Women's Education, Infant and Child Mortality, and Fertility Decline in Sub-Saharan Africa: A Quantitative Assessment*

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Abstract

Sub-Saharan Africa (SSA) was the last major world region to experience the fertility decline that all industrialized countries have gone through and that much of the developing world has experienced in large part. It has uniquely high fertility: at present, the United Nations estimates the total fertility rate at 5.1 for SSA, compared to 2.2 for both Asia and Latin America and the Caribbean. The ongoing fertility transition in the region has been comparatively slow and subject to stalling. At the same time, women's educational attainment and infant and child mortality have been shown in the demography literature to be important determinants of fertility and fertility decline. Since the 1980s, fertility in sub-Saharan Africa has been falling in many countries while women's school enrollment and educational attainment have been increasing and infant and child mortality for the most part has been declining. Previous research using aggregated data has shown the importance of growth in women's schooling and reduction in infant and child mortality as major factors contributing to fertility decline in the region. This research uses individual-level micro data and a well-known decomposition technique for analyzing differences or changes to quantify the importance of increased women's education and declining infant and child mortality in contributing to the observed declines in fertility in numerous countries. More specifically, this paper examines the quantitative impact of these two factors in sub-Saharan Africa in contributing to the ongoing decline in fertility that has been taking place in the region. Data come from 31 countries, and are from the Demographic and Health Surveys (DHS). The methodology is to decompose observed changes in fertility to changes attributable to different factors, including the two key variables of interest – women's education and infant and child mortality – and two control variables, urbanization and age.

Key words: Women's Education, Infant and Child Mortality, Fertility Decline, Sub-Saharan Africa, Decomposition Analysis

1. Introduction

This paper seeks to quantify the roles of increasing women's educational attainment and declining infant and child mortality in contributing to fertility decline in sub-Saharan Africa. Sub-Saharan Africa (SSA) was the last major world region to experience the fertility decline that all industrialized countries have gone through and that much of the developing world has experienced in large part. It has uniquely high fertility: at present, the United Nations (2013) estimates the total fertility rate (estimated lifetime births per woman) at 5.1 for SSA, compared to 2.2 for both Asia and Latin America and the Caribbean. The ongoing fertility transition in the region has been comparatively slow and subject to stalling (Bongaarts, 2008; Shapiro and Gebreselassie, 2008; Shapiro et al., 2013).

Analyses of the pace of fertility transition in SSA using aggregated data indicate that increasing women's educational attainment is the most important factor contributing to the observed decline of fertility in the region. Declines in infant and child mortality – themselves in part a consequence of increasing women's education – also play an important role (Shapiro, 2012). Women's education is associated with demand for fewer numbers of better-educated children (what economists refer to as the quality-quantity tradeoff), reduced exposure to the risk of pregnancy via delays in marriage associated with increased schooling (Shapiro and Gebreselassie, 2014), greater use of more efficient contraception (Rosenzweig and Schultz, 1989; Shapiro and Tambashe, 1994), and lower infant and child mortality (Hobcroft, 1993; Rutstein, 2000).

Fertility decline or fertility transition is part of the broader concept of demographic transition, the transition from high birth and death rates to low birth and death rates that all industrialized countries and many developing countries have undergone. As already noted, sub-

Saharan Africa has been the global laggard with respect to fertility transition, with declines evident at the national level emerging only in the latter part of the 1980s, distinctly after the initiation of fertility decline in other parts of the developing world during the 1960s and 1970s. As a consequence of the late initiation of fertility transition, the prevalence of stalling of fertility decline, and the slow pace of decline (slower than in Asia and Latin America, as shown in Shapiro et al., 2013), the region has an overall level of fertility that is more than twice the level in Asia or Latin America.

Compared to other parts of the developing world, women's schooling is low in sub-Saharan Africa (United Nations, 2010; Shapiro, 2012), although it has been increasing over time, both absolutely and relative to the schooling of men (Schultz, 1993; Barro and Lee, 2013). These increases, then, would be expected to contribute to the ongoing fertility transition in the region; at the aggregate level, within SSA it is clear that countries with comparatively higher levels of female educational attainment are the countries that tend to have lower levels of fertility (Shapiro, 2012).

This research uses individual-level micro data and a well-known decomposition technique for analyzing differences or changes to quantify the importance of increased women's education and reduced infant and child mortality in contributing to the observed declines in fertility in numerous countries. More specifically, this paper examines the quantitative impact of changes in these two factors in sub-Saharan Africa in contributing to the ongoing decline in fertility that has been taking place in the region. Data come from 31 countries, and are from the Demographic and Health Surveys (DHS). These countries account for 87 percent of the population of sub-Saharan Africa.

The methodology entails decomposing observed changes in fertility to identify the magnitudes of those changes that are attributable to changes in different factors, and most notably women's education and infant and child mortality. As discussed below, the decompositions control for not only changes in these two variables, but also changes in the extent of urbanization and in the age composition of the female population. We examine overall changes between the first and last surveys, beginning in the mid-1980s up to the present.

The results indicate that in some countries increased women's educational attainment accounts for the lion's share of the observed changes in fertility, while in other countries it is reductions in infant and child mortality that are predominant in accounting for declines in fertility. Broadly speaking, for the 26 countries for which the decompositions make sense, the average (across countries) contribution of improvements in women's education is to account for 46 percent of the observed decline in fertility. The corresponding figure for improvements in mortality is 37 percent.

The remainder of the paper is organized as follows. The next section provides an overview of changes in fertility, education, mortality, urbanization, and mean age of women in sub-Saharan Africa. Section 3 describes the decomposition method and the data. Section 4 presents the decomposition analysis and section 5 provides concluding remarks.

2. Overview of changes in fertility, education, mortality, urbanization, and mean age of women

This section provides an overview of the changes in fertility and in the different factors that are included in our regressions and that influence fertility between the first and last DHS for the 31 countries in sub-Saharan Africa with at least two surveys. We begin with an examination of the

total fertility rates (TFRs) in those first and last surveys, and the change in the TFR, both overall and per year. These data are shown in Table 1, along with the dates of the first and last DHSs.[1]

It is apparent from the data in the table that there is considerable variation across countries in the pace of decline in fertility. For all of the countries taken together, the average TFR in the first survey was essentially 6.0, while the average TFR in the last survey was just under 5.2. Hence, over a span that on average was a little more than 16 years, the TFR has declined on average by almost 0.05 per year. This is a fairly modest pace as compared to elsewhere in the developing world. For example, in an earlier study covering almost 50 developing countries and examining the pace of fertility decline in the two most recent surveys, Shapiro et al. (2013) found that the average decline in sub-Saharan Africa was 0.05 children per year, compared to an average decline of 0.08 for countries in Asia and 0.12 for countries in Latin America. Going back over a longer time period, Bongaarts (2008) reported an average annual decline in the TFR of 0.09 for all developing countries other than China for the period from 1965 to 1990. For the period from about 1992 to 1998, Bongaarts found an average annual decline in the TFR of 0.07 for sub-Saharan Africa and 0.08 for both Asia/North Africa and Latin America. For the period from about 1998 to 2004, however, he found average declines of only 0.02 per year in sub-Saharan Africa, compared with 0.10 in Asia/North Africa and 0.07 in Latin America.

While the average pace of decline is slow in the region, there is considerable variation across countries. Of the 31 countries shown in the table, just over half of them have a pace of decline that is distinctly slower than the average pace across all countries (this group includes the four countries where fertility has increased between the first and last DHS: Congo, Democratic Republic of the Congo (DRC), Mozambique, and Niger). Another five countries have more or

[1] Because the duration between the first and last survey varies across countries, we show the change per year to facilitate comparability across countries.

less an average pace of decline, while 10 countries have shown relatively rapid declines, with Ghana, Kenya, Namibia, Togo, and Eritrea all showing average annual declines in the TFR in excess of 0.1 children per year.[2]

Levels of and changes in educational attainment between the first and last DHS are shown in Table 2. Two indicators of educational attainment are used: the mean number of years of schooling of women of reproductive age, and the percentage of these women who had never been to school. On average, women had 3.4 years of schooling as of the first survey and 4.9 years as of the last survey, reflecting an increase of 1.6 years (almost half of the initial figure) over a period that on average was just over 16 years. Correspondingly, the average percentage of women who had never been to school declined from 49 percent as of the time of the first survey to 34 percent as of the time of the last survey.

Again, however, there was substantial variation across countries, both in levels and in changes in women's educational attainment. Further, it appears that, with a couple of notable exceptions, countries with higher levels of women's education at the outset of the period of observation tend on average to experience more rapid declines in fertility subsequently.

For example, there are nine countries with average years of school at less than two and the percentage of women with no schooling at 70 percent or higher as of the time of the first survey. These are the low-schooling nations, and their average TFR equals 6.4 children per woman as of the first survey. By the last survey, the average TFR had fallen to 5.8, reflecting an average annual rate of decline of 0.03 children. By contrast, in the ten countries with average years of schooling as of the first survey in excess of two but less than four, the average TFR fell from 6.1 in the first survey to 5.2 in the last survey, with an average annual rate of decline of

[2] It has been argued that the rapid fertility decline in Eritrea – which is the country with the most rapid pace of change in SSA – is in part a consequence of border conflict with Ethiopia that took place during the late 1990s (Blanc, 2004; Woldemicael, 2008).

0.05 children. In the high-schooling group of 11 countries in which the initial average years of education were 4 or higher, the average TFR fell from 5.6 to 4.7 between the first and last survey, representing an average annual decline of 0.04 for the group.

Hence, this examination of aggregated data on initial schooling levels and changes in fertility for countries with comparatively low, medium, and high women's education suggests that those countries with low levels of women's schooling at the time of the first DHS tended to show slower declines in fertility by the time of the last DHS, while the average fertility decline in the high-schooling group was in an intermediate position. But in fact the results for the high-education group are strongly influenced by inclusion of the Republic of Congo and the DRC, which are two of the four countries that experienced increased fertility over the period of observation. Without the Congo and the DRC, the average annual decline in the TFR for the high-education group is in excess of 0.06 children, and three of the four countries with especially rapid fertility decline for which data are available are in this high-education group.[3] Thus, the Congo and the DRC are anomalous cases, having high education initially but showing an increase in fertility. Further, both countries had an interval of only 6½ years between the only two surveys, the second-shortest such interval among the 31 countries. Treating the Congo and the DRC as anomalies means that there is a general tendency for the pace of fertility decline to be more rapid, the higher the initial level of education.

But what can we say about the pace of change of education and the corresponding pace of change of fertility? Educational attainment increased in all countries, but more rapidly in those

[3] Micro data needed to calculate mean years of schooling were not available for Eritrea. Based on both the percentage of women with no schooling (66) and some fragmentary information about educational attainment of women in the 1995 Eritrea DHS Report (National Statistics Office [Eritrea] and Macro International Inc., 1995), this is a country which, at best, would be in the medium-schooling group. As suggested in footnote 2, conflict is likely to have contributed to the very rapid observed fertility decline in Eritrea.

countries that had higher levels of education to begin with. That is, mean years of schooling increased between the first and last survey by 1.1 years on average in the group with the lowest educational attainment as of the first survey, while for the medium group the increase was 1.7 years and for the high-education group it was 1.7 years. Hence, countries with higher initial levels of education tend to have greater increases in education, and this undoubtedly contributes to the more rapid pace of fertility decline.

As noted above, declines in infant and child mortality in SSA have been identified as an important factor contributing to fertility decline in the region. Table 3 shows evidence on changes in mortality for the 31 countries covered by this study. We use ${}_5q_0$, the infant and child mortality rate, calculated over the past 10 years prior to the survey, as our measure of mortality here. Over all, this rate was 172 per thousand on average as of the first survey, and 109 per thousand as of the last survey, representing a decline of more than 35 percent. This translates to an average annual decline of 3.9 in the value of ${}_5q_0$. Again, however, there is considerable diversity of experience across countries. In addition, contrary to our expectation, there was no relationship between the pace of mortality decline over the past 10 years and the speed of fertility decline.[4] Indeed, three of the five countries with especially rapid declines in fertility had only slow declines in mortality, and all four countries with increased fertility had comparatively high rates of decline of mortality. At this bivariate level, then, there is no association between the changes in infant and child mortality and the changes in fertility.

Table 4 shows what has happened between the first and last DHS to the percentage of women of reproductive age who live in urban areas. Over all, there has been growth in the percentage of women residing in urban areas, reflecting the increased urbanization taking place

[4] A scatter plot with the pace of change of mortality on the horizontal axis and the speed of decline of fertility on the vertical axis showed essentially no relationship between the two variables.

globally. As of the first survey in each country, 31 percent of the women of reproductive age were residents of urban areas, on average. This figure increased to 37 percent as of the last survey, representing an increase in the percentage urban of a little more than 0.4 percentage points per year.

As of both the first and last surveys, there is an inverse association between the percentage urban in a country and the TFR, with the simple correlation between these two variables being almost -0.5 for the first survey and about -0.4 for the last survey. However, the relationship between changes in percentage urban and changes in the TFR was distinctly weaker and very slightly positive. From this bivariate analysis, then, increasing urbanization does not seem to be a prominent factor in fertility transition in SSA.

In the decompositions that we carry out and report on below, the age composition of the female population of reproductive age is an important control variable. This is because our dependent variable is children ever born, and this variable increases with age, other things equal. Here, then, we examine the mean age of this population and how it changes between the first and last survey. Since we know from stable population theory that given the level of mortality, higher-fertility populations are younger than lower-fertility populations, in countries experiencing fertility decline the population of women of reproductive age will tend to get older over time. This in turn, by itself, will result in increased numbers of children ever born simply as a consequence of aging. Consequently, we control for the woman's age in the regressions in order to take account of this factor.

Table 5 shows that this aging has been the case in 21 of the 31 countries.[5] In nine countries the mean age has decreased between the first and last survey, and in one country there has been no change. Both the levels and changes in mean age of women are largely unrelated to the corresponding levels and changes in the TFR.

We have used the TFR as our measure of fertility to this point. However, the TFR is a measure based on aggregated data, and for this study we use micro data for our decomposition analyses. For each individual, then, our measure of fertility for these analyses is the number of children ever born, or cumulative fertility, and mean number of children ever born will be a key variable in the analyses. As we shall see below, the mean number of children ever born is sensitive to even small changes in the average age of women of reproductive age.

At this point, however, it is useful to compare the levels and changes of the TFR and the mean number of children ever born. The levels of these two measures of fertility are highly correlated, with the correlation exceeding +0.8 for the levels as of the first survey and +0.9 for the levels as of the last survey. The correlation coefficient for the changes in these two measures is somewhat smaller, being +0.6. Given these high correlations, then, we believe that the analyses below of changes in the determinants of fertility and their consequences for fertility behavior, using children ever born as our measure of fertility, are useful for understanding the ongoing fertility transition in the region.

[5] The estimates for Eritrea were produced based on the frequency distributions by age group of the sample of interviewed women for 1995 and 2002. The numbers are thus a little less precise than those for other countries, but the direction of change – a reduction in mean age – is evident.

3. Decomposition method and data

Decomposing changes in fertility over time

In 1973, Oaxaca introduced a procedure for analyzing differences in wages between two groups. Consider wages as a consequence of earnings functions that reflect both *endowments* of factors that influence wages and the *payoffs* to those factors. From this perspective, two groups may have different wages as a consequence of either or both of different endowments of wage-relevant factors (such as schooling and work experience) and different payoffs to given factors (as might occur with labor market discrimination). The Oaxaca decomposition procedure allows one to assess the importance of different endowments of relevant factors in accounting for the observed difference in wages between two groups.

The procedure developed by Oaxaca (1973) and subsequently refined (Oaxaca and Ransom, 1994) has been used in many studies of wage differences between groups. However, it may also be applied to analysis of differences in fertility (see, for example, Bundervoet, 2014). For our purposes here, we are interested in changes in fertility over time, and in the importance of changes in educational attainment of women and in infant and child mortality in accounting for the fertility changes. The Oaxaca approach allows one to estimate the contribution of each of these factors (as well as the contributions of changes in other characteristics that influence fertility) to overall fertility decline.

Following Oaxaca and Ransom (1994), we first estimate the impact of educational attainment, infant and child mortality, urbanization, and age on cumulative fertility (children ever born), using data from the first and last DHSs (pooled). The estimated coefficients are then used in conjunction with changes in the means of the explanatory variables to identify the

consequences for fertility of the changes in age, urban residence, infant and child mortality, and education between the first and last survey.

Educational attainment is measured by a series of dummy variables indicating the number of years of schooling completed (0, 1-6, 7-8, 9-10, 11-12, 13+). The reference category is those with 1-6 years of schooling, representing primary schooling in a system with six years of primary school. There is variation across countries in grades per level, however – in some countries, there are seven years to primary school. For this reason, then, we prefer to use years of schooling rather than level. In addition, we break up what would be secondary schooling in a 6-6 system into three groups, as previous research (Shapiro and Tambashe, 2003; Shapiro, 2012) has shown that these three secondary-school groups have distinctly different fertility.

Infant and child mortality is proxied by the percentage of children born to women in the respondent's sample cluster who have died. This is essentially a measure of mortality that pertains to the small area in which each woman resides. It is not a measure of the infant and child mortality rate, but since most of the deaths it counts are likely to be of infants and children under five, our mortality measure should be highly correlated with the local area's infant and child mortality rate. And it should be a good indicator of women's perceptions of the level of mortality.

Urbanization is measured by simply a dummy variable for urban residence, and the woman's age is included as a control variable. As noted above, children ever born is our dependent variable in the analyses.

Changes in mean values of the variables

As we've seen in the Overview section, as fertility decline has proceeded at a generally slow pace, women's education has increased, infant and child mortality has typically declined, and urbanization has become more prevalent. Changes in each of these three factors have contributed to the declines in fertility that have been observed, as we shall see below. Likewise, for most of the countries the mean age of women of reproductive age has increased a bit between the first and last DHS, which has the impact of increasing the number of children ever born, other things equal. However, there is considerable variation across countries in the magnitudes of the changes in each of these variables, as noted earlier.

Appendix Table A-1 shows the detailed results for individual countries with respect to changes in the mean values of the variables between the first and last surveys, for the variables used in the regressions.[6] Consider first the education dummy variables. In every country, the proportion of women with no schooling declined between the first and last DHS. On average 49 percent of women had no schooling as of the first survey and 34 percent had no schooling as of the last survey, representing a decline of 30 percent. However, the pace of decline varied substantially across countries, and in particular, was considerably slower in relative terms among the countries that had particularly low educational attainment at the outset. For example, of the 14 countries with more than 50 percent of women of reproductive age with no schooling as of the first survey, the average decline in this percentage by the time of the last survey was 15 percentage points, representing a 21 percent decline; while among the 16 countries with fewer than 50 percent of women with no schooling as of the first survey, the average decline was 13 percentage points, representing 49 percent of the initial level.

[6] Since micro data are not available for Eritrea, these results, as well as those for the following appendix tables, are for 30 countries.

Similarly, the general tendency for each of the three education groups representing women with nine or more years of schooling was for the proportion to increase over time, with this being the case for 84 of the 90 comparisons. These changes thus reflect the increased access to both primary and secondary schooling that women have experienced during the past 20-30 years.

Declines in mortality based on our measure reflecting mortality of children in each cluster of residence were universal within this group of countries, although in some countries the declines were modest while in others they were more substantial. Increases in urbanization were evident for all countries except Chad, the DRC, Madagascar, Mali, and Zambia. But as with other variables, the increases in urbanization were sometimes rather small and in other countries they were distinctly larger. Changes in mean age of the population of women aged 15-49 were mostly increases, as noted in our data overview, but sometimes there were decreases. And again, in some cases the changes were modest and in others more substantial. All of these changes, then, influence the decompositions.

Regression results

The first step in the decomposition procedure is to estimate regressions with the dependent variable, the number of children ever born to each woman, regressed on variables indicating the level of educational attainment, the extent of infant and child mortality locally, whether the woman is in an urban area, and her age. The data from the first and last DHS are pooled, the regressions are estimated using weighted data, and the resulting coefficients indicate the effects

of each variable on the number of children ever born.[7] The sample for each of these regressions consists of all women aged 15-49.

Detailed regression results for each country may be found in Table A-2 in the Appendix. The magnitudes of the estimated coefficients differ across countries, and for the most part these coefficients are highly significant. There are some consistent similarities in the results for the different countries and here we provide an overview of these detailed results that highlights those similarities.

First, consider the estimated coefficients for the education dummy variables. Compared to women with 1-6 years of schooling (the reference group), those women with no schooling tend to have significantly higher fertility. Women with higher levels of schooling tend to have significantly lower numbers of children ever born than their counterparts with lower levels of schooling, and for the most part the negative impact of schooling gets larger in absolute value as the schooling level increases.

Consider, for example, Table 6. This table shows the (unweighted) mean values of the coefficients across the 30 countries for which micro data are available. Controlling for a woman's age, place of residence, and the level of mortality of children in the cluster in which a woman resides, we find that on average women with no schooling have had nearly a quarter of a child more than women with 1-6 years of schooling (this differential represents approximately eight percent of the mean number of children ever born across all countries, including both the first and last surveys). Women with 7-8 years of schooling have lower fertility than their counterparts with 1-6 years of education, other things equal, by a little more than a quarter of a child, on average. As educational attainment increases beyond this level, the magnitudes of the

[7] For some countries (e.g, Cameroon), changes in the way samples were constructed resulted in mean values of unweighted data showing a decline in urbanization, while weighted data reflected the reality of increased urbanization. Hence, we used weighted data.

negative coefficients for the schooling groups rise in absolute value and at an increasing rate. Similar evidence of increasingly stronger negative effects of schooling on fertility as schooling increases was also reported in Shapiro (2012).

The coefficient of our mortality variable has a small, positive value, indicating that where mortality is higher, fertility tends as well to be higher, as anticipated. Women who reside in urban areas tend to have fewer children ever born than their rural counterparts, by about 0.3 children, on average. And finally, the number of children ever born increases with age, other things equal, but at a decreasing rate. The vast majority of estimated coefficients in these 30 regressions were statistically significant.

4. Decomposition analysis

Table A-3 of the Appendix provides detailed results for each country of the decomposition that assesses the contributions of different variables to the observed change in fertility (children ever born) between the first and last DHS. Effects of the changes in means of the different education dummy variables, evaluated using the individual regression coefficients, are aggregated up so that we see the consequences of changes in the education variables as a group. Likewise the effects of changes in age and age squared are reported simply as the effect of the change in age.

Consider first a couple of examples to illustrate the interpretation of the numbers in the table. The increased educational attainment in Benin accounts for just under a fifth of the observed decline in the average number of children ever born between 1996 and 2012. By contrast, the reduction in mortality experienced in Benin implies a corresponding decline in the number of children ever born equivalent to almost three-quarters of the observed decline of 0.7

children. The four variables, taken together, account for 95 percent of the observed change in the number of children ever born between the first and last survey.

In Cameroon, increased education accounts for more than two-thirds of the observed fertility decline between 1991 and 2011 of nearly half a child in the average number of children ever born. The decline in mortality in Cameroon accounts for only 13 percent of the observed reduction in fertility. Increased urbanization was associated with a fertility reduction representing almost 10 percent of that observed. Finally, the slight increase in mean age of women of reproductive age between 1991 and 2011, since it would imply an increase in the number of children ever born, gets a minus sign for its influence, given that fertility in fact declined.

The examples of Benin and Cameroon illustrate that in some countries increased women's educational attainment accounts for the lion's share of the observed changes in fertility, while in other countries it is reductions in infant and child mortality that are predominant in accounting for declines in fertility. Before going into details on this point, however, it is useful to consider some peculiarities of the table. First, there are two countries where some of the individual variable decomposition percentages are extremely high: Uganda and Zambia. The reason for these very high percentages is the very small decline in mean number of children ever born for these two countries: 0.07 in each case. Since that decline is the denominator in the decomposition calculations, the result is inordinately high values for the impact of individual variables. Likewise, in two of the countries with increasing mean number of children ever born, the Congo and the DRC, the change in the mean of this variable between the first and last survey does not exceed 0.1 (and there are some high values for individual variable decomposition percentages). The discussion that follows will exclude these four countries and focus on the

remaining 26 nations; in these cases the change in mean number of children ever born is at least 0.15.[8]

A second aspect of note is that signs of the impact of individual variables are reversed for the four cases in which fertility, measured by mean number of children ever born, has increased. That is, for Chad, the Congo, the DRC, and Niger, the increases in women's education and decreases in mortality (as well as the increased urbanization in the latter two countries) all, in and of themselves, would have contributed to declining fertility; since fertility increased, then, these variables have minus signs. In the discussion below concerning the relative impact of improvements in women's education and infant and child mortality, the absolute values of these estimated impacts will be used for Chad and Niger, the two countries with increasing fertility that are included.

For the 26 countries for which the decompositions make sense, the unweighted mean contribution of improvements in women's education is to account for 46 percent of the observed decline in fertility. The corresponding figure for improvements in mortality is 37 percent. With changes in urbanization accounting for an average of 7 percent and changes in mean age of women of reproductive age accounting for an average of 17 percent of the observed change in fertility, the variables taken together account for an average of 73 percent of the observed changes.

As in virtually all other aspects that we've looked at, here as well we see considerable diversity across countries. Focusing on the relative contributions of changes in women's educational attainment and improvements in infant and child mortality, we can see that, reflecting the overall average relative contributions reported above, the impact of changes in

[8] The minimum absolute value of the change in the mean number of children ever born for these 26 countries is 0.15 for Mozambique, followed by 0.20 for Burkina Faso.

education exceeds the impact of changes in mortality more often than not. More specifically, in 5 of the 26 countries the impact of changing education and mortality are roughly equal (within five percentage points of one another), while in 9 countries the impact of changing mortality is greater and in the remaining 12 countries the impact of changing women's education is greater.

5. Summary and conclusions

This paper has provided analyses of changes in fertility in 31 countries in sub-Saharan Africa, in many cases going back to the mid- or late-1980s. Those changes are typically but not exclusively declines, and they vary substantially in magnitude. Using individual-level data, we employ a technique to decompose those fertility changes into portions due to increasing women's educational attainment and declining infant and child mortality, while at the same time controlling for increasing urbanization and changes in the mean age of women of reproductive age as factors influencing changes in fertility.

Over all, our analyses indicate that on average changes in these different variables can account for almost three-quarters of the observed changes in cumulative fertility. Changes in educational attainment on average account for more than 45 percent of observed changes in fertility, while changes in mortality account for more than 35 percent of the observed changes in fertility.

Examination of the results of the decompositions for each country individually makes it clear that in nearly half of the countries the impact of increasing educational attainment outweighs the impact of declining mortality, while in just over a third of the cases the reverse is true. In the remaining countries the two factors are more or less equally important.

The fertility transition in sub-Saharan Africa, late in getting started relative to elsewhere in the developing world, has been comparatively slow and subject to stalling. As continued high fertility in the region is an obstacle to efforts to promote socioeconomic development and economic growth, policies seeking to encourage lower fertility constitute efforts to facilitate growth and development. Our results make it clear that continued and augmented efforts to increase women's educational attainment and to reduce infant and child mortality are likely to result in more rapid fertility decline, and ultimately, we believe that such fertility decline will contribute to more rapid socioeconomic development.

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Table 1. Fertility and Fertility Changes between the First and Last DHS

Country	First survey		Last survey		Change in TFR	
	TFR	Year	TFR	Year	Total	Per Year
Benin	6.0	1996	4.9	2011.5	-1.1	-0.071
Burkina Faso	6.5	1993	6.0	2010	-0.5	-0.029
Burundi	6.9	1987	6.4	2010	-0.5	-0.022
Cameroon	5.8	1991	5.1	2011	-0.7	-0.035
Chad	6.4	1996.5	6.3	2004	-0.1	-0.013
Comoros	4.6	1996	4.3	2012	-0.3	-0.019
Congo	4.8	2005	5.1	2011.5	0.3	0.046
Cote d'Ivoire	5.3	1994	5.0	2011.5	-0.3	-0.017
DRC[1]	6.3	2007	6.6	2013.5	0.3	0.046
Eritrea	6.1	1995	4.8	2002	-1.3	-0.186
Ethiopia	5.5	2000	4.8	2011	-0.7	-0.064
Gabon	4.2	2000	4.1	2012	-0.1	-0.008
Ghana	6.4	1988	4.0	2008	-2.4	-0.120
Guinea	5.5	1999	5.1	2012	-0.4	-0.031
Kenya	6.7	1989	4.6	2008.5	-2.1	-0.108
Lesotho	3.5	2004	3.3	2009	-0.2	-0.040
Liberia	6.7	1986	4.7	2013	-2.0	-0.074
Madagascar	6.1	1992	4.8	2008.5	-1.3	-0.079
Malawi	6.7	1992	5.7	2010	-1.0	-0.056
Mali	7.1	1987	6.1	2012.5	-1.0	-0.039
Mozambique	5.2	1997	5.9	2011	0.7	0.050
Namibia	5.4	1992	3.6	2006.5	-1.8	-0.124
Niger	7.0	1992	7.6	2012	0.6	0.030
Nigeria	6.0	1990	5.5	2013	-0.5	-0.022
Rwanda	6.2	1992	4.6	2010	-1.6	-0.089

Senegal	6.4	1986	5.0	2010.5	-1.4	-0.057
Tanzania	6.2	1991.5	5.4	2010	-0.8	-0.043
Togo	6.4	1988	5.2	1998	-1.2	-0.120
Uganda	7.4	1988.5	6.2	2011	-1.2	-0.053
Zambia	6.5	1992	6.2	2007	-0.3	-0.020
Zimbabwe	5.4	1988	4.1	2010.5	-1.3	-0.058
Averages	6.0	1993.4	5.2	2009.7	-0.78	-0.046

Countries with at least two DHSs.

[1] Democratic Republic of the Congo

Table 2. Education and Education Changes between the First and Last DHS

Country	First survey		Last survey		Changes	
	mean years of schooling	percentage with no schooling	mean years of schooling	percentage with no schooling	mean years of schooling	percentage with no schooling
Benin	1.5	72	3.0	60	1.5	-12
Burkina Faso	1.1	83	1.8	74	0.7	-9
Burundi	0.9	80	3.1	45	2.2	-35
Cameroon	4.0	41	6.2	20	2.2	-21
Chad	0.8	79	1.2	75	0.4	-4
Comoros	2.9	54	6.3	31	3.4	-23
Congo	7.1	8	7.9	6	0.8	-2
Cote d'Ivoire	2.4	61	3.4	53	1.0	-8
DRC	5.3	22	6.1	16	0.8	-6
Eritrea	NA	66	NA	50	NA	-16
Ethiopia	1.3	77	2.9	52	1.6	-25
Gabon	6.9	6	8.3	5	1.4	-1
Ghana	4.9	40	6.6	22	1.7	-18
Guinea	1.4	81	2.6	67	1.2	-14
Kenya	5.2	25	7.9	9	2.7	-16
Lesotho	7.3	2	8.1	1	0.8	-1
Liberia	2.6	63	4.5	35	1.9	-28
Madagascar	3.7	23	4.3	20	0.6	-3
Malawi	2.6	48	5.4	16	2.8	-32
Mali	0.9	85	1.8	76	0.9	-9
Mozambique	2.1	47	3.8	32	1.7	-15

Namibia	5.9	15	8.4	7	2.5	-8
Niger	0.6	90	1.2	80	0.6	-10
Nigeria	3.1	57	6.1	38	3.0	-19
Rwanda	3.4	39	4.4	17	1.0	-22
Senegal	1.8	78	2.9	58	1.1	-20
Tanzania	4.2	34	5.7	19	1.5	-15
Togo	2.3	59	2.6	49	0.3	-10
Uganda	3.3	38	5.7	14	2.4	-24
Zambia	5.2	18	6.4	11	1.2	-7
Zimbabwe	6.0	14	9.0	2	3.0	-12
Averages	3.4	49	4.9	34	1.6	-14

Countries with at least two DHSs.

Table 3. Mortality and Mortality Changes between the First and Last DHS

Country	First survey		Last survey		Change in 5q0	
	5q0	Year	5q0	Year	Total	Per Year
Benin	184	1996	75	2011.5	-109	-7.0
Burkina Faso	205	1993	148	2010	-57	-3.4
Burundi	183	1987	127	2010	-56	-2.4
Cameroon	144	1991	128	2011	-16	-0.8
Chad	201	1996.5	203	2004	2	0.3
Comoros	113	1996	50	2012	-63	-3.9
Congo	123	2005	82	2011.5	-41	-6.3
Cote d'Ivoire	150	1994	116	2011.5	-34	-1.9
DRC	155	2007	112	2013.5	-43	-6.6
Eritrea	153	1995	107	2002	-46	-6.6
Ethiopia	188	2000	110	2011	-78	-7.1
Gabon	91	2000	63	2012	-28	-2.3
Ghana	154	1988	85	2008	-69	-3.5
Guinea	195	1999	133	2012	-62	-4.8
Kenya	91	1989	84	2008.5	-7	-0.4
Lesotho	102	2004	105	2009	3	0.6
Liberia	231	1986	113	2013	-118	-4.4
Madagascar	178	1992	82	2008.5	-96	-5.8
Malawi	240	1992	127	2010	-113	-6.3
Mali	278	1987	104	2012.5	-174	-6.8
Mozambique	219	1997	108	2011	-111	-7.9

Namibia	92	1992	69	2006.5	-23	-1.6
Niger	326	1992	153	2012	-173	-8.7
Nigeria	191	1990	144	2013	-47	-2.0
Rwanda	163	1992	102	2010	-61	-3.4
Senegal	211	1986	87	2010.5	-124	-5.1
Tanzania	153	1991.5	92	2010	-61	-3.3
Togo	160	1988	144	1998	-16	-1.6
Uganda	187	1988.5	106	2011	-81	-3.6
Zambia	178	1992	137	2007	-41	-2.7
Zimbabwe	85	1988	77	2010.5	-8	-0.4
Averages	172	1993.4	109	2009.7	-63	-3.9

Countries with at least two DHSs. Data on infant and child mortality are for the 10-year period preceding the survey.

Table 4. Urbanization and Changes in Pct. Urban between the First and Last DHS

Country	First survey		Last survey		Change in pct urban	
	pct. urban	Year	pct. urban	Year	Total	Per Year
Benin	40	1996	46	2011.5	6	0.387
Burkina Faso	20	1993	27	2010	7	0.412
Burundi	4	1987	11	2010	7	0.304
Cameroon	42	1991	54	2011	12	0.600
Chad	23	1996.5	21	2004	-2	-0.267
Comoros	30	1996	33	2012	3	0.188
Congo	57	2005	69	2011.5	12	1.846
Cote d'Ivoire	42	1994	51	2011.5	9	0.514
DRC	45	2007	38	2013.5	-7	-1.077
Eritrea	33	1995	43	2002	10	1.429
Ethiopia	18	2000	24	2011	6	0.545
Gabon	80	2000	89	2012	9	0.750
Ghana	34	1988	48	2008	14	0.700
Guinea	32	1999	36	2012	4	0.308
Kenya	17	1989	25	2008.5	8	0.410
Lesotho	24	2004	34	2009	10	2.000
Liberia	43	1986	61	2013	18	0.667
Madagascar	20	1992	17	2008.5	-3	-0.182
Malawi	12	1992	19	2010	7	0.389

Mali	26	1987	25	2012.5	-1	-0.039
Mozambique	24	1997	35	2011	11	0.786
Namibia	38	1992	49	2006.5	11	0.759
Niger	17	1992	19	2012	2	0.100
Nigeria	25	1990	42	2013	17	0.739
Rwanda	6	1992	15	2010	9	0.500
Senegal	41	1986	49	2010.5	8	0.327
Tanzania	25	1991.5	29	2010	4	0.216
Togo	35	1988	38	1998	3	0.300
Uganda	11	1988.5	20	2011	9	0.400
Zambia	52	1992	42	2007	-10	-0.667
Zimbabwe	33	1988	39	2010.5	6	0.267
Averages	31	1993.4	37	2009.7	6	0.439

Countries with at least two DHSs.

Table 5. TFR and Mean Age of Women, First and Last DHS

Country	First survey			Last survey			Change in mean age	
	TFR	Mean age	Year	TFR	Mean age	Year	Total	Per Year
Benin	6.0	29.0	1996	4.9	28.9	2011.5	-0.1	-0.0065
Burkina Faso	6.5	28.1	1993	6.0	28.8	2010	0.7	0.0412
Burundi	6.9	28.5	1987	6.4	27.7	2010	-0.8	-0.0348
Cameroon	5.8	27.7	1991	5.1	27.9	2011	0.2	0.0100
Chad	6.4	27.9	1996.5	6.3	28.3	2004	0.4	0.0533
Comoros	4.6	27.3	1996	4.3	27.6	2012	0.3	0.0188
Congo	4.8	27.8	2005	5.1	28.6	2011.5	0.8	0.1231
Cote d'Ivoire	5.3	27.6	1994	5.0	28.4	2011.5	0.8	0.0457
DRC	6.3	28.3	2007	6.6	28.1	2013.5	-0.2	-0.0308
Eritrea	6.1	30.0	1995	4.8	29.4	2002	-0.6	-0.0857
Ethiopia	5.5	28.1	2000	4.8	27.7	2011	-0.4	-0.0364
Gabon	4.2	27.4	2000	4.1	28.4	2012	1.0	0.0833
Ghana	6.4	28.6	1988	4.0	29.0	2008	0.4	0.0200
Guinea	5.5	29.1	1999	5.1	28.4	2012	-0.7	-0.0538
Kenya	6.7	28.4	1989	4.6	28.5	2008.5	0.1	0.0051
Lesotho	3.5	28.3	2004	3.3	28.2	2009	-0.1	-0.0200
Liberia	6.7	27.9	1986	4.7	28.6	2013	0.7	0.0259
Madagascar	6.1	27.9	1992	4.8	28.9	2008.5	1.0	0.0606
Malawi	6.7	28.5	1992	5.7	28.0	2010	-0.5	-0.0278
Mali	7.1	29.7	1987	6.1	28.6	2012.5	-1.1	-0.0431

Mozambique	5.2	28.6	1997	5.9	28.6	2011	0.0	0.0000
Namibia	5.4	28.0	1992	3.6	28.4	2006.5	0.4	0.0276
Niger	7.0	27.8	1992	7.6	28.8	2012	1.0	0.0500
Nigeria	6.0	28.3	1990	5.5	28.8	2013	0.5	0.0217
Rwanda	6.2	28.3	1992	4.6	28.4	2010	0.1	0.0056
Senegal	6.4	27.7	1986	5.0	27.9	2010.5	0.2	0.0082
Tanzania	6.2	27.8	1991.5	5.4	28.6	2010	0.8	0.0432
Togo	6.4	28.1	1988	5.2	28.6	1998	0.5	0.0500
Uganda	7.4	27.4	1988.5	6.2	28.0	2011	0.6	0.0267
Zambia	6.5	26.9	1992	6.2	28.1	2007	1.2	0.0800
Zimbabwe	5.4	27.8	1988	4.1	28.2	2010.5	0.4	0.0178
Averages	5.974	28.15	1993.4	5.194	28.40	2009.7	0.25	0.0154

Countries with two or more DHSs.

Table 6. Mean Values of Regression Coefficients, Children Ever Born Regressions

Variable	Mean value of Coefficient
Age	0.382
Age^2	-0.00290
Urban	-0.309
ED0	0.233
ED1-6	--
ED7-8	-0.276
ED9-10	-0.628
ED11-12	-1.126
ED13+	-1.824
Mortality	0.021

Table A-1. Mean values of the variables used in the regressions, first and last surveys, by country

Variable/	Benin		Burkina Faso		Burundi		Cameroon		Chad		Comoros		Congo		Cote d'Ivoire	
Year	1996	2012	1993	2010	1987	2010	1991	2011	1997	2004	1996	2012	2005	2011	1994	2012
Age	29.0	28.9	28.1	28.8	28.5	27.7	27.7	27.9	27.9	28.3	27.3	27.6	27.8	28.6	27.6	28.4
Age2	932.7	916.1	877.2	917.2	892.1	861.3	853.9	869.2	864.7	893.8	835.4	848.9	860.2	904.0	844.3	891.2
Urban	0.397	0.465	0.204	0.270	0.038	0.107	0.420	0.539	0.231	0.212	0.296	0.331	0.566	0.686	0.421	0.513
ED0	0.715	0.596	0.831	0.741	0.804	0.453	0.407	0.203	0.792	0.750	0.540	0.315	0.075	0.059	0.609	0.534
ED1-6	0.196	0.179	0.107	0.137	0.176	0.433	0.318	0.355	0.176	0.191	0.268	0.196	0.317	0.259	0.262	0.256
ED7-8	0.038	0.061	0.019	0.042	0.008	0.044	0.116	0.114	0.015	0.024	0.073	0.108	0.220	0.213	0.051	0.041
ED9-10	0.030	0.088	0.026	0.047	0.006	0.028	0.100	0.163	0.009	0.016	0.073	0.127	0.252	0.272	0.050	0.079
ED11-12	0.014	0.034	0.008	0.018	0.003	0.021	0.043	0.090	0.005	0.011	0.028	0.096	0.078	0.096	0.019	0.034
ED13+	0.007	0.042	0.009	0.015	0.002	0.020	0.017	0.075	0.002	0.008	0.018	0.157	0.057	0.101	0.010	0.056
Mortality	20.3	7.8	22.4	15.9	19.3	15.5	16.8	12.6	21.7	21.1	13.2	5.9	11.8	8.9	16.3	12.4
CEB	3.437	2.737	3.495	3.298	3.022	2.711	3.192	2.728	3.505	3.708	2.596	2.173	2.382	2.481	3.090	2.683

Variable/	DRC		Ethiopia		Gabon		Ghana		Guinea		Kenya		Lesotho		Liberia	
Year	2007	2013	2000	2011	2000	2012	1988	2008	1999	2012	1989	2009	2004	2009	1986	2013
Age	28.3	28.1	28.1	27.7	27.4	28.4	28.6	29.0	29.1	28.4	28.4	28.5	28.3	28.2	27.9	28.6
Age^2	891.0	875.0	885.6	854.7	833.7	896.4	904.0	932.2	938.1	898.5	892.7	901.7	900.9	889.3	860.0	908.6
Urban	0.455	0.384	0.182	0.239	0.802	0.886	0.340	0.484	0.320	0.363	0.173	0.254	0.236	0.337	0.432	0.610
ED0	0.217	0.158	0.766	0.523	0.063	0.045	0.398	0.215	0.808	0.671	0.252	0.090	0.021	0.013	0.631	0.349
ED1-6	0.393	0.384	0.144	0.283	0.419	0.249	0.162	0.209	0.103	0.142	0.277	0.187	0.312	0.236	0.180	0.331
ED7-8	0.145	0.166	0.044	0.082	0.213	0.226	0.100	0.128	0.028	0.052	0.287	0.379	0.358	0.345	0.062	0.112
ED9-10	0.117	0.130	0.019	0.054	0.166	0.253	0.287	0.287	0.023	0.053	0.083	0.095	0.202	0.225	0.057	0.082
ED11-12	0.105	0.127	0.021	0.018	0.079	0.096	0.030	0.110	0.013	0.035	0.090	0.175	0.095	0.127	0.057	0.092
ED13+	0.023	0.034	0.006	0.040	0.060	0.131	0.023	0.051	0.024	0.047	0.012	0.074	0.013	0.054	0.013	0.033
Mortality	15.8	12.5	21.8	14.7	10.2	7.4	16.5	10.2	22.2	14.8	10.0	8.6	10.4	9.6	23.8	16.1
CEB	2.977	3.053	3.091	2.882	2.550	2.244	3.169	2.325	3.431	2.979	3.673	2.677	2.055	1.800	3.120	2.887

Table A-1. Mean values of the variables used in the regressions, first and last surveys, by country (continued)

Variable/	Madagascar		Malawi		Mali		Mozambique		Namibia		Niger		Nigeria		Rwanda	
Year	1992	2009	1992	2010	1987	2012	1997	2011	1992	2007	1992	2012	1990	2013	1992	2010
Age	27.9	28.9	28.5	28.0	29.7	28.6	28.6	28.6	28.00	28.4	27.8	28.8	28.3	28.8	28.3	28.4
Age^2	862.8	932.2	907.3	868.9	968.3	898.6	906.3	910.8	874.2	895.2	855.5	909.5	883.5	921.5	887.3	899.2
Urban	0.200	0.173	0.123	0.187	0.261	0.248	0.238	0.347	0.383	0.487	0.173	0.187	0.249	0.421	0.062	0.150
ED0	0.229	0.197	0.482	0.161	0.854	0.760	0.466	0.323	0.151	0.067	0.897	0.803	0.572	0.379	0.394	0.172
ED1-6	0.575	0.551	0.361	0.444	0.097	0.096	0.462	0.434	0.384	0.172	0.074	0.120	0.239	0.175	0.400	0.624
ED7-8	0.106	0.124	0.114	0.203	0.023	0.055	0.046	0.115	0.222	0.169	0.014	0.030	0.036	0.050	0.129	0.112
ED9-10	0.031	0.054	0.024	0.098	0.016	0.036	0.018	0.079	0.151	0.326	0.010	0.029	0.051	0.085	0.023	0.039
ED11-12	0.047	0.053	0.017	0.077	0.005	0.031	0.006	0.037	0.074	0.191	0.002	0.010	0.086	0.222	0.042	0.038
ED13+	0.012	0.021	0.002	0.017	0.006	0.021	0.002	0.012	0.018	0.074	0.002	0.009	0.016	0.089	0.012	0.014
Mortality	18.0	10.0	26.3	15.8	30.6	10.8	21.8	14.1	9.8	7.2	30.7	19.1	19.4	14.8	19.4	14.4
CEB	3.200	2.855	3.481	3.070	3.963	3.298	3.050	2.903	2.436	1.911	3.852	4.187	3.313	3.063	3.069	2.417

Variable/	Senegal		Tanzania		Togo		Uganda		Zambia		Zimbabwe					
Year	1986	2011	1992	2010	1988	1998	1989	2011	1992	2007	1988	2011				
Age	27.7	27.9	27.8	28.6	28.1	28.6	27.4	28.0	26.9	28.1	27.8	28.2				
Age^2	848.5	863.4	863.7	906.8	874.3	905.9	833.9	872.6	806.5	873.7	863.4	879.3				
Urban	0.410	0.493	0.248	0.285	0.351	0.375	0.115	0.198	0.515	0.421	0.334	0.387				
ED0	0.775	0.582	0.339	0.194	0.587	0.487	0.378	0.137	0.175	0.107	0.137	0.024				
ED1-6	0.133	0.228	0.198	0.144	0.292	0.376	0.438	0.473	0.354	0.352	0.342	0.113				
ED7-8	0.000	0.060	0.420	0.530	0.051	0.085	0.109	0.178	0.366	0.264	0.263	0.242				
ED9-10	0.012	0.067	0.018	0.068	0.053	0.046	0.040	0.090	0.054	0.154	0.119	0.218				
ED11-12	0.032	0.033	0.023	0.041	0.013	0.000	0.029	0.057	0.033	0.075	0.125	0.342				
ED13+	0.048	0.030	0.003	0.023	0.003	0.006	0.006	0.065	0.017	0.048	0.014	0.061				
Mortality	22.9	10.4	16.7	11.9	17.3	15.5	18.7	12.7	16.7	14.5	9.1	7.4				
CEB	3.261	2.509	3.105	2.880	3.211	2.932	3.493	3.422	3.104	3.032	2.954	2.100				

Table A-2. Regression coefficients, children ever born, by country

Variable	Benin	B.F.	Bur.	Cam.	Chad	Com.	Congo	C.I.	DRC	Ethio.	Gab.	Ghana	Gui.	Kenya
Age	0.383	0.416	0.336	0.423	0.616	0.242	0.301	0.333	0.453	0.351	0.286	0.304	0.382	0.480
Age^2	-0.003	-0.003	-0.001	-0.004	-0.006	-0.001	-0.002	-0.002	-0.004	-0.002	-0.002	-0.002	-0.003	-0.004
Urban	-0.382	-0.525	0.000^{ns}	-0.341	-0.086^{*}	-0.091^{*}	-0.498	-0.553	-0.071	0.654	-0.445	-0.464	-0.397	-0.703
ED0	0.516	0.337	-0.062^{*}	0.633	0.032^{ns}	0.566	0.220	0.341	-0.098	0.233	-0.259	0.293	0.152	0.319
ED1-6	--	--	--	--	--	--	--	--		--	--	--	--	--
ED7-8	-0.085	0.004^{*}	-0.095^{*}	-0.275	-0.418	-0.288	-0.252	-0.130^{*}	-0.209	-0.178	-0.353	-0.075	-0.284	-0.604
ED9-10	-0.334	-0.634	-0.574	-0.595	-0.735	-0.663	-0.599	-0.560	-0.560	-0.484	-0.635	-0.622	-0.439	-0.862
ED11-12	-0.515	-1.168	-1.301	-1.099	-1.316	-0.960	-0.991	-0.793	-1.230	-1.171	-1.047	-1.090	-0.840	-1.563
ED13+	-1.057	-1.874	-1.882	-1.715	-2.175	-1.650	-1.468	-1.502	-2.367	-1.418	-1.598	-1.790	-1.470	-2.364
Mortality	0.042	0.028	0.013	0.015	0.012	0.013	0.007	0.027	0.022	0.008	0.022	0.028	0.023	0.024
Constant	-5.906	-6.594	-5.526	-5.668	-8.624	-3.726	-3.627	-4.947	-6.481	-5.416	-3.531	-4.520	-5.611	-6.264
R^2	0.598	0.719	0.688	0.591	0.630	0.563	0.590	0.593	0.613	0.670	0.528	0.649	0.637	0.656
N	22090	23431	13321	19286	13532	8353	17867	18152	57534	31882	14596	9377	15868	15565

Variable	Leso.	Lib.	Mad.	Malawi	Mali	Mozamb.	Nam.	Niger	Nigeria	Rwa.	Sen.	Tanz.	Togo	Uga.
Age	0.231	0.360	0.398	0.425	0.495	0.430	0.254	0.551	0.416	0.232	0.312	0.392	0.330	0.559
Age^2	-0.001	-0.002	-0.003	-0.003	-0.005	-0.004	-0.001	-0.005	-0.003	0.000^{ns}	-0.002	-0.003	-0.002	-0.005
Urban	-0.589	-0.259	-0.471	-0.148	-0.197	-0.144	-0.205	-0.510	-0.062	-0.235	-0.489	-0.448	-0.626	-0.461
ED0	0.092^{ns}	-0.008	0.290	0.193	0.090^{*}	0.024^{ns}	0.346	0.336	0.304	0.469	0.545	0.114	0.384	0.136
ED1-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ED7-8	-0.256	-0.332	-0.544	-0.289	-0.190	-0.254	-0.428	-0.136^{ns}	-0.231	-0.169	0.129^{ns}	-0.494	-0.508	-0.266
ED9-10	-0.603	-0.521	-0.900	-0.713	-0.423	-0.653	-0.918	-0.738	-0.376	-0.362	-0.364	-0.753	-0.881	-0.577
ED11-12	-0.926	-1.141	-1.502	-1.374	-0.999	-1.193	-1.346	-1.511	-1.055	-0.832	-0.441	-1.524	-0.799	-1.178
ED13+	-1.280	-1.803	-2.074	-2.238	-1.717	-2.302	-1.746	-2.295	-2.084	-1.182	-1.061	-2.094	-1.929	-2.138
Mortality	0.006	0.024	0.036	0.007	0.023	0.021	0.014	0.014	0.035	0.022	0.035	0.009	0.026	-0.001^{ns}
Constant	-3.010	-5.202	-5.767	-5.888	-6.907	-6.012	-3.256	-8.048	-6.215	-4.388	-5.143	-5.302	-5.226	-7.563
R^2	0.604	0.588	0.533	0.688	0.545	0.547	0.583	0.648	0.627	0.678	0.581	0.633	0.673	0.672
N	14706	14464	23612	27867	13624	22506	15219	17638	47693	20222	20097	19376	11923	13404

Variable	Zambia	Zimb.
Age	0.420	0.339
Age^2	-0.003	-0.003
Urban	-0.140	-0.383
ED0	-0.018[ns]	0.315
ED1-6	--	--
ED7-8	-0.319	-0.616
ED9-10	-0.859	-0.892
ED11-12	-1.466	-1.407
ED13+	-2.481	-1.973
Mortality	0.000[ns]	0.020
Constant	-5.739	-3.983
R^2	0.674	0.623
N	14202	13367

All coefficients are significant at the .01 level, except as noted below.

[*] significant at the .05 level
[ns] not significant

Table A-3. Decomposition results by country, all women aged 15-49

Variable	Benin	B.F.	Bur.	Cam.	Chad	Com.	Congo	C.I.	DRC	Ethio.	Gab.	Ghana	Gui.	Kenya	Leso.
Education	19	33	17	68	-15	111	-97	30	-78	60	61	23	20	40	37
Mortality	74	93	16	13	-3	24	-20	26	-95	27	20	21	38	3	2
Urban	4	18	0	9	1	1	-61	13	7	18	12	8	4	6	23
Age	-1	-80	71	-7	39	-19	140	-47	-126	46	-66	-8	35	1	7
Total	95	64	103	83	22	116	-37	21	-216	151	27	44	97	50	69

Variable	Lib.	Mad.	Malawi	Mali	Mozamb.	Nam.	Niger	Nigeria	Rwa.	Sen.	Tanz.	Togo	Uga.
Education	45	19	63	12	83	80	-22	149	16	13	79	16	337
Mortality	80	83	19	69	108	7	-47	65	17	57	18	17	-5
Urban	20	-4	2	0	11	4	-2	4	3	5	7	5	54
Age	-56	-52	27	34	1	-11	92	-33	-4	-6	-75	-46	-223
Total	89	47	110	114	203	80	21	185	32	70	29	-8	162

Variable	Zambia	Zimb.
Education	266	59
Mortality	0	4
Urban	-18	2
Age	-449	-9
Total	-201	57

Note: Total may not equal sum of components due to rounding.

Figures show percentage of the change in mean number of children ever born that is attributable to the variable in question.