

# Sexual Initiation Among Adolescent Girls and Boys: Trends and Differentials in Sub-Saharan Africa<sup>1</sup>

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This paper examined trends in adolescent sexual initiation in sub-Saharan Africa, with emphasis on differentials in social determinants across gender and contexts. Data were drawn from Demographic and Health Surveys in 8 countries that had at least 2 surveys conducted approximately 5 years apart, each with distinct questionnaires for women and men of reproductive age regardless of marital status. The data were useful both for testing of substantive hypotheses about the correlates of adolescent sexual intercourse as well as for elaborating sexual health interventions in contexts of development. The main analytical tool was multivariate logistic models using a generalized estimating equation to consider the probability of a young man or young woman having first intercourse during adolescence. In some countries, observed declines over time in the proportion of adolescents having had sex were not statistically significant after taking into account changes in background characteristics, especially education. Important gender differentials were also found. While secondary schooling was associated with lower probability of early sex among girls in all countries, the relationship was often in the opposite direction among boys. Influences of other sociodemographic and community status variables were generally less important.

**KEY WORDS:** adolescents; first sexual intercourse; Africa; gender differences; reproductive health.

## INTRODUCTION

Sub-Saharan Africa has some of the highest levels of adolescent and adult childbearing and HIV/AIDS infection in the world. The risk of unplanned pregnancy and sexually transmitted infections (STIs), including HIV/AIDS, may be affected by the age of sexual debut. An individual who initiates sexual activity at age 15, for example, will have more exposure to conception over the reproductive span than one who initiates sex at age 21. Early childbearing has been linked to higher rates of maternal and child morbidity and mortality, truncated educational opportunities, and lower future family income.

Adolescent fertility has also been associated with larger completed family sizes, which in turn may lead to greater population growth rates (see Menken, 1980; Senderowitz & Paxman, 1985; Voydanoff & Donnelly, 1990; Wulf & Singh, 1991; Zabin & Kiragu, 1998). Moreover, sexual activity at younger ages may be associated with greater likelihood of unprotected intercourse and multiple partners, potentially leaving the adolescent at greater risk of contracting HIV/AIDS and others STIs (Blanc & Way, 1998). The serious health risks of early fertility and sexual activity underline the need for addressing adolescent reproductive behaviors both within and outside of marriage (Zabin & Kiragu, 1998).

The Programme of Action of the International Conference for Population and Development reaffirmed the priority of providing high quality, appropriate sexual and reproductive health services for youth (United Nations, 1999). Effective implementation requires an understanding of the causes and consequences of early initiation of reproductive-related behaviors. A growing body of literature on reproductive health and behavior among the

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adolescent populations in sub-Saharan Africa has emerged since the late 1980s. In particular, adolescent fertility has been increasingly viewed as a source of social and policy concern. However, fertility rates among teenagers have not necessarily increased over time; in fact, a recent time-trend analysis showed that the proportion of young women having had a first birth before age 18 decreased in seven of eight countries studied in the region (Mahy & Gupta, 2002). Moreover, although previous studies have suggested that, in many societies, boys are more likely than girls to engage in sexual activity at an early age, the vast majority of the literature on consequences of adolescent childbearing has tended to focus on the effects on the mother, and to a lesser extent on the adolescent father (Gage, 1998). Only recently has attention been increasingly placed on the reproductive health practices and needs among boys, largely in light of the AIDS epidemic.

There are large differences in the trends and impacts of reproductive and sexual behavior between young men and young women. Many analyses on the role of gender in early initiation of reproductive activities have commented on the differences in societal expectations and norms for females and males (Singh, Wulf, Samara, & Cuca, 2000). In most African societies, women get married at a younger age than men and, in some, premarital sexual activity is common and even favored. An early birth is seen to secure marriage for a woman because it demonstrates her fecundity to the man's family and increases her social standing. Adolescents' contextual surroundings can profoundly affect their reproductive and sexual attitudes and practices. The phenomenon of "sugar daddies" (older men offering gifts of cash or kind to young unmarried women in exchange for sexual favors) has also been widely documented (Castle & Konaté, 1999; Djamba, 1997; Singh et al., 2000). Poverty may be considered a root cause. It has further been suggested that economic transactions following intercourse are frequent among both adolescent boys and girls in many countries of sub-Saharan Africa, and are not necessarily perceived as a source of social condemnation (Castle & Konaté, 1999). Reciprocity of the giving and receiving between girls and boys is common, and characterize a majority of early sexual encounters in some areas. Teenagers whose sexual activities are often accompanied by financial rewards exhibit behaviors that put them at greater risk of HIV/AIDS infection.

The purpose of this paper is to present a comparative perspective of trends and differentials in the timing of first sexual intercourse among adolescent females and males in selected countries of sub-Saharan Africa. We sought to examine the levels and trends of adolescent sex, identify the main characteristics associated with those trends, and explore the contexts in which those trends were oc-

curing. The analysis drew on data collected from eight countries participating in the Demographic and Health Surveys (DHS) program, for which at least two surveys were conducted approximately 5 years apart, each with distinct questionnaires for women and men of reproductive age regardless of marital status. The earlier round of surveys was conducted between 1987 and 1994; the later round between 1996 and 1999. The countries included Burkina Faso, Côte d'Ivoire, Ghana, Kenya, Mali, Senegal, Tanzania, and Zimbabwe. Our main analytical tool was multivariate logistic models using a generalized estimating equation to consider the probability of a young man or woman having first intercourse during adolescence.

The levels and trends in early initiation of sexual activity may be affected by young women's and men's background characteristics. We attempted to model these basic social influences and examined how changes in reproductive-related practices occurred within different subgroups among the adolescent populations of the eight countries. We systematically looked at changes over time for any evidence of patterns at the individual and contextual levels that could help explain the timing of first sex. Understanding the sociodemographic causes of changes in behaviors could assist program planners and policymakers in creating programs aimed at improving reproductive health care for adolescents. In particular, we sought the answers to three questions: (1) Have there been significant changes over time in the likelihood of first sex during adolescence? (2) Which sociodemographic and community characteristics were most associated with these trends? (3) Were they different for girls and boys?

The key hypothesis being tested was that changes in the probability of adolescent reproductive-related practices would be associated with selected sociodemographic and contextual variables associated with modernization. Fertility transition theory suggests that modernization—as characterized in part by increasing education, urbanization, and media exposure—brings about forces dissolving traditional tendencies toward large families and replaces them with individualism marked by material aspirations. Based on early research and observation in premodern populations and contemporary industrial countries, the theory claims that, with sufficient modernization, fertility (and mortality) will inevitably fall (see Caldwell, 1976; Coale, 1973; Farooq & DeGraff, 1988; Simmons, 1985). Among other intermediate variables, later age at first sex can be a major contributor to fertility decline.

The selection of explanatory variables can be traced to Easterlin's list of four empirically identifiable aspects of modernization: innovations in formal schooling, urbanization, the introduction of new goods, and innovations in

public health and medical care (Easterlin, 1983). Previous studies have consistently pointed to a strong correlation between higher levels of schooling and delayed reproductive behavior throughout the developing world (see, for example, Ainsworth, 1994; Martin & Juarez, 1995; Robey, Rutstein, & Morris, 1992). Mboup and Saha (1998) found that in many countries of sub-Saharan Africa (including Burkina Faso, Ghana, and Senegal), women with secondary or higher education had about two to three fewer children than those with no schooling. At the contextual level, Lloyd, Kaufman, and Hewett (2000) suggested 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. The urban and rural distinction is important because of differences in access to health facilities, cultural beliefs, and living situations. Access to modern goods and ideas can affect an individual's reproductive decisions. Cleland and Wilson (1987) suggested 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 practices, especially on contraceptive use and age at first marriage (Adamchak & Mbvizo, 1991; Westoff & Bankole, 1997). In addition, access (physical, financial, and sociocultural) to reproductive health care can influence an individual's familiarity with contraception and knowledge of the health risks of early childbearing or HIV/AIDS infection, and in turn of early sexual activity.

## METHOD

### Data Source

The DHS program has been producing cross-national and comparative quantitative data on reproductive health knowledge, attitudes, and behaviors throughout the developing world since 1985, financed by the United States Agency for International Development and with technical assistance from the research firm ORC Macro. The objectives of the ongoing program include the expansion of the international population and health database and promotion of widespread dissemination and use of survey data among policymakers (ORC Macro, 2001). As with the predecessor World Fertility Survey program, the original focus of the DHS was on the reproductive lives of women. Although attention is being increasingly paid to men, the initial instruments and strategies for collecting data from male respondents were less widespread and less consistent. This study drew on information collected from

nationally representative samples of women and men regardless of marital status from surveys conducted at least 4 years apart to allow for time-trend analysis within a given age group. Each survey included independent individual women's and men's questionnaires for examining gender differentials. There were eight countries in sub-Saharan Africa for which surveys were available that met this criteria: Burkina Faso, Côte d'Ivoire, Ghana, Kenya, Mali, Senegal, Tanzania, and Zimbabwe.

The survey samples were designed using scientific sampling probability. Most samples used two-stage stratified designs: selection of area units or clusters (usually census enumeration areas) in a single stage, normally with probability proportional to size, followed by selection of households (Macro International, 1996). Personal interviews were conducted in selected households for all women and in a subsample of households for all men of reproductive age on a broad range of reproductive health topics. Samples generally covered 6000–8000 women ages 15–49 and 2000–3000 men ages 15–54, distributed across some 200–300 clusters. In some countries, the age range for men was different: 20–54 in the earlier Kenya survey, 20–55 in the earlier Mali survey, and 20 and over in both Senegal surveys.

The surveys were generally carried out using standardized instruments, methods of training, data collection, and data processing. Model questionnaires were translated and otherwise adapted to the needs and conditions of a specific country. The standard question on age at first intercourse was "How old were you when you first had sexual intercourse (if ever)?" This wording was chosen with the intention of reducing underreporting of sexual experience; use of the phrase "if ever" was introduced to differentiate the question for young or unmarried respondents (ORC Macro, 2001). It should be noted that, due to differences in questionnaire design, comparable information on age at first sex among men were not available for the earlier surveys in Burkina Faso, Côte d'Ivoire, Mali, and Senegal, and were not used here.

Previous studies have examined DHS data quality on current age reported at the time of interview (Rustein & Bicego, 1990), age at initiation of reproductive behavior (Blanc & Rutenberg, 1990; Gage, 1995), and other demographic measures (Marckwardt & Rutstein, 1996). In general, data quality can be considered better among younger respondents and improving across survey rounds. The expected trend of fewer problems of incompleteness or inconsistency of age reporting among younger respondents and over time was likewise found for the eight countries under observation. In most countries, at least 90% of respondents in the youngest age groups of either sex provided current age or year of birth information in the later

survey. However, some problems were noted. 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 essentially complete. This difference was probably due to a change in survey implementation and training as opposed to an increase in respondents' knowledge of dates and ages.

With regard to data on timing of first sex, some researchers have voiced concerns that respondents, especially young women, might be uncomfortable with the topic of sexual activity. However, low overall levels of nonresponse or inconsistency in reporting of age at first sex in the DHS seemingly indicate willingness among the target populations to answer such questions. In most countries under observation (and where data were available), in fewer than 10% of cases was the age at first sex missing or inconsistent. Moreover, a recent experimental study of interviewing methodologies in Kenya did not uncover evidence of underreporting of sexual activity among either adolescent girls or boys. The results gave little support to the largely speculative assumption that girls may be less likely than boys to report sensitive behaviors such as early sex (Mensch, Hewett, & Erulkar, 2001).

### Statistical Methods

For our multivariate models on timing of first sex, we limited our analysis to young adults in order to minimize potential recall biases, which tend to be more problematic among older respondents for whom such a first reproductive-related experience generally would have taken place several years earlier. Our analysis focused on the likelihood of an individual reporting having first engaged in sexual intercourse during adolescence. For women, adolescent sex was defined as having occurred before her 18th birthday. The multivariate models included women aged 18–24 at the time of the survey to avoid problems of censored observations, given that women younger than 18 would not yet have completed the period of exposure. For men, adolescent sex was considered before his 20th birthday. Men aged 20–29 were included in the multivariate models, to provide a complete picture of their recent reproductive histories and to ensure sufficient sample sizes as well as cross-national comparability. The gender-specific models were used because of the vast differences across males and females.

Our analysis used multivariate regression models to evaluate trends and determinants of adolescent sexual initiation. We focused on the probability of a young woman or young man having had first sex during adolescence. A logistic link was used to model the dichotomous outcomes. We applied a generalized estimating equation to avoid the

inefficient estimation of coefficients, which results from cluster-based survey sampling structures. Standard logistic models assume that the distribution of the error term follows a binomial distribution and the outcomes are random and independent. However, respondents within 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 allowed us to estimate the model parameters while controlling for intracluster correlation (Liang & Zeger, 1993).

A number of background and community-level variables were included in the multivariate models as potential confounding factors: education, place of residence (urban/rural), mass media exposure (radio listenership), as well as proxy indicators for family planning environment and community development. Education has been widely linked in the literature to changes in reproductive behavior. Among adolescents, although we expect greater education to be associated with a lower probability of first sex, the direction of causality is less clear. Teenagers, especially girls, may decide to delay reproductive-related behavior in order to complete their formal education. On the other hand, some sexually active girls may be forced to leave school early after having a child. For example, according to the 1996 DHS in Mali, 12% of adolescent girls (ages 15–19) who were no longer attending school indicated a pregnancy or marriage as the main reason they left. We elected to limit the category for high educational attainment to 8 or more years of formal schooling—referred to as secondary education or more—in hopes of reducing the likelihood of biases in terms of the numbers 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 a reproductive-related event. Primary education was considered as 1–7 years of schooling. Although the educational systems vary by country, these levels were chosen to maintain comparability.

We considered regular radio listenership as representative of access to the mass media and new ideas. Listening to the radio can occur in a number of locations including outside of the home and, therefore, was considered less associated with economic status than radio ownership. Radio was the medium selected here because of the diversity of development levels among the countries studied. However, trends in radio listening habits need to be interpreted carefully, as changes in the questionnaire design across countries and survey rounds hampered comparability. 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.

There is increasing evidence that community characteristics influence individuals' reproductive behaviors. For example, a strong reproductive health program in the community could raise awareness among adolescents of the health risks of early or unprotected sex. Unfortunately, there is a general lack of comparable time-trend data across most countries in the region on the level of accessibility to reproductive health services nor on timing of contraceptive use among all adolescents regardless of marital status. Instead, in this analysis, the effort of public health care services was evaluated indirectly through the community-level family planning environment. In particular, the strength of local health programs was measured through proxy indicators of whether a large proportion of the adult population (women ages 25–49 and men ages 25–54) in the community had ever used a modern contraceptive method (orals, IUD, injectable, implant, condom, vaginal method, or male or female sterilization). Community characteristics were captured through aggregating men and women's individual-level responses within a cluster. For most countries, communities where at least 50% of adults had ever used modern contraceptives were considered to have a better reproductive health care environment. For Mali, the cutoff for stronger family planning environment was at least 10% of adults ever used, and for Zimbabwe it was at least 80%.

A proxy for community development context was measured (albeit imperfectly) through the proportion of adult women and men in the cluster who had 8 or more years of schooling. This was complied by combining the responses of women and men from the individual ques-

tionnaires or as reported in the household schedules. Communities where at least 20% of all adults had achieved this level of schooling were considered to have a higher development status. An exception was made for Mali, where because of small numbers of educated adults, the cutoff for higher status was set at 10%.

## RESULTS

### Exploratory Descriptive Analysis

#### *Sexual Health Knowledge*

Individuals who are adequately informed about reproductive and sexual health may be better able to exercise options favoring an improved health status. As seen in Table I, knowledge of modern contraception among the adolescent populations varied considerably across the eight countries. Knowledge tended to be higher among males. At least some 90% of boys ages 15–19 knew of one or more modern contraceptive methods in Côte d'Ivoire, Ghana, Kenya, Senegal, and Zimbabwe according to the most recent DHS results. The lowest levels of knowledge were found in Tanzania (65%) and Mali (75%). Among girls, the proportion with knowledge of modern contraception reached at least 90% in Côte d'Ivoire, Kenya, and Zimbabwe. Only two-thirds had knowledge in Burkina Faso, Mali, and Tanzania.

Although awareness of HIV/AIDS was widespread, the means of prevention were less well known. Most AIDS-prevention programs focus on condom use, limiting the number of sexual partners, staying faithful to one partner, and sexual abstinence as means to prevent transmission of HIV. Recent survey findings suggested that knowledge of condoms as a barrier method was highest

**Table I.** Percentage of Adolescent Girls and Boys (Ages 15–19) According to Sexual Health Knowledge, Demographic and Health Surveys, 1996–99

	Burkina Faso (1999)	Côte d'Ivoire (1998)	Ghana (1998)	Kenya (1998)	Mali (1996)	Senegal (1997)	Tanzania (1996)	Zimbabwe (1999)
<b>Women</b>								
Knows modern contraceptive method	67	90	87	91	65	72	65	91
Knows condom use prevents AIDS	22	52	22	33	27	23	29	59
Knows no/limiting sex prevents AIDS	39	65	61	52	39	55	39	61
Has misconceptions about AIDS	67	27	24	28	59	60	47	16
<b>Men</b>								
Knows modern contraceptive method	83	96	89	94	75	94	65	98
Knows condom use prevents AIDS	51	72	36	53	51	64	44	73
Knows no/limiting sex prevents AIDS	40	44	55	47	30	72	44	63
Has misconceptions about AIDS	41	12	47	17	44	28	32	11

*Note.* For Kenya, Mali, and Senegal, the male sample considers those ages 20–24.

in Côte d'Ivoire and Zimbabwe, where about half of adolescent girls and two thirds of boys reported knowledge. Preventive means related to the level of sexual activity (abstinence, limiting sex to one faithful partner, avoiding multiple partners, avoiding prostitutes) were reported by at least 60% of girls in Côte d'Ivoire, Ghana, and Zimbabwe, and at least 60% of boys in Senegal and Zimbabwe. In most countries, knowledge of these latter ways was as great or greater among girls than among boys, in contrast to knowledge of condoms, which was substantially lower among girls across all countries.

At the same time, misconceptions about means of HIV/AIDS transmission were common. More than half of adolescent girls in Burkina Faso, Mali, and Senegal indicated misconceptions about AIDS prevention, either having reported no knowledge of any means or given erroneous responses not associated with changes in sexual behavior (including avoiding kissing, avoiding mosquito bites, or seeking protection from a traditional healer). Over 40% of boys in Burkina Faso, Ghana, and Mali had misconceptions. In all countries except Ghana, adolescent girls were less likely to be properly informed about AIDS prevention than their male counterparts.

#### *Sociodemographic Characteristics*

Large disparities in the sociodemographic status of the adolescent populations were also observed. In most countries of sub-Saharan Africa, levels of schooling were substantially lower among girls than among boys (Table II). Only in Tanzania, where education levels were very low for both sexes, and in Zimbabwe, where educa-

tion was relatively high, were the levels similar for girls and boys. Fewer than 10% of girls ages 15–19 had some secondary schooling in Burkina Faso, Mali, and Tanzania. Only in Zimbabwe and Ghana had at least half of adolescent girls attained this level of schooling. A majority of boys had some secondary schooling in Kenya, Zimbabwe, and Ghana.

Increases over time in schooling were noted in a few countries. The proportion of better-educated adolescent girls rose across survey periods in Kenya (from 38 to 42%), Senegal (from 8 to 11%), and especially Zimbabwe (from 53 to 66%). The level dropped somewhat in Ghana (from 56 to 51%) and Burkina Faso (from 8 to 6%). Rapid increases in educational attainment among boys were seen in Mali (from 9 to 16%), Senegal (from 23 to 26%), and Zimbabwe (from 56 to 65%). Again, Burkina Faso experienced a small decrease (from 18 to 13%).

The countries under observation tended to be predominantly rural. Only in Senegal was a majority of boys (55%) living in urban areas. Burkina Faso was the least urban society. Kenya and Senegal were characterized with a somewhat more urban male population than female population, but in all countries the differences by sex remained under 10% points.

Exposure to the mass media varied across the countries in the region. The majority of adolescents of both sexes listened to the radio regularly in Ghana, Kenya, Mali, and Senegal. In contrast, at most one quarter of adolescent girls reported listening to the radio in the latest survey in Burkina Faso and in Côte d'Ivoire. In most countries, radio exposure remained higher among boys than among girls.

**Table II.** Percentage of Adolescent Girls and Boys (Ages 15–19) by Sociodemographic Characteristics, According to Survey Period, Demographic and Health Surveys, 1987–99

	Burkina Faso		Côte d'Ivoire		Ghana		Kenya		Mali		Senegal		Tanzania		Zimbabwe	
	1993	1999	1994	1998	1993	1998	1993	1998	1987	1996	1993	1997	1991	1996	1994	1999
<b>Women</b>																
Has 8 or more years of schooling	8	6	14	14	56	51	38	42	5	5	8	11	6	6	53	66
Lives in urban area	26	21	48	45	46	37	16	22	30	41	46	46	27	24	30	35
Listens to radio regularly	43	15	44	26	50	56	68	51	52	65	69	68	50	43	41	43
<b>Men</b>																
Has 8 or more years of schooling	18	13	32	28	58	59	70	72	9	16	23	26	6	7	56	65
Lives in urban area	31	23	44	42	35	31	23	30	28	43	54	55	24	24	24	29
Listens to radio regularly	NA	23	NA	48	63	66	88	82	NA	84	77	67	77	66	43	47

*Note.* For Kenya, Mali, and Senegal, the male sample considers those ages 20–24. Characteristics refer to those reported at the time of the survey. NA = not available due to questionnaire design.

*Adolescent First Sex*

Similar cross-national differentials were seen in terms of the propensity for first sexual intercourse during adolescence. In some countries, fewer than half of young women had engaged in sexual intercourse before their 18th birthday, and in others the proportion surpassed three-quarters (Fig. 1). The highest level of adolescent first sex was found in Mali (81%) whereas the lowest was in Zimbabwe (40%). In a separate study of DHS data, Mali was also found to be the country with the highest proportion of young women who were married before age 18: 66% at the time of the later survey (Mahy & Gupta, 2002). In most of the other eight countries under consideration here, around a third or less of young women had a first marriage (formal or informal union) during adolescence, including in Côte d'Ivoire, Ghana, Kenya, Senegal, Tanzania, and Zimbabwe.

In most countries, declines over time were observed in the percentage of girls having had first sex during adolescence; only in Kenya was a slight increase noted over survey periods. Likewise, declining proportions of boys having engaged in adolescent first sex were seen, at least in the four of eight countries for which time-trend data were available (Fig. 2). Wide cross-national differentials in male sexual patterns were also presented. Adolescent sexual initiation was most common among boys in Kenya, Côte d'Ivoire, and Tanzania, where some 80% of young

men had first sex during adolescence. Levels were lowest in Senegal (53%). Moreover, a separate analysis revealed in none of the eight countries did more than 20% of young men report having been married before age 20 (Mahy & Gupta, 2002), suggesting widespread male premarital sexual activity across the region.

**Multivariate Analysis**

*Trends and Correlates of Adolescent First Sex Among Girls*

Table III shows the results of the logistic regression models examining the probability of sexual initiation during adolescence among girls for the eight countries, conditioned for a number of background characteristics. Time-trends in the effects of the explanatory variables were analyzed through interaction terms of the characteristic on the survey period. To ease interpretation of the outputs of the multivariate models, our results are expressed in terms of odds ratios, which were calculated by exponentiating the parameters. A ratio greater than unity implies that an individual in the given category would be more likely to have first sex before age 18 (or 20 for males) compared to a counterpart in the base category, all else being equal. A ratio lower than unity signals an individual in the given category would be less likely to

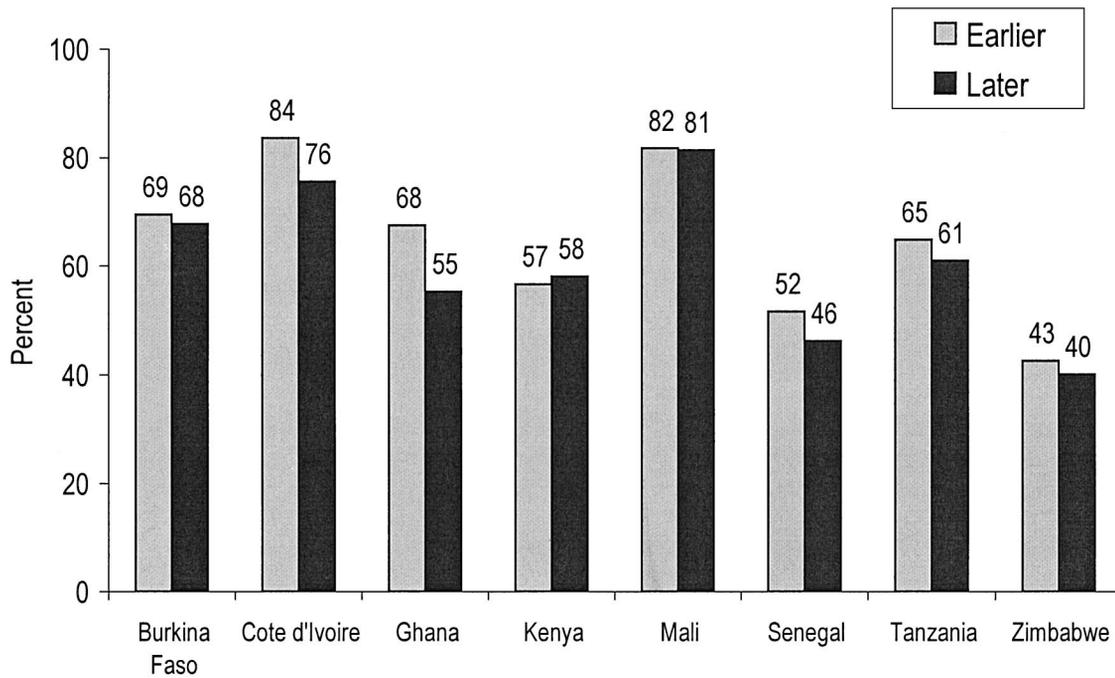


Fig. 1. Percent of young adult women (18–24 years) who had first sex during adolescence, by DHS survey period.

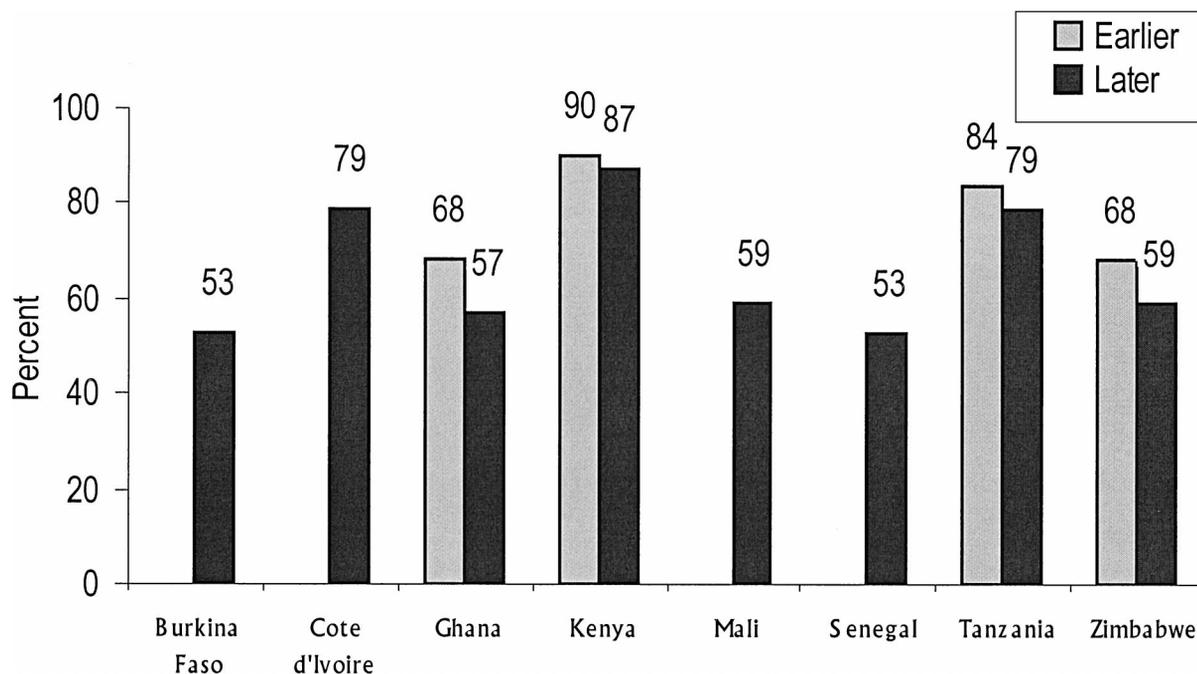


Fig. 2. Percent of young adult men (20–29 years) who had first sex during adolescence, by DHS survey period.

experience the event compared to a counterpart in the base category, and a ratio equal to one suggests similar likelihood.

An independent trend toward lower propensity for first sex during adolescence was found in three countries. The probability of a young woman to have sex before age 18 was significantly lower ( $p < 0.05$ ) in the later survey period compared to the earlier survey in Côte d'Ivoire, Ghana, and Senegal. This was not the case in Mali, where adolescents were somewhat more likely to have engaged in early sex at the later survey period, after controlling for individual and contextual differences. (Given the previously noted important differences in the completeness of recording of age-related information across the 1987 and 1996 Mali surveys, it is also possible that there were other unmeasured influences at work here.) Any previously observed declines in the level of adolescent sex in Burkina Faso, Tanzania, and Zimbabwe were no longer statistically significant after controlling for confounding influences.

In each country, girls with at least some secondary education were significantly less likely to have had sex during adolescence than those with no education. The differential was widest in Tanzania; however, the significance of the interaction term suggested that the magnitude of the effect had changed over time. Effects of primary education were less consistently discernible across countries; only in Burkina Faso, Senegal, and Tanzania was the influence significant.

Place of residence had an independent effect on a young woman's probability of adolescent first sex in five countries. Urban residence was associated with a reduction by about half in the probability of adolescent sex in Côte d'Ivoire, Ghana, Mali, Senegal, and Zimbabwe. There were little interaction effects, suggesting that this association remained essentially stable between survey periods.

Only in Senegal and Zimbabwe was there a significant effect of radio exposure on timing of first sex. In both countries, the effect was in the expected direction, with girls who listen regularly to the radio having about a 25% lower risk of adolescent first sex. Moreover, in Zimbabwe there was an interaction effect. Stratification of the analysis by survey revealed a strong inverse association at the earlier survey and no significant difference at the later survey (results not shown). Thus, in Zimbabwe, the effects of radio exposure on delayed sexual debut among girls, which were appreciable in 1994, had dissipated by the time of the 1999 survey.

The community-level effects were generally not significant and occasionally inconsistent across countries. In Ghana, young women living in communities of higher development status experienced a higher chance of adolescent first sex, whereas in Tanzania the opposite was true. In neither of these two countries did the effect vary considerably across surveys. Effects of family planning environment on the probability of

**Table III.** Odds Ratios from the Multivariate Logistic Models for the Risk Among Young Women of Having First Sex Before Age 18, Demographic and Health Surveys, 1987–99

	Burkina Faso ( <i>N</i> = 3368)	Côte d'Ivoire ( <i>N</i> = 3276)	Ghana ( <i>N</i> = 2388)	Kenya ( <i>N</i> = 4489)	Mali ( <i>N</i> = 3083)	Senegal ( <i>N</i> = 3941)	Tanzania ( <i>N</i> = 4919)	Zimbabwe ( <i>N</i> = 3452)
Survey period								
Earlier survey (r)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Later survey	1.04	0.49*	0.60*	0.78	1.61*	0.56*	0.80	1.10
Education								
No formal schooling (r)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.68
1–7 years of school	0.64*	1.00	0.84	0.76	1.07	0.54*	0.59*	1.00
8+ years of school	0.33*	0.53*	0.44*	0.30*	0.44*	0.22*	0.13*	0.21*
Interaction: Education-survey								
1–7 years school* Later survey	1.15	1.11	1.10	2.19*	0.67	1.14	1.06	0.73
8+ years school* Later survey	1.01	0.91	1.21	1.82	0.68	1.33	1.80*	0.68
Residence								
Rural (r)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Urban	0.83	0.58*	0.54*	0.88	0.50*	0.52*	1.15	0.60*
Interaction: Residence-survey								
Urban* Later survey	0.57	1.44	0.96	1.31	1.10	0.77	1.20	1.33
Radio exposure								
Does not listen regularly (r)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Listens to radio regularly	1.12	0.95	1.20	0.94	0.90	0.75*	0.87	0.72*
Interaction: Radio exposure-survey								
Listens to radio* Later survey	0.74	1.27	0.66*	0.98	0.78	1.37	1.03	1.57*
Community development								
Lower (r)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Higher	0.75	0.82	1.77*	1.02	1.05	0.71	0.51*	1.00
Interaction: Community development-survey								
Higher* Later survey	1.32	1.08	1.21	0.71	0.99	1.23	1.25	1.01
Community family planning environment								
Lower (r)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Higher	0.89	0.83	1.13	0.85	2.27*	0.59	0.84	0.97
Interaction: Community FP environment-survey								
Higher* Later survey	1.14	1.29	0.89	0.94	0.43*	1.57	1.11	0.97

Note. The reference category for education is no schooling in all countries except Zimbabwe where 1–7 years of schooling is reference. (r) = reference category.

\*  $p < 0.05$ .

adolescent sexual initiation were negligible in seven of the eight countries.

#### *Trends and Correlates of Adolescent First Sex Among Boys*

Among males, Zimbabwe was the only country out of the four for which time–trend data were available that showed a significant change in the probability of adolescent sex (Table IV). Zimbabwean boys were 71% less likely to have had first sex before age 20 at the later survey compared to the earlier survey, all else being equal.

The male data suggested that education was related to age at first sex; however, the relationship was often in the

opposite direction as the female models. For Côte d'Ivoire, Mali, and Senegal, we found that boys with only primary education were significantly more likely to have first sex during adolescence as compared to their counterparts with no education. A positive effect of secondary education on adolescent sexual debut was also observed in these three countries. Likewise, Zimbabwean boys with no education were characterized with lesser probability of first sex during adolescence compared to those who had attended primary school. (Note that the Zimbabwe male sample had few cases in the no schooling category, so the findings should be interpreted with caution.) Tanzania alone showed results in the expected direction: lower likelihood of first sex during adolescence among better-educated

**Table IV.** Odds Ratios from the Multivariate Logistic Models for the Risk Among Young Men of Having First Sex Before Age 20, Demographic and Health Surveys, 1987–99

	Burkina Faso (N = 744)	Côte d'Ivoire (N = 306)	Ghana (N = 821)	Kenya (N = 1901)	Mali (N = 606)	Senegal (N = 1177)	Tanzania (N = 1227)	Zimbabwe (N = 1551)
Survey period								
Earlier survey (r)			1.00	1.00			1.00	1.00
Later survey			0.66	1.98			0.65	0.29*
Education								
No formal schooling (r)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.12
1–7 years of school	0.84	2.92*	1.53	2.02	1.58*	1.60*	0.59	1.00
8+ years of school	1.16	3.22	1.84	2.27	2.01*	1.54*	0.21*	0.67
Interaction: Education-survey								
1–7 years school* Later survey			1.28	0.34			2.21	15.11*
8+ years school* Later survey			0.79	0.27			5.33*	1.05
Residence								
Rural (r)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Urban	0.92	1.63	1.14	1.18	1.57	1.33	1.17	0.70
Interaction: Residence-survey								
Urban* Later survey			0.44*	1.15			0.69	1.22
Radio exposure								
Does not listen regularly (r)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Listens to radio regularly	1.14	0.55	1.41	1.05	2.16*		2.34*	0.63*
Interaction: Radio exposure-survey								
Listens to radio* Later survey			0.73	1.35			0.38*	2.06*
Community development								
Lower (r)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Higher	0.91	0.99	1.02	0.79	1.23	0.88	0.38*	1.56
Interaction: Community development-survey								
Higher* Later survey			1.80	0.93			1.96	0.76
Community family planning environment								
Lower (r)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Higher	1.36	1.09	0.80	0.93	1.06	1.13	1.60	0.86
Interaction: Community FP environment-survey								
Higher* Later survey			1.19	1.12			1.12	1.87*

Note. The reference category for education is no schooling in all countries except Zimbabwe where 1–7 years of schooling is reference. (r) = reference category.

\*  $p < 0.05$ .

boys. Even here, the interaction term pointed to changes over time. Further stratification of the model by survey period revealed that the significant inverse relationship between secondary education and adolescent sex at the time of the earlier survey was no longer statistically discernible at the later survey (results not shown).

Effects of other variables were even less conclusive. Overall, place of residence had no statistical bearing on the probability of adolescent sex (although in most countries the trend suggested that boys who lived in urban areas were more likely to have adolescent sex, the findings were not statistically significant). Effects of radio exposure were negligible in most countries. An association was noted in Zimbabwe and Tanzania, but in the opposite direction for the two countries, plus the effect shifted across survey

periods. Regular radio listening habits were found to have directly affected the probability of adolescent sex in the later Mali survey (questions on media exposure were not asked to men in the earlier survey).

For the most part, the variables aiming to capture level of community development and family planning environment did not appear to be significant factors in determining the probability among males for first sex during adolescence.

## DISCUSSION

This study investigated trends and differentials in timing of first sexual intercourse during adolescence in eight countries of sub-Saharan Africa, drawing on data

from successive Demographic and Health Surveys. Despite the brief time between surveys (about 5 years), there has been a decline in the levels of adolescent sexual initiation among girls and boys in most countries. However, in many cases, the decline was not statistically significant after considering changes in the sociodemographic and contextual background of these populations. Strong disparities were observed from country to country, and by gender, suggesting that the pace of modernization and its influences on the probability of adolescent sex have not been consistent across the region.

In the majority of the countries studied, girls tended to be less likely to have first sex during adolescence if they were better educated, urbanized, and had more exposure to the media. However, for boys, the associations were often contradictory. The consequences of modernization may have unexpected impacts on adolescent sexual activity. On the one hand, modernization may offer to girls alternatives outside the domestic sphere, and reduce their reliance on sexual favors for men as a means of financial support. Our multivariate analysis revealed secondary education as having the strongest impact on timing of sexual initiation among young women. It was the only variable to be consistently and significantly associated with lower probability of first sex before age 18 in each country. Girls having more education may better appreciate the health and economic advantages of smaller family sizes, and be more likely to protect themselves from unwanted pregnancy, and concomitantly from HIV/AIDS infection, through delayed sexual activity. On the other hand, modernization may offer to adolescent boys greater economic opportunities to have a sexual partner at a younger age. The school setting also allows greater opportunities to meet members of the opposite sex, removed from traditional familial constraints.

Moreover, many important differences were seen across girls' and boys' sexual health knowledge. Although awareness of modern contraception was generally widespread, other aspects remained less well known. Girls especially tended to be less well informed of ways to prevent transmission of HIV/AIDS. These differentials in reproductive health knowledge could hold important implications for adolescents' decision-making processes.

Such distinctions imply that program managers and policymakers must emphasize gender-specific considerations in all sexual health interventions. In addition, the strong differentials in timing of sexual initiation among girls and boys suggest that efforts aimed at improving the reproductive health of youth must be directed with equal importance at adolescents and older adults alike.

The data obtained from the DHS program were useful in measuring indicators of sexual health knowledge

and behaviors by which program activities can be evaluated. However, as with all household survey data, responses from the DHS were not immune to various types of error including recall errors due to memory lapses, duration heaping, and event omission. Changes in questionnaire design, training of interviewers and fieldwork implementation, and data processing across survey phases can have affected the quality of the information retrieved. Although some caution must be exercised when using survey data, particularly in certain countries in sub-Saharan Africa with poor documentation and knowledge of dates, the quality of age-related information can be generally considered better among younger respondents and improving across survey rounds. The impact of such improvements on the direction of timing of first sex remains unknown. However, by limiting our focus on respondents in the youngest age groups, we hoped to minimize the damaging bias of recall errors, which tend to be more frequent among older respondents. This approach marked a distinct advantage in analyzing trends within a given age group over comparing information from various cohorts from one cross-sectional database.

Despite our attempts to optimize cross-national comparability of information, certain explanatory variables included in the multivariate models must be analyzed with caution. Radio listening habits was notably limited as an indicator of mass media exposure. For one, the reference period for "regular" radio listening habits varied across surveys (weekly vs. daily), possibly reflecting changing program interests in selected countries (such as evolving behavior change communication programs). Although radio was chosen as the medium of focus given its lesser association with socioeconomic status, it is possible that television and newspapers may be more popular among young respondents in some countries. In addition, differential questionnaire designs and sample sizes for women and men interviewed in the DHS were an important limitation to analyzing gender-specific patterns of behavior, especially among young males.

Lastly, our attempts at modeling community-level influences—family planning environment and local development context—on adolescent reproductive-related behaviors produced inconclusive results. The associations were mostly insignificant, or sometimes in opposite directions across countries. Although this may suggest that there is no established relationship between contextual variables and young people's reproductive behavior, measuring community-level effects remains problematic.

Ideally, the contextual variable on the effort of reproductive health care services would be compiled from independent sources, such as from health facility data on youth outreach programs and service utilization. The availability

of such data is still limited in the DHS. Instead, we used a cluster-level aggregate indicator for the proportion of adult women and men of reproductive age having used modern contraceptives. Likewise, our assessment of community development relied on a proxy for the level of adult educational attainment. We used information collected for older adults alone (women ages 25–49 and men ages 25–54) in order to compile these proxy variables, rather than among youth. 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 subgroup of the population, it is unlikely that there will be enough individuals per cluster that match the criteria. Moreover, attempts to include indicators based on self-reported knowledge and practices among youth may fail to completely overcome the problems of endogeneity of current reproductive health status. Thus cluster-level estimates for the proportion of adolescents who ever used modern contraception were not deemed reliable. Nevertheless, the definition of these variables may have been inadequate and should be considered further. In the long-term, understanding the factors that influence adolescents' decisions will allow for interventions affecting overall health, fertility, and population momentum for the region.

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## REFERENCES

- Adamchak, D., & Mbvizo, M. (1991). Family planning information sources and media exposure among Zimbabwean men. *Studies in Family Planning*, 22, 326–331.
- Ainsworth, M. (1994). *Socioeconomic determinants of fertility in sub-Saharan Africa*. Washington, DC: World Bank.
- Blanc, A. K., & Rutenber, N. (1990). Assessment of the quality of data on age at first sexual intercourse, age at first marriage, and age at first birth in the Demographic and Health Surveys. In *An assessment of DHS-I data quality* (DHS Methodological Reports, No. 1). Columbia, MD: Institute for Resource Development/Macro Systems.
- Blanc, A. K., & Way, A. (1998). Sexual behavior and contraceptive knowledge and use among adolescents in developing countries. *Studies in Family Planning*, 29, 106–116.
- Caldwell, J. C. (1976). Toward a restatement of demographic transition theory. *Population and Development Review*, 2, 321–366.
- Castle, S., & Konaté, M. K. (1999). The context and consequences of economic transactions associated with sexual relations among Malian adolescents. In *The African population in the 21st century: Proceedings of the third African population conference* (Vol. 3, pp. 105–128). Durban, South Africa: Union for African Population Studies.
- Cleland, J., & Wilson, C. (1987). Demand theories of the fertility transition: An iconoclastic view. *Population Studies*, 41, 5–30.
- Coale, A. J. (1973). The demographic transition. In *Congrès international de la population* (Vol. 1, pp. 53–71). Liège, Belgium: International Union for the Scientific Study of Population.
- Djamba, Y. K. (1997). Financial capital and premarital sexual activity in Africa: The case of Zambia. *Population Research and Policy Review*, 16, 243–257.
- Easterlin, R. A. (1983). Modernisation and fertility: A critical essay. In R. A. Bulatao & R. D. Lee (Eds.), *Determinants of fertility in developing countries* (Vol. 2, pp. 562–586). New York: Academic Press.
- Farooq, G., & DeGraff, D. (1988). *Fertility and development: An introduction to theory, empirical research and policy issues*. Geneva, Switzerland: International Labour Office.
- Gage, A. J. (1995). *An assessment of the quality of data on age at first union, first birth, and first sexual intercourse for phase II of the Demographic and Health Surveys program* (DHS Occasional Papers, No. 4). Calverton, MD: Macro International.
- Gage, A. J. (1998). The social implications of adolescent fertility. In M. Livi-Bacci & G. Santis (Eds.), *Population and poverty in the developing world* (pp. 120–143). Oxford: Clarendon Press.
- Liang, K. Y., & Zeger, S. L. (1993). Regression analysis for correlated data. *Annual Review of Public Health*, 14, 43–48.
- Lloyd, C. B., Kaufman, C. E., & Hewett, P. (2000). The spread of primary schooling in sub-Saharan Africa: Implications for fertility change. *Population and Development Review*, 26, 483–515.
- Macro International. (1996). *Sampling manual* (Demographic and Health Surveys Basic Documentation, No. 6). Calverton, MD: Macro International.
- Mahy, M., & Gupta, N. (2002). *Trends and differentials in adolescent reproductive behavior in sub-Saharan Africa* (DHS Analytical Studies, No. 3). Calverton, MD: ORC Macro.
- Marckwardt, A. M., & Rutstein, S. O. (1996). *Accuracy of DHS-II demographic data: Gains and losses in comparison with earlier surveys* (DHS Working Papers, No. 19). Calverton, MD: Macro International.
- Martin, T. C., & Juarez, F. (1995). The impact of women's education and fertility in Latin America: Searching for explanations. *International Family Planning Perspectives*, 21, 52–57.
- Mboup, G., & Saha, T. (1998). *Fertility levels, trends and differentials* (DHS Comparative Studies, No. 28). Calverton, MD: Macro International.
- Menken, J. (1980). The health and demographic consequences of adolescent pregnancy and childbearing. In C. S. Chilman (Ed.), *Adolescent pregnancy and childbearing: Findings from research* (pp. 157–205). Washington, DC: US Department of Health and Human Services.
- Mensch, B., Hewett, P., & Erulkar, A. (2001). *The reporting of sensitive behavior among adolescents: A methodological experiment in Kenya*. Paper presented at the annual meeting of the Population Association of America, Washington, DC.
- ORC Macro. (2001). *Model "B" questionnaire with commentary for low contraceptive prevalence countries* (MEASURE DHS+ Basic Documentation, No. 2). Calverton, MD: ORC Macro.
- Robey, B., Rutstein, S. O., & Morris, L. (1992). The reproductive revolution: New survey findings. *Population Reports*, Series M, No. 11. (pp. 1–43).
- Rutstein, S. O., & Bicego, G. T. (1990). Assessment of the quality of data used to ascertain eligibility and age in the Demographic and Health Surveys. In *An assessment of DHS-I data quality*

- (DHS Methodological Reports, No. 1). Columbia, MD: Institute for Resource Development/Macro Systems.
- Senderowitz, J., & Paxman, J. M. (1985). Adolescent fertility: Worldwide concerns. *Population Bulletin*, 40, 3–49.
- Simmons, G. B. (1985). Theories of fertility. In G. M. Farooq & G. B. Simmons (Eds.), *Fertility in developing countries: An economic perspective on research and policy issues* (pp. 20–66). London: MacMillan.
- Singh, S., Wulf, D., Samara, R., & Cuca, Y. P. (2000). Gender differences in the timing of first intercourse: Data from 14 countries. *International Family Planning Perspectives*, 26, 21–28.
- United Nations. (1999). *Report of the ad hoc committee of the whole of the twenty-first special session of the General Assembly*. (A/S-21/5/Add). New York: United Nations Publications.
- Voydanoff, P., & Donnelly, B. W. (1990). *Adolescent sexuality and pregnancy*. Newbury Park, CA: Sage.
- Westoff, C. F., & Bankole, A. (1997). *Mass media and reproductive behavior in Africa* (DHS Analytical Report, No. 2). Calverton, MD: Macro International.
- Wulf, D., & Singh, S. (1991). Sexual activity, union and childbearing among adolescent women in the Americas. *International Family Planning Perspectives*, 17, 137–144.
- Zabin, L. S., & Kiragu, K. (1998). Health consequences of adolescent sexuality and fertility behavior in sub-Saharan Africa. *Studies in Family Planning*, 29, 210–232.