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INDICATORS OF TRENDS IN FERTILITY IN SUB-SAHARAN AFRICA

DHS ANALYTICAL STUDIES 34



AUGUST 2013

This publication was produced for review by the United States Agency for International Development. It was prepared by Charles F. Westoff, Kristin Bietsch, and Dawn Koffman of the Office of Population Research, Princeton University.

MEASURE DHS assists countries worldwide in the collection and use of data to monitor and evaluate population, health, and nutrition programs. Additional information about the MEASURE DHS project can be obtained by contacting MEASURE DHS, ICF International, 11785 Beltsville Drive, Suite 300, Calverton, MD 20705 (telephone: 301-572-0200; fax: 301-572-0999; e-mail: reports@measuredhs.com; internet: www.measuredhs.com).

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- to provide decision makers in survey countries with information useful for informed policy choices;
- to expand the international population and health database;
- to advance survey methodology; and
- to develop in participating countries the skills and resources necessary to conduct high-quality demographic and health surveys.

DHS Analytical Studies No. 34

Indicators of Trends in Fertility in Sub-Saharan Africa

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August 2013

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Editor: Bryant Robey
Document Production: Yuan Cheng

This study was carried out with support provided by the United States Agency for International Development (USAID) through the MEASURE DHS project (#GPO-C-00-08-00008-00) and MEASURE Evaluation (#GPO-A-00-09-00003-00). The views expressed are those of the authors and do not necessarily reflect the views of USAID or the United States Government.

Recommended citation:

Westoff, Charles F., Kristin Bietsch, and Dawn Koffman. 2013. *Indicators of Trends in Fertility in Sub-Saharan Africa*. DHS Analytical Studies No. 34. Calverton, Maryland, USA: ICF International.

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Preface

One of the most significant contributions of the MEASURE DHS program is the creation of an internationally comparable body of data on the demographic and health characteristics of populations in developing countries.

The *DHS Comparative Reports* series examines these data across countries in a comparative framework. The *DHS Analytical Studies* series focuses on analysis of specific topics. The principal objectives of both series are to provide information for policy formulation at the international level and to examine individual country results in an international context.

While *Comparative Reports* are primarily descriptive, *Analytical Studies* comprise in-depth, focused studies on a variety of substantive topics. The studies are based on a variable number of data sets, depending on the topic being examined. A range of methodologies is used in these studies, including multivariate statistical techniques.

The topics covered in *Analytical Studies* are selected by MEASURE DHS staff in conjunction with the U.S. Agency for International Development.

It is anticipated that the *DHS Analytical Studies* will enhance the understanding of analysts and policymakers regarding significant issues in the fields of international population and health.

Sunita Kishor
Project Director

Executive Summary

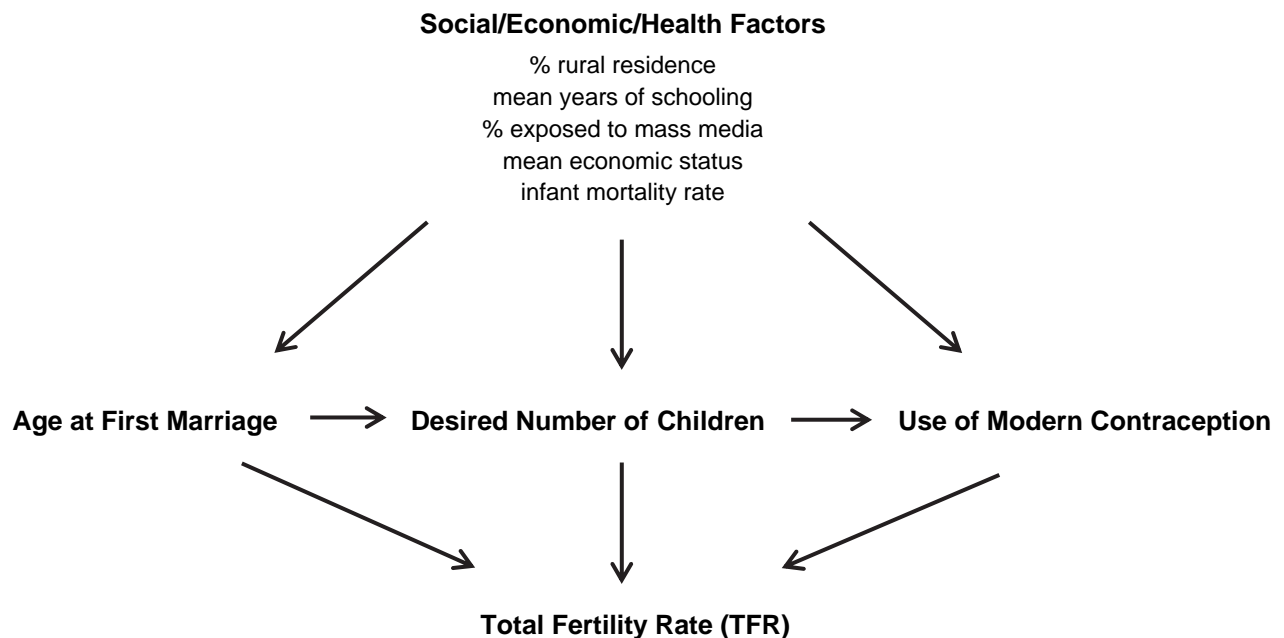
The main objective of this study is to evaluate the relative importance of the factors associated with the decline of fertility in sub-Saharan Africa. The analysis is based primarily on data from the Demographic and Health Surveys in 24 sub-Saharan countries that have conducted at least two surveys. The time interval between the last two surveys is most commonly five years. Most of the findings are based on the characteristics of women, but in 22 of the countries trends for men are also included. An analysis also summarizes findings for 20-year intervals for 12 countries with more than two surveys

Declines in the total fertility rate are strongly correlated with declines in the number of children desired and with increases in the use of modern contraception, but only weakly connected with increases in age at marriage. In turn, changes in the number of children desired are determined mainly by urbanization, by increases in years of schooling, and by exposure to mass media, while changes in contraceptive prevalence are associated with increases in media exposure, mainly television, improvements in economic status, and reductions in infant mortality. Increases in schooling are the primary determinant of increases in age at marriage. These generalizations are shown graphically for all of the countries, and the conclusions are derived from a series of multivariate analyses of these relationships based on 207 internal regions of the 24 countries.

Average changes in all of these determinants are also included for 16 Asian and Latin American countries for comparative purposes. They show the direction that the sub-Saharan African countries are heading.

Introduction

The fertility transition in sub-Saharan Africa is of great current interest because of the large number of its countries with continuing high rates of reproduction, many of which are just entering the downward paths seen throughout Latin America and Asia (Bongaarts and Casterline 2013). While many analyses focus on cross-sectional data, the underlying goal of this paper is to examine changes in country characteristics and their relationships with changes in fertility indicators. Change in the total fertility rate (TFR) is the ultimate focus, which is affected by changes in age at first marriage, desired number of children, and use of contraception as well as other indicators not examined in this analysis. These determinants, in turn, are affected by trends in social, economic, and health-related factors such as rural-urban residence, years of schooling, exposure to mass media, economic status, and infant mortality rates. Most of this research is based on the characteristics of women but a few parallel analyses are included for men. Graphically, the layered view of fertility change takes the following form:



This analysis focuses on the main measurable factors available from the Demographic and Health Surveys (DHS), although many other changes may be predictive of reproductive change. One measure that is not available for all the surveys is the changing status of women, which would ideally be included.

The paper describes the data and measures, the bivariate relationships between the social, economic, and health measures, the intermediate fertility-related variables, and the total fertility rate, and a multivariate analysis identifying the most important indicators.

Data

The countries chosen for analysis include 24 sub-Saharan African countries with multiple standard women's surveys in the DHS program, 22 of which have two surveys including male interviews. For each country, we examine the changes that occurred between the two most recent surveys. The most common interval between surveys is five years, although two of the countries (Burundi and Liberia) have much longer intervals between surveys. We also include a summary of fertility trends for 11 countries in Asia and 5 countries in Latin America for comparison. For a subset of 14 of the 24 African countries we have also explored changes among women over a longer period of time (20 years on average). Countries and survey dates are listed in the Appendix. Average values for each variable in the two most recent surveys are listed in Table 1.

For the sub-Saharan African countries, our analysis includes all women age 15-49. Because many of the countries in Asia do not include unmarried women, the analysis of those countries is confined to married women. We have also examined within-country regions for the later multivariate analyses.

Table 1. Average differences between the most recent and preceding surveys in characteristics of 207 regions in sub-Saharan Africa (1 = preceding; 2 = most recent)

Age at first marriage	1	17.8
	2	18.1
	Difference	0.3
Desired number of children	1	5.5
	2	5.3
	Difference	-0.2
Percent using modern methods	1	14
	2	19
	Difference	5
TFR	1	5.6
	2	5.4
	Difference	-0.2
Percent rural	1	70
	2	68
	Difference	-2
Mean years of schooling	1	4.1
	2	4.6
	Difference	0.5

(Continued...)

Table 1. – Continued

Percent listen to radio	1	72
	2	71
	Difference	1
Percent watch (have) television	1	32
	2	39
	Difference	7
Economic status	1	1.6
	2	1.8
	Difference	0.2
Infant mortality	1	83
	2	65
	Difference	-18

Measures

The total fertility rate (TFR) is used as the measure of fertility. It is the total number of births a woman would have by the end of her childbearing period if she were to pass through those years bearing children at currently observed age-specific fertility rates over the three-year period preceding each survey.

Age at first marriage is taken directly from the survey data. This measure excludes those who are not married at the time of the survey but who will marry. Because many men and women included in this measure were married years before the survey, the changes between surveys in age at first marriage may be minimal.

To measure each person's desired or ideal number of children, we use the survey question: "If you could choose exactly the number to have in your whole life, how many would that be?" (This phrasing is used for those with no children, while those with children are asked a slightly modified version). One difficulty in this measurement is the occurrence of non-numeric responses such as: "It's up to God" or "Whatever happens". In the 24 sub-Saharan countries studied here, this type of response has declined to an average of 7 percent of women in the most recent surveys (ranging from 0.2 percent in Lesotho in 2009 to 20 percent in Senegal in 2010-11) from an average of 9 percent in the penultimate surveys (ranging from 0.4 percent in Lesotho to 25 percent for Liberia in 1986, now at 6 percent (Bachan and Frye 2013)). In the 16 Asian and Latin American countries the average non-numeric response rate is lower, at 4 percent for the most recent surveys and 5 percent for the preceding surveys. For African men the rates are slightly lower, at an average of 6 percent and 7 percent in the most recent and penultimate surveys, respectively.

Based on a simple comparison of the actual number of children of those in the numeric and nonnumeric response categories, we know that women and men who give non-numeric responses about their desired number of children are at the higher end of the preference scale. To avoid under-estimation and loss of data, we convert non-numeric responses to a value equal to one standard deviation above the mean for each survey.

Another measure of reproductive preferences is the intention to cease having any more children. Because this is obviously connected with a respondent's existing number of children, this number is fixed in the measure. We use the proportion of married women with three or four children who want no more children as a secondary measure of the desired number of children. Changes in this measure are highly correlated (-.79) with changes in the desired number of children.

Our measure of contraceptive use is the percent of women currently using a modern method. We chose this measure because modern methods are more effective than other methods in preventing unintended pregnancies, and because modern methods are the primary focus of family planning programs. Changes in the use of all methods of contraception were also examined but were not significantly different statistically compared with changes in the use of modern methods.

The percent rural residence is defined by the standard DHS variable "type of place of residence." Mean years of schooling is used as the measure of education. Exposure to mass media (Westoff and Koffman 2011, Westoff et al. 2011) is measured here by the percent of women that watch any television and by the percent that listen to any radio. Because of questionnaire differences, television exposure for countries in Asia and Latin America is defined by ownership of a television set rather than by frequency of viewing. None of these measures contains information about the content of the exposure.

For the sub-Saharan African countries, we constructed a summary index of economic status which includes six equally weighted items: having or not having electricity, a toilet, a radio, a television set, a

bicycle, and a motor bike. Because the countries in Asia and Latin America are more developed, the summary measure of economic status for these countries includes a somewhat different set of equally weighted items: electricity, a telephone, a television set, a refrigerator, and a car or truck.

The infant mortality rate is the standard measure of the number of deaths before one year of age among 1,000 live births during the five years preceding the survey.

Bivariate Relationships

We explore the bivariate relationships between variables with a series of graphs. In the presentation of these results, the length of the arrows in the figures reflects the magnitude of change in each measure, but it can be affected by the interval between the two surveys (the longer the interval, the greater the opportunity for change to occur). This is not a serious problem since five years is the most common interval. The slope of the arrows reflects the strength of the bivariate association. An arrow that appears as a horizontal or as a vertical line shows change in one measure but not in the other. An arrow that appears at an angle reflects related changes in both measures.

We organize the description of these relationships by moving from the bottom of the flow chart (TFR) through the changes in the intermediate indicators, to the top tier of social, economic, and health changes.

TFR and Intermediate Fertility Indicators

From Figure 1 we see that changes in women's desired number of children and in the use of modern contraception are more highly correlated with changes in the TFR than are changes in the average age at first marriage.

Figure 1. Women's correlation coefficients

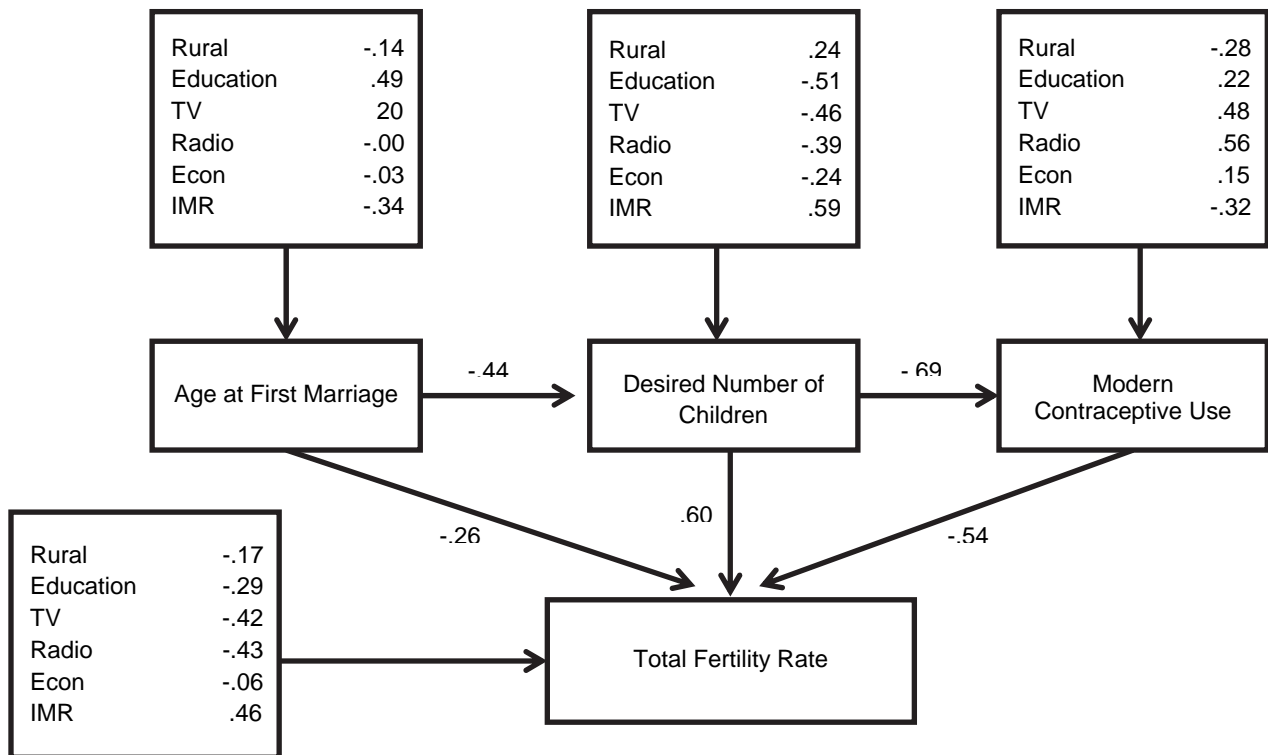
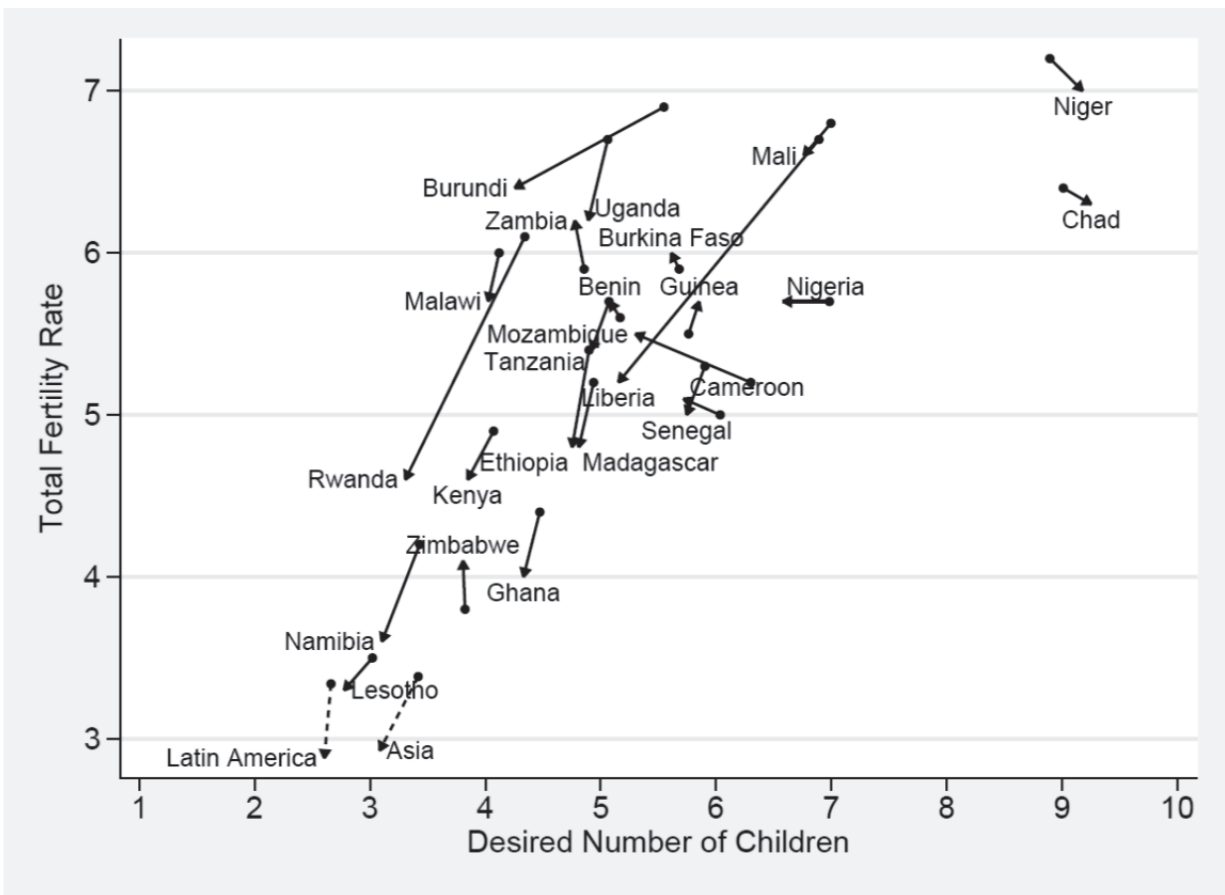


Figure 2 displays the relationship between TFR and women’s desired number children over time in the selected countries. There is a general though not universal pattern of decline in both measures, indicating the strong relationship between changes in demand for children and the realization of this demand. Some of this association may reflect the rationalization of unwanted births as being desired. Outside of the main group of countries, Niger and Chad both show increases in the number of children desired, though showing a slight decline in their high levels of total fertility. Mozambique is also an interesting exception, with increases in fertility across the last three surveys¹, though showing a decline in the desired number of children. Asia and Latin America appear in the bottom left corner of the graph, illustrating their average low desired fertility and actual fertility. Changes in the TFR have a similar correlation (-0.65 compared with -0.60) with changes in the percent of women with three or four children who want no more and with the measure of desired number of children.

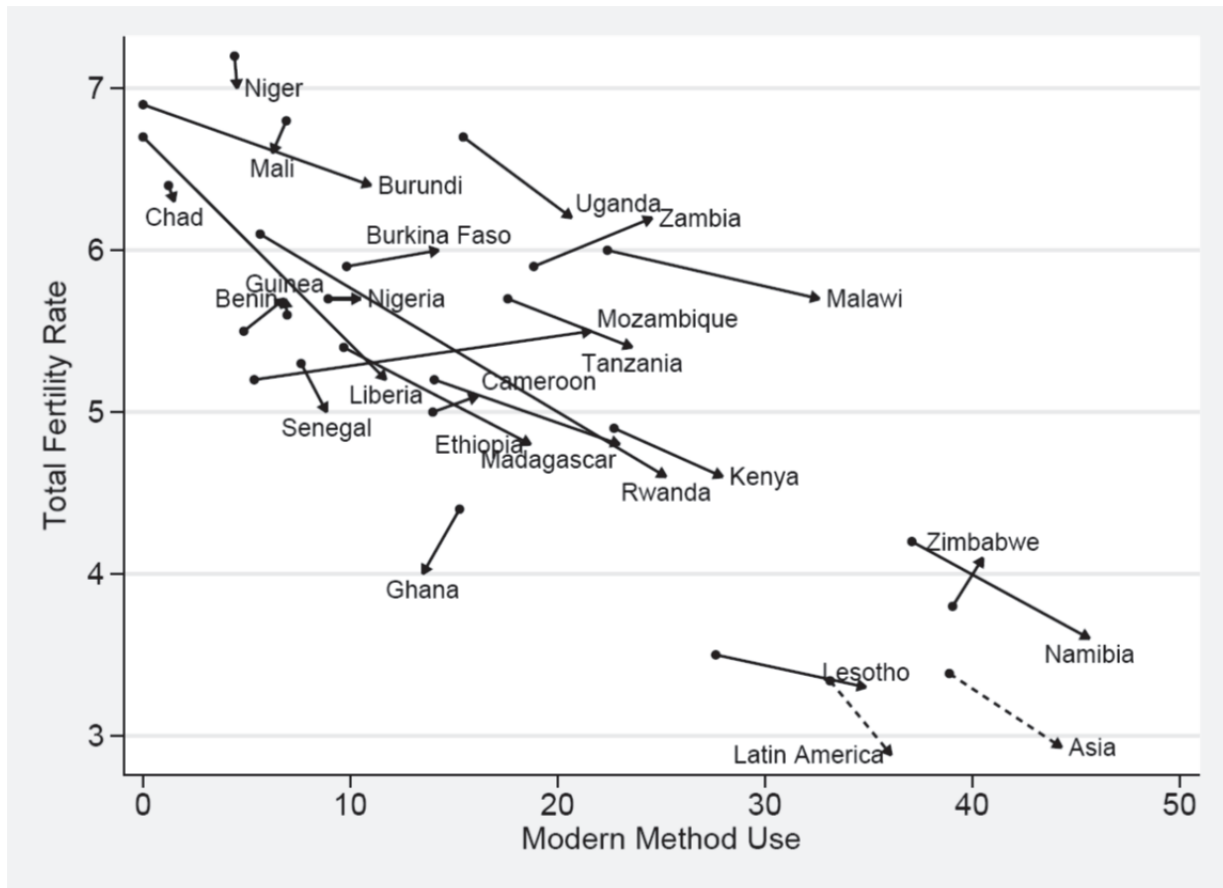
Figure 2. Changes in the total fertility rate by changes in women’s mean number of desired children



¹ The latest DHS in 2011 in Mozambique (not included here) shows a continuation of an increasing TFR from 5.2 in 1997, 5.5 in 2003 and 5.9 in 2011. This has been accompanied by a decline in contraceptive prevalence between 2003 and 2011 from 17 to 12 percent. This is an unusual picture in recent decades in Africa.

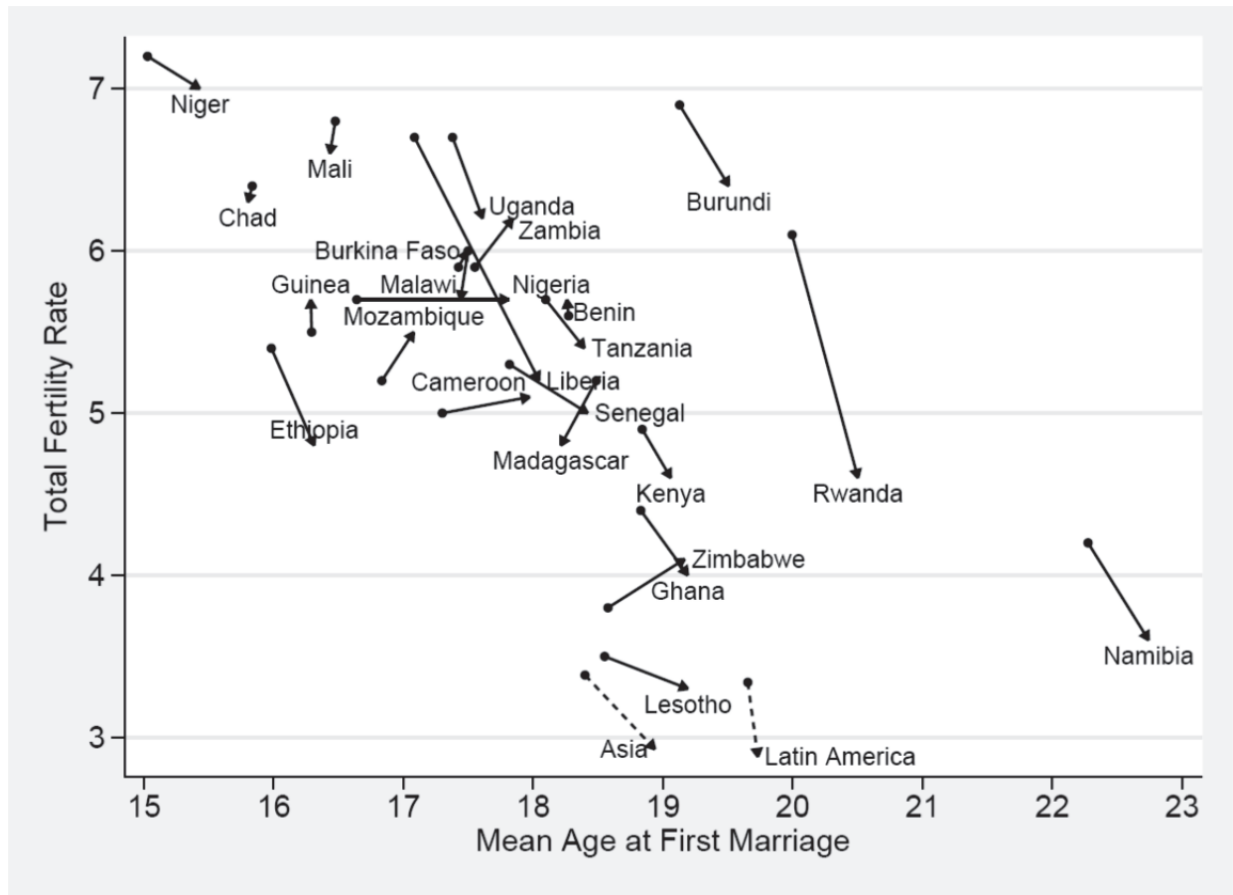
In Figure 3 the general picture is the familiar decline of the TFR with increases in the use of modern contraception. Again, there are several exceptions to this relationship, including Ghana and Mali, where the TFR declined while modern method use decreased slightly, and Mozambique, Burkina Faso, Zambia, and Zimbabwe, where the TFR increased despite increases in modern method use between surveys.

Figure 3. Changes in the total fertility rate by changes in the percent of women using modern methods of contraception



The mean age at first marriage for women is still below 20 in most African, Asian, and Latin American countries included in this report. Figure 4 illustrates the inverse relationship between this measure and total fertility. Since age at marriage reduces fertility only at the beginning of a woman's reproductive years, these small, recent changes do not show as dramatic an effect on changes in fertility as does the desired number of children and contraceptive use, which operate over a much longer time span.

Figure 4. Changes in the total fertility rate by changes in women's mean age at first marriage



Associations among Intermediate Fertility Indicators

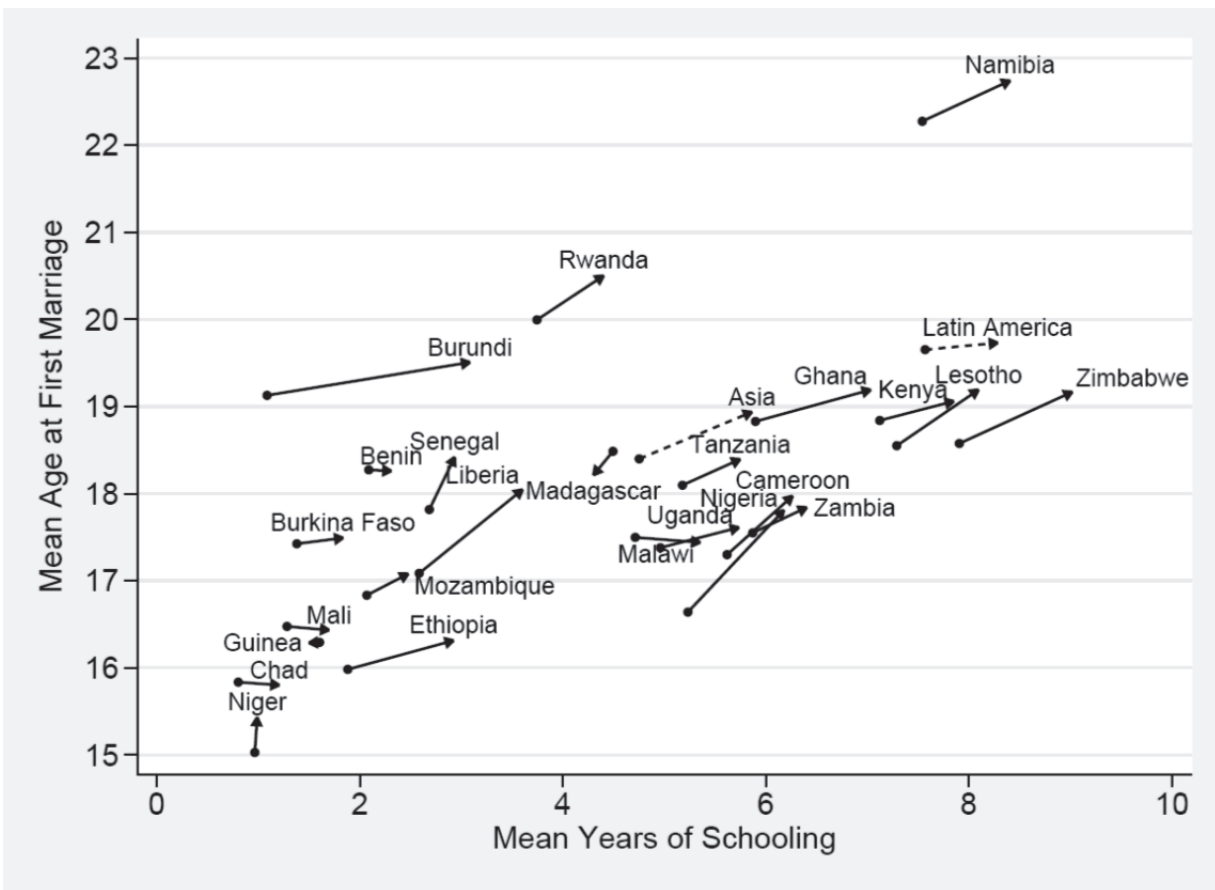
As displayed in Figure 1, changes in the intermediate fertility indicators are not only influenced by social, economic, and health factors but also by each other. For example, increases in age at marriage in many places are associated with decreases in desired number of children (a correlation coefficient of -0.44), and decreases in the desired number of children in turn are correlated with increases in contraceptive use (which has the highest correlation coefficient among the women's measures, at -0.69).

Associations of Social, Economic and Health Indicators with Intermediate Fertility Indicators

Turning to the top level of the model, we now examine the association of country-level changes in women's social, economic, and health indicators with the intermediate fertility indicators: age at first marriage, desired number of children, and use of modern contraception.

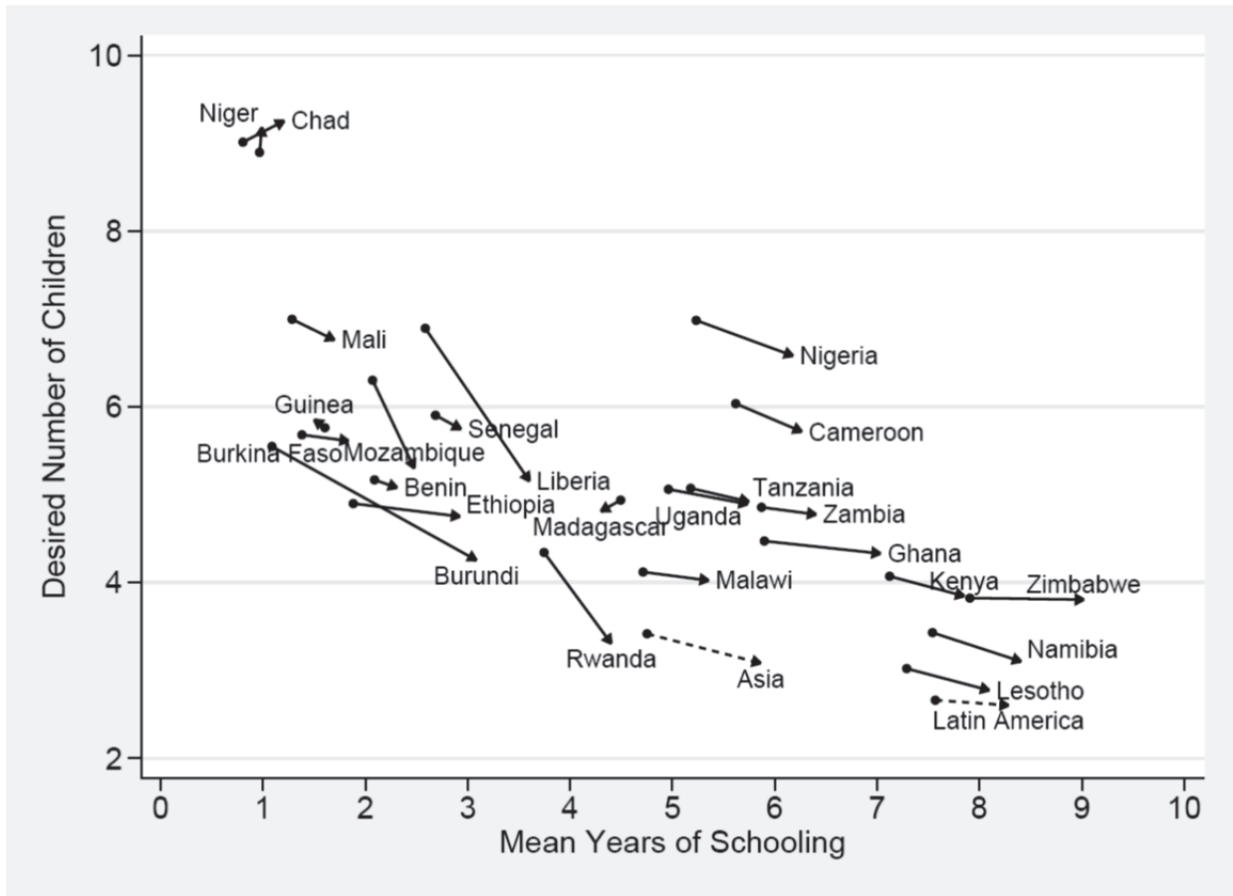
Beginning with age at first marriage, the highest correlation appears with changes in the mean years of schooling. As schooling increases (Figure 5), in most countries age at first marriage also rises. Burundi, Rwanda, and Namibia all stand out from the group with higher ages at marriage by level of education, but all three show increases in both measures between surveys.

Figure 5. Changes in women's mean age at first marriage by changes in mean years of schooling



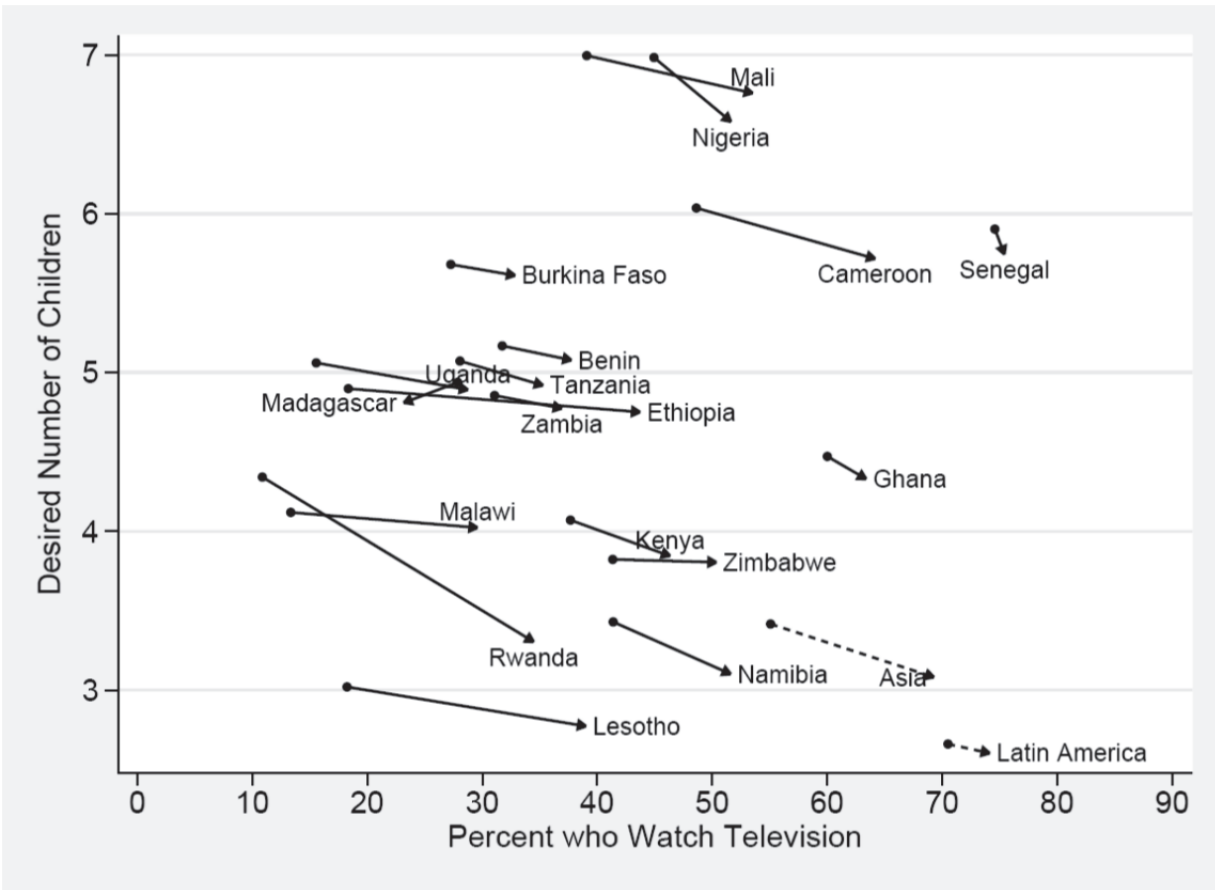
The desired number of children is highly correlated with several of the socioeconomic variables, including education, television, economic status, and infant mortality rate. For education (Figure 6), we see that, except for Niger and Chad, the countries form a general cloud illustrating the relationship of increasing years of schooling with a decrease in the desired number of children. As in other graphs, Madagascar emerges as an exception, in this case showing a decrease in the mean years of schooling while the desired number of children is also declining.

Figure 6. Changes in the mean number of children desired by women by changes in the mean years of schooling



While there is a large variation in the desired number of children, in almost all countries we see a shift toward increased television viewership (Figure 7). This is also true for Latin America and Asia, where viewership is measured as having a television in the household. Radio is a more complicated measure than television, as its use has actually declined in many countries between surveys, probably because of increasing availability of and preference for television.

Figure 7. Changes in women's mean number of desired children by changes in the percentage of women who watch television



All countries except Zimbabwe experienced growth in economic status as well as a decline in the desired number of children between surveys (Figure 8). Chad and Niger are isolated from the other countries with their high and slightly increasing desired number of children, and their low, though increasing economic status.

Figure 8. Changes in women’s mean number of desired children by changes in the mean economic status

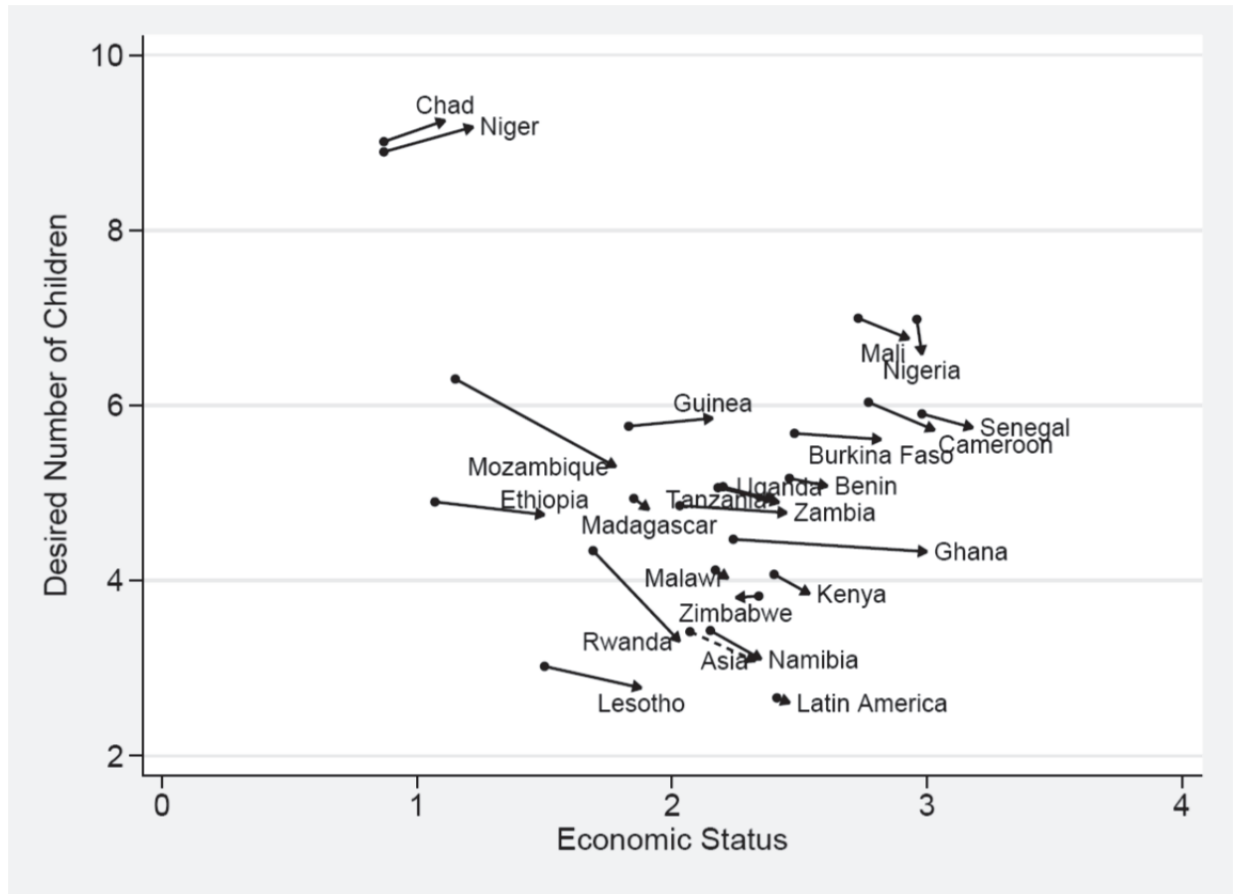


Figure 9 shows the infant mortality rate (IMR), which has the single highest correlation with desired number of children (0.59). In most countries we see a large drop in the IMR. Lesotho, which has a high prevalence of HIV (23 percent in 2011, UNICEF 2013), appears outside the main cluster of countries, with its high and unchanging IMR and low desired number of children. Another exception is Namibia, where the IMR increased between surveys in 2000 and 2006-07. According to the DHS Namibia country report, this may be a measurement problem rather than an actual increase.

Changes in the measure of women with three or four children who want no more children is correlated with the proportion watching television (0.40) (Figure 10) and is also highly correlated with the infant mortality rate (-0.42) (Figure 11). One hypothesis about the connection between declining infant mortality and the desired number of children is that fewer births are wanted as the chances of child survival improve. However, since the decline of infant mortality is enmeshed with other socioeconomic changes, only a multivariate analysis can elucidate competing explanations.

Figure 9. Changes in women's mean number of desired children by changes in the infant mortality rate

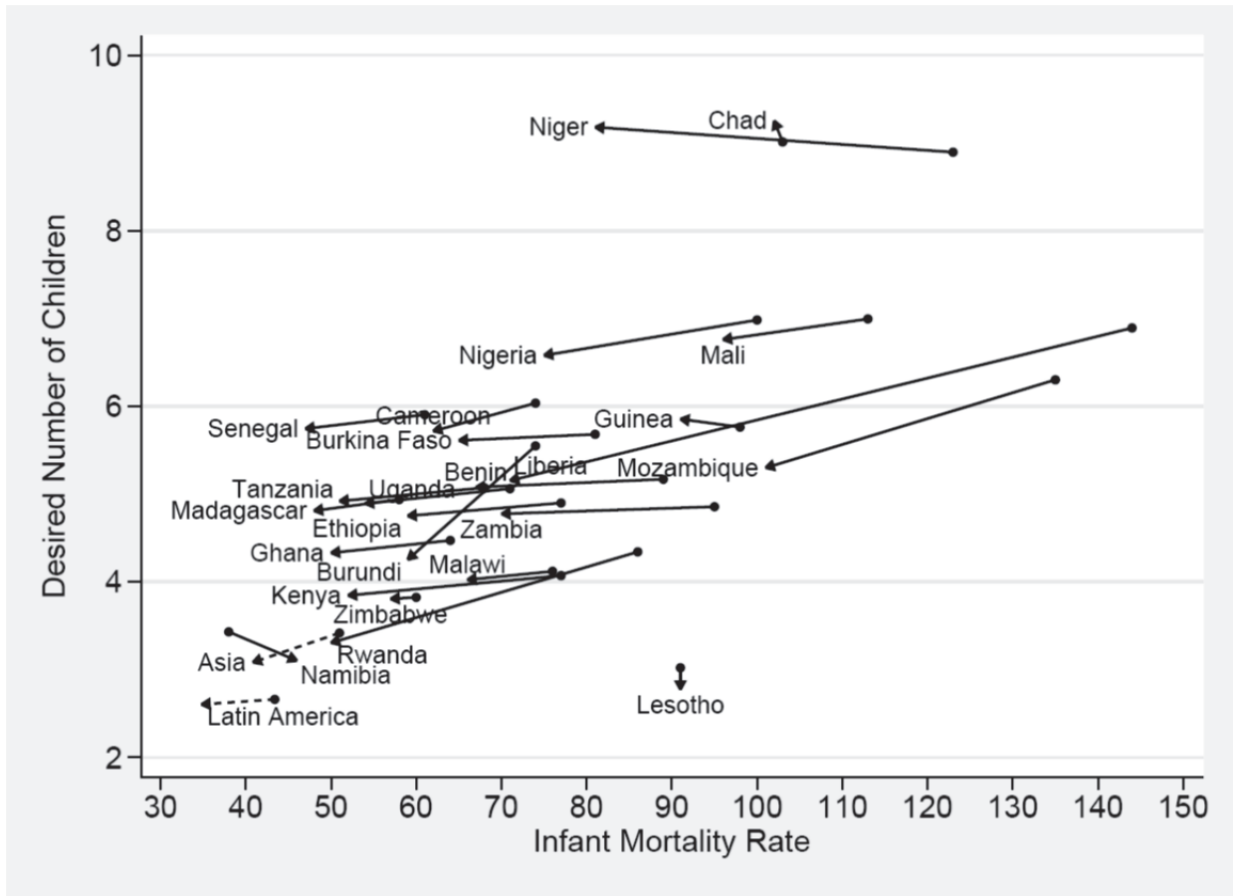


Figure 10. Changes in the percentage of married women with three or four children who want no more by changes in the percentage of women who watch television

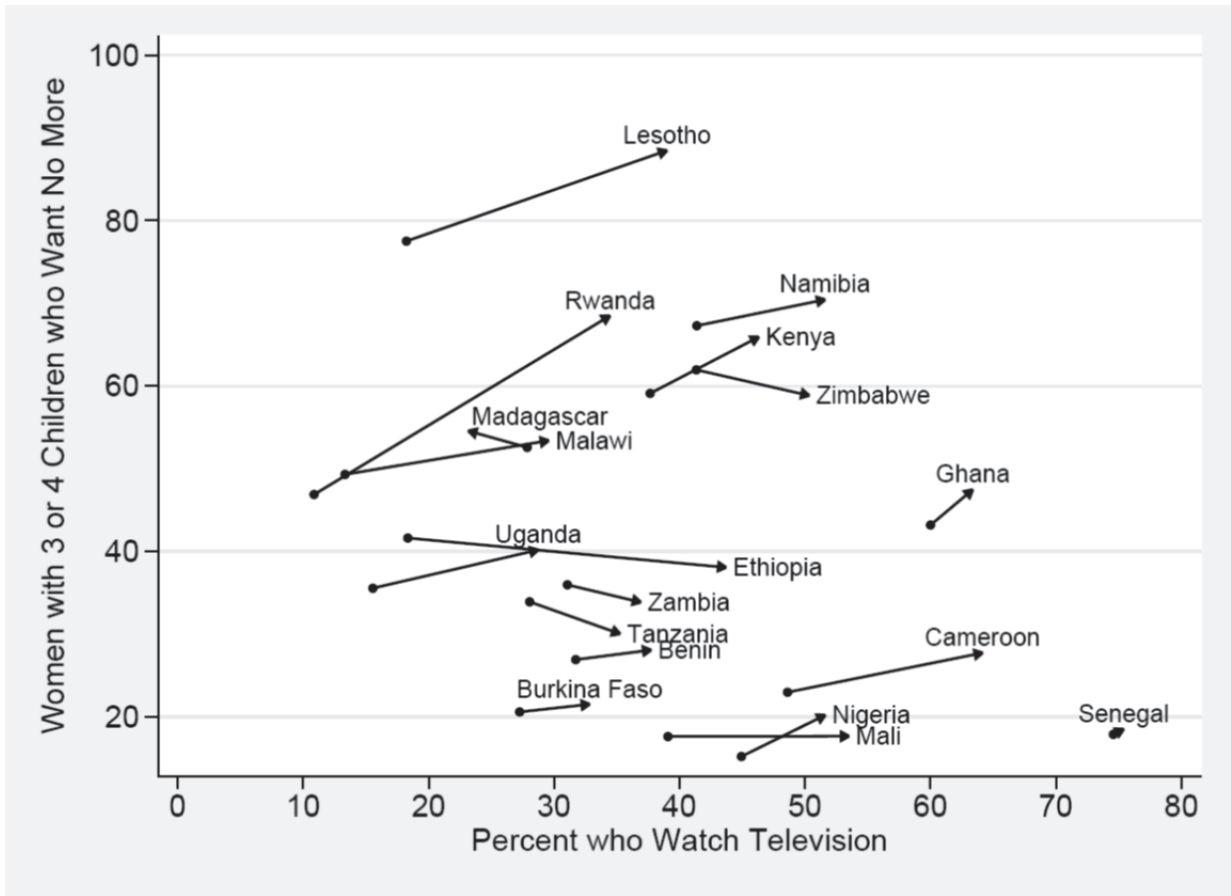
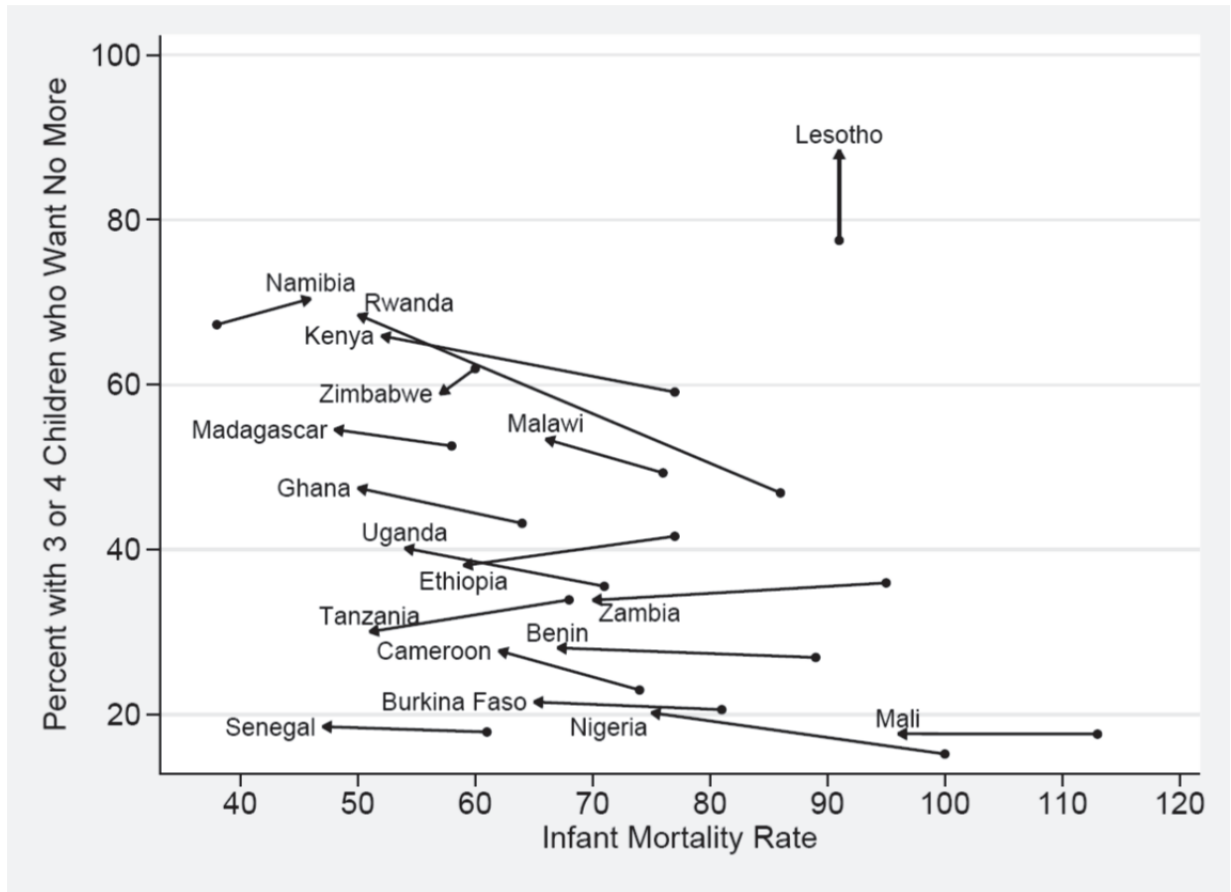


Figure 11. Changes in the percentage of married women with three or four children who want no more by changes in the infant mortality rate



Changes in media exposure are the most highly correlated with changes in the proportion of women using modern methods of contraception (Figure 12). Figure 12 illustrates this relationship in regard to television viewing. In most cases (including Asia and Latin America), there is a strong relationship and large changes in these measures between surveys. Figure 13 illustrates that, although the association is weaker than with several other variables, there is an important positive relationship with changes in mean years of schooling and contraceptive use. Except for Ghana and some countries at the lowest levels of years of schooling, there appears to be large positive changes in both modern method use and educational attainment.

Figure 12. Changes in the percent of women using modern methods of contraception by changes in the percentage of women who watch television

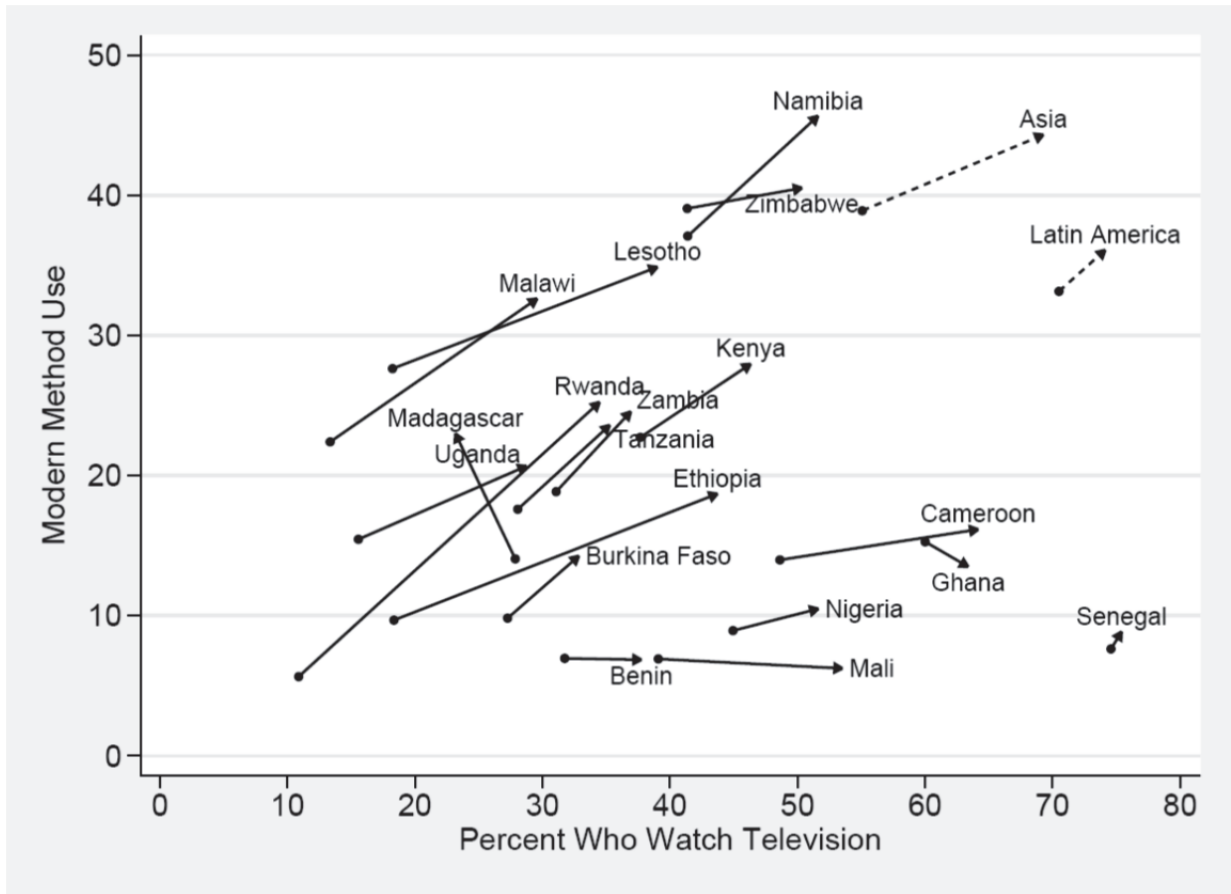
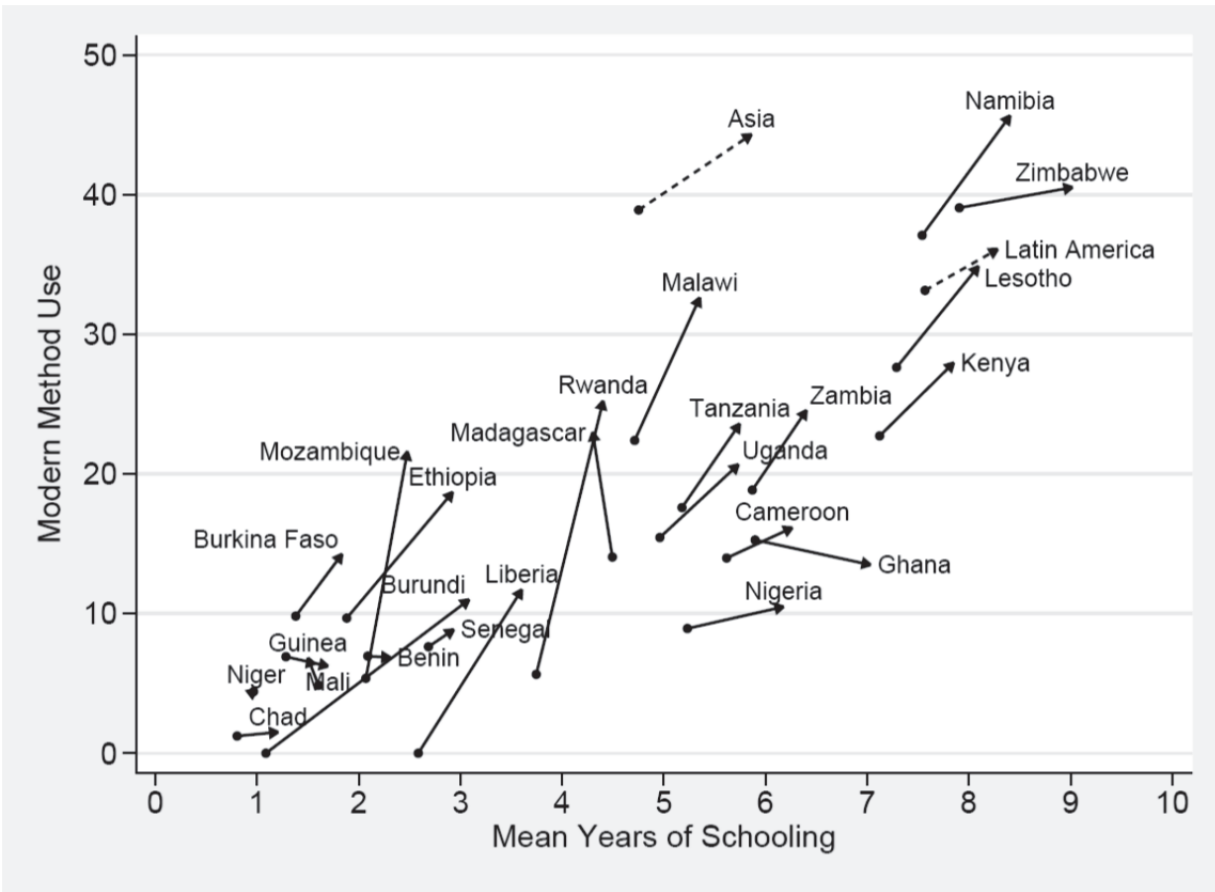


Figure 13. Changes in the percent of women using modern methods of contraception by changes in the mean years of schooling



Relationships between Social, Economic, and Health Indicators and TFR

In general, social, economic, and health changes should operate through proximate determinants of fertility to increase or decrease the total fertility rate (Bongaarts and Potter 1983). In this analysis however, we do not measure each proximate determinant, and only two of our intermediate fertility indicators, age at first marriage and use of modern contraception, are in that category. Therefore, relationships exist between changes in the selected social, economic, and health indicators and the TFR that are not fully captured by changes in the intermediate fertility measures discussed above.

Strong relationships appear with changes in the proportion rural (Figure 14), mean years of education (Figure 15), and the infant mortality rate (Figure 16). As with Latin America and Asia, many African countries show a decline in the total fertility rate with a decline in proportion of the population living in rural areas. This may be associated with many other changes, such as more availability of contraception, smaller desired family size, and increased access to education. For countries with mean levels of schooling above two or three years, there is a consistent trend (excluding in Zimbabwe) of declines in fertility with increasing levels of women's education. The Asian group stands apart from both Latin American and the African countries with a low level of total fertility at a lower level of education than in the other countries. Finally, declining levels of infant mortality are associated with lower total fertility rates. Most countries experienced dramatic declines in infant mortality between surveys, and even those that did not (Namibia and Lesotho) still show declines in the total fertility rate.

Figure 14. Changes in the total fertility rate by changes in the percentage of women who live in rural areas

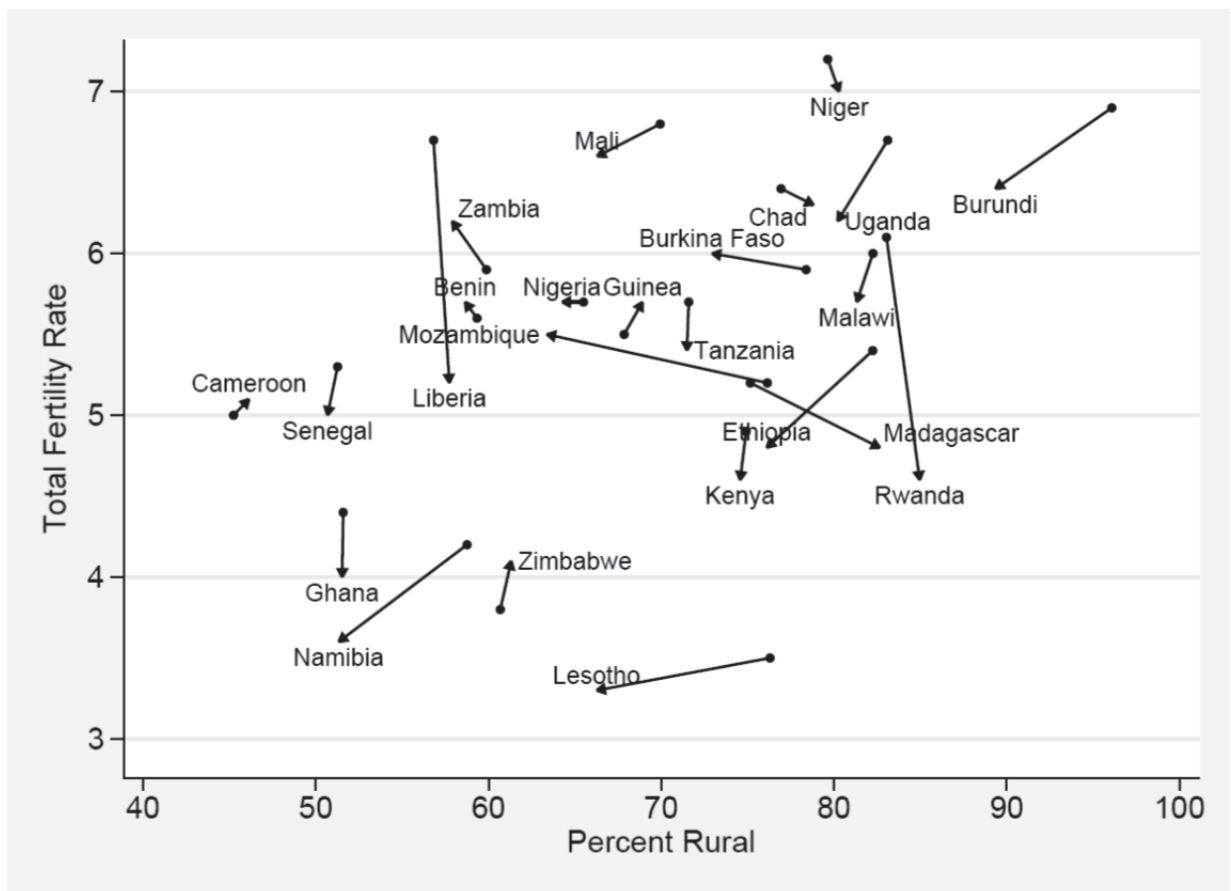


Figure 15. Changes in the total fertility rate by changes in the mean years of women's schooling

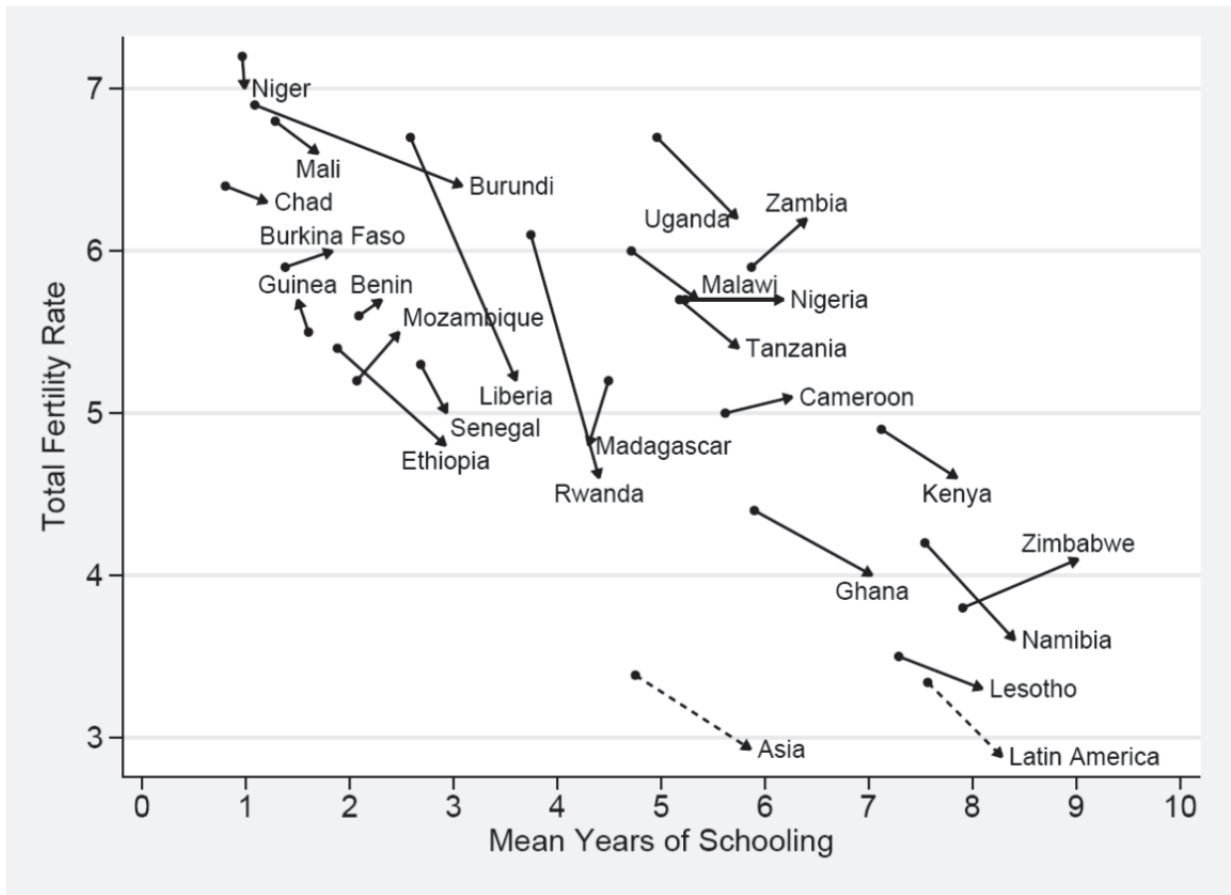
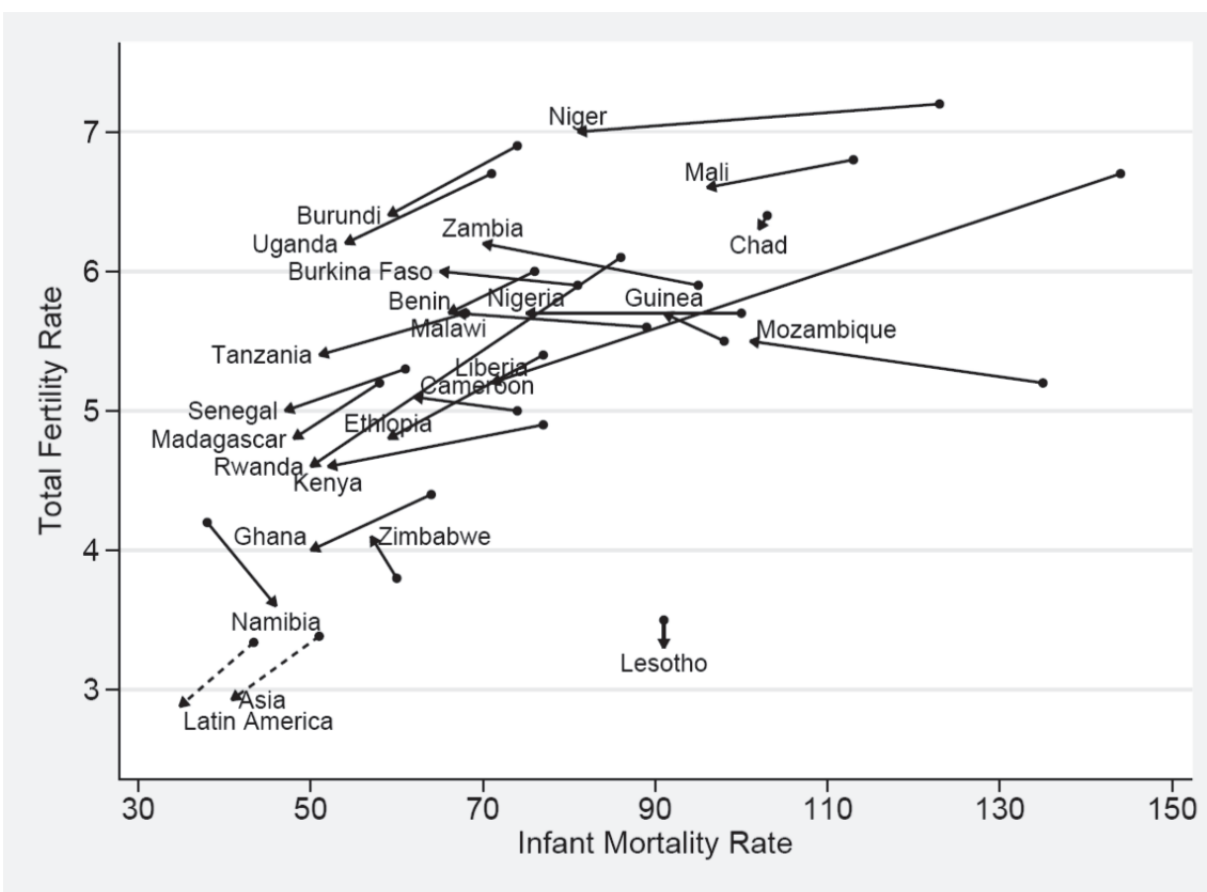


Figure 16. Changes in the total fertility rate by changes in the infant mortality rate



A Longer Perspective

About half of the 24 sub-Saharan African countries studied had participated in a much earlier DHS survey of women (see Appendix). This allows us to look at changes that occurred in our measures during longer intervals of approximately 20 years. In general, we find that the direction of change is similar to that seen during the shorter intervals between surveys, although the correlation is smaller with longer intervals. For example, the correlation between TFR and use of modern contraception for the 14 countries with roughly 20-year intervals between surveys is $-.29$, compared with $-.76$ for the same 14 countries for survey pairs with approximately five-year intervals. Another example is the association between desired number of children and the TFR. Over the longer interval, the correlation is $.35$, and with the shorter interval between surveys the correlation is $.79$.

We also find that countries that deviate in direction of change with shorter intervals show change in the modal direction when examined for longer intervals. One possible explanation is that when minimal change occurs, measurement error is more likely to alter the direction of change. One example of an exception seen during the shorter interval that reverts to the expected direction during the longer interval is Cameroon's increase in TFR (from 5.0 to 5.1) between 2004 and 2011 and its decrease in TFR (from 5.8 to 5.1) between 1991 and 2011. Another example is Ghana's decrease in modern method use (from 15 percent to 13 percent) between 2003 and 2008 and its increase in modern method use (from none to 13 percent) between 1988 and 2008.

The graphs presented in this paper primarily show survey pairs with shorter intervals because this allows us to discuss more countries and to study the bivariate relationships between a greater number of measures. It is important to note, however, that these same relationships are seen when we look at survey pairs with longer intervals. In fact, countries that seem to be outliers when looking at shorter intervals fall into place when taking a longer view.

Bivariate Relationships for Men in Sub-Saharan Africa

As well as analyzing survey findings for women, we were able to examine some of the measures discussed above for men for the more recent intervals, including age at first marriage and desired number of children. Contraceptive use is not included here because of limited questions asked to men in earlier surveys. Figure 17 illustrates the relationship of the measures and their correlations among men. The total fertility rate and infant mortality rate are population measures and therefore are identical for men and women. The two highest correlations in the male framework are changes in the proportion rural and changes in the infant mortality rate with desired number of children. Desired number of children is higher for men than for women (especially in the earlier surveys), and many countries see large declines between surveys.

Figure 18 shows the declining desired number of children of African men with the declining infant mortality rate. Niger and Nigeria, two countries with high numbers of desired children in the earlier surveys, show dramatic declines in infant mortality and desired children, although the number of children desired remains higher than in most other African countries. Changes in the proportion of men with three or four children who want no more and changes in the total fertility rate are highly correlated (-0.76), although the relationship between the changes is weak at the higher end of the total fertility rate range (Figure 19). While the weaker correlations among the male measures illustrate the importance of women's socioeconomic status and fertility change, men's desires for smaller families may facilitate these changes.

Figure 17. Men's correlation coefficients

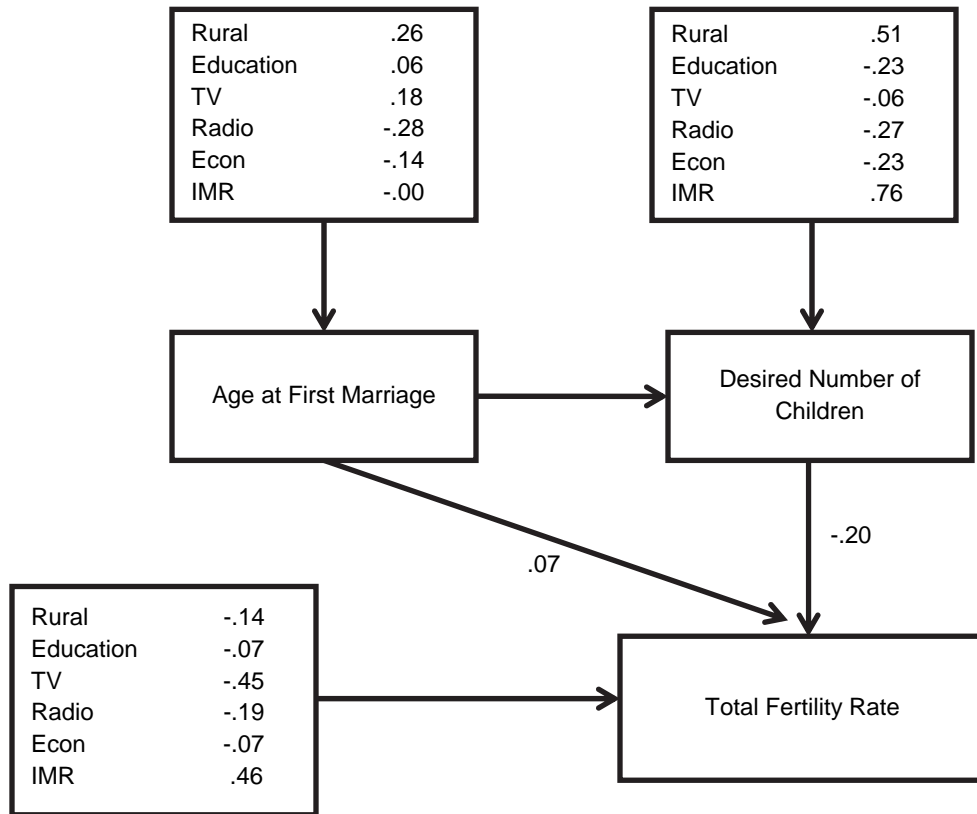


Figure 18. Among men, changes in the mean number of desired children by changes in the infant mortality rate

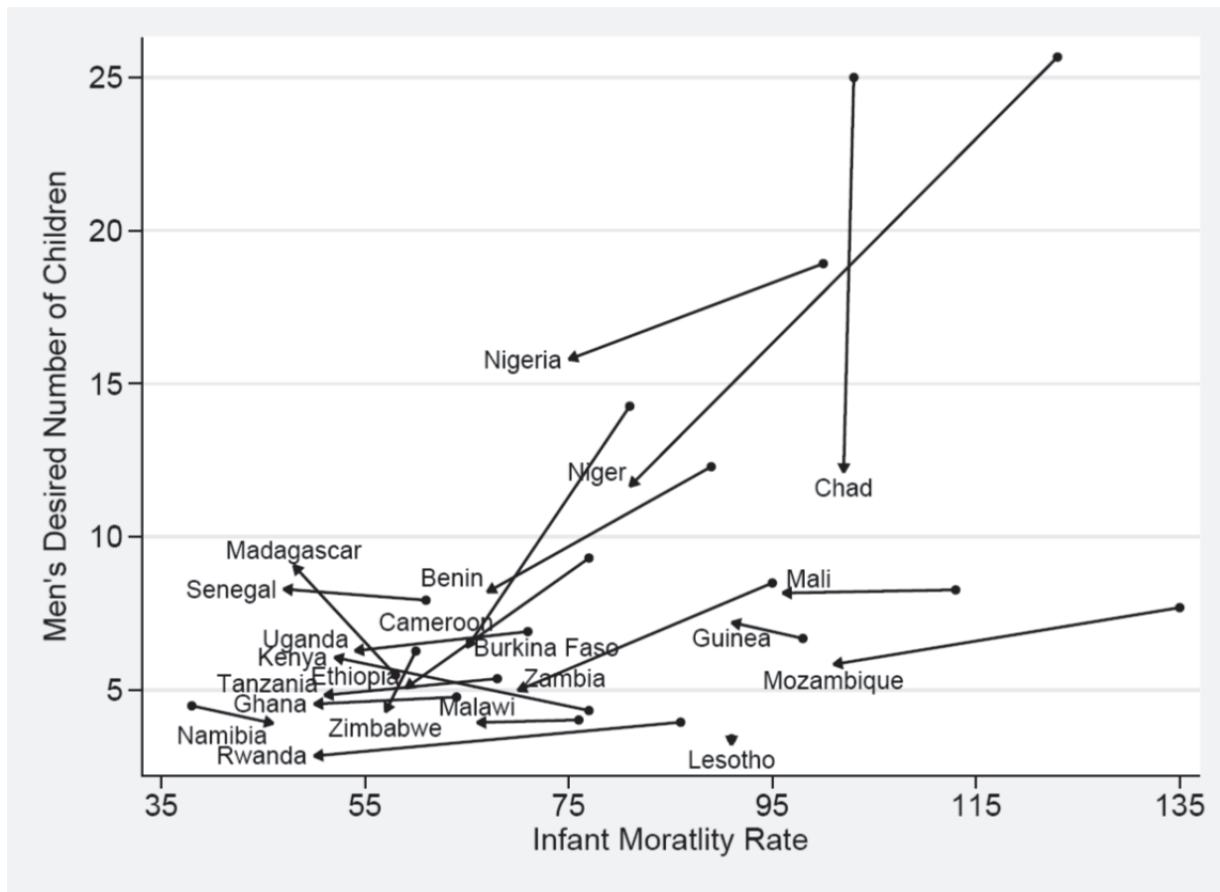
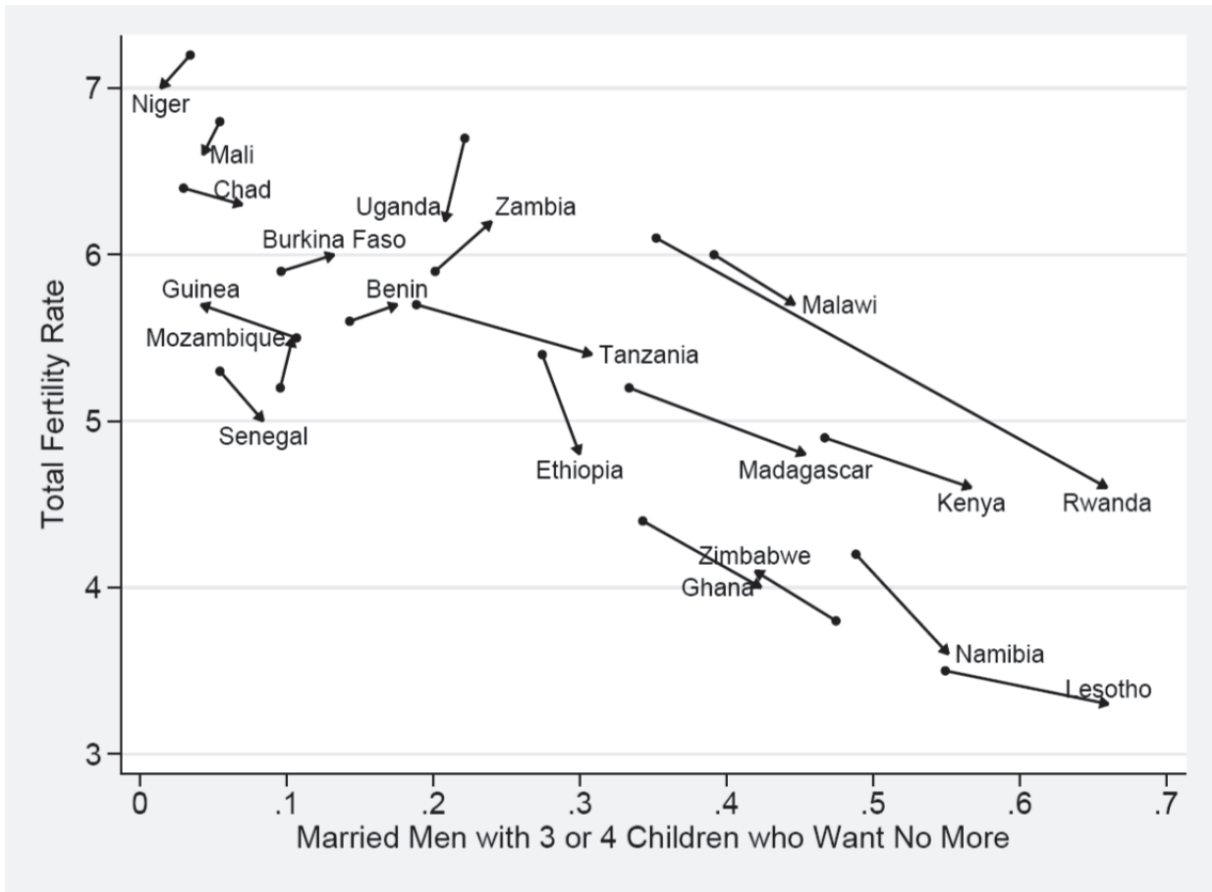


Figure 19. Changes in the percentage of married men with three or four children who want no more by changes in the total fertility rate



Multivariate Analysis

The analysis thus far has focused on bivariate associations of various measures of change in 24 countries of sub-Saharan Africa. Since these measures, and changes over time in these measures, are often correlated, there remains the question of the relative importance of changes in particular indicators when considered simultaneously with changes in other indicators.

Because the sample of these countries is small, we analyze the 207 internal regions of these countries. Since countries vary widely in the number of regions, based largely on administrative rationales, a statistical weight is used (the inverse of the number of regions in each country) to neutralize the variation in that number, so that each country has an equal weight in the analysis. These analyses are all based on women.

The ultimate objective is to identify the determinants or indicators of changes in fertility. We look first at changes in the more primary antecedents of the fertility rate: age at marriage, number of children desired, and use of modern contraception (Table 2). The two best predictors of changes in the TFR are changes in the mean number of children desired and changes in the percent using modern contraception. Age at marriage shows very little influence in the presence of the other two indicators.

Table 2. Multivariate analysis of regional changes in age at marriage, in the number of children desired, and in the use of modern contraception with regional changes in the total fertility rate (standardized partial regression coefficients)

Changes in the:	Sub-Saharan Africa
Mean age at marriage	-.08
Mean number of children desired	.26*
Percent using modern contraception	-.20*

*Significant at least at the .05 level

Multiple regressions² of these antecedent variables along with other covariates are presented in Tables 3 and 4 for the internal sub-Saharan African regions. Increases in age at marriage are dominated in this part of the world by increases in education (Table 3). The two main predictors of decline in the number of children desired are increases in years of schooling and decreases in the percentage of the population residing in rural areas. The strongest predictor of the increase in the use of modern contraception is the increase in television exposure, which is more important than change in radio exposure. The final column in Table 3 shows the net effects on change in TFR of these covariates. The main indicators are changes in economic status and in infant mortality.

As the average economic status of these African regions increases, the TFR decreases. As infant mortality rates decline, the TFR declines, presumably because of the impact of increases in the use of modern contraception.

² The regression analyses here present the standardized partial regression coefficients or betas, which permit comparisons of the relative strengths of the covariates.

Table 3. Covariates of changes in women's age at marriage, desired number of children, use of modern contraception, and the TFR in 177 regions of sub-Saharan Africa (standardized partial regression coefficients)

Changes in:	Age at Marriage	Desired Number of Children	Use of Modern Contraception	TFR
Years of schooling	.68*	-.21*	-.15	-.14
Percent rural	.16	-.21*	.08	-.13
Infant mortality	.03	.11	-.17*	.24*
Radio listening	.09	-.17*	.18*	.05
TV watching	-.15	-.13	.37*	-.16
Economic status	.03	-.10	.17*	-.30*
R ²	.34	.18	.30	.24

*Significant at least at the .05 level

Table 4 includes these same covariates as well as the three antecedent measures of age at marriage, the number of children desired, and contraceptive practice. The purpose of this regression analysis is to determine whether certain covariates add to the prediction of change in the TFR independently of changes in the three antecedent variables. The outcome is that age at marriage is not significant in contrast to the number of children desired and the use of modern contraception. The other two indicators that persist are change in infant mortality and in economic status.

Table 4. All covariates of the changes in the TFR in 177 regions of sub-Saharan Africa (standardized partial regression coefficients)

Changes in:	TFR
Age at marriage	.04
Desired number of children	.25*
Use of modern methods	-.21*
Years of schooling	-.15
Percent rural	-.07
Infant mortality	.17*
Radio listening	.13
TV watching	-.04
Economic status	-.24*
R ²	.35

*Significant at least at the .05 level

Summary and Conclusions

This study examines many of the indicators of declining fertility in sub-Saharan Africa. Of the three intermediate-level measures in our framework, reductions in the desired number of children and increases in the use of modern contraception are clearly the most important, while increases in age at first marriage play only a minor role. In turn, the number of children desired is determined by increases in education, urbanization, and mass media exposure. Increasing use of modern contraception is associated mainly with increasing media exposure, particularly television, although a decline in infant mortality and improvement of economic status are also important factors. Increasing education is relevant to all three antecedents (Garenne 2012) and appears to be the primary driver of later age at first marriage.

Understanding the connections between changes in socioeconomic measures, intermediate-level fertility predictors, and the TFR allows us to better understand the fertility decline currently underway in many countries of sub-Saharan Africa. This understanding in turn allows policymakers to set social and economic priorities that address concerns related to the continuing high rates of reproduction. This appears to have been done quite effectively, for example, by a committed government effort in Rwanda, which saw a decline in the TFR from 6.1 to 4.6 and an increase in the use of modern contraception by married couples from 17 to 52 percent between 2005 and 2010 (Westoff 2013).

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Appendix

Appendix Table. Country demographic and health surveys

Sub-Saharan Africa				Asia / Latin America		
Benin*		2001	2006	Bangladesh	2000	2007
Burkina Faso*	1993	2003	2010	Bolivia	2003	2008
Burundi		1987	2010	Cambodia	2005	2010
Cameroon*	1999	2004	2011	Colombia	2005	2010
Chad*		1997	2004	Dominican Rep.	2002	2007
Ethiopia*		2005	2011	Egypt	2000	2008
Ghana*	1988	2003	2008	Haiti	2000	2006
Guinea*		1999	2005	India	1999	2006
Kenya*	1993	2003	2009	Indonesia	1997	2007
Lesotho*		2004	2009	Jordan	2002	2007
Liberia		1986	2007	Morocco	1992	2004
Madagascar*	1992	2004	2009	Nepal	2006	2011
Malawi*	1992	2004	2010	Pakistan	1991	2007
Mali*	1987	2001	2006	Peru	2000	2008
Mozambique*		1997	2003	Philippines	2003	2008
Namibia*		2000	2006	Turkey	2003	2008
Niger*		1998	2006			
Nigeria*	1990	2003	2008			
Rwanda*	1992	2005	2010			
Senegal*	1986	2005	2010			
Tanzania*	1999	2004	2010			
Uganda*		2006	2011			
Zambia*		2002	2007			
Zimbabwe*	1988	2006	2011			

*Includes male surveys

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