need has identified a range of social, health, and economic factors that pose barriers to women and men who wish to practice contraception (Casterline et al. 1997; Casterline and Sinding 2000; Casterline et al. 2001; Bongaarts et al. 2012). The main obstacles identified by this research include a lack of knowledge of contraceptive methods or sources of supply, stock-outs of methods that require regular resupply (pills and injectables), costs of commodities and provider fees, health concerns and side effects, objections from husbands or other family members, and concerns about moral and social acceptability. Given these obstacles it is not surprising that some women do not use contraception despite a desire to avoid pregnancy: the perceived cost of practicing contraception exceeds the perceived benefits. These women are at high risk of an unplanned pregnancy.

The reproductive years women spend in these three statuses are a key factor in determining the lifetime number of unplanned pregnancies. As noted, in societies at the beginning of the fertility transition, most of women's reproductive years are devoted to wanted childbearing (Status 1). As desired family size declines, the number of years devoted to having wanted children declines, and correspondingly the number of years at risk of unplanned childbearing rises (Statuses 2 and 3). *Ceteris paribus* this produces an increase in unplanned pregnancy rates over the course of transition.

Offsetting this upward pressure on unplanned pregnancies is the rise in contraceptive use. At the extreme, there will be no unplanned pregnancies if all women who wish to avoid pregnancy spend no time in Status 3 and instead occupy Status 2 with 100 percent effective contraception. In reality few women occupy Status 2 or Status 3 to the maximum. The apportionment of the reproductive years between these two statuses depends on the obstacles to contraceptive use identified above and, additionally, on the opportunity costs of an unplanned birth (Bongaarts 1993). As countries proceed through the transition, the obstacles typically decline and the opportunity costs rise. This leads to relatively more time in Status 2 and less time in Status 3; that is, the proportion using contraception among those

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who want to avoid pregnancy increases. This rise in contraception use offsets the upward trend in unplanned pregnancies from expanding years of exposure, explaining the decline in unplanned pregnancies later in the transition evident in Figure 3. At the same time, in many societies abortion becomes a more viable option, reinforcing the decline in unplanned births that results from increased contraceptive use.

Conclusion

The fertility transition, in which the average number of births per woman declines by as much as five births, is commonly viewed as a transition from uncontrolled to controlled fertility. In one sense this is a fundamental truth about fertility transition and the larger demographic transition. While conscious effort to control fertility is by no means entirely absent in pretransition societies—postpartum behaviors, for example, can be employed to space births—the intensity of birth control (via contraception and/or induced abortion) throughout the fecund years in low-fertility societies is in sharp contrast to the limited amount of deliberate control of reproduction in high-fertility societies. Indeed, as illustrated above, it is difficult if not impossible to achieve low fertility at the aggregate level without a high prevalence of consistent and effective practice of birth-control behaviors. Avoidance of sexual activity is in theory another pathway to low fertility, but no major society has adopted this strategy.

While a high level of birth control is characteristic of low-fertility societies, it does not follow that unintended fertility must fall to minimal levels in such societies. When women desire just a few births during their childbearing years, the risk of unintended fertility is high, because of the large fraction of fecund exposure during which pregnancy is not wanted. Put otherwise, high rates of wanted fertility remove many reproductive years from the risk of unintended pregnancy. Somewhat paradoxically, as fertility transition progresses, the exercise of fertility control and the risk of unintended fertility both increase.

Even so, higher rates of unintended fertility do not automatically follow from higher risk of unintended fertility. Consistent and effective practice of birth control (induced abortion, contraception) can offset the higher risk. However, the empirical evidence presented here demonstrates that the offsetting is far from complete in contemporary developing societies. In countries with the lowest desired family size (less than three children desired), unplanned fertility is indeed less common than in countries with moderate desired family size. But the unplanned *pregnancy rate* exceeds two per woman, and the unplanned *birth rate* exceeds one per woman, i.e. substantial departure from entirely successful achievement of fertility desires. Moreover, the data reveal that the *proportion* of pregnancies unplanned is highest in societies with the lowest desired family size—more than one-half

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of pregnancies are unplanned, and almost one-third of pregnancies yield an unwanted or mistimed birth.

The conclusion is that even as fertility declines, the need to address obstacles to consistent and effective birth control continues to be high, indeed if anything this need increases. Certainly, the justification for investment in low-cost access to birth control extends into the later stages of fertility transition and, for that matter, persists in post-transition societies. As for non-access obstacles to birth control, creative interventions adapted to local social and cultural conditions should be devised.

Notes

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1 In the event, which sample is chosen for the DFS analysis has little bearing on the results. The average DFS for this subset of women is about 0.25 child less than the DFS for all women ages 15–49. The correlation of the two measures, at the survey level, is 0.99.

2 Miscarriage and stillbirth are excluded from this analysis. Around 20 percent of recognized pregnancies end in miscarriage or stillbirth (Bongaarts and Potter 1983). This outcome is largely biologically determined and varies little among populations. It therefore is of less interest to understanding fertility behavior and will not be included in the discussion below. The term "all pregnancies" will refer to live births and induced abortions and exclude spontaneous intrauterine mortality.

3 Nepal with a DFS of 1.98 is included in the group of countries with DFS 2-3.

4 The average failure rate is calculated from the distribution of contraceptive methods and method-specific levels of effectiveness estimated from Bongaarts (2015) and Finlay et al. (2016).

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Appendix: Estimating the Rates of Reproductive Outcomes

All the reproductive outcome measures are expressed as "total" rates. That is, they measure the average number of pregnancy outcomes women would have over a lifetime if they experienced the current age-specific event rates.

— Total pregnancy rate (TPR): sum of TFR and TAR as estimated below
— Total fertility rate (TFR): as estimated from DHS birth histories
— Total wanted fertility rate (TFRw): estimated as TFR - TFRunw
— Total unwanted fertility rate (TFRunw): as estimated by DHS (using method of Lightbourne 1985)
— Total mistimed fertility rate (TFRmis): estimation similar to TFR, except that age-specific fertility rates are multiplied by age-specific proportions of recent births that women report retrospectively as occurring sooner than desired
— Total planned fertility rate (TFRpl): estimated as TFR-TFRunw-TFRmis
— Total abortion rate (TAR): estimated from regional or country abortion rates per 1,000 women aged 15–45 (A) as TAR = 30A/1,000. The Guttmacher Institute published factsheets with abortion rates for the following countries included in this study: Bangladesh, Burkina Faso, Columbia, Ethiopia, India, Nepal, Nigeria, Pakistan, Rwanda, Senegal, Tanzania, and Uganda. These country-specific rates are accepted here. Other countries without such special studies are assigned the abortion rate of their subregion as estimated by Sedgh et al. (2016) with a few exceptions. The estimated abortion rate for Western Africa is 29 (per

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1,000 women) and is dominated by Nigeria which has a population that accounts for more than half of the region's population. Assigning the extremely poor countries Chad and Niger (for which no country-specific estimates are available) the subregional estimates would give these countries much higher rates than Senegal (with a rate of 17). This is implausible, and Chad and Niger are therefore assigned the abortion rate of Senegal rather than the subregional average. It should be noted that the subregional estimates of median abortion rates per 1,000 women are subject to statistical uncertainty. For example, as shown by Sedgh et al. (2016) the median (and 90 percent uncertainty interval) are 34 (31 to 47) for Africa, 36 (31 to 48) for Asia, and 44 (36 to 62) for Latin America and the Caribbean.

Estimates of TPR, TFR, TFRw, TFRpl, and TAR for each of the 53 countries are provided in the table below, with countries ordered from high to low desired family size.

Appendix Table Estimates of Reproductive Outcome Measures

Country	Year	Ideal family size DFS	Total pregnancy rate TPR	Total fertility rate TFR	Total wanted fertility rate TFRw	Total planned fertility rate TFRpl	Total abortion rate TAR
Niger	2012	8.62	8.15	7.64	7.40	6.78	0.51
Chad	2015	7.80	6.96	6.45	6.15	5.44	0.51
Nigeria	2013	6.22	6.48	5.55	5.25	4.85	0.93
Congo	2013	5.96	7.62	6.57	5.76	4.15	1.05
Mauritania	2000	5.90	5.36	4.49	4.11	3.11	0.87
Guinea	2012	5.58	6.03	5.10	4.59	3.83	0.93
Mali	2012	5.55	7.03	6.10	5.27	4.59	0.93
Senegal	2015	5.30	5.37	4.86	4.34	3.46	0.51
Cameroon	2011	5.28	6.14	5.09	4.53	3.62	1.05
Afghanistan	2015	5.18	6.40	5.29	4.39	4.05	1.11
Côte d'Ivoire	2012	5.12	5.89	4.96	4.52	3.48	0.93
Burkina Faso	2010	5.07	6.74	5.99	5.47	5.04	0.75
Angola	2015	4.72	7.24	6.22	5.25	3.53	1.02
Sierra Leone	2013	4.67	5.90	4.91	4.46	3.95	0.99
Congo Brazzaville	2011	4.62	6.16	5.11	4.77	3.48	1.05
Tanzania	2015	4.56	6.28	5.20	4.49	3.01	1.08
Liberia	2013	4.54	5.66	4.73	4.21	3.00	0.93
Uganda	2011	4.47	7.37	6.20	4.70	2.71	1.17
Mozambique	2011	4.47	6.94	5.92	5.20	4.55	1.02
Benin	2012	4.40	5.83	4.90	4.02	3.38	0.93
Madagascar	2008	4.34	5.81	4.82	4.20	3.84	0.99

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Country	Year	Ideal family size DFS	Total pregnancy rate TPR	Total fertility rate TFR	Total wanted fertility rate TFRw	Total planned fertility rate TFRpl	Total abortion rate TAR
Zambia	2013	4.33	6.28	5.26	4.53	2.85	1.02
Burundi	2010	4.26	7.40	6.38	4.50	2.78	1.02
Ethiopia	2016	4.17	5.40	4.56	3.58	2.83	0.84
Ghana	2014	4.03	5.12	4.19	3.63	2.64	0.93
Togo	2014	4.00	5.71	4.78	4.10	3.10	0.93
Yemen	2013	3.95	5.48	4.43	3.11	2.18	1.05
Zimbabwe	2015	3.81	5.04	4.02	3.56	2.52	1.02
Pakistan	2012	3.67	5.33	3.83	3.02	2.68	1.50
Jordan	2012	3.61	4.56	3.51	2.55	1.98	1.05
Kenya	2014	3.40	5.05	3.97	3.00	1.99	1.08
Malawi	2015	3.34	5.45	4.43	3.43	2.11	1.02
Namibia	2013	3.31	4.70	3.65	2.91	1.51	1.05
Rwanda	2015	3.16	5.18	4.16	3.08	2.07	1.02
Guatemala	2015	3.04	4.54	3.13	2.59	1.91	1.41
Cambodia	2014	2.79	3.77	2.72	2.45	2.17	1.05
Egypt	2014	2.79	4.61	3.47	2.78	2.51	1.14
Morocco	2003	2.78	3.59	2.48	1.85	1.48	1.11
Philippines	2013	2.60	4.09	3.04	2.18	1.66	1.05
Honduras	2012	2.55	3.93	2.94	2.25	1.42	0.99
Dominican Rep	2013	2.54	3.88	2.47	1.98	1.12	1.41
Lesotho	2014	2.54	4.31	3.26	2.35	1.48	1.05
Myanmar	2016	2.47	3.33	2.28	1.97	1.88	1.05
Indonesia	2012	2.47	3.65	2.60	2.24	2.06	1.05
Nicaragua	2001	2.46	4.10	3.23	2.27	1.65	0.87
Turkey	2008	2.36	3.27	2.16	1.65	1.43	1.11
Peru	2012	2.25	3.97	2.56	1.79	1.01	1.41
Bolivia	2008	2.20	4.92	3.54	2.04	1.19	1.38
India	2006	2.19	4.09	2.68	1.90	1.64	1.41
Vietnam	2002	2.12	3.01	1.87	1.61	1.34	1.14
Bangladesh	2014	2.05	3.38	2.28	1.67	1.36	1.10
Colombia	2015	2.05	3.14	1.97	1.60	1.04	1.17
Nepal	2011	1.98	3.86	2.60	1.77	1.48	1.26

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