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# A MULTILEVEL ANALYSIS OF THE DETERMINANTS OF HIGH-RISK SEXUAL BEHAVIOUR IN SUB-SAHARAN AFRICA

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**Summary.** A number of authors have identified multiple concurrent sexual partnerships by both men and women to lie at the root of the HIV/AIDS epidemic in sub-Saharan Africa. This study applies multilevel models to Demographic and Health Survey data collected during 2003–2008 in 20 sub-Saharan African countries to examine the influence of social and cultural context on involvement with multiple sexual partnerships in the region, above and beyond the effects of individual characteristics. The findings provide support for the ecological argument that health behaviours are shaped and determined by societal conditions, in addition to the effects of individual and household characteristics. Involvement with multiple sex partners is most prevalent in societies in which sexual norms are widely permissive and where polygyny is common. Individual autonomy is substantial and attitudes towards sexuality are more liberal among men and women who live in communities in which sexual norms are widely permissive. Men and women who are most likely to have multiple sex partners in the sub-Saharan region are those who initiated sexual activity earlier and those who have the individual attributes (e.g. young age, urban residence, education, media exposure and working for cash and away from home) that bring to them more rights and/or decision-making autonomy, but not necessarily more financial resources and economic security (mostly among women). On the other hand, involvement with multiple partners is determined by cultural norms (i.e. permissive sexual norms) and social change (i.e. mass education, expansion of cash employment). The findings suggest a number of opportunities for more effective policy and programmatic responses to curb the prevalence of multiple partnerships in sub-Saharan Africa.

## Introduction

HIV/AIDS is a devastating human tragedy and one of the greatest humanitarian challenges of our time. The pandemic is still a complex public health problem in sub-Saharan Africa and accounts for more than 65% of HIV infections worldwide (UNAIDS & WHO, 2009). This has been a painful reality, with noticeable impact



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on families, communities and society at large. There has been an intense debate in the last two decades on the relative roles of high-risk sexual behaviour (i.e. unsafe sex) and unsafe health care in HIV spread in sub-Saharan Africa, but most public health experts believe that unsafe sexual behaviours are the mechanism through which HIV is spreading in the region (Halperin & Epstein, 2004; Leclerc-Madlala, 2003, 2008). According to these authors, multiple sexual partnerships – particularly overlapping or concurrent partnerships – by both men and women lie at the root of the persistence or the severity of the HIV epidemic in sub-Saharan Africa.

According to numerous public health researchers, the key drivers of the HIV tragedy in the sub-Saharan region are multiple and concurrent partnerships with low consistent condom use by men and women before and during marriage in societies that are experiencing significant expansion of national economies and where wealth gaps and people's aspirations for individual advancement are growing rapidly (Halperin & Epstein, 2004; Leclerc-Madlala, 2003, 2008; Shisana *et al*., 2009). For many young women relationships with older and more affluent men provide an easy and readily available way to meet a growing list of personal needs and wants. Older ethnographic accounts of courtship and marriage indicate that sexual practices referred to now as cross-generational or age-disparate relationships, as well as transactional sex and multiple concurrent partnerships, all have antecedents in older practices that have long played a part in defining sexuality in southern Africa (Leclerc-Madlala, 2008, 2009). Many cultural norms and orientations that once legitimized multiple and concurrent partnerships still prevail, and continue to influence the meanings that people attach to contemporary sexual relations and the expectations that people have in relationships.

In the absence of cure, safer sex remains the most effective way to keep HIV/AIDS at bay within sub-Saharan Africa. Correspondingly, there is need for a better understanding of the risk factors for high-risk sexual behaviour in the region. This study uses an analytical framework inspired by the ecological view of health and information from population-based sample surveys conducted in sub-Saharan Africa to identify the determinants of high-risk sexual behaviour in the region. An analysis of the determinants of high-risk sexual behaviour that is guided by the ecological model is set to be of benefit to public health practice because it provides the possibility of understanding the extent to which health behaviours are determined by a range of individual, family and community characteristics (Sallis *et al*., 2002). By offering insights into the determinants of involvement in multiple partnerships in sub-Saharan Africa, this research should be particularly useful for its contributions to learning, policy, planning, advocacy and intervention strategy perspectives.

Many forms of socio-cultural changes have occurred and are currently occurring at all levels in societies across sub-Saharan Africa. Traditional beliefs and values now co-exist and compete with more modern ways of living and thinking (Leclerc-Madlala, 2003, 2008, 2009; Nkosana & Rosenthal, 2007). Growing aspirations for individual advancement in societies in which gaps between rich and poor continue to widen and where women have limited options for economic empowerment and financial autonomy, coupled with cultural allowances for age-disparate relationships and the intertwining of sex and material giving (Leclerc-Madlala, 2008, 2009; Nkosana & Rosenthal, 2007), make young women exceptionally vulnerable to HIV in many communities across the sub-Saharan region. In situations where young women and girls have limited

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resources and/or live in poverty, involvement with multiple partners is often used as a means of survival. According to Ashley (2010), one reason why HIV has been able to proliferate so rapidly in sub-Saharan Africa is the presence of informal transactional relationships, which are much more difficult to identify and control than formal sex work.

*Role of human capital resources and community characteristics*

The determinants of high-risk sexual behaviour are numerous, complex and cross-cut by varying personal and societal experiences. This complexity is exemplified by the contrasting arguments on the role of human capital in involvement in risky sexual behaviour. On the one hand, emerging empirical evidence has linked higher socioeconomic status to reckless lifestyles and risky sexual behaviour, including multiple sexual partnerships (e.g. Kimuna & Djamba, 2005; Awusabo-Asare & Annim, 2008). This is an indication that an increase in socioeconomic status may increase the risk of HIV infection because wealthy or educated people have more resources with which to attract and maintain multiple partners (Shelton *et al*., 2005; Mishra *et al*., 2007). On the other hand, it may be argued that involvement in high-risk sexual behaviours is triggered by people's lack of the human capital skills and social status attributes that support healthy choices. According to Coleman (1988, S100), '... human capital is created by changes in persons that bring about skills and capabilities that make them able to act in more responsible and efficient ways'. Hence, this human capital argument runs as follows: men and women who have advanced human capital skills (i.e. education) and more modern social status attributes (i.e. urban residence, wealth) are least likely to engage in high-risk sexual behaviour.

The modernization literature holds the belief that formal education is the key to human capital development by transforming people's attitudes and values from traditional to more modern, and their behaviour from constrained to more emancipated (i.e. modern thinking, greater decision-making autonomy) (Caldwell, 1982; Kasarda *et al*., 1986; Caldwell & Caldwell, 1993; Kirk, 1996). The human and social capital skills that individuals acquire in school, at the workplace or from media exposure are likely to translate into aspirations for a healthier and longer life. For example, education can increase the ability to avoid involvement with multiple sexual partners by providing people with a greater sense of self-confidence and authority and a greater future orientation.

The role of education in the context of HIV-affected communities can be potentially significant because, in addition to delaying age of sexual debut and/or marriage, exposure to formal education is expected to mitigate people's vulnerability to risky sexual practices, not only by increasing their knowledge and skills in sexual and reproductive health, their self-esteem and their sense of discomfort with risky sexual activities, but also by motivating them to think optimistically about their future and to emulate the healthy behaviour exhibited by the educated people they are familiar with (Edström & Khan, 2009). This viewpoint indicates that people with some education are more likely to continue to learn new things in their lives and to develop new life skills because exposure to formal education is the mechanism through which lifelong learning is developed and sustained.

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Throughout history, socioeconomic status has been consistently associated with better health outcomes and longer lives (Adler *et al*., 1994). Women and men with higher socioeconomic status are more likely to avoid involvement in high-risk sexual behaviours because greater wealth can mean better living conditions, higher social status, stronger social and/or political connections, greater exposure to middle-class life norms and stronger future orientation (Montgomery *et al*., 2000; Veenstra, 2000). On the other hand, low socioeconomic status is associated with poor health outcomes because situations of poverty can include precarious income, economic uncertainty, bad housing and poor quality neighbourhoods. Deprivation also co-exists with psychosocial factors like having no control over work, lack of social support, low participation in community life, low self-esteem and stressful life events, all of which compromise people's ability to exercise and maintain control over important aspects of their lives, including being able to avoid having multiple and concurrent partnerships (O'Brien *et al*., 1997). Nevertheless, it has also been argued that being wealthier may indeed lead to reckless lifestyle and risky sexual relationships as wealthier people (particularly men) tend to attract multiple partners (Hargreaves *et al*., 2002; Kimuna & Djamba, 2005), and wealth may increase the number of opportunities for concurrent heterosexual partnerships to develop (Shelton *et al*., 2005).

Since behaviours are not determined by instincts, but by socially organized institutions and assumptions, we also believe that involvement in high-risk sexual behaviours is determined by community characteristics. This ecological argument underscores the fact that human behaviour cannot be understood unless considered in the broader social context within which it occurs (Smith, 1989; Sallis *et al*., 2002). In his recent study on the determinants of condom use in Zambia, Benefo (2010) found that condom use is influenced by community-level social norms, community infrastructural development (community development), population growth rate and density, and level of access to condoms (community access to condoms).

According to Caldwell and colleagues (Caldwell *et al*., 1989; Caldwell & Caldwell, 1996), cultural norms are a significant determinant of the spread of HIV in sub-Saharan Africa through the impact of permissive sexual norms on sexual behaviours. In his paper on ethnic differences in sexual behaviours in Cameroon, Rwenge (2004) found that cultural norms specific to ethnic groups play an important part in sexual behaviour. Involvement in risky sexual practices (premarital sex, extramarital sex) was found to be higher in societies in which the family institution is relatively weak, where women's rights are least suppressed and where sexual permissiveness is commonly tolerated as a reality for both males and females. Analysing data collected from 1239 married men who participated in the 2001–2002 Zambia Demographic and Health Survey, Kimuna & Djamba (2005) found that living in southern and western provinces of Zambia was associated with significantly increased odds of extramarital sex, while living in northern provinces was associated with significantly decreased odds of sex outside of marriage. Similar situations can be found in other parts of sub-Saharan Africa, and they are being reflected in involvement in high-risk and unsafe sexual activities and high rates of STIs and HIV infection among ethnic groups that grant a great deal of autonomy to both men and women and where attitudes towards sexual conduct are substantially liberal (Romaniuk, 1968a, b).

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*Study objectives*

This study investigates the effects of selected micro-level and macro-level factors on involvement in high-risk sexual behaviours in sub-Saharan Africa, paying particular attention to differences by gender and by marital status within each gender. The study is basically concerned with advancing our understanding of the effects of selected characteristics of individuals and communities on involvement with multiple partners in the region. The specific objectives are to:

- Determine socioeconomic, demographic and behavioural risk factors of involvement with multiple sexual partners among males and females by marital status;
- Determine the effects of community characteristics on involvement with multiple sexual partners among males and females by marital status;
- Identify opportunities for more effective policy and programmatic responses to significantly reduce the prevalence of multiple sexual partnerships in the region.

## Data and variables

The data used in this study come from population-based sample surveys that were conducted in the mid-2000s in 20 countries in sub-Saharan Africa as part of the Demographic and Health Survey (DHS) and AIDS Indicator Survey (AIS) programme. The DHS and AIS surveys include nationally representative samples of women and men of reproductive age (women aged 15–49 and males aged 15–54/59). The analysis sample is restricted to sampled men and women who were sexually active at the time of the survey. In addition to detailed information about basic sociodemographic characteristics, marital status, sexual behaviour, fertility preferences and childbearing, knowledge about HIV/AIDS, perception of personal risk of HIV, and behaviour modifications in response to concerns about HIV/AIDS, the DHS and AIS collect data on the number of sexual partners in the past 12 months prior to the survey. Information on patterns of partner recruitment is crucial to this study because they provide information used to construct the outcome variable. Household and individual characteristics collected by the surveys are the sources of data for both the micro-level and macro-level variables. A summary of the analysis sample, disaggregated by gender and marital status, is presented in Table 1.

Ethnic groups and country settings are used in the analysis as approximations of the social contexts in which sexuality is socially organized and where societal conditions (cultural norms and modernity conditions) are reflected into sexual behaviour. In sub-Saharan Africa, the ethnic setting is the socio-cultural context in which the effects of shared cultural norms and societal conditions inter-play in complex ways to determine value orientations and individual behaviours, including sexual practices (Caldwell & Caldwell, 1987; Caldwell *et al.*, 1989; Benefo, 1995; Ezeh, 1997). On the other hand, the country context is also a setting in which specific sets of societal conditions determined by cultural factors and social change factors can shape and determine people's sexual behaviours.

Sample data from the 20 countries covered by this study were pooled for the analysis. The analysis sample is therefore referred to as 'sub-Saharan Africa'. Pooling the surveys is appropriate mainly because the DHS and AIS were designed to collect cross-nationally

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**Table 1.** Sample sizes analysed for each country by gender and marital status (unweighted cases), DHS and AIS

| Country | Women | | Men | | |
|---|---|---|---|---|---|
| | Married | Unmarried | Married | Unmarried | Total |
| Burkina Faso 2003 | 3196 | 415 | 1831 | 704 | 6146 |
| Cameroon 2004 | 3534 | 1013 | 2532 | 1700 | 8779 |
| Cote d'Ivoire 2005[a] | 2780 | 1364 | 1793 | 1594 | 7531 |
| DR Congo 2007 | 3117 | 954 | 2535 | 1221 | 7827 |
| Ethiopia 2005 | 3713 | 804 | 2873 | 614 | 8004 |
| Ghana 2003 | 3439 | 1054 | 2310 | 917 | 7720 |
| Guinea 2005 | 3053 | 403 | 1753 | 788 | 5997 |
| Kenya 2003 | 1981 | 746 | 1501 | 949 | 5177 |
| Liberia 2007 | 1609 | 928 | 942 | 887 | 4366 |
| Lesotho 2004–05 | 4131 | 2016 | 2922 | 1700 | 10,769 |
| Malawi 2004 | 2092 | 513 | 1587 | 573 | 4765 |
| Mali 2006 | 3977 | 237 | 2554 | 457 | 7225 |
| Niger 2006 | 3557 | 249 | 1944 | 408 | 6158 |
| Rwanda 2005 | 2709 | 1174 | 2428 | 958 | 7269 |
| Senegal 2005 | 3407 | 315 | 1904 | 854 | 6480 |
| Sierra Leone 2008 | 2554 | 682 | 1879 | 767 | 5882 |
| Swaziland 2006 | 1882 | 1894 | 1056 | 1431 | 6263 |
| Tanzania 2003–04[a] | 3869 | 1340 | 2575 | 1369 | 9153 |
| Zambia 2007 | 3443 | 1542 | 2900 | 1586 | 9471 |
| Zimbabwe 2005–06 | 4321 | 1621 | 2530 | 1529 | 10,001 |
| All (sub-Saharan Africa) | 62,364 | 19,264 | 42,349 | 21,006 | 144,983 |

[a] AIDS Indicator Survey (AIS).

comparable data on population and health issues. By pooling data from a large number of countries, both the number of country contexts and the number of ethnic contexts were increased in the analytic sample.

The dependent variable measures involvement with multiple sex partners. It is included in the analysis as a dichotomous variable coded '1' if a man or a woman reported involvement with multiple sexual partners in the past 12 months prior to the survey and '0' otherwise. The focus is on the number of sexual partners because multiple and concurrent partnerships constitute the key mechanism through which STIs and HIV infections are spreading across sub-Saharan Africa. Having multiple recent partners is associated with disease risk for at least two reasons: first, it reflects the increased likelihood of encountering a sexually transmitted pathogen through having multiple potential exposures, and second, it may reflect an increased probability of choosing a partner with an infection through a riskier pattern of partner recruitment.

As indicated earlier, this study uses data from population-based sample surveys conducted in 20 countries in sub-Saharan Africa to investigate the effects of selected micro-level and macro-level factors (Table A1 in the Appendix) on involvement with multiple sexual partners.

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*Micro-level factors*

The human capital and social status attributes that are included in the analysis as micro-level covariates are education, household wealth, media exposure, cash work and age at first sexual activity. Each of these variables is expected to be negatively associated with involvement with multiple sex partners. The individual attributes that are included as statistical controls are age, marital status, urban residence and Christian identity.

The principal measure of individual advancement is formal education, which changes people's view of the world by increasing their ability to understand life from a more secular, progressive and health-focused perspective. Education is included in the analysis according to DHS categories: none, primary, secondary and post-secondary. People who lack formal education constitute the reference category.

Wealth index is the measure of household socioeconomic status. The expected association between socioeconomic status and involvement with multiple partners is likely to be weak for two reasons. On the one hand, men and women who reside in an affluent household are likely to avoid risky sexual behaviours because they are more exposed to middle-class, health-related norms and behaviours through interactions with local professional and political elites and other affluent persons. On the other hand, higher socioeconomic status has also been linked to reckless lifestyles and risky sexual behaviour as wealthier people, especially older men, tend to attract multiple partners (Kimuna & Djamba, 2005; Awusabo-Asare & Annim, 2008; Leclerc-Madlala, 2008, 2009).

The impact of exposure to mass media is investigated because media-based health promotion campaigns can substitute for formal education by increasing understanding of health issues and/or providing knowledge of good sexual practices (Brockerhoff & DeRose, 1996). Exposure to sexuality and reproductive health information and education through exposure to mass media is expected to provide sexually active individuals with the knowledge and confidence to make informed and health-oriented choices about their bodies and sexuality. Regular exposure to sexuality information can help people acquire the skills to negotiate relationships and safer sexual practices, including whether and when to engage in sexual intercourse. Accordingly, media exposure is expected to reduce the likelihood of involvement in high-risk sexual behaviour. The variable 'media exposure' is included as a dichotomous variable coded '1' if a male and/or female respondent reported that he/she watches TV or listens to radio at least once a week, and '0' otherwise.

Cash employment is measured as a dichotomous variable coded '1' if a male or a female respondent was working for cash and away from home at the time of the survey, and '0' otherwise. The impact of cash work is difficult to predict for two reasons. On the one hand, cash work can increase propensity to engage in high-risk sex by increasing exposure to opportunities that can be used to address occasional emotional and/or economic needs. On the other hand, cash work can produce an opposite effect by making it possible for a man or a woman to develop life aspirations that make it difficult to have multiple sexual partners.

Age at first sexual activity is included in the analysis in the following format: $<16$, 16–17, 18–19 and 20+. The reference category is 20 or older. This variable is

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included to assess the extent to which early individual autonomy in sexual conduct is associated with risky sexual choices. Early sexual activity is expected to predict positively involvement with multiple sex partners due to the fact that research has consistently identified an association between early age at first sex and involvement in several kinds of socially unacceptable activities such as school absenteeism, having an increased number of promiscuous friends, premarital sexual activity, stealing, fighting and use of controlled substances (Mott *et al.*, 1996). People who begin having intercourse at younger ages are expected to be more likely to engage in sexual intercourse with casual partners and to have multiple and concurrent partnerships.

As indicated earlier, individual characteristics included in the analysis as statistical controls are age, marital status, urban residence and Christian identity. These variables are included in the analysis as dichotomous variables, with '1' representing the indicated attribute and '0' representing 'otherwise'. A person's sexual conduct is likely to be influenced by age. Information on age is included in the following format: 15–19, 20–29, 30–39 and 40+. People who are aged 40+ constitute the reference category. Older age is expected to be associated with safer sexual practices since as people grow older, the intensity of their sexual desire declines. Also, age is expected to predict negatively risky sexual behaviour because older persons may have competing uses for their time, and multiple social obligations. While marital status is expected to be negatively associated with involvement with multiple partners, people who reside in urban areas are likely to use multiple partnerships as a means of survival. The urban residence control is also crucial here because both educational opportunities and most of the components of the wealth index are highly concentrated in urban agglomerations. Finally, women and men who have Christian identity are expected to avoid risky sexual behaviours because regular exposure to Christian values through church attendance is able to change sexual views and attitudes.

### *Macro-level factors*

Since social context is a societal infrastructure, it is important that we understand how societal conditions are structured and how selected community (contexual) characteristics determine sexual behaviour. To facilitate the description of the analytic model, community variables used as indicators of societal conditions are CAPITALIZED (Table A1 in the Appendix).

The two community variables that are used as cultural norm variables are POLYGYNY and EARLY SEX. The variable POLYGYNY is the proportion of currently married women aged 15–49 in an ethnic group (and in a country for the country version of the variable) who are in a polygynous marriage. On the other hand, the variable EARLY SEX is measured as the proportion of women and men in an ethnic group (and in a country for the country version of the variable) whose age at first sex is 17 or younger. POLYGYNY is included to assess the impact of the suppression of autonomy for women that is associated with the prevalence of patriarchal ideology in a society. In his study on the relationship between polygyny and fertility in Kenya, Ezeh (1997) found that women in high-polygyny societies – whether polygynously or monogamously married – both desire and have more children, on average, than those in low-polygyny communities. By establishing that polygyny is

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not an individual attribute but a normative component of patriarchal and reproductive cultures, Ezeh (1997) concluded that '... the forces that determine a woman's odds of being in a polygynous union also shape her childbearing desires and activities'. The impact of this pronatalism operates equally for men and women; while men attain their fertility goals by marrying multiple wives, women attain theirs by maximizing their childbearing activities. This is an indication that, at any time, the prevalence of polygyny in a society is a reliable indicator of the level of gender stratification and the strength of pronatalism in that society. Therefore, women who are socialized and who live in high-polygyny societies are least likely to have multiple partners because they live in cultures that are highly patriarchal and where women's rights are most suppressed. On the other hand, the variable EARLY SEX is included in the analysis to measure the impact of community sexual norms on sexual behaviours. The hypothesis is that involvement with multiple partners is most likely in communities in which early sexual debut is most prevalent (Rwenge, 2004).

On the other hand, variables EDUCATION and WORK are included in the analysis to measure the impact of societal modernization processes that are referred to as mass education and the market economy on people's decision-making autonomy and sexual behaviours. According to Caldwell (1980, 1982), mass schooling and labour market economy shape most choices of behaviours open to individuals since they foster cultural secularization (freedom from orientations suggested by patriarchal institutions and cultural norms) and increase individual autonomy. When a society has within its various segments large proportions of women with some formal education, a new gender system that would benefit even those women who have no or limited schooling will take shape (Caldwell, 1982; Smith, 1989). By contrast, when there remain many in a community who have not attended school, the society will remain criss-crossed by strong forces maintaining the observance of sexual and reproductive practices.

EDUCATION is the measure of current community education. It is measured as the average number of years of formal education among all men and women of reproductive age in an ethnic group (and in a country for the country version of the variable). Involvement in high-risk sexual behaviour can be socially encouraged in communities in which large numbers of men and women have some formal education.

WORK is the proportion of women and men of reproductive age in an ethnic group (and in a country for the country version of the variable) who work for cash and away from home. Increases in levels of women's and men's participation in the market economy are expected to translate into new freedoms, new aspirations and new role priorities in people's lives, which is viewed by various scholars (Caldwell, 1982; Cain, 1984, 1993; Riley, 1997) as an important dimension of women's empowerment. It is therefore reasonable to assume that unsafe sexual practices can be socially either discouraged or encouraged in high WORK areas. On the one hand, the expansion of the market economy may encourage the sharing of experiences and life perspectives that can be compatible with healthy life. On the other hand, the expansion of the market economy may constitute the channel through which sexual practices that are socially controversial but individually rewarding are shared and maintained.

Finally, the variable CHRISTIAN is used to assess the impact of exposure to Christian values and principles on the nature of sexual practices. It is measured as the proportion of women and men of reproductive age within an ethnic group (and

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in a country for the country version of the variable) who have Christian identity. The impact of Christianization is difficult to predict for two reasons. On the one hand, it is expected that involvement with multiple partners should be least prevalent in communities in which Christian values are widely diffused and accepted. On the other hand, people who reside in communities that are highly Christianized are likely to have multiple partners due to the effects of increases in individual autonomy in those communities. Christianization is likely to translate into greater individual autonomy because of the Christian church's opposition to traditional expressions of authority, socialization, sexuality and exchange. The degree to which an African society is Christianized is viewed by Lesthaeghe (Lesthaeghe, 1989) as an indication of the degree of cultural secularization and people's empowerment. In his study on 'Modern marriage, men's extramarital sex and HIV risk in southeastern Nigeria,' Smith (2007) found that in Nigeria, even where 'Christian discourses exalting mutual monogamy' are strong, historical polygyny and changing economic conditions have created 'contradictory moralities' for men and women, leading men to conceal their extramarital partners.

## Statistical model and estimation

This study's analytical approach features multilevel modelling, placing particular emphasis on country and community (ethnic group) characteristics that are likely to determine involvement in risky sexual behaviour, and the extent of clustering of such behaviour within countries and communities. As analysis of individual situations that incorporates community factors, the multilevel methodology is appropriate for this study due to its ability to take into account not only individual characteristics but also the fact that these individuals belong to larger social units such as ethnic groups and/or countries. The application of multilevel analysis is necessary, not only to address potential correlation of individuals in the same community or country, but also to enable the effects of individual attributes and social context characteristics to be examined.

By including random effects for ethnic group and country context in the analysis, the effects of unobserved characteristics of the ethnic group and the country that may influence the effects of variables included as micro-level and macro-level covariates can be controlled for. In the case of an ethnic group, such factors are, for example, the effects of a common history, language, gender systems and sexual norms on people's sexual conduct. In the case of a country, unobserved factors include for example the effects of national development policies on levels of socioeconomic development, and on both the nature of contemporary sexual practices and the expectations that people have in relationships.

The general form of the multilevel logistic regression model used may be expressed as follows:

$$\text{Logit}\,\pi_{ijk} = X'_{ijk}\beta + u_{jk} + v_k \tag{1}$$

where $\pi_{ijk}$ is the probability of having risky sexual behaviour (i.e. multiple sex partners) for an individual $i$, in the $j^{th}$ community in the $k^{th}$ country; $X'_{ijk}$ is the vector of covariates, which may be defined at the individual, community or country level; $\beta$ is

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the associated vector of usual regression parameter estimates; and the quantities $v_k$ and $u_{jk}$ are the residuals at the country and community level, respectively. These are assumed to have standard normal distributions with mean zero and variances $\sigma_v^2$ and $\sigma_u^2$ (Goldstein, 2003).

The estimates of country- and community-level variances are used to calculate intra-unit correlation coefficients to examine the extent to which risky sexual behaviour is clustered within countries (or communities within countries) in sub-Saharan Africa. These are derived before and after taking into account the effects of significant covariates. Since individuals within the same community are within the same country, the intra-community correlation includes country variances (see, for example, Pebley *et al*., 1996). Thus, the intra-community ($\rho_u$) and intra-country ($\rho_v$) correlation coefficients are given by:

$$\rho_u = \frac{\sigma_u^2 + \sigma_v^2}{\sigma_v^2 + \sigma_u^2 + \sigma_e^2} \tag{2}$$

and

$$\rho_v = \frac{\sigma_v^2}{\sigma_v^2 + \sigma_u^2 + \sigma_e^2} \tag{3}$$

where $\sigma_v^2$ is the total variance at country level, $\sigma_u^2$ is the total variance at community level and $\sigma_e^2$ is the total variance at individual level.

For the multilevel logistic regression model, the level-1 residuals, $e_{ijk}$, are assumed to have a standard logistic distribution with mean zero and variance $\pi^2/3$, where $\pi$ is the constant 3.1416 (see, for example, Hedeker & Gibbsons, 1996).

The analysis was undertaken using MLwiN multilevel software and estimations were based on second-order PQL procedure (Rasbash *et al*., 2005).

A number of data limitations should be borne in mind when interpreting the results. First, the ability to derive a reliable measure of high-risk sexual behaviour is limited by the nature of information available. Multiple sexual partnerships have been used as a proxy for risky sexual behaviour, but key issues such as condom use or timing of partnerships (serial or concurrent), both of which are important in determining the extent of risk, have not been taken into consideration. Information on condom use in most of sub-Saharan Africa is often unreliable in establishing precise risk, since use is often inconsistent. Second, given the cross-sectional nature of the DHS, it is not possible to determine the time sequencing of events. Therefore, it was not possible to infer causal relationships, and the study only establishes and discusses the nature of associations.

## Results

### *Descriptive analysis*

The bivariate results describing the relationship between marital status and involvement with multiple sex partners are presented in Table 2. These are presented separately for women and men in each of the 20 countries that are covered by the study. The descriptive statistics suggest a particularly consistent and strong association between

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**Table 2.** The proportion of women and men in each country who reported having multiple sex partners within the 12 months preceding the survey, by marital status

| Country | Percentage (weighted) reporting multiple partners | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Women | | | Men | | | All | | |
| | Married | Un-married | Sig. | Married | Un-married | Sig. | Married | Un-married | Sig. |
| Burkina Faso 2003 | 0.8 | 6.0 | *** | 20.3 | 21.7 | ns | 8.2 | 16.0 | *** |
| Cameroon 2004 | 5.3 | 14.2 | *** | 37.1 | 35.8 | ns | 18.7 | 27.8 | *** |
| Cote d'Ivoire 2005 | 1.7 | 9.8 | *** | 27.7 | 28.4 | ns | 12.2 | 20.1 | *** |
| DR Congo 2007 | 2.6 | 7.3 | *** | 19.3 | 21.0 | ns | 10.2 | 15.3 | *** |
| Ethiopia 2005 | 0.1 | 0.6 | * | 3.9 | 4.5 | ns | 1.8 | 2.1 | ns |
| Ghana 2003 | 0.4 | 3.7 | *** | 13.0 | 12.6 | ns | 5.8 | 7.9 | *** |
| Guinea 2005 | 2.3 | 6.7 | *** | 30.1 | 28.6 | ns | 12.8 | 21.2 | *** |
| Kenya 2003 | 1.7 | 4.1 | *** | 11.5 | 16.1 | *** | 6.1 | 11.2 | *** |
| Lesotho 2004 | 10.1 | 7.3 | * | 23.9 | 29.8 | ** | 15.2 | 18.4 | ** |
| Liberia 2007 | 7.2 | 12.8 | *** | 21.6 | 22.3 | ns | 13.4 | 17.2 | *** |
| Malawi 2004 | 0.4 | 2.2 | *** | 11.0 | 11.7 | ns | 5.3 | 7.7 | ** |
| Mali 2006 | 1.9 | 10.7 | *** | 24.1 | 16.3 | *** | 11.0 | 14.5 | ** |
| Niger 2006 | 0.9 | 1.6 | ns | 20.2 | 10.7 | *** | 7.9 | 7.4 | ns |
| Rwanda 2005 | 0.2 | 1.1 | *** | 0.2 | 0.0 | ns | 0.2 | 0.6 | ** |
| Senegal 2005 | 1.3 | 3.4 | ** | 24.7 | 11.9 | *** | 9.9 | 9.6 | ns |
| Sierra Leone 2008 | 5.8 | 8.9 | ** | 26.1 | 20.3 | ** | 14.4 | 15.2 | ns |
| Swaziland 2006 | 1.0 | 3.1 | *** | 18.0 | 21.7 | * | 7.3 | 11.5 | *** |
| Tanzania 2003 | 4.5 | 9.0 | *** | 24.3 | 26.3 | ns | 12.8 | 18.2 | *** |
| Zambia 2007 | 0.7 | 3.7 | *** | 19.6 | 14.2 | *** | 9.6 | 9.3 | ns |
| Zimbabwe 2005 | 0.5 | 3.2 | *** | 12.3 | 13.7 | ns | 5.4 | 8.7 | *** |

ns, not significant; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

marital status and multiple partnerships among females, the relationship being significant in all countries except Niger. In all countries, with the exception of Lesotho, the results consistently show a higher risk among unmarried women than their married counterparts. In some countries, such as Burkina Faso, Cote d'Ivoire, Mali, Zambia and Zimbabwe, unmarried women are more than five times more likely than married women to report multiple sexual partners within the last 12 months preceding the survey.

The association between marital status and multiple sex partners is weaker for males and the patterns are less consistent. For the majority of the countries, the association is not significant, and where there is significance, the patterns are mixed, with more than half of the cases showing a higher risk of multiple sex partnerships among married than unmarried men. The higher incidence of reporting involvement with multiple sexual partners among married men is an indication that having multiple partners is socially acceptable for married men across sub-Saharan Africa.

It is worth asking if the profiles of relationships highlighted by the bivariate results still hold once the effects of other relevant micro-level and macro-level independent variables are controlled for. This is important because the observed bivariate associations

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could be partly attributable to the effect of confounding factors that are not taken into account in the current analyses. With a dichotomous outcome variable, multilevel multivariate logistic regression analysis provides a means of addressing this issue.

*Multilevel multivariate analysis*

Multivariate analyses were run separately for men and women by marital status. This is in recognition of the fact that the associations are likely to vary both by gender and by marital status within each gender. The results for males and females are presented in Tables 3 and 4, respectively. Overall, married men are somewhat more likely to have multiple sexual partnerships than their unmarried counterparts with similar individual and contextual characteristics (Table 3). As pointed out earlier (bivariate results), this finding might suggest that increases in social status that are associated with marriage make it easier for men to have multiple sexual partners. Whilst younger unmarried men (especially those in their twenties and thirties) are more likely to have multiple sexual partners than their older counterparts, older married men aged over 40 years are significantly more likely to have multiple sexual partners than younger married men aged below 30 years. The effects of socioeconomic factors (education, wealth, cash work, urban residence and media exposure) are generally weak among men, but there is a tendency for people who initiated sexual activity earlier and those who are individually empowered (e.g. urban residents, the more educated, those in cash employment and those with greater media exposure) to report involvement with multiple sexual partnerships. A similar tendency is observed among men who live in communities in which large numbers of men and women have some formal education. There is little difference in the risk of multiple sex partnerships by household wealth.

Particularly striking is the substantially higher risk of involvement with multiple sex partners among married and unmarried men in the 'not stated' religious category compared with their counterparts of similar characteristics in other religious groups. Further analysis revealed that these cases are exclusively from Lesotho, one of the countries in southern Africa with relatively high HIV prevalence and where concurrent multiple sex partnerships are most prevalent (Motemekoane & Malope, 2008). It is also interesting to note that men of Muslim or traditional/other religious affiliations are more likely to report multiple partners than their Christian counterparts. As indicated earlier, Christian identity predicts negatively and significantly (among men) involvement with multiple sex partners.

As was expected, men who initiated sexual activity earlier, or who were from ethnic groups or countries in which earlier sexual debut is most prevalent, are more likely to report multiple sexual partners. Also, as expected, involvement with multiple sex partners is pervasive in communities in which polygyny is widely practised. These findings suggest that involvement with multiple sex partners is socially acceptable among men who live not only in communities in which sexual norms are permissive but also in those in which polygyny is a normative component of gender relations and reproductive cultures (Ezeh, 1997).

In many societies in sub-Saharan Africa, polygyny has long served as a way to demonstrate wealth and status publicly, and bride wealth transfers have long served as a way to distribute wealth to others. With falling marriage rates throughout the

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**Table 3.** Multilevel logistic regression parameter estimates of multiple sex partners among males (standard errors in parentheses)

| Parameter | Unmarried | Married | All |
|---|---|---|---|
| **Fixed effects** | | | |
| Constant | −3.37 (0.197)* | −2.47 (0.135)* | −2.51 (0.135)* |
| Marital status | | | |
| Married (ref.) | | | |
| Unmarried | NA | NA | −0.07 (0.028)* |
| Age group | | | |
| 15–19 | 0.02 (0.100) | −0.36 (0.124)* | 0.01 (0.030) |
| 20–29 | 0.63 (0.094)* | −0.09 (0.035)* | 0.01 (0.028) |
| 30–39 | 0.55 (0.104)* | −0.00 (0.030) | −0.48 (0.049)* |
| 40+ (ref.) | | | |
| Residence | | | |
| Urban (ref.) | | | |
| Rural | −0.05 (0.051) | 0.13 (0.039)* | 0.07 (0.030)* |
| Education level | | | |
| None (ref.) | | | |
| Primary | 0.25 (0.067)* | 0.03 (0.039) | 0.06 (0.033) |
| Secondary or higher | 0.34 (0.068)* | 0.09 (0.043)* | 0.12 (0.035)* |
| Media exposure | | | |
| None (ref.) | | | |
| Some | 0.23 (0.069)* | 0.21 (0.043)* | 0.23 (0.036)* |
| Not stated | 0.24 (0.238) | 0.23 (0.112)* | 0.39 (0.098)* |
| Wealth quintile | | | |
| Lowest (ref.) | | | |
| Second | −0.03 (0.072) | 0.06 (0.041) | 0.03 (0.035) |
| Third | −0.09 (0.071) | 0.02 (0.042) | −0.01 (0.036) |
| Fourth | −0.15 (0.073)* | 0.08 (0.047) | 0.00 (0.039) |
| Highest | −0.04 (0.08) | 0.07 (0.057) | 0.04 (0.045) |
| Religion | | | |
| Catholic/Orthodox (ref.) | | | |
| Protestant/other Christian | −0.04 (0.053) | −0.09 (0.040)* | −0.06 (0.032)* |
| Muslim | 0.08 (0.079) | 0.18 (0.055)* | 0.14 (0.044)* |
| Traditional/other | 0.09 (0.076) | 0.27 (0.057)* | 0.20 (0.045)* |
| Not stated | 2.76 (0.948)* | 2.10 (0.886)* | 2.53 (0.897)* |
| Working | | | |
| No (ref.) | | | |
| Yes | 0.32 (0.041)* | 0.04 (0.032) | 0.12 (0.024)* |
| Not stated | −0.00 (0.139) | −0.18 (0.135) | −0.07 (0.095) |
| Age at first sex | | | |
| <16 years | 0.86 (0.065)* | 0.62 (0.039)* | 0.66 (0.032)* |
| 16–17 years | 0.72 (0.064)* | 0.53 (0.037)* | 0.55 (0.031)* |
| 18–19 years | 0.41 (0.065)* | 0.35 (0.035)* | 0.33 (0.030)* |
| 20+ (ref.) | | | |
| Contextual factors[a] | | | |
| POLYGYNY (2) | −0.87 (1.285) | 4.68 (1.09)* | 3.50 (0.947)* |
| POLYGYNY (3) | 6.72 (2.64)* | 1.90 (2.315) | 3.30 (2.369) |

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**Table 3.** *Continued*

| Parameter | Unmarried | Married | All |
|---|---|---|---|
| EARLY SEX (2) | 2.30 (0.887)* | 1.21 (0.832) | 1.63 (0.716)* |
| EARLY SEX (3) | 4.69 (1.66)* | 5.81 (1.499)* | 5.68 (1.465)* |
| EDUCATION (2) | 0.17 (0.098) | 0.18 (0.092)* | 0.20 (0.079)* |
| EDUCATION (3) | −0.07 (0.173) | −0.07 (0.159) | −0.10 (0.155) |
| WORK (2) | 0.01 (0.755) | 0.81 (0.633) | 0.63 (0.548) |
| WORK (3) | 1.65 (1.188) | 0.60 (1.022) | 1.10 (1.000) |
| CHRISTIAN (2) | −0.23 (0.323) | 0.34 (0.288) | 0.13 (0.248) |
| CHRISTIAN (3) | 0.55 (0.686) | −0.39 (0.627) | −0.04 (0.626) |
| **Random effects** | | | |
| Ethnicity constant | 0.09 (0.031)* | 0.13 (0.029)* | 0.09 (0.021)* |
| Country constant | 0.21 (0.090)* | 0.16 (0.072)* | 0.19 (0.079)* |

*$p < 0.05$.

[a] Contextual factors ending with (2) denote ethnic group level; those ending with (3) denote country level.

region at present, informal multiple sexual partnerships and age-disparate transactional relationships are now playing similar social roles.

There still remain significant variations in the risk of multiple sex partners among men across countries, and to a lesser extent across ethnic groups, even after taking into account the effects of contextual factors relating to cultural norms and social change processes, in addition to those of individual socioeconomic and demographic factors. The intra-unit correlation coefficients suggest that about 20% of the total variation in multiple partnerships is attributable to country-level factors (results for variance components model not shown). When the individual and contextual factors relating to socioeconomic, demographic and marriage patterns are controlled for (Table 3), less than 5% of the total unexplained variation is attributable to unobserved factors at country levels. This suggests that most of the variation in multiple sex partnerships at country level is explained by the factors included in the model.

Corresponding risk factors for multiple sexual partnerships among married and unmarried women are presented in Table 4. As expected, unmarried women have on average more than double the odds of reporting multiple sex partners during the 12 months preceding the survey than their married counterparts of similar characteristics. Among unmarried women, the younger ones (especially those in their twenties) are significantly more likely to report multiple sex partners than older women aged over 40 years. There is, however, no significant difference in reporting of multiple sex partners by age among married women.

The patterns with respect to socioeconomic factors are generally similar to those observed for men. For instance, urban residence, primary or secondary education, greater media exposure and cash employment are generally associated with a higher risk of multiple sex partnerships. However, it is interesting to note that, among unmarried women, those with primary education have the highest risk, while among those who are married, it is those with secondary or higher education who have the

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**Table 4.** Multilevel logistic regression parameter estimates of multiple sex partners among females (standard errors in parentheses)

| Parameter | Unmarried | Married | All |
|---|---|---|---|
| **Fixed effects** | | | |
| Constant | −4.74 (0.256)* | −5.43 (0.237)* | −5.34 (0.188)* |
| Marital status | | | |
| Married (ref.) | | | |
| Unmarried | NA | NA | 0.81 (0.047)* |
| Age group | | | |
| 15–19 | 0.42 (0.124)* | 0.10 (0.082) | 0.20 (0.079)* |
| 20–29 | 0.71 (0.117)* | 0.14 (0.084) | 0.31 (0.066)* |
| 30–39 | 0.36 (0.132)* | 0.16 (0.118) | 0.21 (0.071)* |
| 40+ (ref.) | | | |
| Residence | | | |
| Urban (ref.) | | | |
| Rural | −0.31 (0.085)* | −0.24 (0.080)* | −0.27 (0.058)* |
| Education level | | | |
| None (ref.) | | | |
| Primary | 0.27 (0.100)* | 0.10 (0.080) | 0.15 (0.061)* |
| Secondary or higher | 0.08 (0.110) | 0.21 (0.100)* | 0.12 (0.072) |
| Media exposure | | | |
| None (ref.) | | | |
| Some | 0.27 (0.088)* | 0.25 (0.071)* | 0.27 (0.055)* |
| Not stated | — | — | −0.30 (0.540) |
| Wealth quintile | | | |
| Lowest (ref.) | | | |
| Second | 0.14 (0.131) | 0.11 (0.091) | 0.11 (0.074) |
| Third | 0.17 (0.129) | 0.02 (0.094) | 0.07 (0.075) |
| Fourth | 0.13 (0.134) | −0.19 (0.106) | −0.06 (0.082) |
| Highest | 0.08 (0.143) | −0.20 (0.124) | −0.05 (0.091) |
| Religion | | | |
| Catholic/Orthodox (ref.) | | | |
| Protestant/other Christian | −0.11 (0.087) | −0.01 (0.085) | −0.04 (0.060) |
| Muslim | −0.27 (0.144) | −0.12 (0.126) | −0.20 (0.093)* |
| Traditional/other | 0.05 (0.168) | 0.01 (0.157) | −0.01 (0.113) |
| Not stated | 0.88 (0.832) | 3.52 (1.113)* | 2.21 (0.913)* |
| Working | | | |
| No (ref.) | | | |
| Yes | 0.26 (0.075)* | 0.23 (0.067)* | 0.22 (0.050)* |
| Not stated | 0.29 (0.257) | 0.27 (0.326) | 0.23 (0.203) |
| Age at first sex | | | |
| <16 years | 1.09 (0.147)* | 0.90 (0.127)* | 0.96 (0.096)* |
| 16–17 years | 0.92 (0.145)* | 0.66 (0.128)* | 0.76 (0.096)* |
| 18–19 years | 0.61 (0.151)* | 0.51 (0.134)* | 0.55 (0.101)* |
| 20+ (ref.) | | | |
| Contextual factors[a] | | | |
| POLYGYNY (2) | 1.58 (2.079) | −2.04 (1.686) | −1.00 (1.342) |
| POLYGYNY (3) | 1.35 (2.784) | 6.42 (3.27)* | 4.45 (2.637) |
| EARLY SEX (2) | 2.11 (1.461) | 1.71 (1.247) | 1.65 (0.985) |

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**Table 4.** *Continued*

| Parameter | Unmarried | Married | All |
|---|---|---|---|
| EARLY SEX (3) | 2.24 (1.883) | 5.61 (2.063)* | 3.88 (1.628)* |
| EDUCATION (2) | −0.03 (0.156) | 0.13 (0.137) | 0.08 (0.107) |
| EDUCATION (3) | 0.28 (0.204) | 0.11 (0.220) | 0.15 (0.177) |
| WORK (2) | 2.45 (1.248)* | 0.12 (1.022) | 0.89 (0.805) |
| WORK (3) | −3.34 (1.504)* | 0.08 (1.483) | −1.07 (1.191) |
| CHRISTIAN (2) | 0.56 (0.541) | 0.39 (0.492) | 0.51 (0.379) |
| CHRISTIAN (3) | −0.88 (0.76) | −0.22 (0.871) | −0.43 (0.704) |
| **Random effects** | | | |
| Ethnicity constant | 0.10 (0.058) | 0.11 (0.055)* | 0.07 (0.034)* |
| Country constant | 0.12 (0.076) | 0.29 (0.130)* | 0.20 (0.088)* |

*$p < 0.05$.

[a] Contextual factors ending with (2) denote ethnic group level; those ending with (3) denote country level.

highest risk of multiple partnerships. As in the case of men, there is little difference in the risk of multiple sex partnerships by household wealth.

There is a particularly strong association between age at first sex and reporting of multiple sex partners among both married and unmarried women. For instance, unmarried women who initiated sexual activity at younger than 16 years of age are on average about three times as likely to report multiple sex partners as their counterparts of similar characteristics who initiated sexual activity after their teenage years. As in the case of men, there is a strong positive association between involvement with multiple sex partners and residence in geo-cultural settings in which early sexual debut and polygyny are most prevalent. Those associations are mostly significant among men and married women (Tables 3 and 4).

Also, as in the case of men, there remain significant variations in the risk of multiple sex partnerships among married women (but not unmarried women) across countries in sub-Saharan Africa and to a lesser extent across ethnic groups within countries, after controlling for contextual factors relating to polygyny and timing of sexual initiation, in addition to individual and other contextual factors. About 20% of the variation in multiple partnerships among married women is attributable to country-level factors (results of variance component model without covariates not shown). When the individual and contextual factors relating to socioeconomic, demographic and marriage patterns are controlled for, less than 10% of the total unexplained variation is attributable to unobserved factors at country level.

## Discussion

This paper used data from population-based sample surveys to explore the effects of community characteristics on men's and women's involvement in multiple sexual partnerships in sub-Saharan Africa, above and beyond the effects of individual attributes. The results provide support for the ecological argument that health behaviours are shaped and determined by societal conditions, in addition to the effects of individual

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and household characteristics. Involvement with multiple sex partners is significantly most likely among men and women who live in societies in which early sexual debut is most prevalent: that is, in communities in which individual autonomy is greatest in gender relations and sexual conduct (Caldwell *et al.*, 1989; Caldwell & Caldwell, 1996).

The impact of the prevalence of polygyny underscores the complexity of contemporary African societies with respect to the impact of social institutions and cultural norms on men's and women's sexual behaviours. Since the social forces that control women's productive and reproductive activities in high-polygyny societies are probably more concerned with maximizing men's and women's reproductive performance than with policing sexual behaviours, the situations of insecurity and frustration within which patriarchy and polygyny place women in those societies (Cain, 1993, 1984; Morgan & Niraula, 1995) provide a powerful motivation for a meticulously managed involvement with multiple sex partners. There seems to exist a sexual culture that is meticulously permissive in a wide range of patriarchal communities across sub-Saharan Africa (Caldwell *et al.*, 1989; Caldwell & Caldwell, 1996). While sexually permissive behaviours are triggered by the desire to exhibit wealth and/or a high social status for men, emotional and/or economic needs are the most common reason for women (Bagnol & Chamo, 2004; Jones, 2006).

The findings indicate that unmarried women are likely to have multiple sex partners when they are living in communities in which cash work is most prevalent. This may be an indication that involvement with multiple partners is likely to take place in social environments in which cash employment is most prevalent and where large numbers of men and women have developed new role priorities and new aspirations for individual advancement. The positive impact of the expansion of mass education on involvement with multiple sex partners among men seems to suggest that men are socially encouraged to have multiple partners in communities that are substantially modernized and secularized as a result of the expansion of mass education. It is possible that the mechanism that contributes to this impact is the collapse of the traditional value system as a result of the spread of formal education.

The effects of individual characteristics suggest that increases in human and social capital skills are not necessarily associated with healthy sexual behaviours in contemporary sub-Saharan Africa. This is an indication that sub-Saharan Africa is undergoing rapid social change and that people's value orientations and attitudes towards sexual practices, which might be socially controversial, have become more prevalent as a result of socioeconomic modernization and secularization influences. In the case of young women, the micro-level attributes that are assumed to be empowering at the individual level are significantly associated with increases in aspirations for upward mobility and the pursuit of modernity, and less with basic economic security, across sub-Saharan Africa.

The findings are in line with Kirk's (1996) and Caldwell's (1980, 1982) viewpoint that modernization revolutionizes society through the effects of transformative processes referred to as mass education, urbanization, expansion of the market economy, cultural secularization and individual autonomy. When social change takes shape, it happens as a societal transformation: that is, the collapse of the collective value system that can be brought about by the spread of mass education and the market economy (Caldwell, 1982). The modernization elements (i.e. decision-making autonomy) that have penetrated African societies are likely to translate into sexual practices that are

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a risk factor for HIV transmission because they are less constrained by cultural and religious norms.

A prominent aspect of contemporary African societies that undoubtedly contributes to the expansion of involvement in multiple partnerships is the development of a sexual culture that associates transactional sex with gifts and/or favours among women and multiple sex partners with sexual prowess and social prestige among men (Leclerc-Madlala, 2008, 2009). In southern Africa, for example, transactional sexual exchange is used by young women to gain the financial resources that allows them to meet the demands associated with rising consumerism and/or individual advancement needs (Leclerc-Madlala, 2003). Until the issue of young women's vulnerability to occasional transactional sex is properly addressed, it will be difficult to achieve a significant decline in numbers of girls and women who engage in unsafe sex.

The findings of this study suggest a number of opportunities for more effective policy and programmatic responses. Above all, the results argue strongly for multi-year behaviour change and partner reduction efforts to be conducted in the communities and countries in which higher-risk behaviours such as transactional sex and multiple partnerships are normalized and most prevalent. They also suggest that behaviour interventions that attempt to decrease the odds of risky sexual behaviour by solely focusing on individual behaviours are unlikely to succeed over an extended period of time because the social forces that make women vulnerable to transactional and cross-generational sex are embedded within the sexual norms that are present in the societal conditions in which people live. Without a developmental approach that can address and dismantle the cultural legacies (e.g. cultural scripts that allow the intertwining of sex and material giving) that tend to affirm and lend legitimacy to cross-generational and multiple partnerships, it is not realistic to expect young women to forgo in a near future the many potential benefits that come from involvement in unsafe sex (Leclerc-Madlala, 2008, 2009).

The findings also suggest the necessity of a coordinated multi-year development approach that focuses not only on the economic empowerment of women (assuming that regular income can decrease women's vulnerability to cross-generational and/or transactional sex) while working to change men's attitudes towards women and sexuality, but also on scaling-up and strengthening conventional programmatic efforts (behaviour change communication campaigns that emphasize delay of sexual debut, partner reduction, knowing of partner status and consistent use of condoms during unsafe sex; availability and affordability of voluntary counselling and testing (VCT) centres; and availability and affordability of condoms) that can significantly reduce vulnerability to HIV infection in many communities. Overall, it is important to remember that interventions that can reduce women's vulnerability to the 'pursuit of modernity through informal transactional sex' are important means of addressing the social determinants of multiple sexual partnerships in sub-Saharan Africa (Leclerc-Madlala, 2008, 2009).

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## Appendix

**Table A1.** Description of study variables

| Name of variable | Measure |
|---|---|
| **Dependent variable** | |
| Multiple partners (unmarried) | 1 = an unmarried respondent had multiple sexual partners in the past 12 months prior to the survey; 0 = otherwise |
| Multiple partners (married) | 1 = a married respondent had multiple sexual partners in the past 12 months prior to the survey; 0 = otherwise |
| **Macro-level independent variables** | |
| POLYGYNY (2) | The proportion of currently married women aged 15–49 in an ethnic group who are in a polygynous marriage |
| POLYGYNY (3) | The proportion of currently married women aged 15–49 in a country who are in a polygynous marriage |
| EARLY SEX (2) | The proportion of women and men in an ethnic group whose age at first sex is 17 years or younger |
| EARLY SEX (3) | The proportion of women and men in a country whose age at first sex is 17 years or younger |
| EDUCATION (2) | Average number of years of education among all women and men of reproductive age in an ethnic group |
| EDUCATION (3) | Average number of years of education among all women and men of reproductive age in a country |
| WORK (2) | The proportion of women and men of reproductive age in an ethnic group who work for cash and away from home |
| WORK (3) | The proportion of women and men of reproductive age in a country who work for cash and away from home |
| CHRISTIAN (2) | The proportion of women and men of reproductive age in an ethnic group who have Christian identity |
| CHRISTIAN (3) | The proportion of women and men of reproductive age in a country who have Christian identity |
| **Micro-level independent variables** | |
| Education | |
| None (ref.) | |
| Primary | 1 = if respondent's educational attainment is some or full primary |

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**Table A1.** *Continued*

| Name of variable | Measure |
|---|---|
| Secondary or more | 1 = if respondent's educational attainment is secondary or higher |
| Household wealth/DHS wealth quintile | |
| Lowest (ref.) | |
| Second quintile | 1 = if household wealth status is second quintile |
| Third quintile | 1 = if household wealth status is third quintile |
| Fourth quintile | 1 = if household wealth status is fourth quintile |
| Highest quintile | 1 = if household wealth status is highest quintile |
| Media exposure | |
| No exposure (ref.) | |
| Some | 1 = if a respondent reported watching TV or listening to radio at least once a week at the time of the survey |
| Not stated | 1 = if media exposure was not reported |
| Working | |
| No (ref.) | |
| Yes | 1 = if a respondent reported working for cash and away from home at the time of the survey |
| Not stated | 1 = if employment status was not reported |
| Age group | |
| 40+ (ref.) | |
| 15–19 | 1 = if age is 15–19 |
| 20–29 | 1 = if age is 20–29 |
| 30–39 | 1 = if age is 30–39 |
| Age at first sex | |
| <16 | 1 = if age at first sex is less than 16 |
| 16–17 | 1 = if age at first sex is 16 to 17 |
| 18–19 | 1 = if age at first sex is 18 to 19 |
| 20+ (ref.) | |
| Residence | |
| Urban (ref.) | |
| Rural | 1 = if respondent was living in a rural area at the time of the survey |
| Religion | |
| Catholic/Orthodox (ref.) | |
| Protestant/other Christian | 1 = if religion is Protestant or other Christian |
| Muslim | 1 = if religion is Muslim |
| Traditional/other religion | 1 = if religion is other/Traditional |
| Not stated | 1 = if religion is not stated |
| Marital status | |
| Currently married (ref.) | |
| Unmarried | 1 = if a woman or man was unmarried at the time of the survey |

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