Africa's Unique Fertility Transition

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Over the past half century substantial changes in reproductive behavior have occurred throughout the developing world, with the total fertility rate declining by 56 percent—from 6.0 to 2.7 births per woman between 1960 and 2010 (United Nations 2015). Declines have been especially rapid in Asia and Latin America over this period, but in sub-Saharan Africa ("Africa") the fertility transition occurred later and is proceeding at a slower pace. As a result of high African fertility and declining mortality, the population of this region is now growing at a faster rate (2.5 percent per year) than other regions of the developing world. The UN projects the sub-Saharan population to grow from 0.8 billion in 2010 to 3.9 billion in 2100 (ibid.) Such an unprecedented expansion of human numbers will create a range of social, economic, and environmental challenges and make it more difficult for the continent to raise living standards. Not surprisingly, interest in and concerns about the adverse consequences of demographic trends in Africa have reached high levels among policymakers and researchers.

Although fertility transitions have now started in nearly all African countries, declines have often been modest. In addition, fertility in a number of African countries has stalled in mid-transition, a pattern that has rarely been observed elsewhere (Bongaarts 2006, 2008; Ezeh, Mberu, and Emina 2009; Machiyama 2010; Shapiro and Gebreselassie 2008; Shapiro et al. 2013; Westoff and Cross 2006). This raises the question of whether, how, and why Africa's fertility transitions are exceptional and what policies and programs can be implemented to accelerate fertility decline.

This article presents an assessment of trends in regional fertility and development. An examination of fertility transition patterns identifies key differences between regions of the developing world and provides insights into why Africa's transitions are slow compared to earlier transitions in Asia and Latin America. The analysis is carried out at a highly aggregate regional level. Country or sub-national patterns will only rarely be examined because they are described in later chapters.

Possible explanations for Africa's distinct transitions

The simplest explanation for the distinct fertility transitions in Africa is provided by conventional demographic transition theory, which was formulated to explain the fertility decline that occurred in the West from the late nineteenth century through the 1930s (Davis 1945; Notestein 1945, 1953). According to this theory fertility transitions are driven by social and economic development. As societies modernize, economic and social changes such as industrialization, urbanization, new occupational structure, and increased education lead first to lower mortality and subsequently to a decline in fertility. A reduction in desired family size results from the rising costs of children (e.g., for education) and their declining economic value (e.g., for labor and old-age security), which are considered the central forces driving the transition. The desire for smaller families in turn leads to a rise in the demand for and adoption of birth control. If this theory applies to contemporary societies, one would expect that the later onset of the transitions in Africa is the result of lower levels of development in the region and that the slow pace of fertility decline is the result of slower improvements in development. As will be shown below, some of the fertility patterns observed in Africa are consistent with conventional transition theory and others are not. There are several possible explanations for these inconsistent findings.

First, the response of fertility to development could be fundamentally different in Africa than elsewhere in the developing world. This view has been expressed persuasively by Caldwell and his collaborators (1987, 1988, 1992), who argue that African societies have unique pronatalist features. (See Casterline's chapter in this volume for further discussion.) Empirical evidence in support of African exceptionalism will be provided below.

Second, countries' fertility levels are indeed inversely related to socioeconomic indicators (Bryant 2007; Hirschman 2001), but this relationship is typically a loose one. Conventional fertility theory could therefore be incomplete in that it ignores other important processes that affect the transition. This view became widely accepted when detailed analyses of historical and contemporary data found patterns that were inconsistent with conventional theories. The best known of these analyses is a massive study of province-level data from European countries for the period 1870–1960 (Coale and Watkins 1986; Knodel and van de Walle 1979; Watkins 1986, 1987). It yielded two surprising conclusions: 1) socioeconomic conditions were only weakly predictive of fertility declines, and transitions started at widely varying levels of development; 2) once a region in a country had begun a decline, neighboring regions sharing the same language or culture followed after short delays, even when they were less developed. Similarly, results from World Fertility Surveys in 41 developing countries in the 1970s and early 1980s failed to find the expected

dominant influence of economic characteristics on fertility (Cleland 1985; Cleland and Wilson 1987). Moreover, levels and trends in fertility in the developing world since the 1950s deviated stubstantially from expectations (Bongaarts and Watkins 1996). For example, Hong Kong and Singapore started their fertility transitions when they had much higher levels of income, literacy, and urbanization than Bangladesh, where fertility decline began when the country was still largely rural and agricultural. Fertility declined sharply in a few countries with unfavorable development conditions (e.g., in Bangladesh and Indonesia). These were traditional, poor, rural, and agricultural societies, yet fertility had declined to low levels by the 1990s.

These unexpected findings required a revision of thinking about the fertility transition and led to the introduction of theories of the diffusion of innovations. Diffusion refers to the process by which new ideas, behaviors, and attitudes spread within a population through a variety of mechanisms (e.g., social networks, opinion leaders, and media). This spread is most rapid within linguistically and culturally homogeneous populations and is often largely independent of social and economic changes. In particular, the diffusion of information about methods of birth control is now considered an important mechanism of fertility change. In addition, new ideas about the costs and benefits of children that may lead to a smaller desired family size are also subject to diffusion processes (e.g., Cleland 2001; Cleland and Wilson 1987; Casterline 2001a, 2001b; Hornik and McAnany 2001; Knodel and van de Walle 1979; Kohler 2001; Montgomery and Casterline 1993, 1996; National Research Council 2001; Retherford and Palmore 1983; Rogers 1973, 1983; Watkins 1987). Since Africa is the latest world region to enter the fertility transition, one might expect the diffusion of ideas about birth control from non-African countries to Africa to cause the African onset of the transition to be earlier in time and at lower levels of development than would have been the case without diffusion. This pattern is indeed observed as will be shown below.

Third, as noted by Caldwell, Orubuloye, and Caldwell (1992), the adoption of voluntary family planning programs could be slower and less pervasive in Africa than in other regions of the developing world. Evidence of high levels of unintended pregnancies persuaded many governments and international organizations to implement such programs from the 1960s onward in Asia and Latin America, and these efforts accelerated fertility declines (Bongaarts et al. 2012; Cleland et al. 2006; Freedman and Berelson 1976). In a majority of African countries, however, including Nigeria, Congo (DR), and most of the Sahel, family planning is still given low priority and government leaders are reluctant to discuss contraception and the benefits of smaller families (May 2012).

The empirical analysis in the following sections documents unique features of African transitions and sheds light on possible explanations for these findings.

Regional fertility and development levels: Is Africa different?

As a first step in examining the roles of various determinants of fertility, I provide an overview of long-range trends in regional averages of several key variables. This allows a basic comparison of average sub-Saharan African patterns with those of other developing regions over time. I examine annual trends in five country-level indicators—one outcome variable (fertility as measured by the total fertility rate; United Nations 2015) and four socioeconomic determinants: log of GDP per capita (at PPP) from the Penn World Table (Feenstra, Inklaar, and Timmer 2013); education level, measured as the percent of women aged 15–35 with at least primary education (Wittgenstein Centre 2014); life expectancy at birth (United Nations 2015); and percent urban (United Nations 2014a).

The set of countries included in the analysis below was obtained after applying the following exclusion criteria to all developing countries (see Casterline 2001b for a similar approach): 1) countries with a population size of less than 1 million in 1970, 2) countries that started the fertility transition before 1950, as indicated by fertility levels below 5 births per woman after 1950, 3) former Soviet states, and 4) rich oil exporters. After these exclusions, 88 countries were available, of which 36 are in sub-Saharan Africa and 52 in other regions. Estimates of the TFR, life expectancy, and percent urban are available for all 88 countries from 1960 to 2010, but data on GDP per capita and education are missing for many countries especially before 1970. The analysis will therefore focus on the period from 1970 to 2010.

In the figures and tables below, results are presented as unweighted averages of country estimates, separately for sub-Saharan Africa and other developing regions of Asia/North Africa and Latin America.

Total fertility rate. Figure 1 plots the average TFR for Africa (not including N. Africa), Asia/North Africa, and Latin America from 1960 to 2010. Over this half century the average for Africa always exceeded the average for the other two regions, with the difference rising over time and reaching 2.5 births per woman in 2010. Asia/North Africa and Latin America show a very similar pattern of decline and in the remaining tables and figures these two regions are combined into one called "other LDCs" or "non-African."

Transition onset. A key indicator used in the analysis below is the year of onset of the fertility transition, measured here as the time when the TFR has declined 10 percent below its pre-transitional maximum (Coale and Treadway 1986).[1] By this measure all but one of the countries included in the analysis have experienced an onset before 2014.[2] The cumulative distribution of the year of onset is plotted in Figure 2. The years of country-level onsets in Africa range from 1980 in Madagascar to 2012 in Mali (with

FIGURE 1 Total fertility rate in Africa and other developing regions, 1960–2010

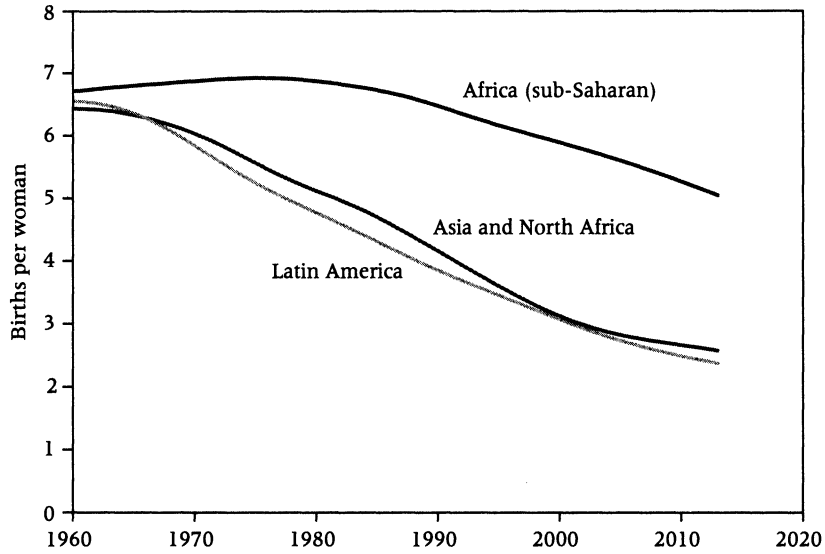
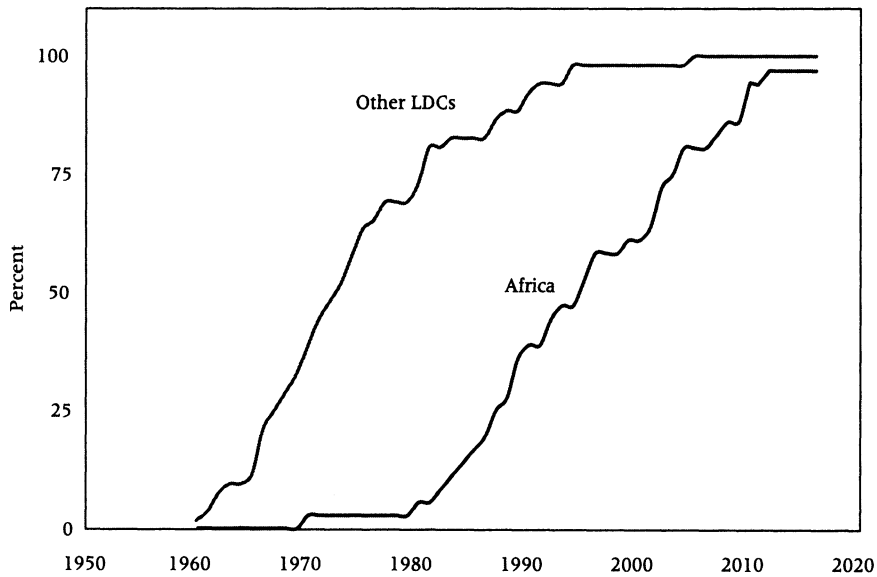
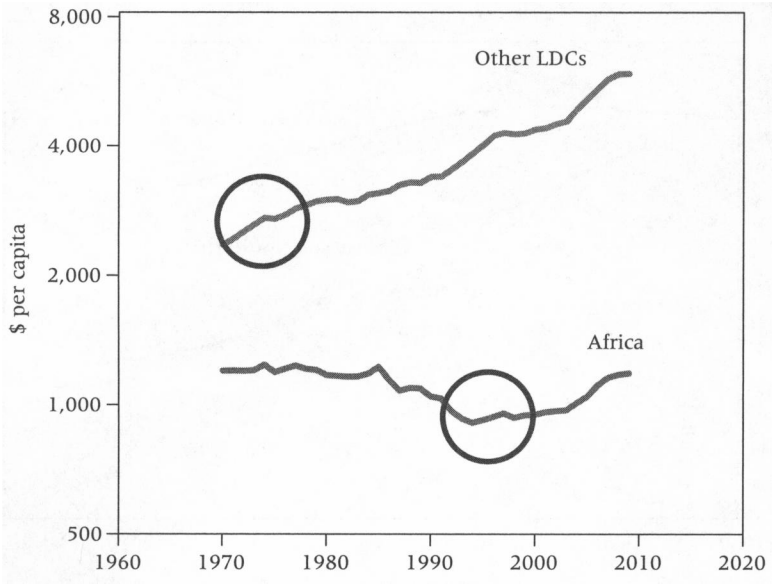


FIGURE 2 Cumulative percent distribution of year of country transition onset in Africa and other LDCs, 1960–2010



the exceptions of South Africa in 1970 and Niger), and the average year of all onsets was 1995. In the non-African countries, the country-level onset years ranged from 1960 in Singapore to 1994 in Yemen (also one exception, Afghanistan in 2005), and the average of all onsets occurred in 1975.[3] Clearly, there is substantial variation in the timing of country onsets within each region, with the more developed countries in a region tending to

FIGURE 3 GPD per capita (PPP) in Africa and other LDCs, 1970s–2010



enter the transition earliest (e.g., countries in Southern Africa entered earlier than countries in West Africa). On the other hand, there is a substantial 20-year difference between average onsets in Africa and other LDCs.

GDP per capita (PPP). By 1970 many non-African LDCs had already experienced substantial development. Their average GDP per capita at that time is estimated at $2,100 per capita, twice the African level. In subsequent decades economies in the non-African LDCs grew rapidly, and by 2010 their GDP per capita reached $6,000. In contrast, Africa experienced little change in standards of living over the past half century. In fact, the continent's GDP per capita slumped temporarily in the 1980s and 1990s and did not rise above the 1970 level until after 2000 (Figure 3). The circles in Figure 3 indicate the average year in which the onset of the fertility transition occurred.

Education level. This indicator has risen steadily since 1970 in nearly all developing countries, mostly as a result of massive investments in the education sector (Figure 4). However, the African average consistently lags the average in other LDCs. By 2010 the proportion with at least primary education reached 47 percent in sub-Saharan Africa and 84 percent in other LDCs.

Life expectancy. This indictor had already risen substantially before 1970 as a result of public health interventions in preceding decades. In non-African countries life expectancy (both sexes combined) continued to rise

FIGURE 4 Level of education in Africa and other LDCs, 1970s–2010

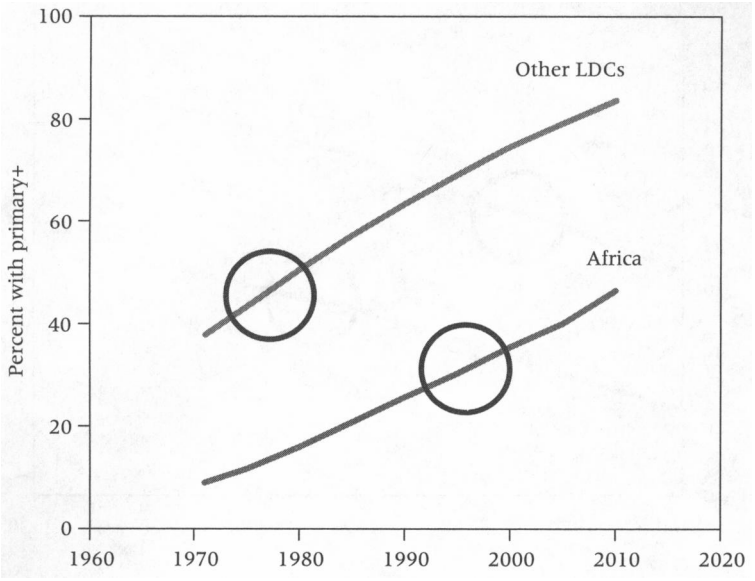
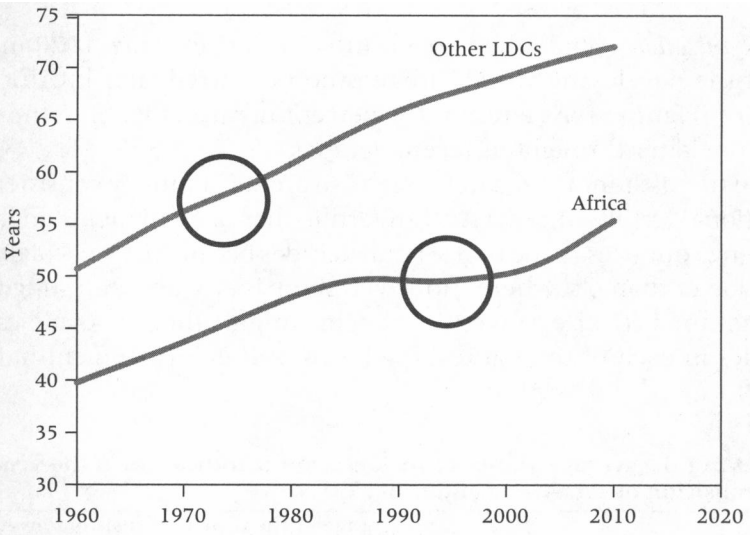
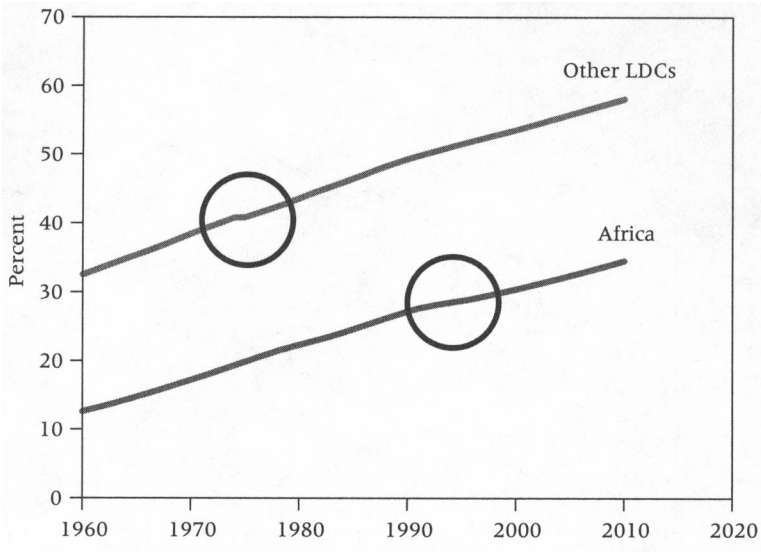


FIGURE 5 Life expectancy in Africa and other LDCs, 1960–2010



steadily from 51 years in 1960 to 72 years in 2010 (Figure 5). Sub-Saharan Africa also experienced further improvements during the 1970s and early 1980s, but progress then stalled due to the massive AIDS epidemic that spread throughout the continent. In the most severely affected countries in Southern and Eastern Africa, life expectancy actually declined during the 1990s. Africa's average life expectancy did not rise above 50 years until

FIGURE 6 Percent urban in Africa and other LDCs, 1960–2010



after 2000 when large investments in treatment and prevention programs reduced the AIDS death rate.

Urbanization. While the percent urban has risen since 1970 in all regions of the developing world, urbanization occurred later in Africa than elsewhere (Figure 6). As a result, the percent urban is higher in the former than in the latter throughout recent decades.

The trends summarized in Figures 1–6 are substantially consistent with conventional fertility theory: African fertility has been higher than in other developing countries in the past several decades because its level of development is lower than elsewhere. However, there is also an interesting finding that is not predicted by conventional demographic theory. As indicated by the circles in each of the figures, the levels of the development indicators

TABLE 1 Average values of socioeconomic indicators in the year of transition onset, Africa and other LDCs

	Average at the time of transition onset	
	Sub-Saharan Africa	**Other LDCs**
Year of transition onset[a]	1995	1975
GDP per capita (log)	6.9	7.7
Education (percent primary+)	29	42
Life expectancy (years)	51	59
Percent urban	29	40

[a]Year when TFR declined 10 percent below its pre-transitional maximum.

at the time of transition onset are lower in African than in non-African countries.

Table 1 presents further evidence on this issue. For each country the level of the four development indicators in the onset year is calculated. The table provides the average values of these indicators in the transition onset year. The results confirm that the average values of the socioeconomic indicators at the time of transition onset are lower in sub-Saharan Africa than in other LDCs. This unexpected finding is consistent with the analysis of Bongaarts and Watkins (1996), who found that the level of development at the onset of the transition has declined over time among countries. For example, the first transitions in the developing world took place in Hong Kong and Singapore around 1960 when these countries had substantially higher indicators of development than poorer Asian countries had at the time of their transition in the 1970s and 1980s or African countries in the 1990s. Bongaarts and Watkins attributed this effect to the role of diffusion of ideas and social influence at the individual, country, and global level. In particular, the diffusion of ideas about birth control from non-African countries to Africa appears to have resulted in an earlier African onset of the fertility transition than would have been the case without diffusion.

Pace of change in regional fertility and development

The preceding section examined levels of fertility and socioeconomic indicators over time without commenting on the rate of change in these variables. Because Africa's fertility seems to be declining at a relatively slow pace, I examine this issue further. I calculate the pace of change in each of the indicators as the absolute annual change, that is, the difference in estimates between one year and the previous year. For the socioeconomic indicators this usually yields a positive pace because these indicators tend to rise over time. However, the TFR tends to decline over time and the annual change is therefore usually negative. To simplify comparisons among indicators, the pace for the TFR is measured as the absolute annual decline, which is usually positive.

The resulting pace estimates are plotted in Figures 7–11, which correspond to the absolute levels given in Figures 1, 3, 4, 5, and 6. Each of these figures also includes two circles: the first points to the period in the mid-1970s around the average time of transition onset in non-African countries, the second to the mid-1990s around the transition onset in sub-Saharan Africa.

Total fertility rate. As expected from the early onset of the transition in non-African countries, the pace of change in the TFR rose sharply in the 1960s and reached a peak rate of decline of 0.11 births per

FIGURE 7 Annual pace of change in total fertility rate in Africa and other LDCs, 1960–2010

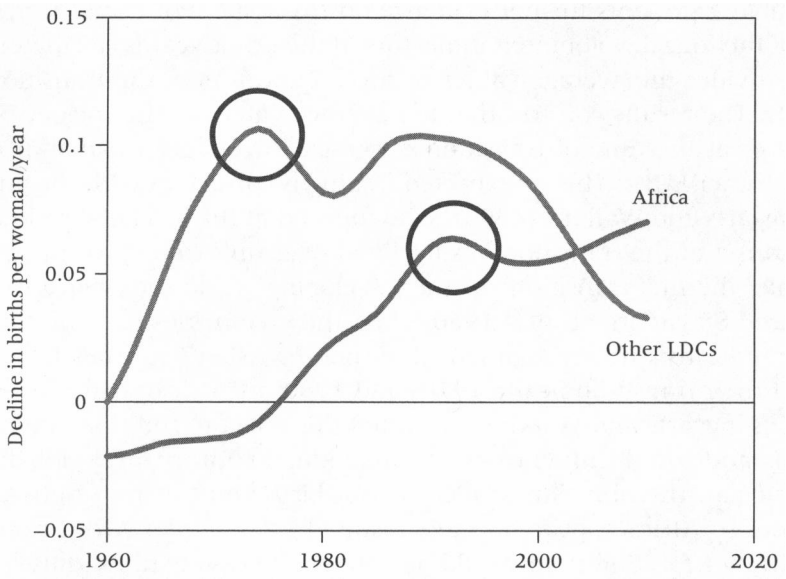
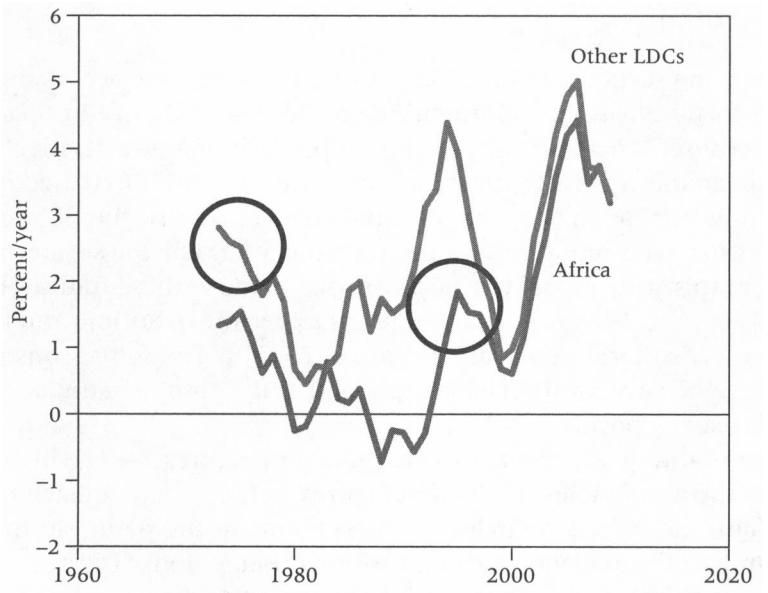


FIGURE 8 Annual rate of change in GDP per capita in Africa and other LDCs, 1970–2010



woman per year in the mid-1970s (Figure 7). The pace remained near 0.1 into the 1990s, before declining sharply in the 2000s. In the future this pace should approach zero as these countries reach the end of their transitions near or below 2 births per woman. The African

FIGURE 9 Annual pace of change in level of education in Africa and other LDCs, 1960–2010

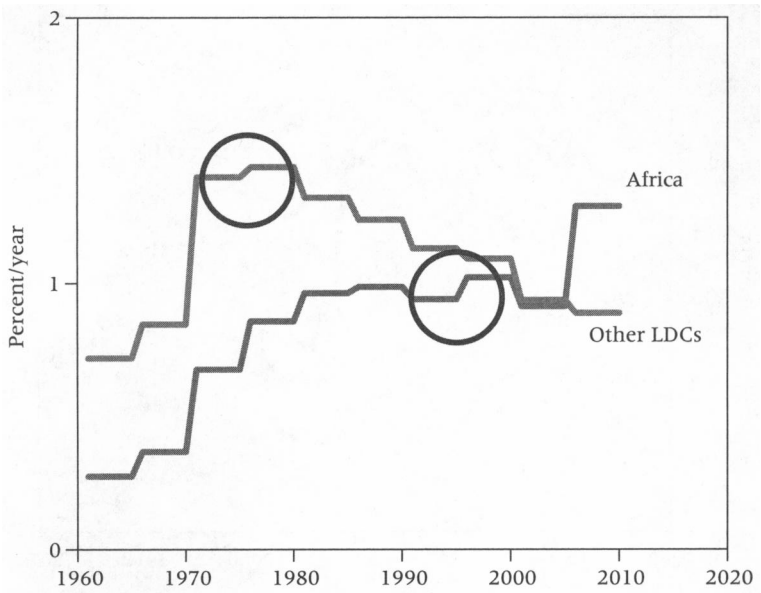
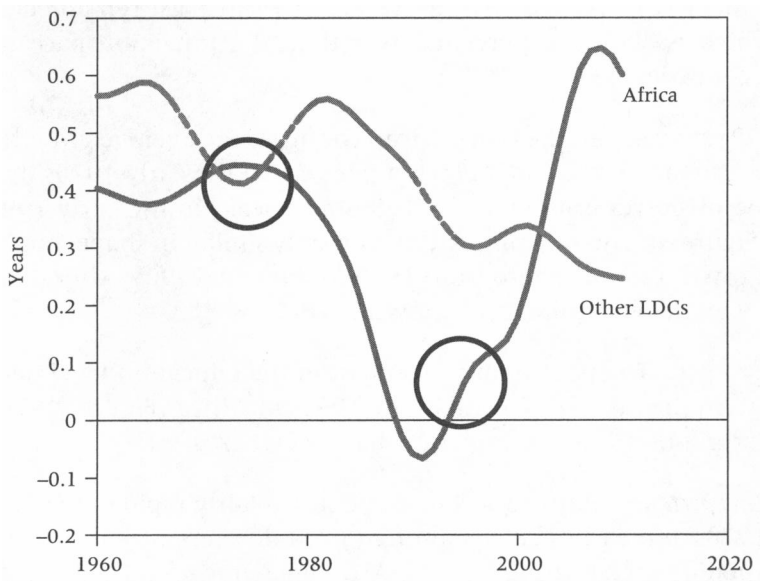
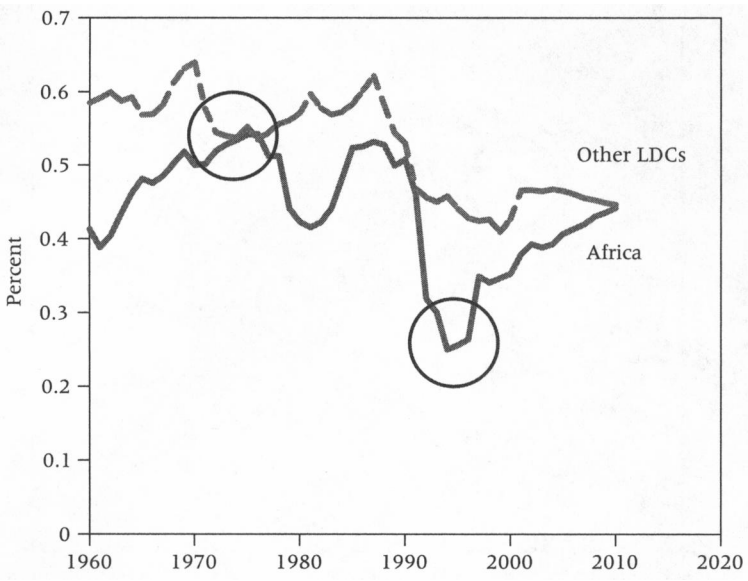


FIGURE 10 Annual pace of change in life expectancy in Africa and other LDCs, 1960–2010



pattern is quite different. In the 1960s and part of the 1970s the pace was negative, reflecting a rising TFR. During the 1980s the pace rose as countries began entering transitions. A peak was reached in the mid-1990s (second circle), but it occurred at a lower level than in non-African countries.

FIGURE 11 Annual pace of change in percent urban in Africa and other LDCs, 1960–2010



During the 1990s and 2000s the average African pace remained around 0.06, which is about 40 percent lower than the transition pace in non-African countries.

GDP per capita. In the non-African countries the average growth rate of GDP per capita was around 3 percent per year in the early 1970s, followed by period of slower growth in the 1980s and peaks in the early 1990s and 2000s (Figure 8). The African pattern is broadly similar in shape, but is lower with a growth rate near zero from 1980 to the mid-1990s. After 2000 both regions experienced quite rapid growth.

Education. The pace of improvement in the education level peaked in the 1970s in the other LDCs and in the 1990s in Africa (Figure 9). The pace at transition onset is lower in Africa than elsewhere.

Life expectancy. Both regions experienced a fairly rapid pace of increase in the 1970s and early 1980s, although from different absolute levels. But trends then diverged strongly as the AIDS epidemic took hold and African life expectancy dropped for a short period (Figure 10). The recent sharp upswing in life expectancy in Africa is due to the rapid uptake of ART treatment, a decline in new HIV infections, and investments in public health programs, but this rebound still leaves a substantial life expectancy gap between African and non-African countries in 2010.

TABLE 2 Average pace of change in TFR and development indicators in the year of transition onset

	Average pace at the time of transition onset	
	Sub-Saharan Africa	**Other LDCs**
Year of transition onset	1995	1975
TFR decline	0.09	0.15
GDP per capita (log)	0.0	0.04
Education (percent with primary +)	1.1	2.0
Life expectancy (years)	0.17	0.54
Percent urban	0.32	0.56

Percent urban. Urbanization has proceeded at a rapid pace throughout the developing world since 1970. The pace declined slightly over time, with Africa's pace generally lower than in other LDCs (Figure 11).

Table 2 presents the average values of the pace of change in the TFR and in the socioeconomic indicators in the transition years of the countries. These findings lead to two conclusions: 1) the pace of fertility decline was slower at the time of transition onset in Africa than in the other LDCs; 2) the pace of change in the development indicators at the time of onset was slower in Africa than in the rest of the LDCs. These results are broadly consistent with classical transition theory, which assumes a relationship between development and fertility and hence a correlation between the rate of change in fertility and the rates of change in its determinants. Apparently, a key explanation for the relatively slow pace of fertility decline in sub-Saharan Africa during the 1990s lies generally in the continent's slower pace of development during this period.

The "Africa effect"

The preceding analysis of past regional trends found that the relationship between socioeconomic development and the onset and pace of the transition was different in Africa than in other LDCs. I now examine the impact of these past differences on fertility in 2010. A key objective is to determine whether there is an "Africa effect"— that is, whether countries in Africa have systematically higher fertility than countries in other regions after controlling for socioeconomic development.

Figures 12–15 plot country estimates of TFR by GDP per capita, education, life expectancy, and percent urban for all available countries in 2010. Each African country is represented with a solid square and each non-African country with an open circle. Regression lines are fitted separately to African and non-African data points in each figure. Several conclusions can be drawn:

FIGURE 12 Relationship between TFR and GDP per capita in Africa and other LDCs, 2010

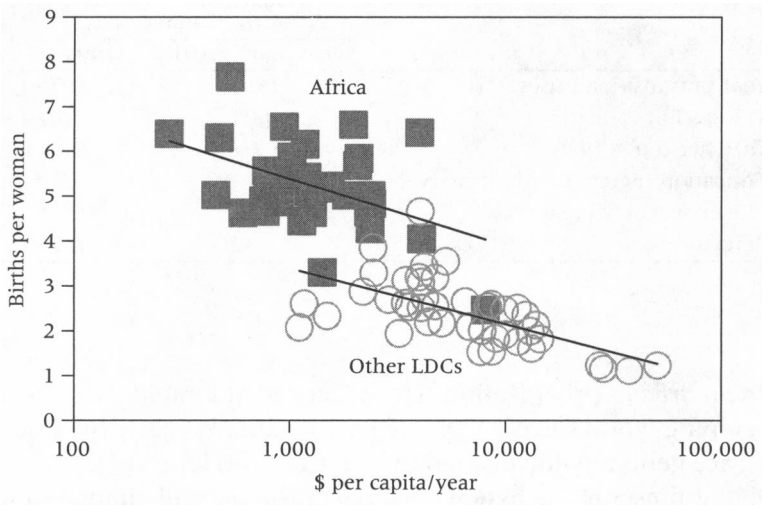
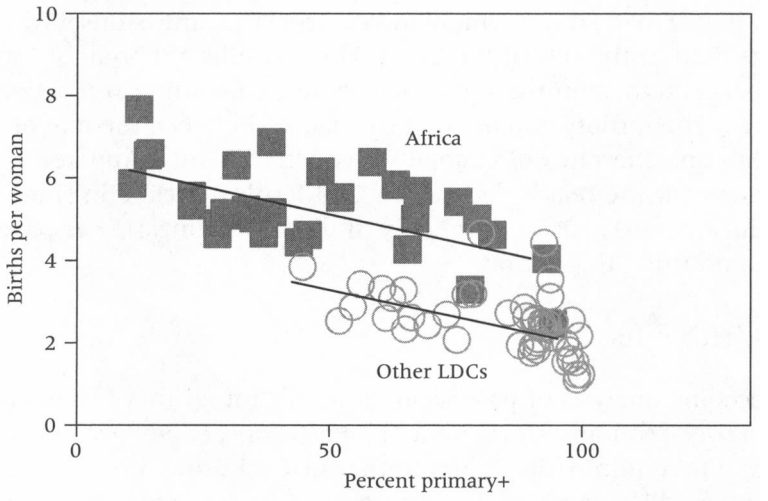


FIGURE 13 Relationship between TFR and level of education in Africa and other LDCs, 2010



— The correlations between fertility and the development indicators are in the expected negative direction. That is, fertility tends to be lower the higher the level of GDP per capita, education, life expectancy, and percent urban. These findings are consistent with the conventional view that development and lower mortality are key determinants of fertility decline.
— The correlations are far from perfect and there is considerable variation around the regression lines.

FIGURE 14 Relationship between TFR and life expectancy in Africa and other LDCs, 2010

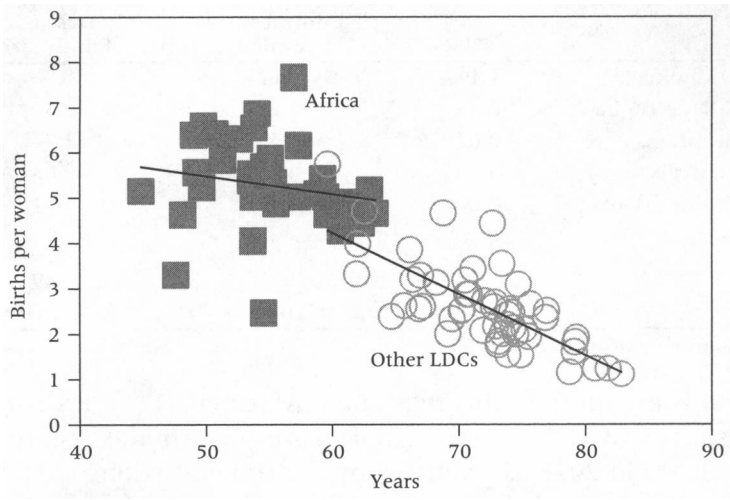
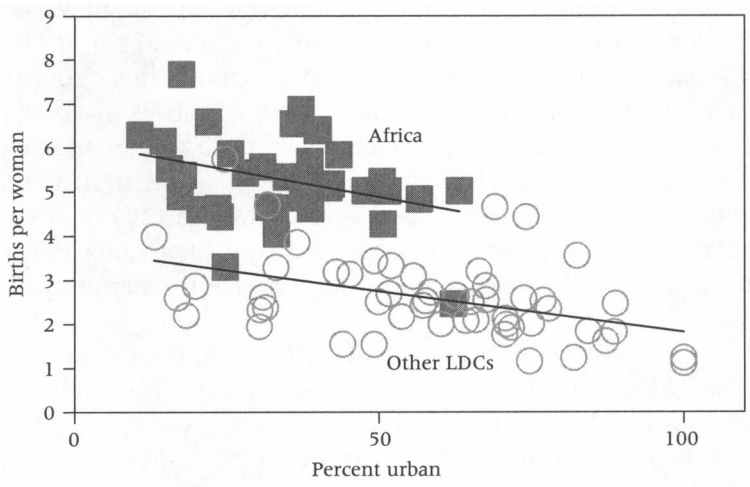


FIGURE 15 Relationship between TFR and percent urban in Africa and other LDCs, 2010



— The cluster of African countries lies largely above the cluster of non-African countries at a given level of development. (The exception is Figure 13, where life expectancy is distorted by the AIDS epidemic.) This finding indicates the existence of an Africa effect. To confirm this conclusion, I estimate a multiple regression with the TFR as the dependent variable and the four socioeconomic indicators and a dummy variable for Africa as the explanatory variables. The results are summarized in the first column of Table 3. The main finding is that the Africa effect is statistically significant at 1.1 births per woman.[4]

TABLE 3 Results of OLS regressions with TFR, contraceptive prevalence, and desired family size as dependent variables

	TFR	Contraceptive prevalence	Desired family size
Africa effect	1.1**	−11*	1.2*
GDP per capita	−0.33*	0.83	0.3
Education	−0.019***	0.51***	−2.7***
Life expectancy	−0.03	0.65	−0.04
Percent urban	0.00	−0.15	0.01
R^2	0.84	0.86	0.72
N	71	71	39
Year	2010	2010	Latest DHS

***p<0.01, **p<0.01, *p<0.05

What is the cause of this substantial Africa effect? To investigate this issue, I estimate two additional multiple regressions. In the first, contraceptive prevalence in 2010 as estimated by the United Nations (2014b) is the dependent variable and the explanatory variables are the same as in the TFR regression. The results are presented in the second column of Table 3. The Africa effect is substantial and statistically significant at −11 percent. In the final regression desired family size is the dependent variable and the same explanatory variables are again used. Estimates of desired family size are taken from the latest available DHS surveys in 42 countries, the only source of desired family size estimates for countries in 2010. The results in the last column of Table 3 again show a substantial and significant Africa effect on desired family size. This finding is consistent with results from Bongaarts (2011) and Bongaarts and Casterline (2013). It should be noted that desired family size can change fairly quickly as development proceeds and as family planning programs emphasize the benefits of smaller families.[5]

A key finding here is that the Africa effect is approximately the same size for the TFR (1.1) and desired family size (1.2). This implies that the Africa effect arises largely from the link between socioeconomic indicators and desired family size rather than between desired family size and fertility.

Conclusion

This study uncovered both expected and unexpected patterns in the fertility transitions of African populations. The results can be summarized concisely: the African transition is later, earlier, slower, and higher than the previous transitions in other regions of the developing world.

Later. The onset of the transition in Africa occurred on average in the mid-1990s, about two decades later than in non-African LDCs. This

delay is more or less in accord with conventional theory, which predicts that transitions take place later in countries where socioeconomic development is delayed.

Earlier. The level of development at the time of onset of the African fertility transitions was lower than at the onsets in other LDCs. In other words, the African transitions occurred earlier than they would have if Africa had followed the non-African relationship between fertility and development. This finding is expected from diffusion theory.

Slower. The pace of fertility decline at the time of the African transition onsets was slower than the comparable pace at the onsets of non-African transitions. Further, the pace of improvement in development indicators at the time of the African onsets was also slower. This finding is therefore largely in accord with conventional demographic theory.

Higher. At a given level of development Africa's fertility is higher, contraceptive use is lower, and desired family size is higher than in non-African LDCs. While the higher preferences can explain the lower prevalence of contraception and the higher fertility, the reasons for the relatively high preferences lie in traditional pronatalist social, economic, and cultural practices as discussed by Caldwell, Orubuloye, and Caldwell (1992).

The slow pace of the African transitions and the occasional stalling of fertility declines can therefore be attributed to several factors. First, the pace of African development has been slow and, other things being equal, this alone would lead to slower transitions. Second, the pronatalist nature of African societies implies a resistance to fertility decline that is absent or weaker in non-African countries. Finally, although I have not examined the role of family planning programs in Africa, the fact that these programs remain weak in many African countries undoubtedly contributes to slow transitions in much of the continent. By contrast, in the few countries where governments have made family planning programs a priority (e.g., Ethiopia, Malawi, and Rwanda), rapid uptake of contraception and fertility decline have followed.

Notes

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1 A discussion of alternative ways to measure the transition onset is provided in the chapter by Gerland, Biddlecom, and Kantorova in this volume.

2 The last transition onset occurred in Mali in 2012. It is included in analyses of the determinants of the onset by extrapolating trends up to 2010 for socioeconomic indicators that are not available after 2010. Niger is the only country without an onset before 2014.

3 The average year of onset is 1976 for Asia and North Africa and 1972 for Latin America.

4 The regression for the TFR was repeated for the years 2000 and 1990. The Africa effect was positive and statistically significant but smaller at 0.88 births per woman in 2000 and 0.60 births per woman in 1990.

5 Moreover, reported desired family size can in part be a rationalization of achieved fertility.

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