DHS Analytical Studies 3

Trends and Differentials in Adolescent Reproductive Behavior in Sub-Saharan Africa

MEASURE *DHS+*

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Trends and Differentials in Adolescent Reproductive Behavior in Sub-Saharan Africa

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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 Analytical Studies* series and the *DHS Comparative Reports* series examine these data, focusing on 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. Whereas *Comparative Reports* are primarily descriptive, *Analytical Studies* take a more analytical approach.

The *Analytical Studies* series comprises 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 under study. A range of methodologies is used, including multivariate statistical techniques. The topics covered are selected by MEASURE *DHS*+ staff in conjunction with the MEASURE *DHS*+ Scientific Advisory Committee and USAID.

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

Martin Vaessen
Project Director

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Executive Summary

Fertility levels in sub-Saharan Africa are among the highest in the world. Much of the high fertility can be attributed to young age at first sex, young age at first union, and young age at first birth. At the same time, there is wide variation in early initiation of reproductive behavior across countries and between subgroups in the same country. This paper examines the trends and differentials in age at first sex, age at first union, and age at first birth in the adolescent populations in selected sub-Saharan countries.

The study draws on data from Demographic and Health Surveys carried out in eight countries—Burkina Faso, Côte d'Ivoire, Ghana, Kenya, Mali, Senegal, Tanzania, and Zimbabwe. These countries had at least two surveys conducted approximately five years apart, with questionnaires for women and men of reproductive age.

The main analytical tool used to carry out the study is a multivariate logistic model that uses a generalized estimating equation to consider the probability of a young woman having a birth, sex, or union before age 18. The study also considers the probability of a young man engaging in first sex or union before age 20.

The results suggest that certain sociodemographic characteristics of adolescents, particularly education, have a strong influence on early reproductive outcomes. However, the direction of the relationship is not always the same for young women as for young men. The effects of community characteristics are inconclusive. While these results may be useful for identifying target groups for reproductive health services and outreach programs, further research is needed to find more appropriate community-level measures for assessing adolescent reproductive behavior.

1 Introduction

Over the past four decades the developing world has seen important changes in reproductive behavior in both adult and adolescent populations. Fertility has declined rapidly in the face of higher levels of schooling, better health care, increased urbanization, and greater exposure to modern forms of mass communication. In developing countries in particular, estimates indicate that fertility has dropped by about one-third, from an average of six lifetime children per woman in the 1960s to about four today. However, wide variations in reproductive behavior persist at the national and subnational levels, and across social groups. While much research has been carried out on the causes and consequences of differential behavior among adults, until recently adolescents have received relatively little attention. The factors that influence adolescents to behave similar to, or different from, adults remain less understood.

In conjunction with an increasing body of literature on adolescent reproductive behavior produced in the past decade, concerns are increasing over the health, social, and economic consequences of early sexual activity, pregnancy, and childbearing. A review of the literature reveals a number of potentially adverse impacts of early sex, including unplanned pregnancy and exposure to sexually transmitted infections (STIs) through unprotected sex. Early childbearing has been linked to higher rates of maternal and child morbidity and mortality,[1] truncated educational opportunities, and lower family income. Larger completed family size is one of the long-term demographic effects of adolescent fertility because the timing of the first birth is usually an indicator of future fertility patterns (see Menken, 1980; Senderowitz and Paxman, 1985; Voydanoff and Donnelly, 1990; Wulf and Singh, 1991).

The Program of Action of the International Conference for Population and Development, recently reaffirmed the priority of providing reproductive health services for youth (United Nations, 1999). To achieve this objective, policymakers need a better understanding of the causes and consequences of initiation of reproductive behavior among adolescents. The purpose of this report is to present a comparative perspective on determinants and trends in the timing of sexual activity, union formation, and childbearing during adolescence. The analysis draws on data collected by Demographic and Health Surveys (DHS) in eight sub-Saharan countries in which at least two surveys were conducted, each with questionnaires for women and men of reproductive age.

The report is divided into six sections. Following the introduction, section 2 outlines a conceptual framework for the analysis of adolescent reproductive behavior. Section 3 details the data and statistical methods being used. Section 4 presents descriptive analyses of the trends in sociodemographic characteristics, reproductive health knowledge, and reproductive practices of the adolescent populations in each country. Section 5 focuses on multivariate analyses of changes in reproductive behavior among the target groups. Section 6 summarizes results and explores the policy and programmatic implications.

[1] Among the documented health consequences of early childbearing are higher than average levels of toxemia, anemia, bleeding, cervical trauma, prolonged and difficult labor, premature delivery, and death. Children born to teenage mothers are susceptible to higher incidence of low birth weight (which can lead to neurological problems, retardation, and death), prematurity, stillbirth, and perinatal mortality (Senderowitz and Paxman, 1985).

2 Conceptual Framework

Sub-Saharan Africa has some of the highest levels of adult and adolescent childbearing in the world. Since the 1980s, several countries in the region have begun a transition to lower fertility. This has generally been accompanied by an upward trend in the age at first birth, although wide variations remain across countries and social groups.

The present study examines trends in age at first birth among women in eight countries in sub-Saharan Africa (Burkina Faso, Côte d'Ivoire, Ghana, Kenya, Mali, Senegal, Tanzania, and Zimbabwe), drawing on information from successive DHS surveys conducted between 1987 and 1999 (see Table 2.1). The goal is to evaluate the risk of a young woman having a first birth before age 18. Because of the strong associations between fertility and sexual activity and union formation, our analysis also focuses on changes in age at first sex and age at first union. Trends in male reproductive behavior are explored where data permit. We systematically look at changes over time for any evidence of patterns at the individual and contextual levels that could help explain early initiation of reproductive behavior. Understanding the sociodemographic causes of changes in behavior will assist program planners and policymakers in creating programs aimed at improving reproductive health care for adolescents.

Table 2.1 Summary of DHS surveys used in this analysis, 1987-1999

	Year of fieldwork	
Country	Earlier survey	Later survey
Burkina Faso	1993	1998/99
Côte d'Ivoire	1994	1998
Ghana	1993	1998
Kenya	1993	1998
Mali	1987	1995/96
Senegal	1992/93	1997
Tanzania	1991/92	1996
Zimbabwe	1994	1999

The framework for this analysis is based on the Bongaarts model of proximate determinants which measures the effects of behavioral and biological variables on fertility (Bongaarts, 1978). These intermediate variables are the pathways through which sociodemographic variables directly influence fertility outcomes. They pertain to the three stages of the reproductive process: intercourse, conception, and gestation and parturition. The intermediate variables are: proportion of reproductive age who are married or in union, frequency of sex, contraceptive use, lactational infecundability, duration of the fertile period, sterility, spontaneous abortion, and induced abortion. These variables are considered to most directly influence fertility in any society.

Borrowing from this framework, we can consider only those variables that affect the probability of early first birth. Because lactational infecundability only applies to women who have a previous child, it is dropped for this model. Given the lack of consistent, reliable data, such variables as duration of the fertile period,[2] sterility, and abortion (induced or spontaneous) are not considered here. Age at entry into union, age at first sex, and contraceptive use remain as intermediate variables that affect the timing of the first birth.

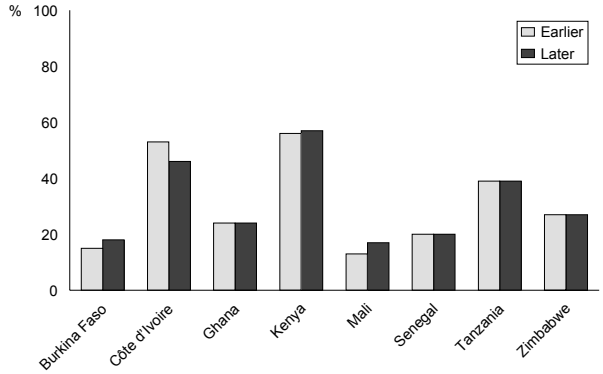
[2] It is likely that the duration of the fertile period varies across societies in sub-Saharan Africa but is increasing over time as the average age at menarche declines under conditions of improved nutritional status (Meekers, 1994). Different levels of sterility might also exist due to sexually transmitted infections.

Intermediate fertility variables	Intermediate variables for early first birth
Proportion married or in union	Age at first union
Frequency of sex	Age at first sex
Contraceptive use	Contraceptive use
Lactational infecundability	Lactational infecundability (not applicable)
Duration of fertile period	Age at menarche (not considered here)
Sterility	Sterility (not considered here)
Induced abortion	Induced abortion (not considered here)
Spontaneous abortion	Spontaneous abortion (not considered here)

Early initiation of sexual activity warrants particular attention among both males and females given the risk of contracting or transmitting a sexually transmitted infection such as HIV/AIDS. The risk of contracting a disease is affected by the age of sexual debut. An individual who initiates sexual activity at age 15, for example, will have more exposure to STIs over the reproductive period than one who initiates sex at age 20. Also, sexual activity at a younger age is often associated with greater likelihood of unprotected intercourse and multiple partners, which can leave the adolescent at greater risk of STIs (Blanc and Way, 1998).

Early entry into union is considered to be strongly associated with early childbearing. Assuming that living with a partner exposes individuals to regular sexual activity, union formation will increase the probability of conception. For most countries in sub-Saharan Africa, the majority of childbearing occurs in union,[3] but in both Côte d'Ivoire and Kenya about half of first births among women under age 18 occurred out of union (Figure 2.1). In some societies an early birth is seen as securing the marriage because it demonstrates the woman's fecundity to the man's family and increases her social standing. In such a case, union formation is not a determinant of the first birth, rather the first birth is a determinant of union formation.

Figure 2.1 Percentage of women age 15-19 who had their first birth before age 18 and out of union, by relative date of survey



The effects of early union formation on risk of STIs are mixed. If the couple remain faithful to each other, the risk of infection is reduced for both partners. However, if a young woman marries an older man who is more sexually experienced, she may have increased exposure to STIs.

[3] It has been noted elsewhere (Westoff, Blanc, and Nyblade, 1994) that in some sub-Saharan societies a considerable amount of childbearing goes on outside of cohabiting relationships. The two countries where this is most common are Botswana and Namibia, neither of which is included in this analysis.

DHS surveys provide information about ever use and current use of contraceptive methods. As seen in Figures 2.2.1 and 2.2.2, ever use of modern methods[4] among adolescent populations varies by sex. Contraceptive use tends to be higher among men than women largely due to greater use of condoms. In most countries, contraceptive use is increasing over time for both sexes. It should be noted that ever use of contraceptive methods does not necessarily imply continual use since sexual debut or consistent use with every, or even any, partner. The direction of the causality between contraceptive use and sexual initiation and union formation among adolescents may be difficult to trace. Many health delivery systems in sub-Saharan Africa provide contraceptives only to married women. However, unmarried adolescents, who may be more likely to have multiple partners, face greater risk of unplanned pregnancy or STI infection. Given the general lack of data in these countries on duration of contraceptive use and level of accessibility to reproductive health services among adolescents, contraceptive practice is measured indirectly in our multivariate models through the community-level family planning environment (described below).

Operationalizing the Model

DHS surveys collect data on age of first birth, age of first sex, and age of first union for female respondents. Age of first sex and age of first union are generally collected for male respondents. All the countries analyzed in this report had surveys at least four years apart[5] so it is possible to use young adult data from two points in time to conduct trend analyses. This allows the assumption of similar recall biases and background variables that best reflect the situation at the time of the event.

Figure 2.2.1 Percentage of women age 15-19 who had first sex before age 18 and reported ever use of modern contraceptive methods, by relative date of survey

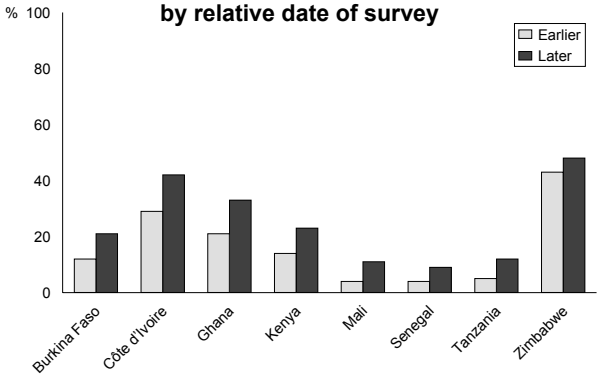
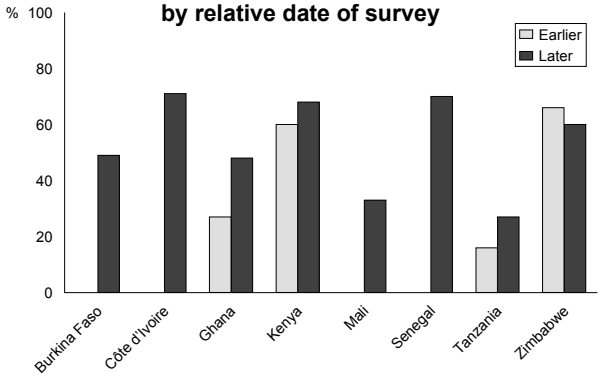


Figure 2.2.2 Percentage of men age 15-19 who had first sex before age 18 and reported ever use of modern contraceptive methods, by relative date of survey



Our analysis first examines the probability of a woman having a first birth before age 18. The trends and differentials of this event then lead us to seek a better understanding of what influenced the observed changes in adolescent fertility. Two intermediate variables, age at first sex and age at first union, are considered here as outcomes. Because the histories of women under age 18 are incomplete, we only include in our multivariate models women age 18-24 at the time of each survey. Trends and differentials in the probability of a man having first sex and first union before age 20 are also considered. The different age groups for men and women were chosen primarily because of data constraints (some surveys only collected data for men 20 years and older) and to ensure sufficient sample sizes. Only men age 20-29 are included in the multivariate analyses to avoid problems of censored observations.

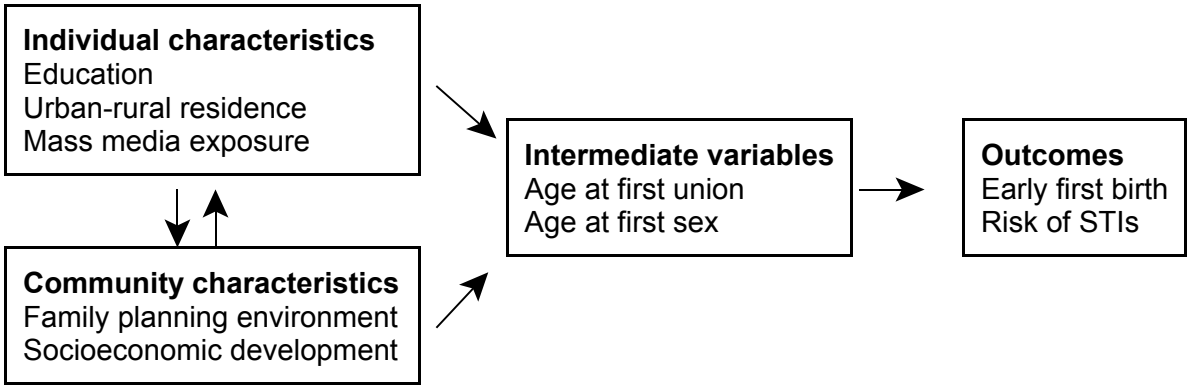
[4] Modern contraceptive methods include male and female sterilization, the pill, the IUD, injectables, implants, condoms, and vaginal methods (foam, jelly, or diaphragm).

[5] While the intervals between surveys may be somewhat short, collection of information from male respondents is a relatively recent practice in the Demographic and Health Surveys. Future implementation of male surveys should improve researchers' ability to conduct gender-specific, trend analyses.

There are large differences in reproductive behavior between young men and women. In many African societies men start sexual behavior and marry at a later age than women. The repercussions of early fertility are also different for both sexes. For this reason it is important to evaluate both adolescent women's and adolescent men's reproductive health needs. The following analysis considers both female and male models of adolescent reproductive behavior to emphasize the differences between the two sexes.

Figure 2.3 diagrams how individual and community characteristics affect intermediate variables, which in turn influence reproductive health outcomes. Risk of STIs (including HIV/AIDS), as well as early fatherhood among men, are evaluated through observation of the intermediate variables.

Figure 2.3
Framework for assessing adolescent reproductive outcomes



Several characteristics related to individuals and their communities have been linked in the literature to changes in reproductive behavior. Theories of fertility transition suggest that modernization dissolves traditional tendencies toward large families and replaces those tendencies with individualism marked by material aspirations. Based on early research and observation in pre-modern populations and contemporary industrial countries, the theory claims that, with sufficient modernization, fertility (and mortality) will inevitably fall (see Caldwell, 1976; Coale, 1973; Farooq and DeGraff, 1988; Simmons, 1985).

Four widely recognized, empirically identifiable aspects of modernization are identified in Easterlin (1983) as follows: innovations in formal schooling; innovations in public health and medical care; urbanization; and the introduction of new goods. We will attempt to model these basic social influences and examine how changes in reproductive outcomes occur in different subgroups among the adolescent populations of the eight countries.

A strong correlation between education and reproductive outcomes consistently emerges from empirical applications throughout the developing world. Evidence of correlations exist between education and reduced fertility, increased contraceptive use, and delayed union formation (see, for example, Ainsworth, 1994; Martin and Juarez, 1995; Robey et al., 1992). Mboup and Saha (1998) found that in many sub-Saharan countries, including Burkina Faso, Ghana, and Senegal, women with no schooling have two or three children more than women with secondary or higher education.

Among adolescents, while we expect more education to be associated with a lower probability of early first birth, the direction of causality is unclear. Young women may decide to delay childbearing in order to complete their formal education. On the other hand, some teenage mothers may be forced to leave school early after having a child. For example, according to the 1996 DHS survey in Mali, 12 percent of adolescent women (age 15-19) who were no longer attending school indicated a pregnancy or marriage as the main reason they left. We have elected to limit the category for high educational attainment in our multivariate models to eight or more years of schooling, in hopes of reducing the likelihood of biases in terms of the

number of young respondents who might not have finished their education at the time of the survey, or who may have been obliged to leave school early due to an event related to pregnancy or marriage.

Urban-rural residence is another variable considered to influence reproductive outcomes. The distinction between urban and rural residence is important because of differences in access to health facilities, cultural beliefs, and living situations. According to transition theory, modern urban-commercial life produces special motivational constraints on childbearing. Costs of children are highest in urban areas, where nearly everything must be bought.

Access to modern goods and ideas can also affect an individual's reproductive decisions. Cleland and Wilson (1987) suggest that the spread of new knowledge and technology can help explain observed patterns of fertility decline in many low-income countries, independent of economic circumstances. Research has found that exposure to modern forms of mass communication in particular has a strong effect on reproductive outcomes, especially on contraceptive use and age at marriage (Adamchak and Mbvizo, 1991; Westoff and Bankole, 1997). We consider in this analysis radio listenership as representative of access to the mass media and new ideas. Listening to the radio can occur outside the respondents' home and, therefore, may be less strongly associated with economic status as compared with radio ownership. Radio is the medium selected here because of the diversity of development levels among the countries studied. This variable needs to be interpreted carefully since television and newspapers may be more popular among young respondents in some countries.

At the contextual level, indirect variables include access (physical, financial, and sociocultural) to reproductive health care, which affects the risk of early childbearing or STIs. For example, a strong reproductive health program in the community could influence an individual's familiarity with contraception and knowledge of how to avoid contracting STIs. While improving knowledge and practices is an important component of many reproductive health programs, modeling impacts based on individual-level survey responses poses statistical problems. Attempts to include indicators of reproductive health knowledge and service use among youth may fail to completely overcome problems of endogeneity.

Ideally, the contextual variable on health care in the multivariate analyses would be measured independently from health facility data on outreach programs and on the use of services by adolescents. The availability of such data is limited in the DHS program. Alternatively, the strength of local health programs can be measured through proxy indicators of whether a large proportion of the population of reproductive age in the community has practiced family planning. As will be described in detail in the next section, this proportion can be measured through cluster-level aggregates of the number of adults who have reported ever using modern contraceptives.

Lastly, there is increasing evidence that adolescents are strongly influenced by their environment, suggesting that community characteristics might influence reproductive behaviors. Lloyd, Kaufman, and Hewett (2000) suggest that in areas that have not yet achieved mass schooling, development will be slow because of the slower pace of social interaction and diffusion, resulting in a lagging fertility decline. In our models we use cluster-level aggregates of educational attainment among adults as proxy for the local socioeconomic development context.

3 Data and Methods

3.1 Data

The DHS program has been producing cross-national and comparative quantitative data on fertility in developing countries since 1985. The bulk of the information is collected from personal interviews with a representative sample of women of reproductive age (although in certain countries coverage is limited to ever-married women). The standard DHS questionnaire addresses fertility, family planning, and maternal and child health. In some cases additional questionnaires are included for husbands/males and on community-level service availability.

Repeat surveys, usually conducted around five years apart, allow researchers to evaluate national trends. Over time the standard questionnaire has expanded to collect more in-depth data on a broader range of reproductive-related behavior and health topics such as knowledge and practices related to STIs and HIV/AIDS or the prevalence of anemia.

The surveys are carried out in a standardized manner, although questionnaires may be adapted to the needs and conditions of a specific country. Survey samples are designed using scientific sampling probability. Most samples use two-stage stratified designs: selection of area units or clusters in a single stage, normally with probability proportional to size, followed by selection of households.

The present study draws on information collected from samples of women and men regardless of marital status from surveys conducted at least four years apart to allow for trend analysis in particular age groups. Each survey included separate women's and men's questionnaires for examining gender differentials. The DHS countries retained are Burkina Faso, Côte d'Ivoire, Ghana, Kenya, Mali, Senegal, Tanzania, and Zimbabwe. The surveys generally cover six to eight thousand women and two to three thousand men of reproductive age.[6]

3.2 Data Quality

Our analysis focuses on the probability of early initiation of reproductive behavior, using retrospective data compiled from young women and (where available) from young men on age at first birth, age at first sex, and age at first union. Because the study is heavily dependent on information pertaining to the timing of events, an assessment of the quality of age-related responses is important.

As with all survey data based on individuals, responses in the DHS surveys are not immune to errors such as recall errors due to memory lapses, duration heaping, and event omission (both deliberate and accidental). Previous studies have examined the quality of information on current age reported at the time of interview (Rutstein and Bicego, 1990), age at initiation of reproductive behavior (Blanc and Rutenberg, 1990; Gage, 1995), and other demographic measures (Marckwardt and Rutstein, 1996). In general, the quality of age reporting can be considered better among the youngest age groups and improving across survey rounds. In the DHS individual questionnaire, the respondent's age is obtained by asking both the birth date and age in completed years. While there is no record of how age was recorded under circumstances when the respondent could report neither current age nor year of birth, interviewers are considered likely to have placed respondents at about the middle of the age range, usually between 30 and 40 years (Rutstein and Bicego, 1990).

[6] Women age 15-49. Men age 15-54 in most countries; age groups 20-54 in the earlier Kenya survey, 20-55 in the earlier Mali, and 20 and over in both Senegal surveys.

As seen in Figures 3.1.1 and 3.1.2, the expected trend toward better current age information among women and men in the youngest age groups and over time can be noted for the eight sub-Saharan countries. In most countries, at least 90 percent of young respondents of either sex could provide current age or year of birth information in the latest survey. However some problems remain. Changes in questionnaire design, training of interviewers, fieldwork implementation, and data processing across survey phases can affect the quality of the information obtained. In Mali in particular, only a third of female respondents provided age or year information in the earlier survey, but in the later survey the information was recorded as complete. This difference is probably due to a change in survey implementation and training as opposed to an increase in respondents' knowledge of their age.

Information on the timing of the first birth is only collected from women in DHS surveys. A detailed birth history is obtained from female respondents. It includes all live births in the woman's lifetime, along with the age, birth date, sex, survival status, and living arrangements of each child. Age at first birth is calculated as the difference between the date of birth of the woman and the date of birth of her first child. While the accuracy of information on age at first birth is dependent on that of the date of birth of the first child, the probability of recall errors is less among younger women.

Figure 3.1.1 Percentage of women with current age/year of birth reported, by age group and relative date of survey

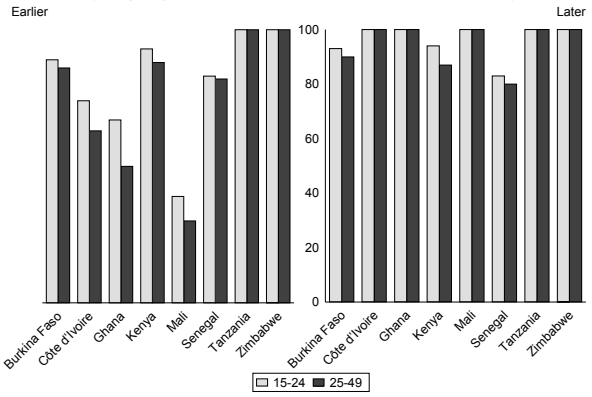
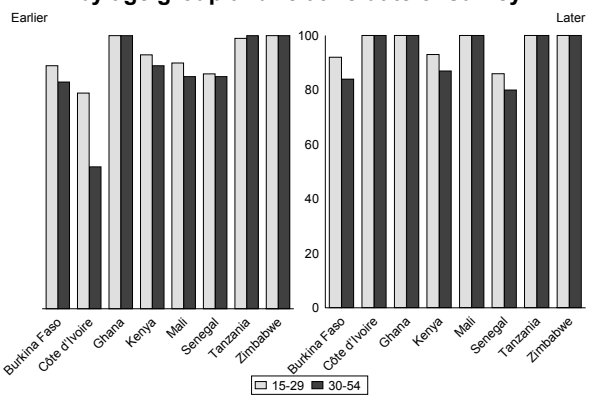


Figure 3.1.2 Percentage of men with current age/year of birth reported, by age group and relative date of survey



With regard to the timing of first sex, the DHS questionnaires collect information on age at first sex from male and female respondents in most countries. Because only age (and not year) information is collected, comparable analysis on the completeness of date reporting is not possible. Some researchers have voiced concern that respondents, especially teenagers, might be uncomfortable with the topic of sexual activity. However, low levels of nonresponse or inconsistency in reporting of age at first sex in the DHS surveys indicate willingness of the target populations to answer such questions. Tabulations of consistency of reported age at first sex by current age group among women and men are presented in Figures 3.2.1 and 3.2.2. In most of the countries (and where data were available), age at first sex was missing or inconsistent in less than 10 percent of cases.

In the DHS program, unions are generally defined as encompassing both formal marriage and consensual union. The DHS questionnaires ask respondents whether they have ever been married or have lived with a member of the opposite sex, and if so the age at which and date when they first entered into union. Collecting both age at first union and date of first union allows for checks on the consistency of information on first union formation.

Figure 3.2.1 Percentage of sexually experienced women with consistent age at first sex reported, by age group and relative date of survey

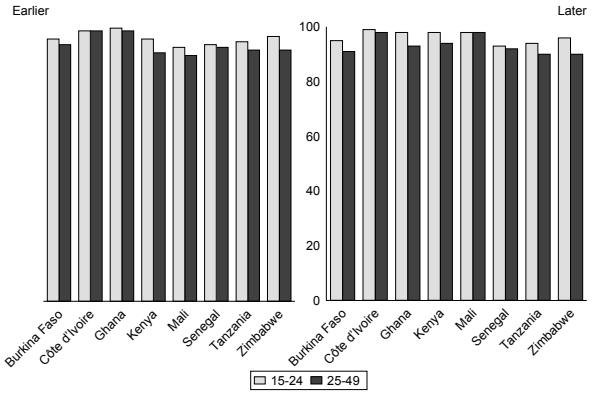
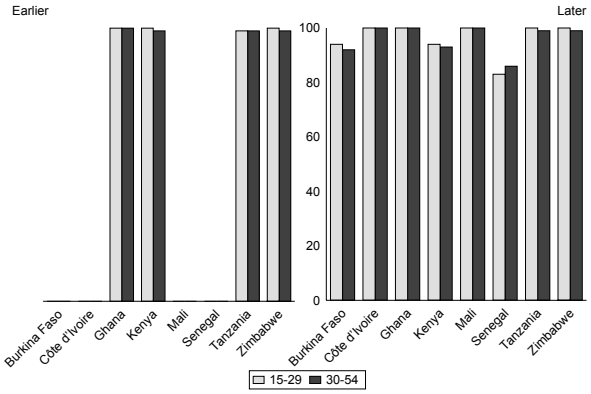


Figure 3.2.2 Percentage of sexually experienced men with consistent age at first sex reported, by age group and relative date of survey



In general, fewer problems of incompleteness or inconsistency for age at first union and date of first union are noted among younger male and female respondents and over time (Figures 3.3.1 and 3.3.2). While date displacement or omission may be less of an issue with younger respondents, a potentially greater problem of data quality is the failure to report certain unions because they were of short duration, not socially recognized, or were followed by more stable unions.

Figure 3.3.1 Percentage of women ever in union with age/year at first union information reported, by age group and relative date of survey

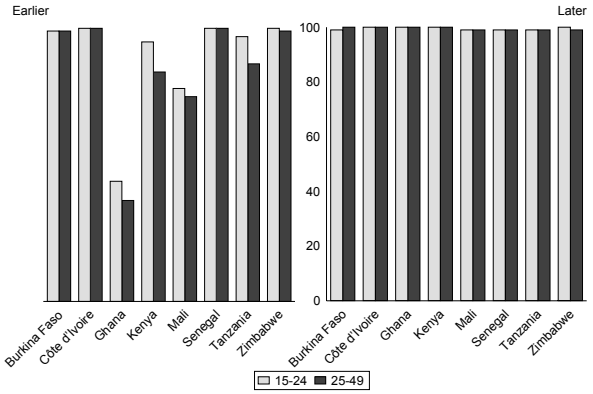
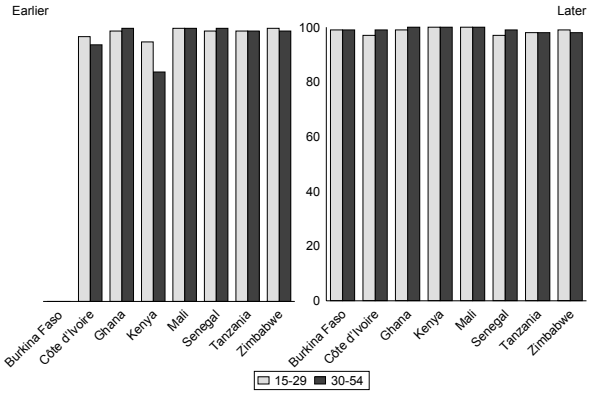


Figure 3.3.2 Percentage of men ever in union with age/year at first union information reported, by age group and relative date of survey



In sum, while caution must be exercised when using survey data, particularly in countries in sub-Saharan Africa that have poor documentation and knowledge of dates, improvements in quality of age reporting can be noted over the course of the DHS program. The impact of such improvements on the direction of timing of first reproductive events remains unknown. But by limiting our focus to respondents in the youngest age groups, we may minimize the bias of recall errors, which tend to be more frequent among older respondents, whose first experience with reproductive behavior generally took place several years earlier. For this reason there is a distinct advantage in analyzing trends within a given age group from successive surveys instead of using selected cohorts from one cross-sectional database in a retrospective study.

3.3 Statistical Methods

Our analysis uses multivariate regression models to evaluate trends and determinants of adolescent reproductive outcomes. The focus is on the probability of a young woman having first birth, first sex, and first union before age 18, and the probability of a young man having first sex and first union before age 20. A logistic link is used to model the dichotomous outcomes.

We use a generalized estimating equation to avoid the inefficient estimation of coefficients that result from the cluster-based DHS sampling structure. The standard logistic model assumes that the distribution of the error term follows a binomial distribution and the outcomes are random and independent. However, respondents in the same community or cluster are likely to demonstrate similar characteristics and behaviors (due to a number of unmeasured and unmeasurable factors), implying that the outcomes are not independent within clusters. General estimating equations allow us to estimate the model parameters while controlling for intracluster correlation (Liang and Zeger, 1993).

Included in the regressions are a number of variables related to individuals' sociodemographic characteristics (education, urban-rural residence, and exposure to mass media) as well as contextual variables (community development and family planning environment). Community characteristics are captured through aggregating men and women's individual-level responses within a cluster. Clusters in the DHS surveys are made up of roughly 200 households in a defined geographical area, from which approximately 30 households are randomly selected in each area to be interviewed. A proxy for community development is measured through the proportion of adult women and men (age 25 or over) in the cluster who have eight or more years of schooling.[7] Communities where at least 20 percent of all adults have achieved this level of schooling are considered to have a higher socioeconomic development. An exception was made for Mali: because of the small number of educated adults, the cutoff for higher status was set at 10 percent.

Family planning environment is evaluated through the pooled responses for ever use of modern contraceptive methods among adult women and men in the cluster. For most countries, communities where at least 50 percent of adults had ever used contraception are considered to have a better reproductive health care environment. For Mali the cutoff for stronger family planning environment was set to at least 10 percent of adults who have ever used contraception, while for Zimbabwe it was set to at least 80 percent. It should be noted that, in order to capture the community-level characteristics, each cluster must have a sufficient number of respondents to make a valid assessment of the situation. In cases where we are only interested in a specific age group, it is unlikely that there will be enough individuals per cluster that match the criteria. Thus cluster-level estimates for the proportion of adolescents who have ever used modern contraception are not deemed reliable.

The key hypothesis being tested is that changes in sociodemographic and contextual variables associated with a process of modernization influence adolescents' risk of early first birth, first sex, and first union. Given the important differences in the underlying social and biological processes shaping reproductive behaviors among women and men, each sex is treated distinctly. Separate models are run for each country to take account of unobserved variables not captured here. Trends in the effects of sociodemographic and community variables are analyzed through interaction terms of the characteristic on the survey period. These interaction terms are used to specify how the influences on the outcomes have changed between surveys.

[7] In most countries, adult education was obtained from the number of women and men age 25 or over with 8 or more years of schooling as reported in the household schedule. In the later Côte d'Ivoire, later Senegal, and both Mali surveys, the level of adult schooling was compiled by pooling responses from the individual women's and men's datasets.

The coefficients in the regression outputs can be described as the log of the odds for a given category of a variable over the odds for the base category of the same variable. To ease interpretation, our results will be expressed in terms of odds ratios, which are calculated by exponentiating the parameters. A ratio greater than unity implies that an individual in the given category would be more likely to have a first birth, first sex, or first union before age 18 (or 20 for males) compared with a counterpart in the base category. A ratio lower than unity signals that an individual in the given category is less likely to experience the event during adolescence compared with a counterpart in the base category.

4 Levels and Trends

This section first looks at trends in the sociodemographic characteristics, reproductive health knowledge, and reproductive behavior among the adolescent populations in selected countries of sub-Saharan Africa. We then identify some of the interrelationships between these traits as a prelude to modeling the possible determinants of reproductive outcomes in the target groups.

4.1 Sociodemographic Characteristics

Evidence from the DHS surveys points to large disparities in the sociodemographic status of adolescent populations[8] across sub-Saharan Africa. In most countries, levels of schooling are substantially lower for women (Figure 4.1.1) than for men (Figure 4.1.2). Only in Tanzania, where education levels are very low for both sexes, and in Zimbabwe, where education levels are relatively high, are the levels similar for young women and young men.

Figure 4.1.1 Percentage of women age 15-19 with 8 or more years of schooling, by relative date of survey

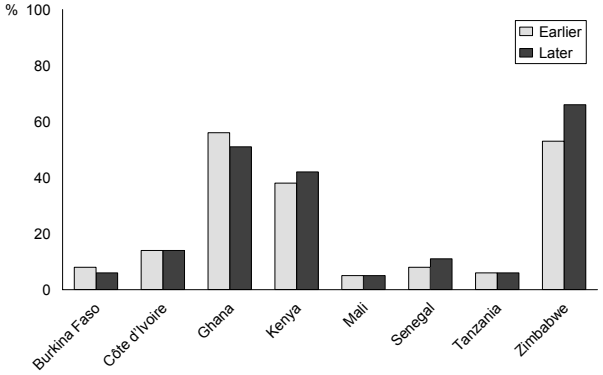
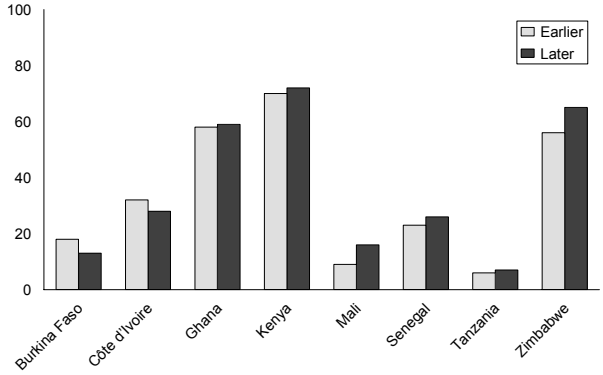


Figure 4.1.2 Percentage of men age 15-19 with 8 or more years of schooling, by relative date of survey



Fewer than 10 percent of young women have eight or more years of schooling in Burkina Faso, Mali, and Tanzania. On the other hand, the majority of young women had attained this level of schooling in Zimbabwe (66 percent) and Ghana (51 percent) according to the most recent survey findings. A majority of young men have eight or more years of schooling in Kenya (72 percent), Zimbabwe (65 percent), Ghana (59 percent), and Côte d'Ivoire (58 percent). Rapid improvements in schooling between surveys can be noted in a few countries: Kenya, Senegal, and Zimbabwe for women; and Côte d'Ivoire, Mali, Senegal, and Zimbabwe for men. In Burkina Faso, the proportion of better-educated adolescents decreased among both sexes.

As seen in Figures 4.2.1 and 4.2.2, all eight countries are predominantly rural. Only in Senegal are a majority of young men (55 percent) living in urban areas. Burkina Faso is the least urban society. Kenya and Senegal are characterized by a somewhat more urban male population than female population, but in all countries the differences by sex remain under 10 percentage points.

[8] Characteristics refer to those reported at the time of the survey. For the earlier Kenya and Mali surveys and both Senegal surveys, the male sample considers those age 20-24 years.

Figure 4.2.1 Percentage of women age 15-19 living in urban areas, by relative date of survey

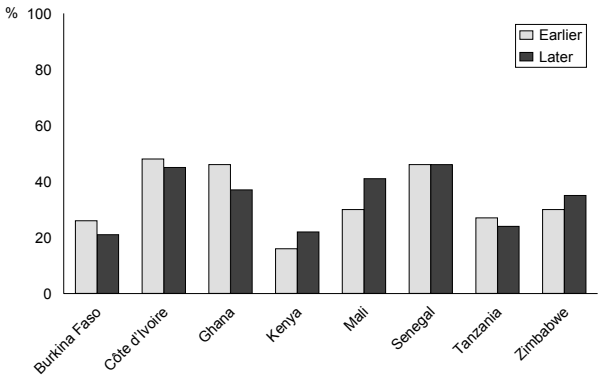
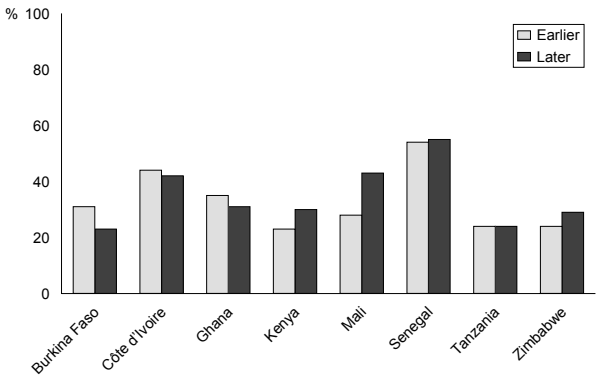


Figure 4.2.2 Percentage of men age 15-19 living in urban areas, by relative date of survey



Exposure to radio varies across the countries in the region. The majority of adolescents of both sexes listen to the radio regularly[9] in Ghana, Kenya, Mali, and Senegal (Figures 4.3.1 and 4.3.2). In contrast, at most one-quarter of adolescent women reported listening to the radio in the latest survey in Burkina Faso and in Côte d'Ivoire, where listenership has fallen over time. In most countries, exposure to radio is higher among young men than among young women.

Figure 4.3.1 Percentage of women age 15-19 who listen to the radio regularly, by relative date of survey

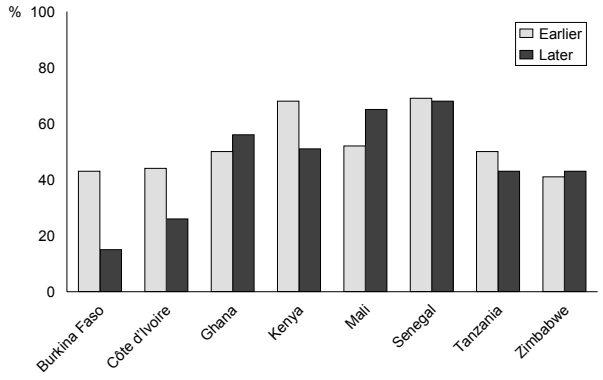
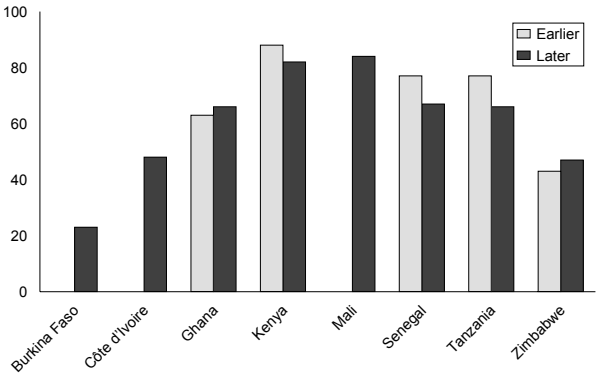


Figure 4.3.2 Percentage of men age 15-19 who listen to the radio regularly, by relative date of survey



Such characteristics of the adolescent populations suggest general modernizing trends across the region. There remain strong differentials across countries, however, and even across subgroups within each country. The implications of such disparities would undoubtedly affect other aspects of individuals' lives, in particular reproductive health knowledge and behaviors.

4.2 Reproductive Health Knowledge

[9] In the earlier surveys for Burkina Faso, Côte d'Ivoire, Ghana, and Kenya, and in both surveys for Mali, Senegal, and Tanzania, respondents were asked whether or not they usually listen to the radio once a week. In the later surveys for Burkina Faso, Côte d'Ivoire, Ghana, and Kenya, and for both surveys in Zimbabwe, respondents were asked whether or not they usually listen to the radio every day.

Behavior change communication (BCC) campaigns are an important component of most successful reproductive health interventions. Data from the DHS surveys allow a descriptive portrait to be drawn on the levels and trends of knowledge of reproductive health issues among young women and men in the countries being studied[10]. Individuals who are adequately informed about reproductive health may be better able to exercise options favoring improved health status.

As seen in Figures 4.4.1 and 4.4.2, knowledge of modern contraceptive methods varies across countries and generally increases over time. Knowledge tends to be higher among males. According to the most recent survey findings, at least 90 percent of young men in Côte d'Ivoire, Ghana, Kenya, Senegal, and Zimbabwe know of one or more modern contraceptive methods. The lowest levels of knowledge are found in Tanzania (65 percent) and Mali (75 percent). Among women, the proportion with knowledge of modern contraception reaches at least 90 percent in Côte d'Ivoire, Kenya, and Zimbabwe. Only two-thirds have knowledge in Burkina Faso, Mali, and Tanzania. The greatest intersurvey increase was observed in Mali, where knowledge of modern methods was lowest among the earlier surveys.

Figure 4.4.1 Percentage of women age 15-19 with knowledge of modern contraception, by relative date of survey

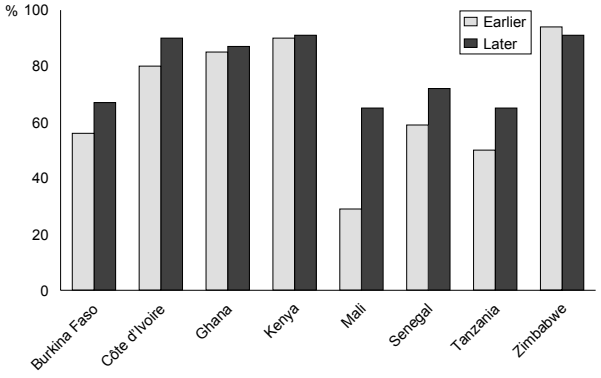
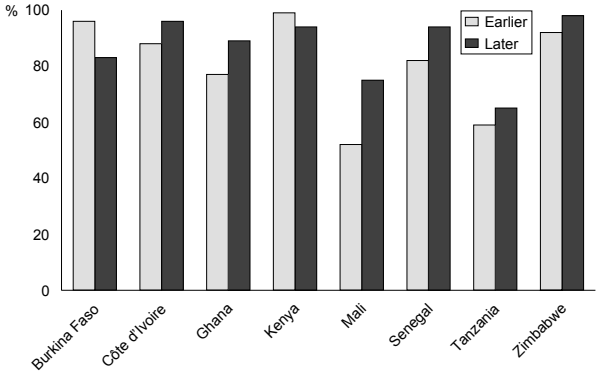


Figure 4.4.2 Percentage of men age 15-19 with knowledge of modern contraception, by relative date of survey



The DHS program collects information from women on their knowledge of the ovulatory cycle. Knowledge of basic reproductive physiology remains poor across the region. Fewer than 10 percent of young women could correctly identify the fertile period in the latest surveys in Burkina Faso, Mali, Senegal, Tanzania, and Zimbabwe (Figure 4.5). Even in Côte d'Ivoire where knowledge is highest barely a third of women age 15-19 know when the fertile period occurs. There was little sign of improvement in any country.

Figures 4.6.1 and 4.6.2 present data on young women's and men's knowledge of ways to avoid getting HIV/AIDS. Although awareness of AIDS is widespread, methods of AIDS prevention are less well known. Most AIDS-prevention programs focus on using condoms, limiting the number of sexual partners, staying faithful to one partner, and abstaining from sexual intercourse as ways to prevent transmission of HIV. According to information from the most recent DHS surveys, knowledge of condoms as a barrier method is highest in Côte d'Ivoire and Zimbabwe, where about half of young women and two-thirds of young men reported knowledge. Ways to avoid HIV/AIDS related to the level of sexual activity (abstaining from sex, limiting sex to one faithful partner, avoiding multiple partners, avoiding prostitutes) were reported by at least 60 percent of young women in Côte d'Ivoire, Ghana, and Zimbabwe, and by at least 60 percent of young men in Senegal and Zimbabwe. In most of the countries studied, knowledge of these latter ways to

[10] The age group 15-19 was chosen for this analysis because it most closely approximates the level of young women and men's knowledge of reproductive health when they enter their reproductive years. (For the earlier Kenya and Mali and both Senegal surveys, the male sample considers those age 20-24 years.)

avoid HIV/AIDS was as great or greater among women than among men, in contrast to knowledge of condoms, which was substantially lower among women across all countries.

Figure 4.5 Percentage of women age 15-19 with knowledge of the fertile period in the ovulatory cycle, by relative date of survey

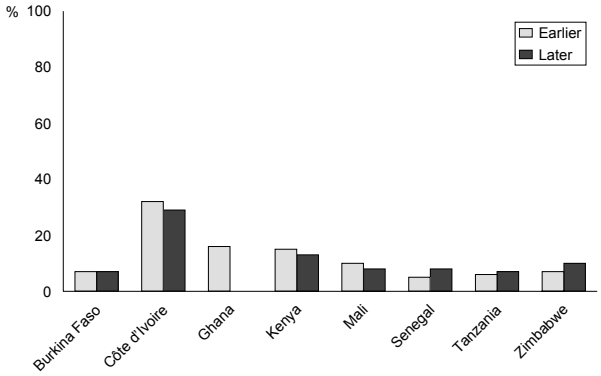


Figure 4.6.1 Percentage of women age 15-19 with knowledge of ways to avoid HIV/AIDS

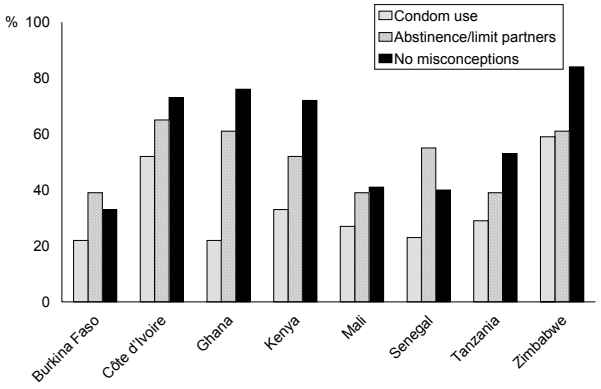
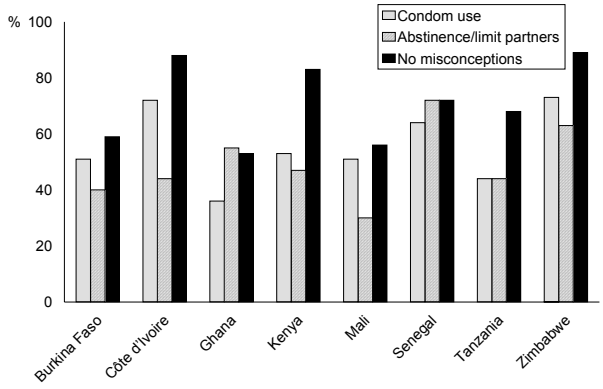


Figure 4.6.2 Percentage of men age 15-19 with knowledge of ways to avoid HIV/AIDS



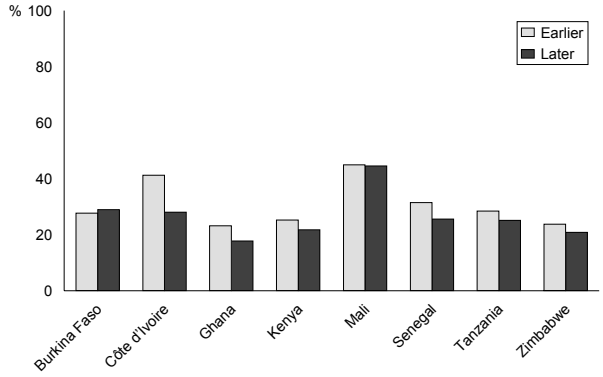
At the same time, misconceptions about HIV/AIDS transmission are common. Fewer than half of young women in Burkina Faso, Mali, and Senegal indicated correct knowledge of ways to prevent HIV/AIDS; the majority reported no means or gave erroneous responses not associated with changes in sexual behavior (among them, avoiding kissing, avoiding mosquito bites, or seeking protection from a traditional healer). Less than two-thirds of men in Burkina Faso, Ghana, and Mali reported only correct ways to avoid HIV/AIDS. In all countries except Ghana young women were less likely to be properly informed about AIDS prevention than their male counterparts.

Many important differences are seen across young women's and men's knowledge of reproductive health issues, and only small improvements were noted between surveys. While awareness of modern contraception is generally widespread, other aspects remain less well known. Such differentials in the range of reproductive health knowledge could hold important implications for adolescents' decisionmaking processes.

4.3 Reproductive Behavior

Most of the sub-Saharan countries being studied experienced a decline in adolescent fertility between the surveys, though important differentials emerge. Figure 4.7 presents the trends in the proportion of young women[11] who had a first birth before age 18 for each survey. The proportion is seen to have declined for all countries in the study except for Burkina Faso. The highest level of adolescent childbearing was observed in Mali (45 percent). In contrast, less than a quarter of young women had had an early first birth in Ghana, Kenya, and Zimbabwe. Côte d'Ivoire witnessed the largest intersurvey reduction in the proportion of first births occurring to women under the age of 18 (from 41 to 28 percent). In Mali, the difference was only marginal. This is noteworthy given that Mali also had the largest interval between surveys (in most countries the time between surveys averaged about five years; however, in Mali the surveys were eight years apart).

Figure 4.7 Percentage of women age 18-24 who had first birth by age 18, by relative date of survey



Similar trends are observed in terms of the proportion of young women who had first sex and first union before age 18 (Figures 4.8.1 and 4.8.2). Most countries showed declines over time in the level of adolescent sex. Only in Kenya is a slight increase noted. The highest level of adolescent sexual activity is found in Mali (81 percent) while the lowest is in Zimbabwe (40 percent). Likewise, Mali has the highest proportion of young women who entered into union before age 18 (66 percent) and Zimbabwe has the lowest (23 percent). In every country, union formation among adolescent women has declined across surveys. The largest declines were observed in Côte d'Ivoire and in Mali, where the differences were more than 10 percentage points.

Figures 4.9.1 and 4.9.2 show the trends in the proportion of young men who had first sex and first union before age 20. In countries where information from two surveys is available, declines over time are observed in the proportion of men who had first sex before age 20. However, there is no consistent trend with regard to the proportion in first union before age 20. Overall levels of early union formation are much lower among young men than young women in every country.

[11] Data on age at first birth, first sex, and first union among women refer to retrospective information collected from respondents age 18-24 at the time of the survey. Among men, data on age at first sex and age at first union are compiled from respondents currently age 20-29.

Figure 4.8.1 Percentage of women age 18-24 who reported having had first sex before age 18, by relative date of survey

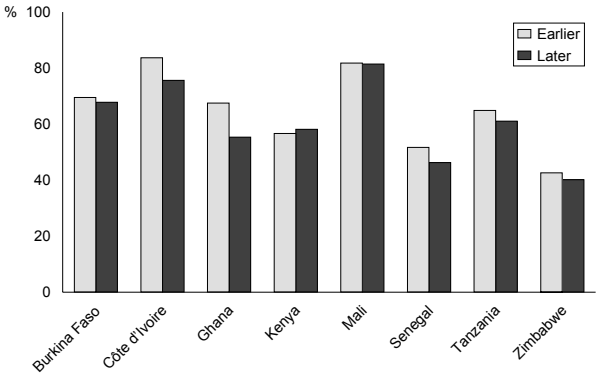


Figure 4.8.2 Percentage of women age 18-24 who reported having had first union before age 18, by relative date of survey

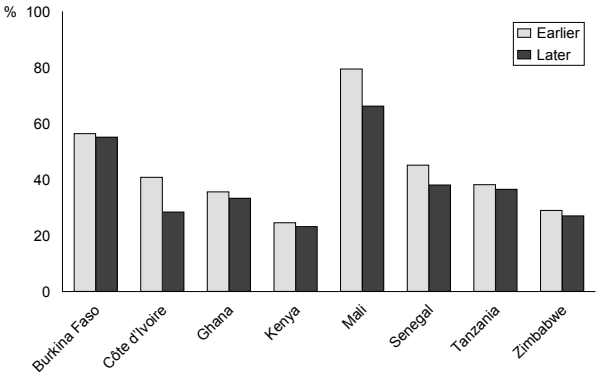


Figure 4.9.1 Percentage of men age 20-29 who reported having had first sex before age 20, by relative date of survey

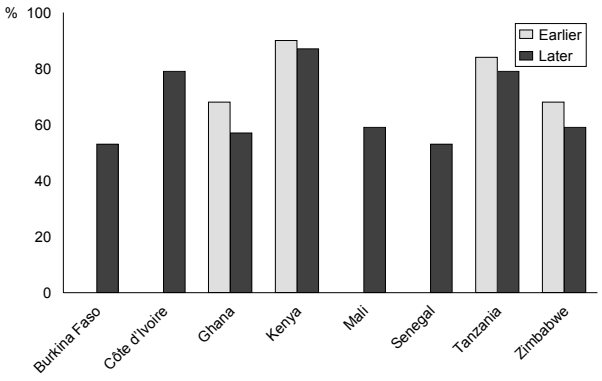
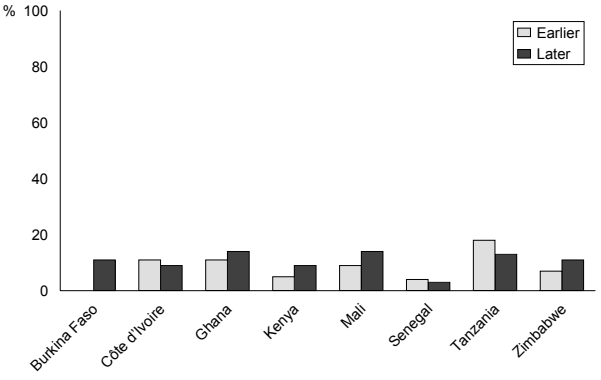


Figure 4.9.2 Percentage of men age 20-29 who reported having had first union before age 20, by relative date of survey



Levels of male sexual experience and union formation during adolescence remain lowest in Senegal. Early sexual initiation is most common in Kenya, Côte d'Ivoire, and Tanzania, where some 80 percent of young men had first sex before age 20. However, there was no country in which more than 20 percent of men reported having had first union before age 20, suggesting widespread premarital sexual activity across the region.

Given the general trend toward lower adolescent fertility, later sexual initiation, and later union formation, which are occurring alongside strong differentials across countries and population subgroups, we need to consider which background variables are associated with these differences.

4.4 Differentials in Reproductive Health Knowledge and Behavior by Sociodemographic Characteristics

Evidence from the DHS program points to differences in reproductive health knowledge and behaviors among adolescents according to their sociodemographic background characteristics. For example, as seen in Figures 4.10.1 and 4.10.2, the proportion of adolescent women and men with knowledge of modern family planning methods is substantially higher among those who live in urban areas compared with their rural counterparts. This trend remains universal across countries and time periods. Differences by urban-rural residence tend to be greater in countries where overall levels of knowledge are poorer, such as in Mali, where the gap reaches 20 percentage points or more.

Differences can also be observed in terms of age at initiation of reproductive behaviors by sociodemographic subgroup. The levels and trends in early first birth, first sex, and first union are affected by young women's and men's background characteristics. Following is a brief descriptive analysis of these trends according to selected individual and contextual variables.

Figure 4.10.1 Percentage of women age 18-24 with knowledge of modern contraceptive methods, by place of residence and relative date of survey

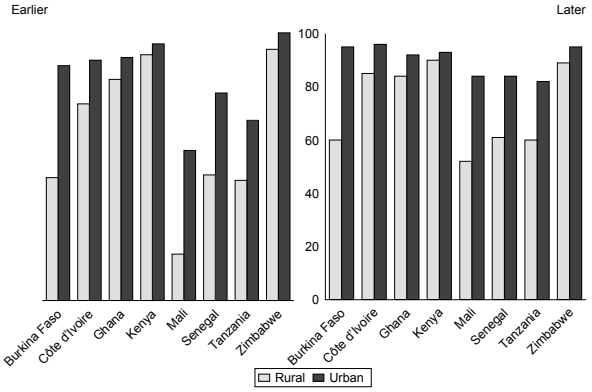
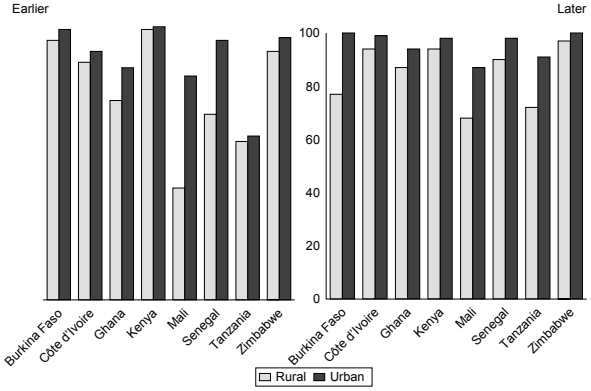


Figure 4.10.2 Percentage of men age 20-29 with knowledge of modern contraceptive methods, by place of residence and relative date of survey



Education

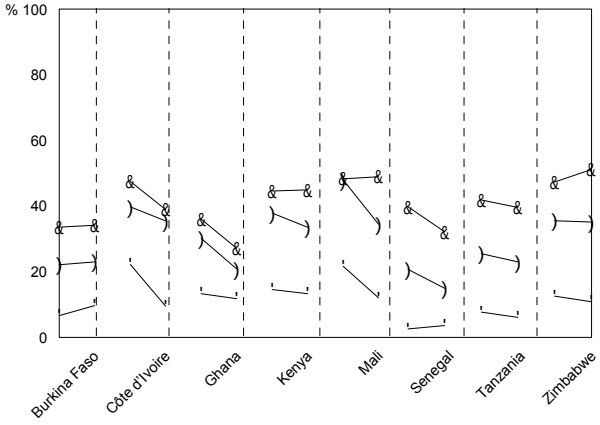
Figures 4.11.1 and 4.11.2 show the trends in the percentage of young women and men with early first birth, first sex, and first union by educational attainment (no formal schooling, one to seven years, eight or more years). As was previously described, overall the propensity for early reproductive outcomes has changed between survey periods. The direction and pace of change for each education category can be seen by the distinct angle of the line between the earlier and later surveys. (Note that this representation is simply for illustrative purposes and does not necessarily imply a linear trend across the intersurvey period.)

Although in general the trends seem quite parallel between education groups, there is a definite association between education and the proportion of women who have given birth before age 18. Better-educated women are consistently less likely to have had an early first birth than their less educated counterparts. Most countries experienced a similar decrease across education categories in the percentage of women with an early birth; but in Côte d'Ivoire and Mali, the pace of change was faster among the most educated women compared with those who were less educated. Burkina Faso saw slightly increasing proportions of early births between the two surveys for each education level and Zimbabwe saw an increase among those women with no schooling.

Figure 4.11.1 Trends in percentage of women age 18-24 who had first birth, first sex, and first union before age 18, by education level: earlier survey versus later survey

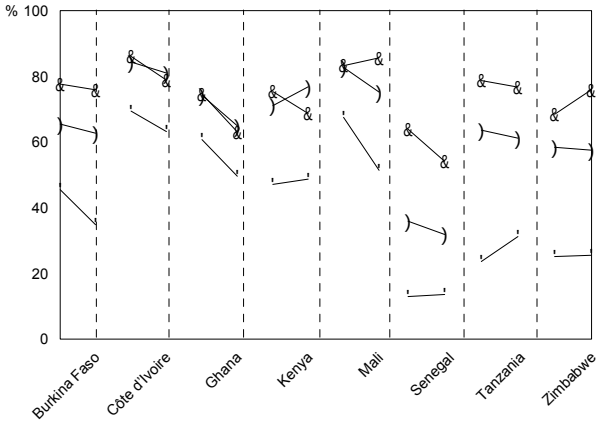
Figure 4.11.2 Trends in percentage of men age 20-29 who had first sex and first union before age 20, by education level: earlier survey versus later survey

First birth before age 18

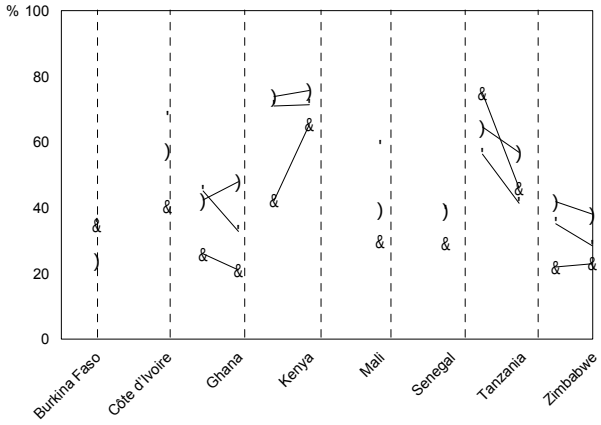


No data on age at first birth for men

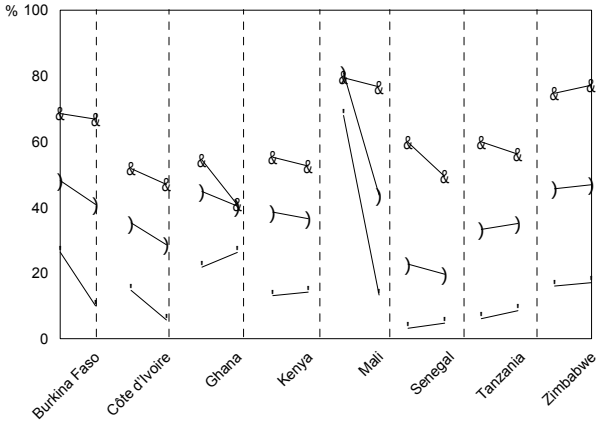
First sex before age 18



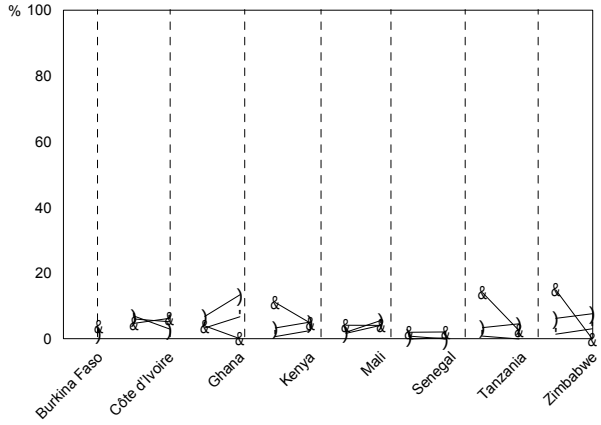
First sex before age 20

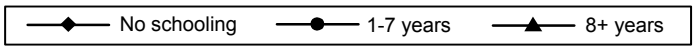


First union before age 18



First union before age 20





Burkina Faso and Mali are good examples of how different education levels have different effects on levels and trends of early sex among young women. Educated women are less likely to have first sex before age 18 than women with no schooling. The higher the level of educational attainment the stronger the declining trend: the fastest decline in early sex occurred among the most educated women (eight or more years of schooling). Thus both the level and the pace of change are correlated with education category.

We also see from Figure 4.11.1 that in some countries, the proportion of more educated women who had early sex increased while that for less educated women decreased. This discordant trend occurred in Kenya, Senegal, and Tanzania. In Côte d'Ivoire and Kenya, the proportion of women with no schooling who had early sex decreased over time to below the rate observed for women with primary education.

Education and early union appear to have a more consistent relationship than education and early sex. Better-educated women are least likely to have had an early union, while women with no schooling are most likely to have had an early union. Many of the countries showed roughly parallel trends between the subgroups, notably Côte d'Ivoire, Kenya, and Zimbabwe. On the other hand, Mali had the widest differences in trends between education and early union formation: women with no schooling had a small decline in the proportion in union before age 18 while the most educated women had a large decline (2 and 55 percentage points, respectively).

Among young men the findings are often quite different (Figure 4.11.2). Although trend data are not available for all countries, we can still see some important differences across education level and reproductive behavior. There are a number of cases where trends in reproductive outcomes are discordant between education categories. In some instances the survey sample sizes for men are small, rendering estimates for subgroups unstable. The trends in risk of early first sex and early first union by education level are much less consistent for men than for women.

The likelihood of early sexual initiation is remarkably different for males than for females. In most of the countries, higher proportions of men who reported having had first sex before age 20 were found among the better-educated groups (except in Tanzania and Zimbabwe). In Zimbabwe, for the educated men (the majority of the population) there has been a decrease in the percent having early sex; however, for men with no schooling there has been a sharp rise. This could be due in part to the small numbers of men that fall into the latter category.

Union formation by education level is more difficult to interpret for the male data. In most cases the better-educated men were the least likely to have formed an early union, but the trends suggest this could be changing over time. In Ghana, Mali, and Zimbabwe there have been increases in the proportions in early first union among the more educated men, resulting in higher rates by the later survey period than their non-educated counterparts. Tanzania had a large variation in the trend by education group. The men with no education had the largest decline while the men with the most education had a minimal decline in likelihood of early first union.

The situation among young men in Ghana shows some interesting trends. The proportion of educated men having early sex is decreasing over time while that same group is showing an increasing proportion in early union. Conversely, the percent of men with no schooling who had sex early is decreasing and the percent who were in union early is increasing.

Urban-rural Residence

For each of the reproductive behaviors, urban women are less likely to experience the outcome before age 18 than rural women, across all countries and survey periods (Figure 4.12.1). In most cases the levels of early first birth, first sex, and first union are decreasing over time at a fairly uniform pace according to urban-rural residence.

In particular, the stratification of adolescent first births shows that most of the decline between surveys has not been affected by urban-rural differences (i.e. most of the trends lines are relatively parallel indicating steady decline). Only in Burkina Faso do we find discordant trends: the proportion of women having a first birth by age 18 increases in rural areas and decreases in urban areas.

Some distinctions emerge in terms of the trends in early first sex by urban-rural residence. In Tanzania and Zimbabwe, despite an overall decline between periods in the proportion of women who had first sex by age 18, there was an increase in urban areas. In Kenya there were increases in the percentage of women having early sex in both urban and rural settings. In Mali the proportion increased over time in rural areas but decreased in urban areas.

The pace of decline in levels of early first union among women was somewhat faster in urban areas for Burkina Faso, Côte d'Ivoire, and Mali. In Senegal a large part of the overall decrease is due to changes in behavior among women in rural areas. In Zimbabwe, despite a decrease nationally in the proportion in first union by age 18, in urban areas the proportion actually increased.

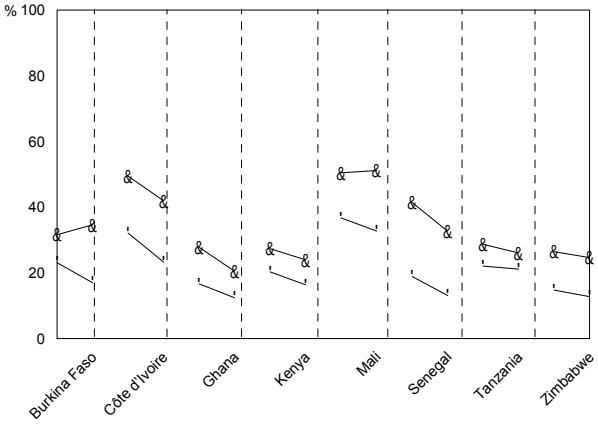
As was seen for trends by level of education, the male figures are often different from the female figures by urban-rural residence. For the earlier period, men in urban areas were more likely to have had first sex before age 20 than rural males in all countries where data were available except Kenya and Zimbabwe (Figure 4.12.2). This tendency has changed over time in Ghana, where the decline in the proportion having early sex was faster for urban males than rural males. Declines were observed regardless of urban-rural residence in all countries except Kenya.

In most instances, levels of early union formation are lower for urban men than rural men. In five of the seven countries for which trend data are available, overall increases are observed in the proportion having first union before age 20. However, no consistent trend by residence is apparent; increases are found among urban men in some countries, and among rural men in others.

Figure 4.12.1 Trends in percentage of women age 18-24 who had first birth, first sex, and first union before age 18, by residence: earlier survey versus later survey

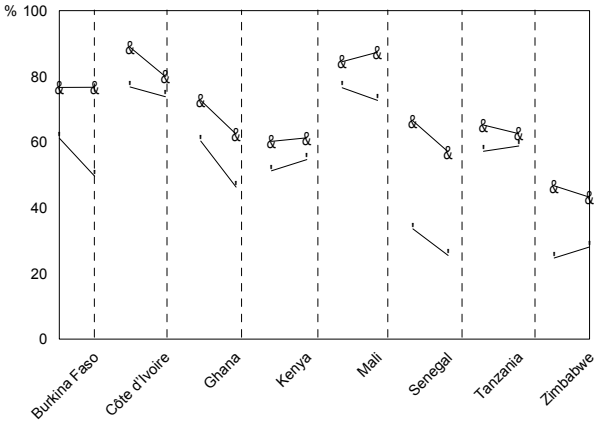
Figure 4.12.2 Trends in percentage of men age 20-29 who had first sex and first union before age 20, by residence: earlier survey versus later survey

First birth before age 18

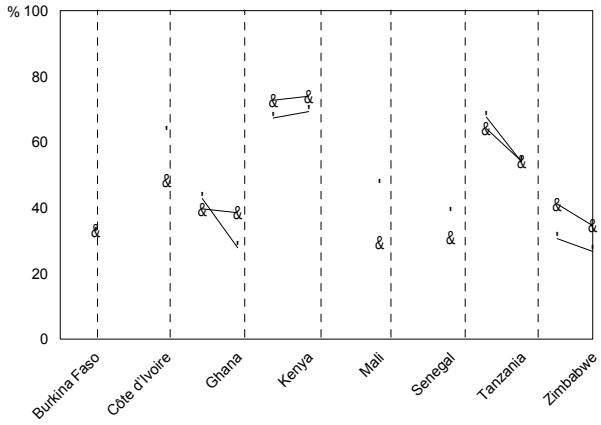


No data on age at first birth for men

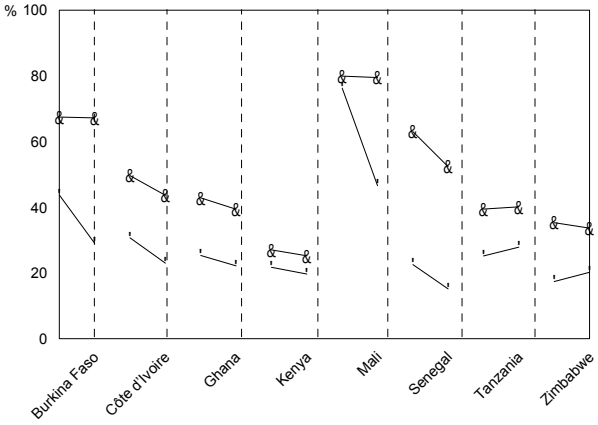
First sex before age 18



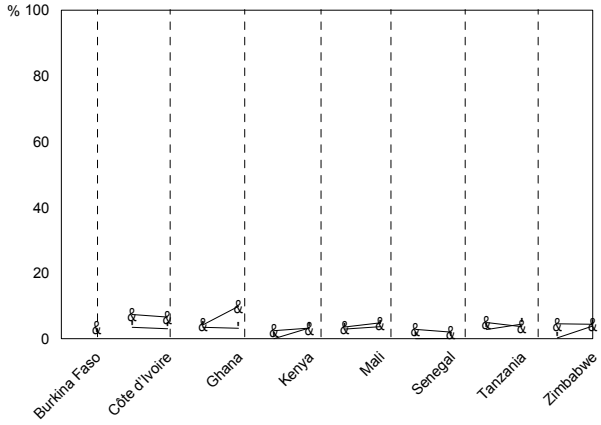
First sex before age 20

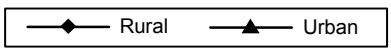


First union before age 18



First union before age 20





Exposure to Mass Media

Exposure to mass media, as measured by regular listening to the radio, tends to have a negative correlation with likelihood of early reproductive behavior. As seen in Figure 4.13.1, in most cases higher proportions of young women who do not listen to the radio regularly reported having first birth, first sex, and first union before age 18 compared with women who listen regularly.

Declines over time in the proportion of women having an early first birth are generally uniform by exposure to radio. Only in Mali do discordant differences exist, but they are minor. Côte d'Ivoire had the fastest decline in probability of early first birth among women with little or no exposure to radio. Although we had previously found that Burkina Faso was the only country where the proportion having an early first birth rose nationally, this trend disappeared when the analysis was by media exposure. Caution is warranted in interpreting the data, because a small number of cases were missing information on exposure to radio.

In most countries, the trend toward early first sex is similar for both women who have been exposed to radio and those who have not. However, Mali and Zimbabwe show differences for the two subgroups. In Zimbabwe women who listen to radio regularly were increasingly likely to have early sex, while in Mali increases in early sex were seen among women who were not exposed to radio.

In addition, exposure to radio appears to have affected the proportion of young women having formed a first union before age 18 differently between surveys in Mali. The proportion in early first union dropped by 20 percentage points among women who listened to the radio regularly, whereas the decline was only one percentage point among those who were not regular listeners. Only in Zimbabwe was the trend different for the two subgroups: the likelihood of having an early union increased for women with exposure to radio but decreased for those without.

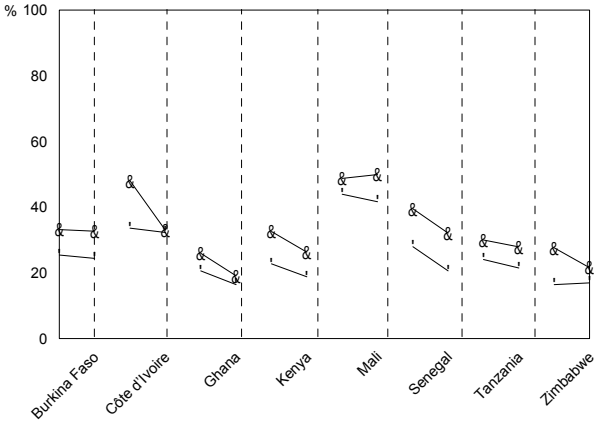
We find a smaller correlation between exposure to radio and early initiation of sex for males (Figure 4.13.2). In many countries little difference is observed in the proportion of young men who had first sex before age 20 by exposure to radio. Only in Mali was there a large difference; men who listen regularly were more likely to have early first sex than those who did not.

There was also no appreciable correlation with exposure to radio and early union formation for men. In general it appears that young men who listened to radio regularly are less likely to form a first union before age 20, but the differences are small.

Figure 4.13.1 Trends in percentage of women age 18-24 who had first birth, first sex, and first union before age 18, by mass media exposure: earlier survey versus later survey

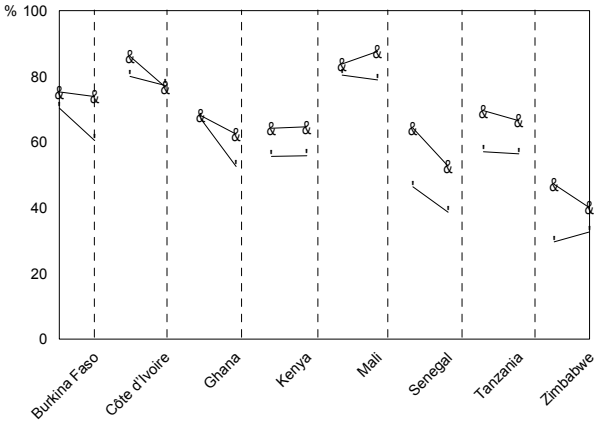
Figure 4.13.2 Trends in percentage of men age 20-29 who had first sex and first union before age 20, by mass media exposure: earlier survey versus later survey

First birth before age 18

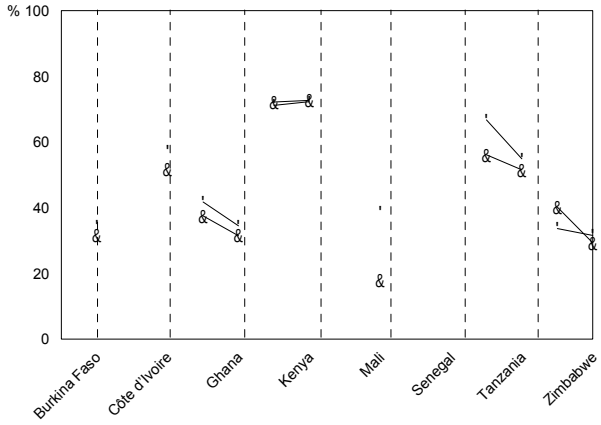


No data on age at first birth for men

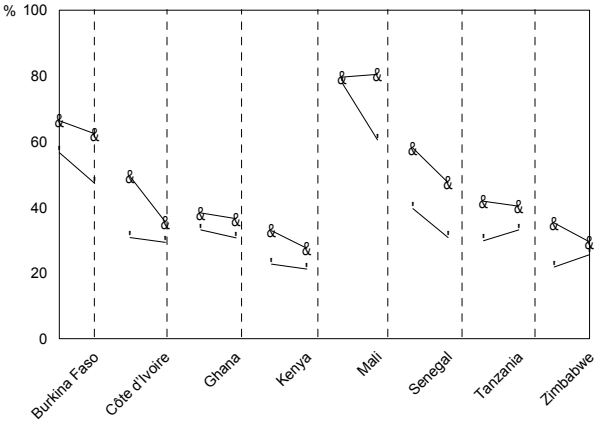
First sex before age 18



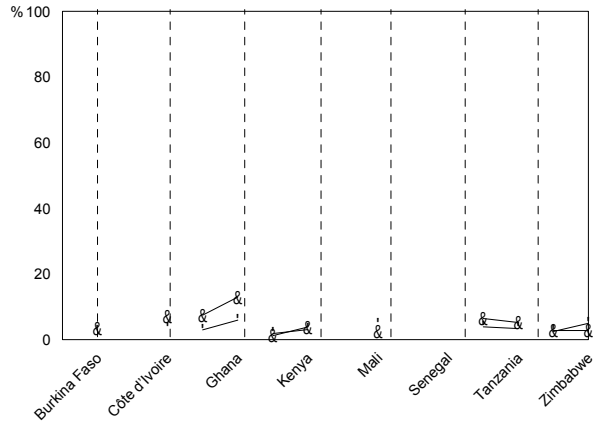
First sex before age 20

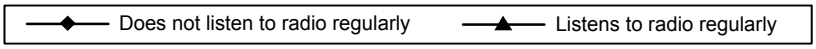


First union before age 18



First union before age 20





Contextual Variables

A comparison was made of the different reproductive outcome variables among young women and men according to their community characteristics. Two aspects were considered: the degree of community development and the family planning environment. The first was measured by the proportion of adults in the sampling cluster who had completed eight or more years of schooling. The family planning environment was evaluated though the proportion of adults who had ever used a modern method of contraception. For the multivariate models that follow, the cluster-level aggregates were transformed into dichotomous variables for higher or lower community status. We will comment here only on the general relationships, focusing on trends in early first sex (Figures 4.14 and 4.15). The trends for early first birth and early first union are similar (not shown).

Figure 4.14 Distribution of cluster-level variable for proportion of adults with eight or more years of schooling, by whether women (age 18-24) or men (age 20-29) had first sex during adolescence

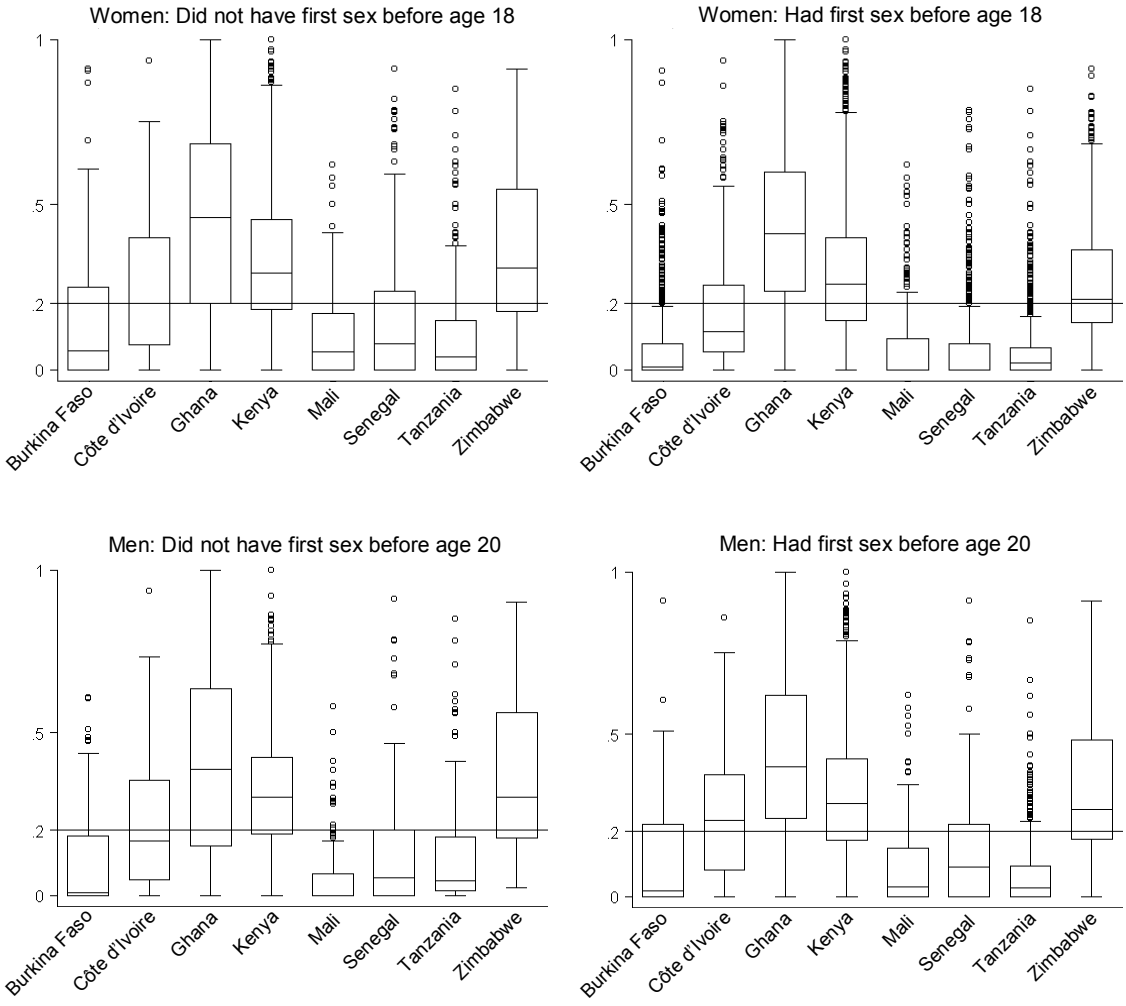
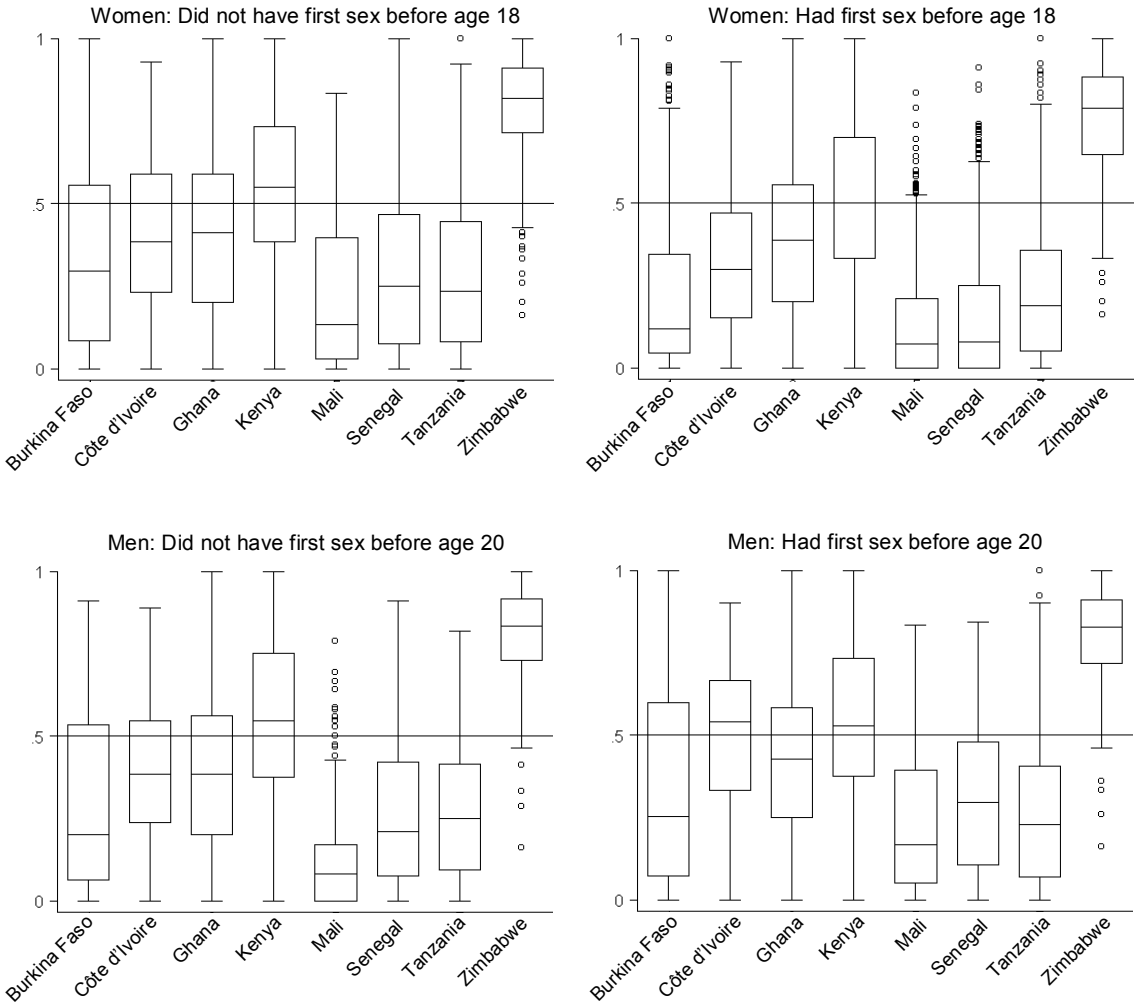


Figure 4.15 Distribution of cluster-level variable for proportion of adults who have ever used modern contraception, by whether women (age 18-24) and men (age 20-29) had first sex during adolescence



Young women who had early first sex are less likely to live in communities with lower development status. In every country, the median proportion of well-educated adults in a cluster is higher for women who did not have sex before age 18 compared with those who did. For males the relationship is the opposite: men who did not have sex during adolescence tend to live in less-developed communities (except in Zimbabwe and perhaps Tanzania). Interestingly, for Kenya the median proportion of well-educated adults in the clusters for men who had early sex was very similar to the median proportion for men who did not have early sex. Because this trend exists in Tanzania and Zimbabwe, it might suggest that there is a regional effect based on higher HIV/AIDS awareness in the East African countries. The trend could also be a result of small male sample sizes, and should be verified with larger data sets.

Considering the local family planning environment, young women who had early first sex tend to reside in communities characterized by a smaller proportion of adults who have ever used a modern contraceptive method. Males, however, show a different pattern. In the majority of the countries studied, young men who had early first sex live in communities that have a strong family planning environment.

Overall, little change in patterns can be noted over time.

5 Determinants of Changes in Adolescent Reproductive Behavior

As described in section four, similar trends in early reproductive behavior across background characteristics suggest that similar social influences are at play. To control for the potentially confounding influences, and to see if variables have their own significance, we have included them in a multivariate model. This section describes the results of the multivariate analyses of the three outcome variables: first birth, first union, and first sex during adolescence.

Analysis of how trends are affected by sociodemographic and community-level variables is captured through interaction terms of the characteristic on the year of the survey. The interaction terms are included to specify how the effects of the dependent variables on the outcome variables have changed between surveys. Although stratification of the regressions by survey could help simplify the analyses, in a stratified form we are unable to see if the difference between the coefficients is statistically significant. In some cases we have run the stratified regressions to explain the findings of the interaction term more clearly; however, we do not display those results here.

We refer to the category of one to seven years of schooling as primary education and that of eight or more years as secondary education. Although the educational systems vary by country, these levels of schooling have been chosen to maintain comparability.

5.1 Age at First Birth

As seen in Table 5.1, the decline between the earlier and later surveys in the risk of first birth before age 18 for women was statistically significant in Côte d'Ivoire and in Senegal. As expected, overall young women in the region who were less educated were more likely to have an early birth. Women with secondary schooling were consistently at least 50 percent less likely to have had a first birth before their 18th birthday than were those with no education, all else being equal (Table 5.1). In Côte d'Ivoire there was a significant interaction effect for education and survey period. The interaction term was less than one, suggesting that the difference in the probability of early childbearing for a woman with secondary education versus a woman with no education was greater in 1994 than in 1998.

In many countries, effects of other sociodemographic and contextual variables were not statistically significant once effects of education were considered. The association between residence and probability of early childbearing was significant only in Côte d'Ivoire, Ghana, and Senegal. Women in these countries who lived in urban areas were over 30 percent less likely to have a first birth before age 18 as compared with rural women.

In Côte d'Ivoire and Zimbabwe, exposure to radio was inversely associated with the probability of an adolescent birth. Both countries also experienced changes in the effects between surveys; the negative association that was observed in the earlier survey was no longer significant by the later survey as suggested by the significant interaction term.

There was no significant effect of the community development variable for the probability of a first birth before age 18 in any of the countries. The family planning environment proved to be significantly associated with probability of an early birth among young women in Ghana and Senegal, but the direction of the association was not consistent. In Ghana, an adolescent was more likely to have had an early birth in communities with a strong family planning environment, while in Senegal the opposite was true. The interaction term for Ghana was also significant; it appears that the positive association in the early survey was no longer significant in the later survey.

Table 5.1 Odds ratios for having first birth before age 18, among women age 18-24

First birth before age 18	Country							
	Burkina Faso	Côte d'Ivoire	Ghana	Kenya	Mali	Senegal	Tanzania	Zimbabwe
Relative date of survey								
Reference category: Earlier survey								
Later survey	1.08	0.65 **	0.64	1.21	1.11	0.70 *	0.85	0.75
Education								
Reference category: None[1]								
1-7 years of schooling	0.57 **	0.85	0.75	0.76	1.16	0.60 **	0.49 ***	0.64
8+ years of schooling	0.16 ***	0.47 ***	0.27 ***	0.23 ***	0.41 *	0.09 ***	0.15 ***	0.19 ***
Interaction education-survey								
1-7 years of schooling × Later	1.29	1.11	0.91	0.90	0.61	0.87	1.01	0.84
8+ years of schooling × Later	2.43	0.47 *	1.38	1.11	0.54	1.80	0.95	0.66
Residence								
Reference category: Rural								
Urban	1.37	0.70 **	0.57 **	0.90	0.67	0.59 **	1.02	0.85
Interaction residence-survey								
Urban × Later	0.49 *	0.82	1.14	1.10	1.01	0.93	1.19	0.75
Exposure to radio								
Reference category: Does not listen								
Listens to radio regularly	0.92	0.74 **	0.99	0.86	0.96	0.85	1.01	0.70 **
Interaction exposure to radio–survey								
Listens to radio × Later	0.98	1.68 **	1.11	1.03	0.96	1.03	1.01	1.71 **
Community development								
Reference category: Lower								
Higher	0.65	0.77	1.05	0.97	0.90	0.93	0.71	0.94
Interaction community development–survey								
Higher × Later	0.82	1.25	1.19	0.76	0.85	0.93	0.72	1.45
Community family planning environment								
Reference category: Lower								
Higher	0.82	0.87	1.73 **	0.95	1.16	0.49 *	0.72	1.05
Interaction community FP environment–survey								
Higher × Later	1.54	0.98	0.55 *	0.75	0.94	2.14	1.33	1.16
Sample size	3,513	3,299	2,415	4,630	3,185	4,137	5,166	3,549

[1] The reference category for education is no schooling in all countries except Zimbabwe where 1-7 years of schooling is reference.
* p<0.05 ; ** p<0.01 ; *** p<0.001

5.2 Age at First Sex

Between the surveys in Côte d'Ivoire, Ghana, and Senegal, there was a significant reduction in the proportion of women who had early sex (Table 5.2.1). This was not the case in Mali, where adolescents were somewhat more likely to have engaged in early sex at the time of the later survey, after controlling for effects of the background variables.

In each country, women with at least secondary education were significantly less likely to have had sex before age 18 than were women with no education. Effects of primary education were less consistent. In Kenya and Tanzania there were significant interaction terms for education. After stratifying to investigate the interaction term for Kenya, we find that in 1998 the direction of the association changed and adolescents were more likely to have early sex if they had primary education than if they had no education.

In five countries, urban-rural residence had an independent effect on a woman's probability of having sex before age 18. Urban residence reduced the probability of early sexual debut by some 40 to 50 percent in Côte d'Ivoire, Ghana, Mali, Senegal, and Zimbabwe. No interaction effects were found, suggesting that this association did not change between the two surveys.

Exposure to radio was associated with early sexual debut only in Senegal and Zimbabwe. In both countries the odds ratios were in the expected direction: women listening regularly to the radio had about a 25 percent lower probability of engaging in early sex. In Zimbabwe, moreover, there was an interaction effect. After stratifying the analysis by survey, we find that the effect of exposure to radio was negative at the time of the earlier survey and insignificant at the time of the later survey. Thus in Zimbabwe, exposure to radio in 1994 was significantly associated with the probability of early sexual debut among women, while in 1999 there was no noticeable effect.

The community effects were less important and less consistent in most countries. In Ghana, women in communities of higher development had a higher chance of early sex, while in Tanzania the opposite was true. In neither of these two countries did the effect vary across surveys. There was no consistent effect of family planning environment on the probability of adolescent sexual initiation.

Among young men, Zimbabwe was the only country that showed a significant change in the probability of early sex between the two surveys (Table 5.2.2). While controlling for other variables, men were 71 percent less likely to have had first sex before age 20 at the later survey compared with the earlier survey.

The male data suggest that education is related to age at first sex; however, the relationship is often in the opposite direction of the female models. This is similar to what had been found in the bivariate analysis. In Côte d'Ivoire, Mali, and Senegal we find that men with education are more likely to have early sexual debut compared with men with no education. In Zimbabwe and Tanzania, however, men with education were less likely to have early sexual experience compared with men with no education.

Moreover, in Zimbabwe there was a significant interaction effect between education and survey. Further stratification showed a significant negative effect of no education on early sex at the earlier survey and no effect at the later survey. (Note that the Zimbabwe male sample had few cases in the no schooling category, so the findings should be interpreted with caution.) Tanzania also experienced a significant interaction effect: at the time of the earlier survey there was a significant negative association between secondary education and sex before age 20 while at the time of the later survey there was no association.

In Zimbabwe and Tanzania there was an association between exposure to radio and early sex but the effect changed between the two surveys. In Tanzania the earlier survey showed a significant positive association and the later survey showed a nonsignificant negative association. The opposite was true for Zimbabwe. In Mali exposure to radio was associated with the probability of early sex in the later survey (questions on media exposure were not asked to men in the earlier survey).

There were few significant community effects on the probability of men having first sex before age 20.

Table 5.2.1 Odds ratios for having first sex before age 18, among women age 18-24

First sex before age 18	Country							
	Burkina Faso	Côte d'Ivoire	Ghana	Kenya	Mali	Senegal	Tanzania	Zimbabwe
Relative date of survey								
Reference category: Earlier survey								
Later survey	1.04	0.49 ***	0.6 *	0.78	1.61 *	0.56 ***	0.80	1.10
Education								
Reference category: None[1]								
1-7 years of schooling	0.64 **	1.00	0.84	0.76	1.07	0.54 ***	0.59 ***	0.68
8+ years of schooling	0.33 ***	0.53 ***	0.44 ***	0.30 ***	0.44 *	0.22 ***	0.13 ***	0.21 ***
Interaction education-survey								
1-7 years of schooling × Later	1.15	1.11	1.1	2.19 *	0.67	1.14	1.06	0.73
8+ years of schooling × Later	1.01	0.91	1.21	1.82	0.68	1.33	1.80 *	0.68
Residence								
Reference category: Rural								
Urban	0.83	0.58 **	0.54 ***	0.88	0.50 *	0.52 ***	1.15	0.60 **
Interaction residence-survey								
Urban × Later	0.57	1.44	0.96	1.31	1.10	0.77	1.20	1.33
Exposure to radio								
Reference category: Does not listen								
Listens to radio regularly	1.12	0.95	1.20	0.94	0.90	0.75 *	0.87	0.72 **
Interaction exposure to radio–survey								
Listens to radio × Later	0.74	1.27	0.66 *	0.98	0.78	1.37	1.03	1.57 **
Community development								
Reference category: Lower								
Higher	0.75	0.82	1.77 **	1.02	1.05	0.71	0.51 **	1.00
Interaction community development–survey								
Higher × Later	1.32	1.08	1.21	0.71	0.99	1.23	1.25	1.01
Community family planning environment								
Reference category: Lower								
Higher	0.89	0.83	1.13	0.85	2.27 *	0.59	0.84	0.97
Interaction community FP environment–survey								
Higher × Later	1.14	1.29	0.89	0.94	0.43 *	1.57	1.11	0.97
Sample size	3,368	3,276	2,388	4,489	3,083	3,941	4,919	3,452

[1] The reference category for education is no schooling in all countries except Zimbabwe where 1-7 years of schooling is reference.
* p<0.05 ; ** p<0.01 ; *** p<0.001

Table 5.2.2 Odds ratios for having first sex before age 20, among men age 20-29

First sex before age 20	Country							
	Burkina Faso	Côte d'Ivoire	Ghana	Kenya	Mali	Senegal	Tanzania	Zimbabwe
Survey period								
Reference category: Earlier								
Later survey			0.66	1.98			0.65	0.29 ***
Education								
Reference category: None[1]								
1-7 years of schooling	0.84	2.92 **	1.53	2.02	1.58 *	1.60 **	0.59	0.12 *
8+ years of schooling	1.16	3.22 **	1.84	2.27	2.01 *	1.54 *	0.21 **	0.67
Interaction education-survey								
1-7 years of schooling × Later			1.28	0.34			2.21	15.11 *
8+ years of schooling × Later			0.79	0.27			5.33 *	1.05
Residence								
Reference category: Rural								
Urban	0.92	1.63	1.14	1.18	1.57	1.33	1.17	0.70
Interaction residence-survey								
Urban × Later			0.44 *	1.15			0.69	1.22
Exposure to radio								
Reference category: Does not listen								
Listens to radio regularly	1.14	0.55	1.41	1.05	2.16 **		2.34 **	0.63 *
Interaction exposure to radio–survey								
Listens to radio × Later			0.73	1.35			0.38 *	2.06 **
Community development								
Reference category: Lower								
Higher	0.91	0.99	1.02	0.79	1.23	0.88	0.38 *	1.56
Interaction community development–survey								
Higher × Later			1.80	0.93			1.96	0.76
Community family planning environment								
Reference category: Lower								
Higher	1.36	1.09	0.80	0.93	1.06	1.13	1.60	0.86
Interaction community FP environment–survey								
Higher × Later			1.19	1.12			1.12	1.87 *
Sample size	744	306	821	1,901	606	1,177	1,227	1,551

[1] The reference category for education is no schooling in all countries except Zimbabwe where 1-7 years of schooling is reference.
* p<0.05 ; ** p<0.01 ; *** p<0.001

5.3 Age at First Union

After taking into account changes in background variables, trends in the percentage of women in a union before age 18 were mixed (Table 5.3.1). In some countries, such as Ghana and Senegal, the probability of early union formation decreased by about 40 percent during the intersurvey period. However, in Mali the probability increased by over 50 percent.

Education is significantly associated with early union for females. In every country except Mali, women with secondary or higher education were 70 to 95 percent less likely to enter into union by age 18. Similarly, in most cases women who had some primary education were 25 to 65 percent less likely to be in first union during adolescence than their counterparts with no education.

Table 5.3.1 Odds ratios for having first union before age 18, among women age 18-24

First union before age 18	Country							
	Burkina Faso	Côte d'Ivoire	Ghana	Kenya	Mali	Senegal	Tanzania	Zimbabwe
Relative date of survey								
Reference category: Earlier survey								
Later survey	1.00	0.79	0.54 *	1.02	1.53 *	0.60 **	0.81	0.80
Education								
Reference category: None[1]								
1-7 years of schooling	0.57 ***	0.63 ***	0.74	0.55 **	1.10	0.38 ***	0.40 ***	0.33 **
8+ years of schooling	0.28 ***	0.27 ***	0.26 ***	0.15 ***	0.54	0.08 ***	0.07 ***	0.09 ***
Interaction education-survey								
1-7 years of schooling × Later	0.89	0.82	1.44	1.24	0.38 **	1.29	1.27	0.89
8+ years of schooling × Later	0.46 *	0.39 *	2.39 **	1.58	0.23 **	2.08	1.65	0.80
Residence								
Reference category: Rural								
Urban	0.68	0.8	0.55 ***	1.19	0.69	0.38 ***	0.90	0.62 *
Interaction residence-survey								
Urban × Later	0.6	0.83	0.91	1.12	0.81	0.83	1.03	1.15
Exposure to radio								
Reference category: Does not listen								
Listens to radio regularly	1.03	0.72 **	1.15	0.92	0.9	0.82	0.98	0.77 *
Interaction exposure to radio–survey								
Listens to radio × Later	0.94	1.57 *	0.84	1.11	0.69	1.20	1.24	1.74 **
Community development								
Reference category: Lower								
Higher	0.91	0.63 **	0.78	0.95	0.84	0.83	0.85	0.94
Interaction community development–survey								
Higher × Later	0.86	1.18	1.48	0.70	0.78	0.70	0.66	1.13
Community family planning environment								
Reference category: Lower								
Higher	0.76	0.68	1.46 *	0.68 **	2.3 *	0.47 *	0.47 **	1.10
Interaction community FP environment–survey								
Higher × Later	1.45	1.36	0.63 *	0.82	0.36 *	2.21	1.5	1.10
Sample size	3,513	3,299	2,415	4,630	3,185	4,137	5,166	3,549

[1] The reference category for education is no schooling in all countries except Zimbabwe where 1-7 years of schooling is reference.
* p<0.05 ; ** p<0.01 ; *** p<0.001

Although the overall effects of education were not significant in Mali, the significance of the interaction terms suggests that education had a different effect on early first union between the two surveys. After stratifying the analysis we note that in the earlier survey primary education had no association with adolescent union formation; however, in the later period there was a significant negative association. The same was found with regard to the secondary education category. Thus in 1995 lack of schooling was associated with early first union, an association that did not exist in 1987.

Burkina Faso, Côte d'Ivoire, and Ghana also had significant interactions between the survey and secondary education variables. In Burkina Faso and Côte d'Ivoire the interaction suggested that more education resulted in a higher probability of first union before age 18 at the earlier survey; however, this was reversed in the later survey. In Ghana, secondary education was associated with less probability of early union in both surveys; however, the odds ratio was closer to one in the later survey.

Urban-rural residence affected age at first union in three countries. In Ghana, Senegal, and Zimbabwe women were less likely (45, 62, and 37 percent, respectively) to enter into union before age 18 if they lived in an urban area compared with their rural counterparts. These associations remained stable over time while controlling for other background variables.

Regular exposure to radio is associated with early union in only two of the eight countries in the analysis. In Côte d'Ivoire and Zimbabwe, women who listen to the radio regularly were about 25 percent less likely to have first union before age 18 than those who do not listen. Interaction effects between exposure to radio and survey are in the positive direction, suggesting that, for both countries, the effect was greater in the later survey compared with the earlier survey.

There were few significant associations with the community variables. Côte d'Ivoire was the only country in which there was a development effect on women's probability of early union. Women living in a more developed community were 37 percent less likely to be in union by age 18. This influence did not vary between the two surveys.

The effect of family planning environment was mixed. In Kenya, Senegal, and Tanzania, women who lived in a community with a strong family planning environment were 30 to 50 percent less likely to enter into a union before age 18. However, in Ghana and Mali, women in such types of communities were more likely to enter into union. The latter two countries also exhibited significant interactions: in both cases a significant positive effect of family planning effort was found for the earlier survey but was no longer evident at the later survey.

Among men, the proportion in first union by age 20 was low across the region (Table 5.3.2); this makes it unlikely that many significant results can be derived from these data. In fact, in Senegal there were too few cases of male union formation during adolescence for the multivariate model to converge; thus the results presented here are from the later survey only. Tanzania was the only country to demonstrate significant change in the probability of early union formation, with a decreasing trend over time.

Male education had a negative association with early union in Kenya, Tanzania, and Zimbabwe. In Kenya and Tanzania, we found differences in the effect between the first and second surveys. In both cases the education-survey interaction term was greater than one suggesting an upward shift in the effect. After running the models stratified, we found a significant negative association of primary school with early union formation in the earlier survey that dissipated in the later survey.

Controlling for education, there were few significant associations of other sociodemographic or contextual variables with men's probability of first union before age 20. Residence was significantly associated with early union formation only in Côte d'Ivoire: men who lived in an urban area were 64 percent less likely to have an early union than men in a rural area. This trend was stable over time.

Neither exposure to radio nor indicators of community context (development level and family planning effort) were significantly associated with men's probability of early union for any of the countries.

To summarize, education had the most significant effect for most of the countries and on most of the outcomes. Exposure to radio and residence had effects in a few of the countries and, for females, consistently had a negative association with early reproductive behavior.

The community variables had little overall effect. This suggests that any trends at the bivariate level would be better captured by individual-level sociodemographic characteristics.

Table 5.3.2 Odds ratios for having first union before age 20, among men age 20-29

First union before age 20	Country							
	Burkina Faso	Côte d'Ivoire	Ghana	Kenya	Mali	Senegal	Tanzania	Zimbabwe
Survey period								
Reference category: Earlier survey								
Later survey		0.96	0.65	0.70	1.36		0.29 *	0.80
Education								
Reference category: None[1]								
1-7 years of schooling	0.52	1.00	2.00	0.31 *	1.34	0.11 **	0.22 ***	2.52
8+ years of schooling	0.45	1.00	1.25	0.07 ***	0.99	0.18	0.08 ***	0.39 *
Interaction education-survey								
1-7 years of schooling × Later		0.76	1.73	3.08	0.88		5.08 **	0.38
8+ years of schooling × Later		1.08	1.58	5.86 *	1.31		3.02	0.93
Residence								
Reference category: Rural								
Urban	0.55	0.36 *	0.55	1.04	1.04	0.42	0.94	0.68
Interaction residence-survey								
Urban × Later		1.62	0.59	1.33	0.40		0.67	1.32
Exposure to radio								
Reference category: Does not listen								
Listens to radio regularly	0.79		0.72	1.35			1.65	1.18
Interaction exposure to radio–survey								
Listens to radio × Later			0.79	0.65			0.60	1.59
Community development								
Reference category: Lower								
Higher	0.78	0.72	0.49	0.55	0.38	0.25	0.19	0.77
Interaction community development–survey								
Higher × Later		0.36	2.43	1.50	2.54		5.81	0.88
Community family planning environment								
Reference category: Lower								
Higher	0.74	2.08	1.12	0.62	0.23	0.36	0.21	0.81
Interaction community FP environment–survey								
Higher × Later		1.18	1.02	0.99	5.15		4.01	2.36
Sample size	794	1,124	822	1,974	916	1,352	1,232	1,551

[1] The reference category for education is no schooling in all countries except Zimbabwe where 1-7 years of schooling is reference.
* p<0.05 ; ** p<0.01 ; *** p<0.001

6 Discussion and Conclusion

This report has investigated trends and differentials in reproductive behavior among adolescents in eight sub-Saharan countries, drawing on data from successive DHS surveys. The key questions we set out to answer were: what are the levels and trends of adolescent reproductive behavior, what characteristics are associated with these trends, and in what contexts do the trends occur.

The data presented in section 4.3 suggest that, despite the shortness of the time between surveys, in most countries, there was a decline in the levels of first birth, first sex, and first union among adolescent women and men. Exceptions included a slight increase in early first birth among women in Burkina Faso, of first sex among women in Kenya, and of first union among men in Ghana, Kenya, Mali, and Zimbabwe (though overall levels of union formation among young men remained low). Subsequently, multivariate models were used to determine the independent impact of selected sociodemographic and contextual variables on those trends (section 5).

As previous research has found, modernization is a key determinant of reductions in fertility. In our models we proxy modernization through a series of characteristics related to individuals and their environment: education, urbanization, exposure to mass media, community development, and family planning environment. Strong disparities are observed with regard to these characteristics from country to country, suggesting that the pace of modernization has not been consistent across the region.

The findings suggest that adolescent women's sociodemographic characteristics (education, residence, and exposure to mass media) had greater influence on early reproductive outcomes while the contextual variables had weaker influence. In particular, secondary schooling had among the strongest and most consistent negative effects.

Modernization had a negative effect on probability of early sex for males, but was associated with delayed union formation. While DHS surveys do not collect data on age at first birth for men, in the absence of increased contraceptive use, increased probability of early first sex and early first union will affect the probability of early first birth. Community development and family planning environment did not appear to be significant factors in determining probabilities among males for early first sex or first union. The definition of these variables was inconsistent and may need to be considered further.

Important gender differentials were observed. In the majority of the countries studied, young men who were more educated, more urbanized, had greater exposure to the media, and lived in more developed settings were more likely to have had early sex. However, these same men were more likely to enter into union later. Women, on the other hand, tended to be less likely to have had early birth, early sex, or early union if they were more educated, more urbanized, had more exposure to the media, and lived in a more developed setting. These distinct associations suggest that program planners and policymakers need to plan separate activities (but with equal emphasis) for young men and women.

This research suggests that modernization is associated with fewer early births for women but not necessarily delayed sexual debut, and not associated with later fatherhood for men. Modernization, especially as measured by educational attainment, may increase the chances of men initiating reproductive behavior during adolescence, but decreases the chances for women. However, the benefits of schooling outweigh any negative effects on early male sexual activity and imply that as modernization occurs, programs directed at young men should be distinct from those directed at young women.

There are differences between what women and men know about reproductive health, with only small improvements occurring between surveys. Men had more knowledge of modern contraceptive methods than

women. This is partially due to greater knowledge of condoms. There was very little knowledge of the ovulatory cycle among adolescent women and virtually no improvement between the surveys. There was an interesting gender disparity between HIV/AIDS prevention knowledge. Women were more likely to know that abstaining from sex or limiting the number of partners help prevent HIV transmission, but were also more likely to report misinformation about how HIV is transmitted than were men. Men were much more likely to know that condoms prevent transmission. Solid reproductive health knowledge is essential for adolescents making decisions about reproductive behavior.

While the ability to conduct quality research in the area of adolescent reproductive health and behavior has been improved in recent years, in part due to the data collected through the DHS program, in many ways empirical analyses are limited by survey design. The present results are useful for identifying target groups for reproductive health services and outreach programs; however, the need for more contextual and qualitative information is evident.

For example, while the health consequences of early reproductive behavior have been well documented elsewhere, less is known about the social context in which it occurs. Little information is available about the partner, familial, and community reactions to adolescent childbearing, sexual activity, and union formation. Researchers have suggested the timing of first union may affect young women, especially in terms of autonomy in choosing their spouse and in the way they are viewed by their parents, in-laws, and society. However, quantitative indicators of personal autonomy are difficult to measure. Moreover, in many African cultures union formation is a process and not necessarily a single definitive event. The standard DHS questions on age at first union do not necessarily refer to timing of marriage in a religious or legal ceremony, or consummation of the union.

In addition, it has been suggested that financial transactions following intercourse are frequent among adolescents in many sub-Saharan societies, and characterize a majority of early sexual encounters in some areas. While the standard DHS questionnaire includes a question on payment for sex, there is no clear distinction between those paying formal prostitutes and those reimbursing girlfriends or more regular partners. Nor does it measure reciprocity of giving and receiving between unmarried adolescents and their partners (Castle and Konate, 1999).

An area of weakness of the DHS sampling scheme is the age distribution of respondents, in particular the often small sample sizes in the youngest groups and exclusion of teens under 15 years (sometimes even under 19 years for males). In a sense, the age intervals chosen here to represent adolescence have been arbitrary, reflecting DHS convention and sample sizes more than the real experiences of African youth.

Our analyses have helped to identify areas for further investigation related to adolescent reproductive health and behavior. Among these are the following:

- Biological effects of differential fertility levels early in the reproductive years (age at menarche, sterility due to STI infection)
- Information on community-level reproductive health behavior change communication programs, and accessibility of contraceptive methods for adolescents regardless of marital status
- Information on reproductive behaviors among young men
- Context of first birth for teenage mothers and fathers, such as familial support systems
- Context of first sexual experience (age of partner, nature of the relationship)
- Context of first union formation (age of spouse, familial influences)

The findings on differentials and determinants in adolescent reproductive health and behavior are useful for policy and program development for the region. Consideration of contextual variables enhances understanding of the factors that influence adolescent reproductive decisions, which in turn affect adolescent

health. Understanding the factors that influence adolescents' decisions allows for interventions affecting overall health (including HIV transmission), fertility, population growth, and population momentum for the region.

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