

**Multiple sex partners and perceived risk of HIV infection in Zambia:  
attitudinal determinants and their gender differences**

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## INTRODUCTION

The relations between perceived susceptibility (or vulnerability) and health behaviors are central in many behavior theories, including the Health Belief Model, the Protection Motivation Theory, and the Precaution Adoption Process. In most cases, perceived vulnerability is hypothesized to be a motivation for the avoidance of risky behaviors or the adoption of prevention behaviors. However, the relation is reciprocal, in which perceived vulnerability, which influences future behaviors, is a reflection of current and/or past risky and preventive behaviors (Gerrard, Gibbons and Bushman, 1996). Although the relationship between perceived vulnerability or risk of HIV and related sexual behaviors has received much attention, the evidence of its reciprocity remains scarce. In this regard, there are three implicit hypotheses on the relations between sexual behaviors and perceived vulnerability of HIV/AIDS:

- a) individuals who have engaged in risky behaviors are more likely to report higher perceived vulnerability to HIV/AIDS;
- b) individuals who have practiced preventive behaviors are less likely to report perceived vulnerability to HIV/AIDS; and
- c) those who have changed their behaviors from risky ones to precautionary ones are likely to subsequently report changes in perceived vulnerability to HIV/AIDS.

In this paper, we test the first hypothesis among Zambian men and women. Specifically, we examine whether having sex with multiple partners within the last 12 months increased current perceived risk of HIV infection among men and women. We also explore individual- and community-level attitudinal factors that influenced sex with multiple partners within the last 12 months and perceived risk of HIV infection, and how these factors may influence men and women differently.

## BACKGROUND

Zambia, like other sub-Saharan African countries, is dealing with many important health issues. While estimates vary, the country prevalence of HIV among adults is close to 20%, which is among the highest in sub-Saharan Africa (Central Statistical Office (CSO) [Zambia] et al., 2003; Dzekedzeke, 2003; Fylkesnes et al., 1997; van den Borne, Tweedie and Morgan, 1996). Awareness of HIV/AIDS is nearly universal: 95% of Zambians reported having heard of AIDS and knew that it was fatal (CSO et al., 2003). The Health Communication Partnership (HCP) project also reported that 96% of men and 97% of women in Zambia had heard of HIV/AIDS in 2005 (Louis et al., 2006). There was a marked increase in AIDS-related knowledge that took place in the early 1990s, probably because of an increasing number of individuals who had been personally affected by the epidemic – having known someone who was infected with HIV or had died of AIDS (Bloom et al., 2000). However, many continue to engage in risky sexual behaviors: 17% of men and 3% of women reported having more than one sex partners within the last 12 months, according to the 2001-2002 Zambia Demographic and Health Survey (DHS) as well as the 2005 Zambia Health Communication Survey 2005 conducted under the HCP project (CSO et al., 2003; Louis et al., 2006). One in every ten men also reported having paid for sex within the previous year. Polygyny and the pattern of married men's having a mistress or patronizing sex workers, which have been in place for a number of decades, may put men, and potentially their spouses at significantly increase risk of HIV infection (Fieldman et al., 1997; Schuster, 1979).

There are similar discrepancies between awareness of condoms and condom use for HIV prevention. Knowledge of condoms was ubiquitous and more than three in four adults knew a source for condoms (CSO et al., 2003; CSO [Zambia], Ministry of Health [Zambia], and Macro International, 1997; Gaisie, Cross, and Nsemukila, 1993; van den Borne et al., 1996). Nevertheless, less than three-quarters of men and only 45% of women reported that they could obtain a condom easily; and only 44% of men and 33% of women used a condom during last sex with a non-cohabiting partner (CSO et al., 2003). Condom use with a spousal or cohabiting partner was even lower. A survey of young Zambian men found that while the vast majority of them (91%) perceived themselves to be at risk of HIV infection and 86% knew that condoms could reduce the risk of HIV, only 27% used condoms consistently (Ndubani et al., 2003). Numerous cultural barriers are believed to be associated with low level of condom use in Zambia, including stigmas due to perceived associations between condoms and infidelity and sexually transmitted diseases (STDs), perceptions of what constituted a satisfying sex encounter, and beliefs that condoms were not effective in HIV prevention (Bond and Dover, 1997; Fieldman et al., 1997).

Like in many other settings, women are disproportionately affected by the epidemic in Zambia, not only for gender specific biological reasons, but also due to factors associated with gender-based power dynamics. The majority of HIV transmission in sub-Saharan Africa occurs through sex within marital and cohabiting relationships (Fidelli et al., 2001); and certain sexual practices (such as dry sex) that are common in Zambia would decrease women's ability to protect themselves (Campbell and Kelly, 1995; Chikumbi, 1999; Fleishman, 2003; Ministry of Health [Zambia], 1999). A recent study among HIV positive Zambian women found that women's role in sexual decision-making remained limited and was influenced by poverty; many of them did not know the serostatus of their partner and the partner's status was not associated with sexual behavior (Jones et al., 2005). The study also found that while men had a strong desire to protect themselves against HIV infection, they were much less well-informed than their female counterparts concerning HIV transmission (Jones et al., 2005).

This paper has the following objectives:

- 1) to explore the associations between attitudinal factors related to sexual behaviors of men and women, having multiple sex partners in the last 12 months, and perceived risk of HIV/AIDS; and
- 2) to test the hypothesis that recent risky sex behaviors (having multiple sex partners in the last 12 months) influence current perceived risk of HIV infection.

## **DATA AND METHODS**

### **Data**

Data for this study come from the Zambia Health Communication Survey conducted in 2005 under the Health Communication Partnership (HCP) project. HCP's communication program in Zambia uses strategic communication approaches to support households and communities to take positive health action by strengthening community-based systems and networks, by mobilizing religious and traditional leaders and youth, and by changing harmful social and gender norms. The survey conducted in 2005 served as a baseline survey for the impact evaluation of the program.

The Zambia Health Communication Survey 2005 included household and community survey components. The household survey was conducted in 36 pre-selected HCP intervention districts to collect data on individuals' attitudes, perceptions and sexual behaviors; multi-stage stratified sampling was employed to select individuals. Women aged 10-49 and men aged 10-59 were eligible for interviews. The community survey component was conducted in the same 36 districts to solicit information about the community infrastructures and norms from key informants, who are community leaders. In each community, at least 4 of the following community leaders were interviewed: teachers, health workers, religious leaders, political leaders, and headmen of the village. One rural and one urban standard enumeration areas (SEA) were selected per district. A total of 445 informants were interviewed. Community data are matched with individual data at the community (SEA) level, resulting in a sample of 4,823 individuals, among them 2,610 men and women had sexual relationships within the last 12 months. This is the sample for this study.

### **Dependent variables**

Two outcomes of interest are: whether a respondent had more than one sex partner in the 12 months prior to the survey and his/her perception of risk of HIV infection. The number of sex partners within the last 12 months was obtained directly from responses to question "In total, with how many men/women have you had sex in the last 12 months?". Perceived risk of HIV infection came from responses to question "Do you think your chances of getting AIDS are small, moderate, great, or do you think that you have no chance of getting it at all?". Individuals reported no or small risk of HIV are categorized as considering themselves at no risk of HIV; individuals who reported moderate or great chance of getting HIV are categorized as considering themselves at risk of HIV.

### **Independent variables**

Independent variables examined in this study are at individual and community levels. Their definition and distribution are presented in Table 1. At the individual level, attitudes towards sexual practice include respondent's agreement or disagreement with statements "Women who carry condoms on them are easy" and "It is common for a married man to have one or more female friend who he is sexually intimate with". Individual's perception of AIDS as a serious problem in their community is also hypothesized to be related to risky sex behaviors and perceptions of their own risk. Perceived approval of others if respondent has only one sex partner is theoretically related to behavior (the number of sex partner within the last 12 months). Condom use at last sex, having had an HIV test within the last 12 months and awareness of partner's serostatus are hypothesized to directly affect current perception of risk of HIV infection. In addition, knowledge of AIDS - constructed from 19 items related to symptoms of AIDS, prevention of HIV/AIDS, whether there was a cure for AIDS, whether a healthy looking person could have HIV and whether it could be transmitted from mothers to children - is hypothesized to be related to both outcomes. Other individual factors include the degree that an individual is integrated in the community (measured by their involvement in community-based organizations) and interpersonal channels and TV as sources of information on HIV/AIDS.

Table 1 about here

At the community level, the same two measures of attitudinal factors were obtained from key informants and aggregated to the community level. It is hypothesized that perceptions of community leaders may have influence on individuals' behaviors – either through social norms, or direct influence of the leaders on community members. Community cohesion is hypothesized to be related to individual behaviors: the more strongly community members are connected, the less likely that its members would engage in risky behaviors. Other individual- and community-level socio-demographic factors are controlled for.

## **Methods**

Multivariate logistic regressions are employed to examine the associations between attitudinal factors at the individual and community levels and outcomes of interest: having multiple sex partners in the last 12 months and current perceived risk of HIV, while controlling for other potential confounders. Because of the hierarchical structure of data, two-level modeling is used to take into account the non-independence of individuals in the same community (Goldstein, 1995).

Structural equation modeling (SEM) then is used to test the hypothesis that recent risky behaviors are associated with perceived risk of HIV. The two-equation model examines two potentially endogenous variables, in which one is a covariate in the equation of the other. It helps resolve the problems of confounding variables and selection bias. The potential reciprocity of the association between having multiple partners and perceived risk is partly, theoretically solved with the temporal order: questions were asked about the number of sex partners in the last 12 months, which must occur prior to current perception of HIV risk. In addition, the threat of endogeneity is empirically tested with tests for exogeneity (Bollen, Guilkey and Mroz, 1995). Because both outcomes are binary variables, bivariate probit model is employed to test whether the number of sex partners may be endogenous to perceived HIV risk (Greene, 1993). If the test is passed ( $\rho$  is zero), simple one-stage regressions may be used, and having multiple partners in the last 12 months may be used as a predictor in the equation for perceived risk of HIV. In this paper,  $\rho = -.057$  ( $p = .82$ ), it is not significantly different from 0 and we conclude that having multiple partners is exogenous to perceived HIV risk for theoretical and empirical reasons.

In addition, in SEM, each of the potentially endogenous variables must be identified by one or a set of independent variables that are excluded from other equations. Overlap is permitted, but for proper identification, each equation must contain at least one exogenous variable that is excluded from the other equations (Kennedy, 1998). These exclusions must be based on theoretical and empirical grounds. In this study, perceived approval of respondent' having only one partner is excluded from the equation for perceived risk because it is hypothesized to be directly related only to the number of sex partners. Log-likelihood ratio test shows that its exclusion from the equation does not affect the identification of perceived risk of HIV infection (not shown). Similarly, condom use at last sex, having an HIV test within the last 12 months and awareness of HIV status of the last sex partners are theoretically and empirically excluded from the equation for having multiple partners in the last 12 months (not shown).

Finally, as studies have documented that women are likely to be disproportionately affected and at risk of HIV, we carry the analysis separately for men and women to explore how attitudinal factors may affect men and women differently.

## FINDINGS

A small, but significant proportion of the study sample (13%) reported having two or more sex partners in the last 12 months. The difference between men and women is marked: only 4.3% of women, compared to 21.5% of men reported more than one sex partner. On the other hand, nearly a third of respondents (31.5%) considered themselves to be at risk of HIV infection. Interestingly, while very few women reported the risky behavior (having more than one sex partner), as many as 36.5% of them thought they were at risk of HIV infection; meanwhile, only 26.8% of men considered themselves to be at risk of HIV. These results indicate strong differences in HIV-related beliefs, perceptions and practices between men and women.

Results presented in Table 1 show that more than 60% of men and women in the sample still thought that women should not carry condoms; slightly more men than women agreed that women who carried condoms were easy (63.4% and 60.4%, respectively, not shown). On the other hand, most (80%) of the sample believed that married men's practice of having outside sex partners was no longer common; 82% of women and 77% of men held the belief (not shown). Consistent with previous studies, almost two-thirds of the sample had high levels of HIV/AIDS knowledge and nearly three-quarters of the sample believed that AIDS was a serious problem in their communities. However, less than a third of them (30%) used condoms at last sex within the last 12 months. Only 18% of the sample had an HIV test within the last year and a similar proportion knew the serostatus of their last partner. These findings suggest that while HIV-related awareness may be high, precautionary behaviors are still low.

Attitudes towards sexual practices of men and women at the community level are similar to those at the individual level. Beliefs that women who carry condoms are easy are still widespread: more than 70% of the sample lived in communities where leaders held such belief. On the contrary, data at the community level show that only 14% of the sample lived in communities where their leaders believed that it was still common for a married man to have outside sex partners.

### ***Factors associated with having multiple partners in the last year and current perceived risk of HIV***

Figure 2 summarizes SEM results, depicting factors associated with either or both outcomes of interest and the association between having multiple partners in the last 12 months and risk of HIV infection. As mentioned before, perceived approval of having only one sex partner is purposely excluded from the equation for perceived HIV risk for theoretical and empirical reasons, and condom use at last sex, having an HIV test in the last 12 months and awareness of last partner's HIV status are all excluded from the equation for having multiple sex partners, also on theoretical and empirical grounds.

Being male, currently married and having a high level of HIV/AIDS knowledge were associated with both outcomes of interest. Compared to women, men were markedly more likely to have more than one sex partner in the last 12 months: the risk is increased nearly seven-fold ( $p < .001$ ). However, men were much less likely than women to consider themselves to be at some

risk of HIV. The finding that men were much more likely to have multiple sex partners, but only half as likely as women to perceive themselves at risk of HIV infection, independent of condom use and HIV testing is alarming ( $p < .001$ ). These men are likely to be careless about their risk of getting HIV, and without realizing their own risk, they may become an important vehicle that helps the virus spread. Being married and highly knowledgeable of HIV/AIDS reduce the likelihood of both having more than one sex partner and perceiving oneself at risk of HIV infection. The risk of having multiple sex partners was reduced by two-thirds for people who were married compared to those who were not, and perceived risk of HIV was also reduced by one-third ( $p < .001$  in both cases). High level of HIV/AIDS knowledge was associated with a nearly 30-percent decrease in the risk of having multiple sex partners and a nearly 20-percent decrease in the likelihood of perceiving oneself at risk of HIV ( $p < .05$  and  $p < .10$ , respectively).

Figure 1 about here

In addition, individuals who perceived others' approval for monogamy were significantly less likely to have had multiple sex partners in the last 12 months ( $OR = .73$ ,  $p < .001$ ). Perceptions of norms and peers' approval clearly have positive effects in reducing risky behaviors. Community-level community cohesion, measured by how well community leaders thought their members worked together to solve problems, was also associated with lowered risk of having multiple sex partners ( $OR = .91$ ,  $p < .10$ ). It is possible that in a community where its members are better interconnected, where the majority of individuals were monogamous in the last 12 months, and where perceived support for monogamy is high, the idea of having only one partner is more likely to be diffused and held firmly among the community members. Community cohesion in this case creates a favorable environment for healthy behaviors to be spread and maintained. On the other hand, it is also possible that in a community where everyone knows and talks to everyone else, behaviors that do not conform to the norms, such as having multiple sex partners, are easier to be known and frowned upon.

With regard to perceived risk of HIV, a number of individual- and community-level factors are found to be associated with one's perception of risk. Age, perception of AIDS as a problem in the community and learning about HIV/AIDS on television were associated with increased perceived risk. People who considered AIDS as a problem in their community were more than 50% more likely than others to consider themselves at risk ( $p < .001$ ). Independent of HIV/AIDS related knowledge and sexual behaviors, the association suggests that individuals' perceived severity and prevalence of a health problem is directly related to their own perceptions of risks. Learning about HIV/AIDS from TV was also related to significantly increased perception of risk ( $OR = 1.40$ ,  $p < .05$ ). It is possible that the content of messages conveyed on this mass medium and the way HIV/AIDS is depicted may increase risk awareness. On the other hand, it is also plausible that people who watched television were better off than others and were more aware of their risks, regardless of whether they engaged in risky behaviors or practiced preventions.

At the individual level, belief that it was no longer common for married men to have other female sex partners was associated with lower perceived risk ( $OR = .59$ ,  $p < .001$ ). However, attitudes toward women carrying condoms were not related to perceived risk. For these individuals, HIV transmission is perhaps closely linked to men's sexual behaviors. The results

suggest that individuals may have recognized some risky behaviors that may increase the chance of HIV transmission. On the other hand, individuals might have discounted behaviors that women may practice to protect themselves against HIV/AIDS, possibly for cultural reasons. Condom use at last sex and having an HIV test in the last 12 months, surprisingly, were not related to perceived HIV risk. However, knowing the serostatus of the last partner was negatively related to perceived risk: people who knew their partner's HIV status, regardless of what it was, were less likely to see themselves at risk of HIV infection (OR=.70,  $p<.05$ ). One possible explanation is that in couples where one knows the serostatus of the other, partner communication is more open, which facilitates one or both partners' taking precautions to protect themselves against HIV infection. The result reinforces the idea that partners should be open in communicating potential risks and precautions against HIV. Finally, individuals who were involved in community-based organizations were significantly less likely than those who were not to perceive themselves at risk of HIV (OR=.64,  $p<.05$ ). It seems that people who participated in community-based organizations were those with greater social participation and connectedness with other individuals; as a result, they may be more likely to be exposed to information and ideas related to HIV/AIDS, better equipped to assess their own risk and take precautions against HIV.

At the community level, the perception that married men do not have other female sex partners was also associated with lower perceived risk. In communities where key informants believed that it was no longer common for married men to have other sexual partners, individual's perceived risk of HIV was reduced by more than 40% (OR=.57,  $p<.01$ ). It indicates that not only individual perceptions of norms of men's sexual practices, but community-level perceptions of norms were also important to individual's perceptions of risk. Again, attitudes toward women's carrying condoms at the aggregated level were not significantly associated with individual's risk perceptions. Individuals who lived in communities with higher living standards were also less likely to report some risk of HIV infection (OR=.79,  $p<.05$ ).

Finally, in this SEM, we test the hypothesis that recent risky behaviors are associated with current perceived risk of HIV infection. The model provides evidence that supports the hypothesis: people who engaged in sexual relationships with more than one partner in the last 12 months were more than 3 times as likely as those who did not to report having some risk of HIV infection ( $p<.001$ ). In fact, having more than one sex partner in the last 12 months is the single strongest predictor of current risk perception, independent of HIV related knowledge, attitudes and other behaviors such as condom use or HIV testing, or other potential confounders.

### ***Stratification by gender***

This section examines how individual- and community-level factors may influence two outcomes differently for men and women. Results are presented in Table 2. For both men and women, having more than one partner in the last 12 months remains the strongest predictor of current perception of HIV risk.

Table 2 about here



Among men, high level of knowledge of HIV/AIDS, individual's perceptions of others' approval of having only one sex partner, community-level perception of married men's having other sex partners, and community cohesion – measured by community leaders' perceptions of how well community members worked together - were all associated with lowered likelihood that men would have more than one sex partner in the last 12 months. Men with high level of HIV/AIDS, who perceived others' approval of having only one partner and who lived in communities with greater community cohesion were between 25% and 30% less likely to have had more than one sex partner in the last 12 months, compared to men with less HIV/AIDS knowledge, who did not perceive approval by others if they had only one sex partner, and those who lived in communities with less cohesion ( $p < .10$ ,  $p < .001$  and  $p < .05$ , respectively). In addition, for men who lived in communities where community leaders believed that it was no longer common for married men to have other sexual partners, their likelihood of having multiple sex partners was cut down by nearly half ( $OR = .56$ ,  $p < .05$ ).

By contrast, current perceived risk of HIV infection among men did not seem to be influenced by many attitudinal factors. The perception that AIDS was a problem in the community was the strongest attitudinal predictor of perceived risk: those who perceived AIDS as a problem were more than two times as likely as those who did not to report some risk of HIV infection ( $p < .001$ ). The perception that it was no longer common for married men's having other sexual partners was marginally associated with lowered perceived risk ( $OR = .72$ ,  $p < .10$ ), as was having an HIV test within the last 12 months ( $OR = .63$ ,  $p < .10$ ).

Among women, however, having an HIV test within the last 12 months was marginally associated with increased perceived risk ( $OR = 1.43$ ,  $p < .10$ ). Perceived risk of HIV among women was also negatively related with perceptions that married most men no longer had other sexual partners – an association that is similar to that among men but much more strongly significant. In addition, women's perceived HIV risk was associated with awareness of partner's HIV status, involvement in community-based organizations, learning about HIV/AIDS from interpersonal sources, community-level living standards and attitudes towards married men's having other sex partners. Although risk behaviors among women were not under strong influence of attitudinal factors, it seems that women who were more socially integrated and who communicated more with partners and people in the communities were more likely to perceive themselves at some risk of HIV.

Being currently married is the only factor associated with a lowered risk of having multiple sex partners among both men and women, and it is also the only factor that was significantly related to having multiple sex partners among women.

## **DISCUSSION**

The study provides evidence that supports the hypothesis that individuals who recently engaged in risky behaviors are more likely to report higher perceived vulnerability to HIV/AIDS. Zambian men, and particularly women, who had more than one sex partner in the last 12 months were markedly more likely to perceive themselves at risk of HIV infection. Having multiple sex partners, in fact, is the single most important predictor of one's perception of their own risk of

HIV infection, independent of other confounding factors such as condom use at last sex, having an HIV test in the last 12 months, an awareness of partner's HIV status.

The study also examines individual- and community-level factors that may influence the likelihood that individuals had multiple partners in the last 12 months and whether they perceived themselves to be at risk of HIV infection. Although it is reportedly no longer common for married men to have other sex partners, Zambian men were much more likely than women to have sex with more than one partner in the last 12 months. Yet, they were much less likely to consider themselves at risk of HIV infection. In addition, only a third of men used condoms at their last sex, which means the majority of men continued to put themselves at risk of HIV infection and of transmitting the virus to other partners. Married men in particular were much less likely to consider themselves at risk of HIV, and thus, indirectly putting their wives or partners at risk of infection. Unless men recognize risky behaviors and HIV risks associated with them, intervention programs that aim to reduce risky behaviors and HIV transmission can anticipate a hard time to reach desirable outcomes.

Many individual- and community-level attitudinal factors are found to have important effects on individual's having multiple sex partners and perceived risk of HIV. Men were less likely to have had multiple sex partners if they believed others would approve of having only one partner, and if they lived in a community where it was believed that married men did not often have other sex partners. Men's perceptions of risk, however, were influenced only by their perceptions of AIDS as a serious problem in their communities. It is possible that men underestimated their vulnerability to HIV, which is a phenomenon that has been documented in previous studies (see for example Bauman and Siegel, 1987; Gerrard and Warner, 1990; Linville, Fischer, and Fischhoff, 1993). Nevertheless, the results underline that Zambian men may not necessarily make the connections between their sexual behaviors and risk of HIV infection. These findings also suggest that working through peers and community leaders, and through community-based activities may be an effective mechanism for interventions that aim to reduce risky sexual behaviors among men.

Very few women engaged in sexual relationships with more than one partner in the last 12 months. While the behavior remained the most important predictor of perceived risk of HIV, women's perceptions of risk seemed to depend much more on their own and community leaders' attitudes than on their peers. The finding that women who believed, or who lived in communities where it was believed, that married men were no longer likely to have other sex partners were much less likely to report some risk of HIV has important implications. Although having a mistress may no longer be a norm, many men (more than a third of them in this study) still have multiple sex partners. The underestimation of risk of HIV transmission within marital relationships by both men and women highlight the needs for risk communication to and between couples. The findings that awareness of partner's HIV status and leaning about HIV/AIDS from interpersonal communication were both associated with lower perceived risk further necessitate program emphasis on couple communication.

A potential limitation of this study that needs to be acknowledged is the reliance on individual's recall and self-report of the number of sex partners within the last 12 months. It is possible that some individuals, particularly women, may have underreported the number of sex

partners, either because they did not recall, or because of reporting bias, in which individuals did not wish to report behaviors that may be deemed undesirable.

A next step from this study will be an analysis that focuses on couples' attitudes and behaviors. Because many more men had multiple sex partners in the last year than did women, one could explore among married couples how husband's sexual behaviors may be related to wife's perception of risk of HIV. Such a study will provide insights on potential disproportionate risks of HIV that women bear, as well as suggestions for interventions that aim to promote awareness of risk and reduction of risky behaviors.

In conclusion, the present study indicates significant gaps in risky behaviors and perceptions of risk of HIV among Zambian men and women. It indicates that distinct approaches need to be employed in intervention programs to promote protective attitudes and behaviors among men and women. It is important for HIV prevention programs to focus on male risk perceptions. At the same time, while men can be approached through their peers and communities, it is important to help women recognize potential risks and know how to protect themselves even within marital and long-term relationships, where the majority of HIV transmission still takes place.

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## TABLES AND FIGURES

**Table 1.** Definition and distribution of independent variables

Variables	Definition	Distribution (n=2,610) Mean (s.d.) or %
<i>Individual-level</i>		
Gender	Gender of respondent	Male: 50.5 Female: 49.5
Age	Continuous variable indicating age of respondent, between 10 and 59	28.9 (8.7)
Current marital status	Binary variable indicating whether respondent is currently married	No: 33.1 Yes: 66.9
Education	Categorical variable indicating the highest level of schooling that respondent attended	Never attended school: 7.9 Primary school: 32.5 Secondary school: 45.9 Higher: 13.8
Household wealth	Categorical variable indicating household wealth quintile, constructed for the total 2005 survey sample, based on ownership of household assets	First (poorest): 21.6 Second: 16.6 Third: 15.4 Fourth: 21.0 Fifth (richest): 25.5
Religion	Categorical variable indicating religion of respondent	Catholic: 29.4 Protestant: 59.3 Others: 11.3
Attitude towards women's carrying condoms	Binary variable indicating whether respondent disagrees with the statement "Women who carry condoms on them are easy"	No: 61.9 Yes: 38.1
Attitude towards married men's having other female sex partners	Binary variable indicating whether respondent disagrees with the statement "It is common for a married man to have 1 or more female friend who he is sexually intimate with"	No: 79.4 Yes: 20.6
Knowledge of HIV/AIDS	Binary variable indicating whether respondent has high level of knowledge of HIV/AIDS, which is constructed from 19 items on: <ul style="list-style-type: none"> <li>- main symptoms of AIDS,</li> <li>- prevention of HIV/AIDS,</li> <li>- whether it is possible for a healthy-looking person to have HIV,</li> <li>- whether there is a cure for HIV/AIDS, and</li> <li>- whether HIV can be transmitted from a mother to child</li> </ul>	Low: 36.5 High: 63.5
Perceived AIDS as a problem	Binary variable indicating whether respondent perceives AIDS as a problem in their community	No: 27.3 Yes: 72.7
Perceived approval if respondents has only one partner in the next 12 months	Ordinal variable, ranging from 1 (strongly disapprove) to 5 (strongly approve), indicating respondent's perceived approval from others if s/he has only one sex partners in the next 12 months	4.1 (.9)
Condom use at last sex within the last 12 months	Binary variable indicating whether respondent used a condom at the last intercourse within previous 12 months	No: 69.6 Yes: 30.4
HIV test within the last 12 months	Binary variable indicating whether respondent had an HIV test within the last 12 months	No: 82.5 Yes: 17.5
Knew HIV status of last partner	Binary variable indicating whether respondent knew the HIV status of the last sex partner	No: 81.6 Yes: 18.4
Involved in community-based organizations	Binary variable indicating whether respondent is involved in any community-based organizations	No: 92.7 Yes: 7.3

Variables	Definition	Distribution
		(n=2,610) Mean (s.d.) or %
Interpersonal communication (IPC)	Continuous variable indicating the number of IPC sources (school, family, relatives, friends, teachers, health workers, and community leaders) that respondent receives information about HIV/AIDS from	.7(.7) Range: 0 - 6
TV	Binary variable indicating whether respondent receives most information about HIV/AIDS from television	No: 85.5 Yes: 14.5
<b>Community-level</b>		
Urban	Binary variable indicating whether the respondent's community is in urban	No: 72.5 Yes: 27.5
Living standards	Continuous variable indicating the level of living standards of the community, averaged from all key informants interviewed in the community	4.1 (.7) Range: 0 - 5
Attitude towards women's carrying condoms	Binary variable indicating whether more than half of key informants disagree with the statement "Women who carry condoms on them are easy"	No: 71.4 Yes: 28.6
Attitude towards married men's having other female sex partners	Binary variable indicating whether more than half of key informants disagree with the statement "It is common for a married man to have 1 or more female friend who he is sexually intimate with"	No: 86.5 Yes: 13.5
How well community members work together	Continuous variable indicating on average, how well community members work together to solve problems, as assessed by key informants	2.9 (.8) Range: 1 - 4

**Table 2.** Individual- and community-level factors associated with whether respondent had more than one sex partner in the last 12 months and current perceived risk of HIV/AIDS, by gender.

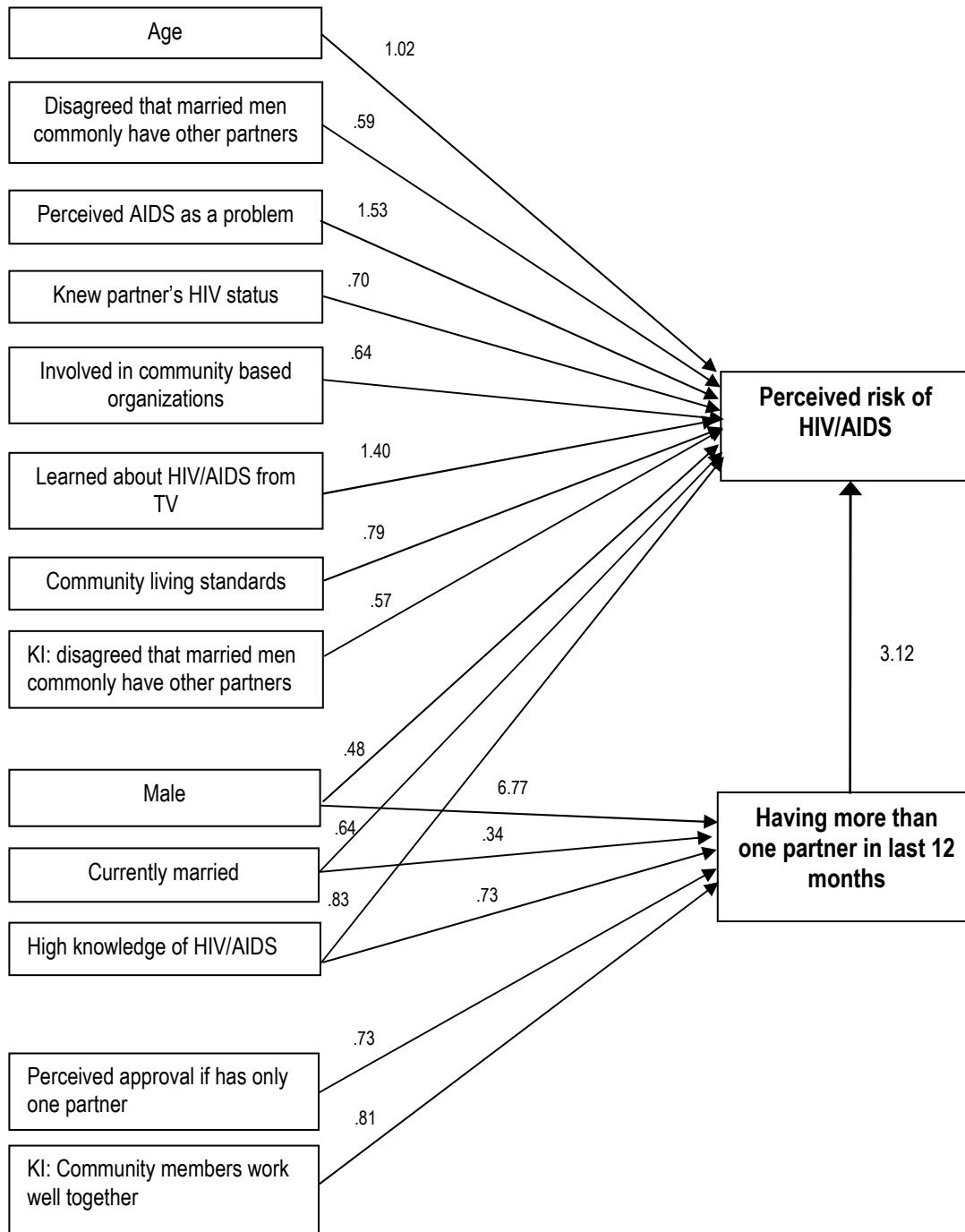
Individual and community characteristics	Males		Females	
	Multiple partners last 12 months	Perceived risk of HIV/AIDS	Multiple partners last 12 months	Perceived risk of HIV/AIDS
	OR (s.e.)	OR (s.e.)	OR (s.e.)	OR (s.e.)
<b>Individual-level</b>				
Having more than one partner in the last 12 months	—	2.83***	—	4.37***
Age	.98	1.04***	.99	1.01
Currently married	.45***	.33***	.11***	.95
Education				
Never attended school	1.00	1.00	1.00	1.00
Primary school	1.51	2.18*	1.16	1.10
Secondary school	1.66	1.93†	1.20	1.07
Higher	2.39†	1.76	1.15	.73
Household wealth				
First (poorest)	1.00	1.00	—	1.00
Second	.76	1.06	—	1.09
Third	1.20	.60*	—	.95
Fourth	1.25	.47**	—	1.02
Fifth (richest)	.65	.79	—	.90
Religion				
Catholic	1.00	1.00	1.00	1.00
Protestant	.97	.86	.87	1.08
Others	.99	.78	.71	1.07
Disagreed that women carrying condoms are easy	1.06	.82	1.62	1.03
Disagreed that it's common for married men to have other female sex partners	.87	.72†	.48	.47***
High knowledge of HIV/AIDS	.72†	.86	.70	.83
Perceived AIDS as a problem	.88	2.14***	.74	1.26
Perceived approval if respondents has only one partner in the next 12 months	.72***	—	.78	—
Condom use at last sex	—	1.02	—	.85
HIV test within last 12 months	—	.63†	—	1.43†
Knew partner's HIV status	—	1.07	—	.56**
Involved in community-based organizations	.83	.72	2.08	.56*
Learned about HIV/AIDS from interpersonal communication (IPC)	1.18	1.03	1.35	.74*
Learned about HIV/AIDS from TV	1.40	1.31	1.83	1.35
<b>Community-level</b>				
Urban	.87	1.20	1.46	1.08
Living standards	.83	.98	.83	.63**
Disagreed that women carrying condoms are easy	1.45	1.02	1.34	1.15
Disagreed that it's common for married men to have other female sex partners	.56*	.69	1.80	.45**



Individual and community characteristics	Males		Females	
	Multiple partners last 12 months	Perceived risk of HIV/AIDS	Multiple partners last 12 months	Perceived risk of HIV/AIDS
	OR (s.e.)	OR (s.e.)	OR (s.e.)	OR (s.e.)
How well community members work together	.75*	.84	1.31	1.01
N				
Individuals (level 1)	1,186	1,166	1,187	1,164
Community (level 2)	102	102	102	102
Log likelihood	-544.83	-599.38	-157.80	-691.52
Level 2 variance (s.e.)	.308 (.148)	.110 (.084)	.171 (.608)	.416 (.116)

†p<.10; \*p<.05; \*\*p<.01; \*\*\*p<.001

**Figure 1.** Individual- and community-level factors associated with whether respondent had more than one sex partner within the last 12 months and perceived risk of HIV/AIDS.



KI: Key informant