Community Influences on Young People's Sexual Behavior in Three African Countries

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Abstract

Despite rapid increases in HIV prevalence among young people (15-24) in many Sub-Saharan African countries, and the continued implementation of community-based HIV interventions, the role of the community in shaping a young person's sexual behavior is not well understood. This paper examines the factors associated with risky sexual behavior among young men and women in three African countries: Burkina Faso, Ghana and Zambia. The analysis employs a multilevel modeling strategy and examines how demographic, economic and behavioral characteristics of communities influence the sexual behavior of young people. Results demonstrate that the mechanisms through which the community environment shapes sexual behavior vary for males and females. There is evidence that prevailing economic conditions and the behaviors and attitudes of older people in the community are a strong influence on young people's sexual behavior. While these results provide strong support for a focus on the community as an intervention point for behavioral change, such interventions should be tailored not only the specific cultural setting, but the differential needs of young males and females.

Introduction

Sub-Saharan African countries have been disproportionately affected by the HIV/AIDS epidemic; accounting for only 10% of the world's population, approximately 85% of AIDS deaths have occurred there (Eaton *et al.,* 2003: World Bank 2000). The fastest growing rates of HIV infection in Sub-Saharan Africa are among young people (15-24), with approximately half of all new infections occurring in this group (UNFPA 1997; Eaton *et al.,* 2003; Kiapi-Iwa and Hart 2004). Previous studies suggest that reported levels of knowledge of HIV transmission routes are high among young people in many of these countries (Glover *et al.,* 2003; James *et al.,* 2004). Despite these high levels of knowledge, previous studies have also shown significant deviation between knowledge and reported behaviors (Hulton *et al.,* 2000), with high levels of sexual risk taking, including non-use of condoms (Kofi *et al.,* 2003; Ilika 2004), transactional sex (Luke 2003; Ilika 2004) and multiple partners (Gorgen *et al.,* 1998; Okafor and Obi 2005). Blanc and Way (1998) note that as age at marriage has increased at a faster rate than age at first sex, there is a widening gap during which young people are partaking in risky sexual behaviors. The potential health risks of these behaviors are well documented, and include the risk of HIV/STI infection and unplanned pregnancy (Zabin and Kiragu 1998; Blanc and Way 1998; Gupta and Mahy 2003) in addition to a range of psychosocial problems (Ilika 2994). Despite the known health risks of sexual risk taking among young people, little is known about the factors associated with sexual behavior among adolescents in developing countries (Singh and Wulf 1991; Gage 1995; Weiss *et al.,* 1996; Blanc and Way 1998). To date, much of the research on young people's sexual behavior has adopted a micro-level approach, focusing on individual characteristics as

predictors of behavior (Billy *et al.,* 1994), and there has been little consideration of the role of the wider community in shaping the behaviors of young people. Given that young people constitute almost twenty percent of the world's population, and as such their sexual and reproductive behaviors have implications for future population growth, an understanding of the factors shaping their behaviors is a necessary step in the development of tailored behavioral change interventions (Blanc and Way 1998; Zabin and Kiragu 1998). In particular, it is important to understand the role that community-level factors have in shaping sexual risk taking, to aide in the development of community level interventions. This paper seeks to understand the community-level factors associated with sexual risk taking behavior among young people in three African countries (Burkina Faso, Ghana and Zambia).

Young People's Sexual Behavior

For many young people in Sub-Saharan Africa, as in much of the rest of the world, adolescence marks the entry into sexual activity (Prata et al., 2005). The sexual habits formed during adolescence are often continued into adulthood (Rwenge 2000; Prata et al., 2005), and as such the adolescent period marks an opportune time for behavioral change interventions. Many studies have highlighted the high levels of sexual activity among young people in many Sub-Saharan African countries (Gorgen *et al.,* 1998; Etuck *et al.,* 2004; Taffa et al., 2002; Okafor and Obi 2005; Prata et al., 2005), levels of activity which take place in the context of some of the world's highest HIV prevalences (World Bank 2000). Previous studies of young people's sexual behavior in

these settings have focused on individual characteristics, and little attention has been paid to the social, cultural and economic environments in which young people exist.

Many previous studies of adolescent sexual behavior have focused on condom use as the outcome of interest (MacPhail 2001; Meekers and Klein 2002; Betts *et al.,* 2003; Prata *et al.,* 2005; Hoffman *et al.,* 2006), not surprising given the focus of many HIV prevention strategies on promoting condom use, while other studies have examined factors associated with sexual activity or sexual debut (Slap *et al.,* 2003; Eaton *et al.,* 2003; Gupta and Mahy 2003; Blanc and Way 1998). Factors found to be significantly associated with sexual behaviors among young people can be broadly categorized as; demographic, economic, and cognitive factors, although there are considerable differences in the directions and magnitudes of these relationships between genders. In terms of demographic characteristics, higher levels of reporting of sexual activity have been shown among males and at older ages (Slap *et al.,* 2003; Betts *et al.,* 2003), while higher levels of risky sexual behavior (non-use of condoms) have been shown among females (Gregson *et al.,* 2002; Etuck *et al.,* 2004; Okafar and Obi 2005). The latter demonstrates the highly gender-structured nature of sexual behavior in much of Sub-Saharan Africa. Previous studies have highlighted the lack of negotiating power afforded to young females in sexual relationships (Luke 2003; Morojele 2006), exacerbated by the large age differences that are common place in many relationships (Gorgen *et al.,* 21998; Gregson *et al.,* 2002; Luke 2003). In such situations, the presence of violence or coercion (Hoffman *et al.,* 2006) or economic incentives (Luke 2003) makes negotiation for condom use impossible for many young women.

In terms of economic factors, indicators of educational attainment (for example, school enrollment and school attendance) have been shown to be associated with sexual behaviors among young people (Van Rossem *et al.,* 2001; Taffa *et al.,* 2002; Prata *et al.,* 2005; Okafor and Obi 2005). Previous studies suggest that these relationships are more than just a function of increased knowledge leading to positive health behaviors; the type of educational institution and the place of residence of the student (on or off campus) have shown to be influential in determining sexual behaviors (Taffa *et al.,* 2002), suggesting that the relationship is also a product of the degree of freedom afforded to the young person. Additionally, lower levels of educational attainment of the parent have also shown to be associated with sexual risk taking among young people (Slap *et al.,* 2003; Etuk *et al.,* 2004), demonstrating the increased likelihood of sexual risk taking among young people from poorer households. Young females from poorer households have been shown to be at particular risk of sexual risk taking, with their economic status motivating them to partake in transactional sex and limiting their negotiating power (Luke 2003; Okafor and Obi 2005).

In some contexts, knowledge of the risk of HIV infection has been shown to be linked to sexual risk taking among young people (Magnani *et al.,* 2001). However, more important than knowledge of risk is the perceived risk of HIV infection held by an individual. Previous studies have demonstrated a disparity between knowledge of HIV risk and perceived risk (Hulton *et al.,* 2000; MacPhail and Campbell 2001), such that despite knowing the risk of unprotected sex many young people still engage in risky sexual practices. There is some evidence to suggest that risk knowledge is a more protective factor against risky sex among females (O'Sullivan *et al.,* 2006), with the fear

of unplanned pregnancy providing a greater deterrent for females than males. Perceived risk of HIV infection, however, has been shown to be mediated by the quality of parental relationships (Magnani *et al.,* 2001) and the degree of social connectivity (Slap *et al.,* 2003).

Despite what is known about the factors associated with young people's sexual behavior, the role of the community in shaping such behaviors has been largely overlooked. Recently, there has been a growing interest in examining the role of the community in shaping individual health outcomes and behaviors (see for example Stephenson and Tsui 2002, Stephenson *et al.,* 2006, Stephenson *et al.,* 2007), although to some extent this interest has been fueled by a greater availability of data rather than the development of testable hypotheses or theories (Macintyre *et al.,* 2002). Billy *et al.,* (1994) suggest that young people's sexual behavior is strongly influenced by a community's opportunity structure. This structure consists of three components. Firstly, the presence and availability of reproductive and sexual health services, which determine a young person's access to information and services. Secondly, the demographic characteristics of the community, which determine the presence and availability of potential sexual partners. Finally, the nature and availability of paths for potential future mobility that exist in a community, which determine the perceived opportunity costs of sexual behavior. However, studies testing this theory are largely restricted to developed countries (Brewster *et al.,* 1993; Billy *et al.,* 1994). Studies of the influence of community factors on young people's sexual behavior in developing countries have focused largely on structural characteristics of the community, for example aggregate levels of school attendance and average wages (Kaufman *et al.,* 2004; Karim *et al.,*

2006). An understanding of the range of ways through which a community can influence young people's sexual behavior has the potential to directly inform the development of community-level HIV intervention programs. This paper examines factors associated with young people's sexual behavior in three African countries, adopting a holistic approach to the conceptualization of the community environment and considering economic, demographic and cultural dimensions of the community as potential influences on young people's sexual behavior.

Data and Methods

Three African countries were selected for analysis: Burkina Faso, Ghana, and Zambia. The data used in this analysis are from the Demographic and Health Surveys (DHS) conducted in the three study countries (Burkina Faso 2003, Ghana 2003 and Zambia 2001-02). The three countries were selected from all African countries that had DHS data available within the last five years that included a comparable module on sexual behavior. From this list of countries, three countries were selected to represent countries with differing levels of HIV prevalence. The DHS use a stratified multi-stage cluster sample design to collect nationally representative samples of women of reproductive age (15-45) and men (15-59). Questionnaires are conducted with all eligible women and men in each sampled household, collecting data on fertility, family planning, and child health, in addition to demographic and socioeconomic data. In Zambia questionnaires are conducted with eligible men in every third household sampled. Full descriptions of the study designs used in each country can be found at http://www.measuredhs.com. In terms of sexual behavior, the DHS collect data on the

number of sexual partners in the 12 months prior to the survey, relationship status with each partner, and condom use with each partner.

The samples for analysis are women and men aged 15-24 who report that they have ever had sex, resulting in sample sizes of Burkina Faso (males 528, females 2577), Ghana (males 1022, females 2138) and Zambia (males 549, females 2138). The DHS data provide the individual, household and community level data for the analysis. Community factors are created from the DHS data; this entailed averaging individual data to the PSU level (the PSU denotes the community in this analysis) producing derived community level factors.

The dependent variable for analysis is a binary variable coded one if the male/ female reports having risky sex in the 12 months prior to the survey. Risky sex is defined as sex without condom use with more than one partner in the past 12 months. Each of the DHS data sets has a hierarchical structure, with women and men nested within households and households within PSUs, thus violating the assumption of independence of ordinary logistic regression models. A multilevel modeling technique was employed to account for the hierarchical structure of the data and to facilitate the estimation of community (PSU) level influences on risky sexual behavior. The multilevel modeling strategy accommodates the hierarchical nature of the data and corrects the estimated standard errors to allow for clustering of observations within units (Goldstein 1995). Multilevel models allow the identification of clustering in risky sexual behavior (also known as the random effect), providing a measure of the extent to which the odds of reporting risky sexual behavior varies between communities, while also controlling for a range of individual and household level factors thought to influence the outcome.

Separate multilevel logistic models are fitted for males and females in each of the three countries using the MLwiN software package (CMM 2007). The models are written:

$$Y_{ij} = \pi_{ij} + \varepsilon_{ij} Z_{ij}$$

where $\log_e(\pi_{ij}/(1-\pi_{ij})) = \alpha + \beta X_{ij}^T + U_j$. Y_{ij} is a binary outcome (reporting of risky sexual behavior)for individual *i* in PSU *j*, Y_{ij} are assumed to be independent Bernoulli random variables with the probability of the reporting of risky sexual behavior $\pi_{ij} = \Pr(Y_{ij} = 1)$. Consequently, to correctly specify the binomial variation, Z_{ij} denotes the square root of the expected binomial variance of π_{ij} and the variance of the individual residual term ε_{ij} is constrained to be one. The outcome variable $\log_e(\pi_{ij}/(1-\pi_{ij}))$ fitted in the model is the $\log_e$ odds of risky sex reported versus no risky sex reported. This constrained the predicted values from the model to be between zero and one. α is a constant, whilst β is the vector of parameters corresponding to the vector of potential explanatory factors defined as X_{ij}. The PSU (level 2) residual term is defined as $U_j \sim N(0, \sigma_u^2)$.

The variables to be entered into the models are grouped into individual / household and community variables: the same independent variables are entered into all six models (Table 1). The choice of individual and household independent variables is informed by previous studies on the factors influencing adolescent sexual behavior. Three dimensions of the community were considered as potential influences on young people's

sexual behavior: economic, demographic and behavioral. Table 2 shows all the community-level variables that were considered in the analysis. Only those that were statistically significant in at least one country for one gender are presented in the final analysis. To represent demographic characteristics of the community, three variables were considered: the mean age at first birth , the mean age at first marriage, and the mean number of children born to women in the community. For the economic characteristics of the community, the analysis considered four variables: the percentage of men and women currently employed and the percentage of men and women with at least primary education in the community. In terms of behavioral traits prevalent in the community, the analysis aimed to identify how the behaviors of older people in the community influenced the sexual behavior of young people. Community level behavioral variables were thus created by aggregating individual responses from men and women aged over 35 in the community, and linking these by community identifier to the young people's data. The community-level behavioral factors tested were: the mean age at first sex for men/ women aged over 35, the level of knowledge of HIV/AIDS among men/women aged over 35, and the attitudes towards HIV positive individuals among men/women aged over 35 in the community (Table 2).

Results

Tables 3 and 4 show the results of the modeling of recent risky sexual behavior among young males and females (15-24) in Burkina Faso, Ghana and Zambia. In terms of individual level factors, there were many similarities in the factors associated with reporting risky sexual behavior across the three countries, although the direction of these

relationships often varied by gender. With the exception of Burkina Faso where females aged 20-24 were less likely to report risky sexual behavior than those aged 15-19 (OR 0.55), age was not significantly associated with the reporting of sexual behavior. For females in all three countries, achieving education of secondary or higher level was associated with a lower odds of reporting risky sex (Burkina Faso OR 0.37, Ghana OR0.84, Zambia OR 0.48), although there was no significant difference in the reporting of risky sex between those with no education and primary education. For males, the only relationship between education and sexual behavior was seen in Ghana where was there a significant association between achieving secondary education and the reporting of risky sex (OR0.37). Mixed results were found for the relationship between ethnicity and sexual behavior: in Burkina Faso Mossi males had significantly higher odds of reporting sexual behavior than other ethnicities (OR1.86), while in Ghana Akon males had significantly lower odds of reporting sexual behavior than other ethnicities (OR0.60). There were no significant relationships found between ethnicity and risky sexual behavior for females. For females in all three countries, being currently married was associated with significantly lower odds of reporting risky sex (Burkina Faso OR 0.02, Ghana OR0.17, Zambia OR0.05), while in Burkina Faso (OR5.78) and Zambia (OR4.37) being married was associated with significantly higher odds of reporting risky sex.

Being currently employed was associated with significantly lower odds of reporting risky sexual behavior among males in Burkina Faso (OR0.60) and Zambia (OR0.51), while among females in Zambia being currently employed was associated with increased odds of reporting risky sex (OR1.46). Household size showed a significant negative relationship with the reporting of risky sex among males in Ghana (OR0.95) and

Zambia (OR0.95), but among females in Burkina Faso household size showed a significant positive relationship (OR1.03). Only among females in Zambia was residence in a female headed household significantly associated with increased odds of reporting risky sex (OR1.82).

Having a biological child significantly reduced the odds of reporting risky sex among females in Ghana (OR0.29) and Zambia (OR0.54), yet was not associated with the reporting of risky sex among males in any country. Females who reported that they had the final say decisions concerning their own health had significantly lower odds of reporting risky sex in Burkina Faso (OR0.55) and Ghana (OR0.47), but similar associations were not found among males. Higher levels of knowledge of HIV/AIDS were associated with significantly reduced odds of reporting risky sexual behavior among males and females in Burkina Faso (males OR0.86 females OR0.84), and males in Zambia (OR0.75). Residence in a wealthier household, as indicated by the ownership of household goods, was significantly associated with a reduced odds of reporting risky sex among males and females in Burkina Faso (males OR0.80 females OR0.840) and Ghana (males OR0.86 females OR0.79) and among males in Zambia (OR0.87).

The community characteristics significantly associated with the reporting of risky sex varied considerably by country and gender. Demographic characteristics of the community were not significantly associated with the reporting of risky sex among females, yet for males in Burkina Faso and Zambia higher mean ages at marriage for women in the community was significantly associated with increased odds of reporting risky sex (Burkina Faso OR1.27 Zambia OR1.16). In terms of economic characteristics of the community, a greater percentage of men in the community who were currently

employed significantly reduced the odds of reporting risky sex among males in Burkina Faso (OR0.24), yet increased the odds among females in Ghana (OR3.54). However, the percentage of women employed in the community increased the odds of reporting risky sex among females in Ghana (OR4.30) and males and females in Zambia (males OR2.17 females OR3.07). The percentage of men with at least primary education reduced the reporting of risky sex among both males and females in Burkina Faso (males OR0.86 females OR0.90), while the percentage of women with at least primary education reduced the reporting of risky sex among females in Zambia (OR0.80). The results for community-level behavioral characteristics were equally varied. A greater mean age at first sex for women aged over 35 was associated with increased reporting of risky sex among females in Zambia (OR1.02). While greater levels of knowledge of HIV/AIDS among women aged over 35 reduced the odds of reporting risky sex among females in Zambia (OR0.75), they increased the odds among males in Burkina Faso (OR1.62) and Zambia (OR2.16). More tolerant attitudes towards HIV positive individuals among males aged over 35 was associated with a reduced odds of reporting risky sex among females in Burkina Faso (OR0.74) and Ghana (OR0.71) and males in Zambia (OR0.43).

After controlling for all independent variables in the models, the random effect term remained significant for females in all three countries, but was significant for males only in Burkina Faso. Hence, some element of the community-level variation in the reporting of risky sex remains unexplained for females in all three countries and for males in Burkina Faso.

Discussion

The results demonstrate a range of factors that are significantly associated with the reporting of risky sexual behavior among young people in the three countries studied, with significant variations in the results across both study settings and genders. To some extent, the results reflect the higher gender-structured nature of sexual behavior in many Sub-Saharan African countries, with not only differences in the factors that were significantly associated with the reporting of risky sex between males and females, but opposing directions of effect for some significant factors. For example, being married was a significant protective against risky sex for females in all three countries, while having a child reduced the odds of reporting risky sex for females in Ghana and Zambia. For males, however, there was no impact of being a parent on the reporting of risky sex, and for males in Burkina Faso and Zambia, being married actually increased the odds of risky sexual behavior. These results reflect the disparate behavioral expectations for young males and females in many Sub-Saharan African countries: only for young females are marriage and parenthood liked to expectations of fidelity. This raises a concern for the risk of HIV transmission within couples if the male partner is undertaking risky sexual behavior outside of the union. Furthermore, this poses a challenge for HIV intervention programs, which must tackle the dual issues of male sexual risk behaviors and barriers to condom use within married couples (Allen *et al.,* 1991).

Many of the factors that were significantly associated with the reporting of risky sexual behavior point to the importance of economic factors in shaping young people's sexual behavior, and once again, these factors vary in direction and magnitude between genders. Much has been written of the "*commercialization*" of sexuality for young

people, particularly young women, in Sub-Saharan Africa (Haram 1995; Bohmer and Kirumira 1997; Luke 2003). In setting where there have traditionally been large age differences between marital and sexual partners, economic exchange has become an integral part of relationship development (Haram 1995; Luke 2003). As such, pre-marital and extra-marital sexual encounters often include the exchange of money or gifts (Vos 1994; Luke 2003). Hence, economic gain may become a motivation for entry into sexual activity, and the reliance on such economic gain may reduce even further a young woman's ability to negotiate condom use. The results in this analysis reflect these issues. There was an almost universal positive benefit of residence in wealthier households, suggesting that potential economic gain may be motivating young people form poorer households to undertake risky sexual behavior. Additionally, young women who resided in female headed households in Zambia showed an increased likelihood of reporting risky sex. In a strongly patriarchal society such a Zambia, female headed households are likely to have access to more limited resources than male headed households, again demonstrating the increased likelihood that young women from poorer households will undertake risky sexual behaviors.

The influence of employment on sexual risk taking varied for males and females: for males in Burkina Faso and Zambia being employed reduced the odds of reporting risky sexual behavior, while for females in Zambia being employed actually increased the odds of reporting risky sex. The results for males likely reflect the role of income in increasing access to information and services that may influence sexual behavior. For females, however, being employed may remove young woman from traditional family roles and provide greater opportunities to meet potential sexual partners. Also, in

societies in which women's work is largely restricted to the home, women seeking employment outside of the home may be doing so out of economic desperation; hence the finding that employment increases risky sexual behavior among females in Zambia may reflect a combination of greater social mixing and economic motivations to engage in risky sex.

The results also point to the role of autonomy and knowledge in shaping sexual behavior. For females in all three countries, higher levels of education were associated with lower odds of reporting risky sex, while for females in Ghana and Burkina Faso women who reported that they made their own health decisions were also less likely to report risky sex. Previous studies have noted similar relationships between condom use and educational attainment among young women (Kiragu and Zabin 1995; Van Rossem *et al.,* 2001; Prata *et al.,* 2005). There is undoubtedly an economic aspect of the relationship between higher educational attainment and risky sexual behavior; these young women are more likely to be from wealthier households. Higher educational attainment, however, may also lead to increased access to information outside of the home, which when combined with experience gained through social mixing may lead to the development of the functional autonomy to enable young women to make informed healthy choices. Having high levels of knowledge of HIV was protective against risky sex for young people in Burkina Faso, and for males only in Zambia. The lack of consistent results between knowledge and behavior across the 3 countries and between males and females demonstrates that increased knowledge does not always lead to behavioral change, and that there are a myriad of other factors whose influence may over-ride knowledge of the risk of HIV infection to encourage sexual risk taking behavior.

The community-levels factors that were significantly related to the reporting of risky sex varied by country and gender, and it is clear that the influence of the community on young people's sexual behavior is a combination of prevailing behaviors, demographic trends and the economic context in which young people exist. Importantly, the random effect term remained significant for females in all three countries (and for males only in Burkina Faso) after controlling for a large number of community-level factors. Thus, although we have identified a range of community-level influences on risky sexual behavior, there still unexplained variation at the community-level that warrants further investigation.

The results demonstrate that community-level economic factors play an important role in shaping young people's sexual behavior, above and beyond household and individual level economic characteristics. For young women in Ghana, living in a community in which a large percentage of the men are currently employed increased the odds of reporting risky sex. This result may reflect the tendency for young women to enter sexual relationships with older men; if a young woman resides in a community with a greater percentage of relatively wealthy men there exists the greater potential for entry into economically motivated sexual activity. Conversely, for young males in Burkina Faso, residence in a community with a large percentage of employed males was protective of risky sex, likely reflecting the greater economic opportunities for males in these communities, and the associated greater access to services and information for young men. Interestingly, residence in a community in which a large percentage of women were employed was associated with higher reporting of risky sex for young people in Zambia and for females in Ghana. As mentioned earlier, female employment

outside of the home may in fact be an indicator of economic deprivation, and thus this result may in fact indicate the increased odds of risky sex for young people in poorer communities, a product of a lack of information, services and competing opportunities, and economic motivations to engage in sexual activity. High levels of educational attainment among males in the community reduced the reporting of risky sex among young people in Burkina Faso, while in Zambia lower odds of reporting risky sex were associated with residence in a community in which a high percentage of women had received primary education. These results may be indicative of more favorable economic conditions in these communities, greater access to services and educational opportunities, or a greater proportion of the community who have potentially had access to sexual health knowledge through education that can then be transferred to younger people.

There were no significant associations between community-level demographic characteristics and the reporting of risky sex for females; however, in both Burkina Faso and Zambia residence in a community with a higher mean age at marriage for women was associated with an increased reporting of risky sex. This unusual result may be a product of increased opportunities for sexual partnering for males; a higher mean age at marriage results in a larger number of single young women, hence greater opportunities for males to find multiple sexual partners. A similar result was not found for young women, perhaps reflecting the lower likelihood for young women to have, or at least report, multiple sexual partners.

Several interesting relationships were identified between community-level behaviors and young people's sexual behavior. Living in a community in which older males had more tolerant attitudes towards those living with HIV reduced the reporting of

risky sex among females in Ghana and Burkina Faso and among males in Zambia. Tolerant and positive attitudes towards those with HIV are arguably the product of knowledge and familiarity with HIV. Similarly, a higher level of knowledge of HIV among older women in the community was associated with reduced reporting of risky sex among females in Zambia. These results suggests that older people in such communities may be passing their knowledge of and attitudes towards HIV to younger people, and in doing so discouraging them from risky sexual behavior. In contrast, for young males in Burkina Faso and Zambia, residence in a community in which older women reported higher levels of knowledge of HIV was associated with an increased reporting of risky sex. This result may be a product of the targeting of behavioral change interventions towards high risk/ prevalence communities; as a product of knowledge-based interventions women in these communities may have high levels of knowledge of HIV, but these may not yet have been translated into behavioral change among younger people. In Zambia, young women who live in communities in which older women report a high mean age at first sex were had increased odds of reporting risky sex. This result perhaps indicates social changes that are taking place in some communities, with young women moving away from older ages at sexual debut as practiced by their elders towards risky sexual behaviors.

There are two main limitations to this analysis. Firstly, the analysis relies on self-reported sexual behavior data from young people, and previous studies have suggested that young women are likely to under-report sexual activity while young men may over-report (Glynn *et al.,* 2001; Zaba *et al.,* 2002). The DHS data, however, remains the only routinely collected and comparable data source on young people's sexual behavior in

Africa, and although we acknowledge the potential for misreporting of behavior, the new information gained through this analysis far outweigh this potential bias. Secondly, the community-level variables used in the analysis are derived from individual-level data, due to absence of comparable community-level data. As such, information on health facilities and ongoing educational and behavioral change activities in the community are missing from the analysis, an absence that is likely reflected in the significant random effects terms.

Conclusion

In the three countries studied, young people's sexual behavior is the product of a complex of inter-related individual, household and community-level economic, demographic and behavioral factors. The results reveal vast differences in the factors shaping the sexual behaviors of young men and women, highlighting the divergent behavioral expectations for young men and women, which act to place both at high risk of HIV transmission. Community-level influences on sexual behavior varied not only by gender but also by country setting, highlighting two important points. Firstly, the interaction between the community and the individual is different for males and females, often providing greater freedom to males and placing females in a vulnerable position. Secondly, there is no single "community-level" influence on young people's sexual behavior; the ways in which community factors act to influence young people's behavior are specific to cultural contexts, the gender of the individual, and the characteristics of the community. Thus, caution must be taken in developing community-based interventions that reflect not only the heterogeneity of communities but also the differential needs of

young males and females. As the HIV epidemic continues to surge among young people in many parts of Sub-Saharan Africa it is imperative that we develop effective behavioral change interventions; an understanding of the role of community characteristics is an integral step in this process. Although this analysis has highlighted several new and important relationships between community-level factors and individual sexual behavior, a greater focus on the collection of community level data is required to ensure that we can fully capture the role of the community in shaping young people's sexual behavior.

Table 1. Individual, Household and Community Characteristics of Analysis Samples

	Burkina Faso		Ghana		Zambia	
	Males	Females	Males	Females	Males	Females
INDIVIDUAL						
Age						
15-19	35.4	38.3	29.5	32.3	51.2	41.2
20-24	64.6	61.7	70.5	67.6	48.8	58.8
Education						
None	48.2	70.9	11.8	24.2	3.0	12.4
Primary	25.8	16.1	19.2	22.0	56.6	57.7
Secondary/ Higher	26.0	13.0	69.0	52.8	40.4	29.9
Belongs to the largest ethnic group	44.4	54.3	53.7	45.1	84.4	16.5
Currently married	22.8	78.8	26.1	60.3	18.8	66.4
Currently employed	35.5	80.1	35.2	63.3	52.9	47.9
Number of household members	9.5 (1-34)	8.8 (1-37)	3.9 (1-40)	5.4 (1-22)	6.8 (1-22)	6.2 (1-26)
Lives in a household headed by a female	6.7	8.7	24.4	35.0	17.8	19.3
Has a child	13.3	62.7	16.5	51.8	17.6	68.3
Has final say in their own health	28.3	86.7	42.7	59.9	----	----
Knowledge of AIDS*	4.2 (0-7)	1.4 (0-7)	3.9 (0-7)	3.5 (0-7)	4.1 (0-6)	---- 3.9 (0-6)
HOUSEHOLD						
Ownership of assets**	1.8 (0-5)	1.7 (0-5)	2.1 (0-5)	2.0 (0-5)	--- 2.2 (0-5)	2.1 (0-5)
COMMUNITY						
Demographic						
Mean age at first birth for women	19.7 (15-29)	19.7 (15-29)	20.1 (14-28)	20.1 (14-28)	18.2 (11-26)	18.2 (11-26)
Mean age at marriage for women	17.9 (13-24)	17.9 (13-24)	19.1 (11-31)	19.1 (11-31)	17.5 (11-29)	17.5 (11-29)
Mean number of children ever born	6.3 (3-12)	6.3 (3-12)	5.0 (1-10)	5.0 (1-10)	6.5 (1-10)	6.5 (1-10)
Economic						
Percentage of men currently employed	0.65 (0-1)	0.65 (0-1)	0.69 (0-1)	0.69 (0-1)	0.58 (0-1)	0.58 (0-1)
Percentage of men with at least primary education	0.51 (0-1)	0.51 (0-1)	0.83 (0-1)	0.83 (0-1)	0.95 (0-1)	0.95 (0-1)
Percentage of women currently employed	0.81 (0-1)	0.81 (0-1)	0.61 (0-1)	0.61 (0-1)	0.52 (0-1)	0.52 (0-1)
Percentage of women with at least primary education	0.72 (0-1)	0.72 (0-1)	0.73 (0-1)	0.73 (0-1)	0.86 (0-1)	0.86 (0-1)

Behavioral						
Mean age at first sex for women aged over 35	17.2 (13-22)	17.2 (13-22)	24.4 (9-27)	24.4 (9-27)	21.0 (12-26)	21.0 (12-26)
Mean score on knowledge of AIDS index for women aged over 35	3.4 (0-5)	3.4 (0-5)	3.4 (0-5)	3.4 (105)	4.2 (0-6)	4.2 (0-6)
Mean score on attitudes towards AIDS index for women aged over 35	0.7 (0-4)	0.7 (0-4)	1.8 (0-4)	1.8 (0-4)	0.8 (0-2)	0.8 (0-2)
Mean score on attitudes towards AIDS index for men aged over 35	1.2 (0-4)	1.2 (0-4)	1.4 (0-4)	1.4 (0-4)	0.7 (0-2)	0.7 (0-2)

* Index ranges from 0-7 and includes; having heard of AIDS, knowing a healthy person can be HIV+, knowledge of mother to child transmission, knowing that abstinence, condom use, limiting number of sexual partners and monogamy are ways to prevent HIV.

** Asset score ranges from 0-5, and is composed of ownership of radio, clock, television, motor vehicle and bicycle.

Table 2. Operational Definitions of Community-Level Variables

All variables in the table were included in the analysis; those in italics were significant in at least one country and are thus presented in the final analysis

Community Characteristic	Definition
Demographic	
Mean age at first birth for women	Mean age at first birth for women aged over 35 in the community
Mean age at marriage for women	Mean age at first marriage for women aged over 35 in the community
Mean number of children ever born	Mean number of children born to women aged over 35 in the community
Economic	
Percentage of men currently employed	Percentage of adult men currently employed in the community
Percentage of men with at least primary education	Percentage of adult men in the community who have achieved at least primary education
Percentage of women currently employed	Percentage of adult women currently employed in the community
Percentage of women with at least primary education	Percentage of adult women in the community who have achieved at least primary education
Percentage of households with electricity	Percentage of all households in the community that have electricity
Mean household asset score	Mean score on the asset index for all households in the community. Asset score ranges from 0-5, and is composed of ownership of radio, clock, television, motor vehicle and bicycle.
Behavioral	
Mean age at sex for women	Mean age at first sex for all women aged over 35 in the community
Mean age at sex for men	Mean age at first sex for all men aged over 35 in the community
Sexual behavior of men	Percentage of men aged over 35 who report risky sex (sex with multiple partners with non-use of condoms) in the last 12 months
Sexual behavior of women	Percentage of women aged over 35 who report risky sex (sex with multiple partners with non-use of condoms) in the last 12 months
HIV/AIDS knowledge of men	Mean score on knowledge of HIV/AIDS index for all men aged over 35 in the community. Index ranges from 0-7 and includes; having heard of AIDS, knowing a healthy person can be HIV+, knowledge of mother to child transmission, knowing that abstinence, condom use, limiting number of sexual partners and monogamy are ways to prevent HIV.
HIV/AIDS knowledge of women	Mean score on knowledge of HIV/AIDS index for all women aged over 35 in the community. Includes same elements as for men.
HIV/AIDS attitudes of men	Mean score on attitudes towards others with HIV for men aged over 35 in the community. Index includes in Burkina Faso and Ghana: would care for a relative with HIV, does not think HIV+ status should be kept a secret, believes a HIV+ teacher should be allowed to teach, and believes children should be taught about condoms. In Zambia does not include believes a HIV+ teacher should be allowed to teach.
HIV/AIDS attitudes of women	Mean score on attitudes towards others with HIV for women aged over 35 in the community. Includes same elements as for men.

Table 3. Multilevel Logistic Model for the Reporting of Risky Sex among Women aged 15-24 in Three African Countries

	Burkina Faso	Ghana	Zambia
INDIVIDUAL			
Age 20-24	*0.55 (0.37-0.81)*	0.84 (0.57-1.23)	0.90 (0.65-1.24)
Education			
Primary	0.82 (0.53-1.27)	1.18 (0.64-2.27)	1.18 (0.70-1.96)
Secondary/ Higher	*0.37 (0.21-0.63)*	*0.84 (0.46-1.53)*	*0.48 (0.26-0.87)*
Belongs to the largest ethnic group	1.01 (0.71-1.42)	*1.66 (1.10-2.51)*	0.76 (0.49-1.16)
Currently married	*0.02 (0.01-0.04)*	*0.17 (0.10-0.27)*	*0.05 (0.04-0.08)*
Currently employed	0.71 (0.47-1.07)	0.87 (0.59-1.26)	*1.46 (1.08-1.97)*
Number of household members	*1.03 (1.01-1.06)*	1.04 (0.98-1.10)	1.04 (0.99-1.09)
Lives in a household headed by a female	0.79 (0.48-1.32)	1.31 (0.89-1.93)	*1.82 (1.30-2.56)*
Has a child	0.71 (0.45-1.11)	*0.29 (0.18-0.47)*	*0.54 (0.39-0.76)*
Has final say in their own health	*0.55 (0.34-0.91)*	*0.47 (0.32-0.69)*	1.14 (0.84-1.56)
Knowledge of AIDS	*0.84 (0.73-0.96)*	0.95 (0.81-1.31)	0.91 (0.85-1.78)
HOUSEHOLD			
Ownership of assets	*0.84 (0.76-0.94)*	*0.79 (0.69-0.91)*	0.96 (0.85-1.08)
COMMUNITY			
Demographic			
Mean age at first birth for women	1.03 (0.88-1.19)	0.99 (0.89-1.11)	1.01 (0.90-1.12)
Mean age at marriage for women	1.03 (0.87-1.22)	0.91 (0.82-1.01)	1.04 (0.96-1.14)
Mean number of children ever born	1.05 (0.88-1.25)	1.07 (0.91-1.25)	0.98 (0.88-1.10)
Economic			
Percentage of men currently employed	1.48 (0.72-3.01)	*3.54 (1.19-10.57)*	0.68 (0.36-1.27)
Percentage of men with at least primary education	*0.90 (0.81-0.99)*	1.09 (0.98-1.20)	0.95 (0.86-1.06)
Percentage of women currently employed	1.54 (0.28-8.51)	*4.30 (1.19-15.44)*	*3.07 (1.53-6.18)*
Percentage of women with at least primary education	0.99 (0.80-1.22)	0.87 (0.76-1.10)	1.08 (0.93-1.25)

Behavioral			
Mean age at first sex for women aged over 35	0.96 (0.74-1.25)	0.98 (0.97-1.01)	*1.02 (1.01-1.04)*
Mean score on knowledge of AIDS index for women aged over 35	0.83 (0.62-1.10)	1.14 (0.83-1.56)	*0.75 (0.57-0.99)*
Mean score on attitudes towards AIDS index for women aged over 35	1.25 (0.66-2.36)	0.88 (0.64-1.22)	0.73 (0.48-1.10)
Mean score on attitudes towards AIDS index for men aged over 35	*0.74 (0.59-0.95)*	*0.71 (0.50-0.99)*	1.08 (0.81-1.44)
Random Intercept Term	*0.008 (0.001)*	*0.003 (0.001)*	*0.009 (0.001)*

Figures in italics are significant at the 5% level.

Table 4. Multilevel Logistic Model for the Reporting of Risky Sex among Men aged 15-24 in Three African Countries

	Burkina Faso	Ghana	Zambia
INDIVIDUAL			
Age 20-24	1.25 (0.80-1.96)	0.86 (0.52-1.41)	0.79 (0.53-1.18)
Education			
Primary	0.79 (0.47-1.32)	1.14 (0.48-2.71)	1.12 (0.37-3.73)
Secondary/ Higher	0.82 (0.45-1.48)	*0.37 (0.16-0.85)*	0.64 (0.20-2.01)
Belongs to the largest ethnic group	*1.86 (1.21-2.86)*	*0.60 (0.37-0.96)*	1.39 (0.87-2.20)
Currently married	*5.78 (2.39-14.01)*	1.29 (0.74-2.32)	*4.37 (2.12-9.00)*
Currently employed	*0.60 (0.38-0.94)*	0.86 (0.53-1.40)	*0.51 (0.35-0.76)*
Number of household members	1.01 (0.94-1.04)	*0.95 (0.90-.099)*	*0.95 (0.90-0.99)*
Lives in a household headed by a female	1.16 (0.54-2.45)	1.08 (0.67-1.74)	0.98 (0.63-1.52)
Has a child	0.57 (0.21-1.56)	2.10 (1.03-4.31)	1.41 (0.71-2.81)
Has final say in their own health	1.32 (0.79-2.20)	0.83 (0.53-1.30)	****
Knowledge of AIDS	*0.86 (0.74-0.95)*	0.96 (0.80-1.15)	*0.75 (0.63-0.89)*
HOUSEHOLD			
Ownership of assets	*0.80 (0.67-0.94)*	*0.86 (0.74-0.99)*	*0.87 (0.63-0.98)*
COMMUNITY			
Demographic			
Mean age at first birth for women	0.89 (0.74-1.08)	1.01 (0.87-1.13)	1.03 (0.88-1.17)
Mean age at marriage for women	*1.27 (1.04-1.54)*	1.08 (0.96-1.22)	*1.16 (1.04-1.31)*
Mean number of children ever born	1.20 (0.95-1.51)	1.02 (0.86-1.21)	1.04 (0.90-1.20)
Economic			
Percentage of men currently employed	*0.24 (0.08-0.67)*	1.59 (0.44-5.69)	0.42 (0.16-1.18)
Percentage of men with at least primary education	*0.86 (0.73-0.99)*	1.06 (0.93-1.21)	0.89 (0.77-1.02)
Percentage of women currently employed	3.36 (0.43-7.64)	1.34 (0.37-4.83)	*2.17 (1.01-4.64)*
Percentage of women with at least primary education	0.95 (0.74-1.23)	0.94 (0.80-1.09)	*0.80 (0.77-0.93)*

Behavioral			
Mean age at first sex for women aged over 35	0.91 (0.66-1.23)	0.99 (0.97-1.01)	1.01 (0.98-1.02)
Mean score on knowledge of AIDS index for women aged over 35	*1.62 (1.11-2.37)*	1.08 (0.78-1.49)	*2.16 (1.49-3.12)*
Mean score on attitudes towards AIDS index for women aged over 35	*2.49 (1.15-5.42)*	0.91 (0.63-1.34)	0.82 (0.47-1.42)
Mean score on attitudes towards AIDS index for men aged over 35	0.84 (0.63-1.14)	0.82 (0.56-1.19)	*0.43 (0.29-0.63)*
Random Intercept Term	*0.009 (0.001)*	0.323 (0.173)	0.473 (0.251)

Figures in italics are significant at the 5% level.

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