Published in final edited form as:
J Acquir Immune Defic Syndr. 2008 April 1; 47(4): . doi:10.1097/QAI.0b013e3181648de8.

Sexual Behavior and Reproductive Health Among HIV-Infected Patients in Urban and Rural South Africa

Mark Lurie, PhD[*], **Paul Pronyk, FRCPC, PhD**[†,‡], **Emily de Moor, BA**[*], **Adele Heyer, FCFP, MBChB**[§], **Guy de Bruyn, MBBCh, MPH**[§], **Helen Struthers, MSc, MBA**[§], **James McIntyre, MBChB**[§], **Glenda Gray, MBBCH, FCPaeds (SA)**[§], **Edmore Marinda, MSC, MS**[||], **Kerstin Klipstein-Grobusch, MSc, PhD**[||], and **Neil Martinson, MBBCh, MPH**[§,¶]

[*]Department of Community Health, International Health Institute, Warren Alpert Medical School of Brown University, Providence RI

[†]Rural AIDS and Development Action Research Programme, School of Public Health, University of the Witwatersrand, Acornhoek, South Africa

[‡]Department of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, London, United Kingdom

[§]Perinatal HIV Research Unit, University of the Witwatersrand, Johannesburg, South Africa

[||]School of Public Health, University of the Witwatersrand, Johannesburg, South Africa

[¶]School of Medicine, Johns Hopkins University, Baltimore, MD

Abstract

Background—With the rollout of antiretroviral therapy in South Africa and its potential to prolong the lives of HIV-infected individuals, understanding the sexual behavior of HIV-positive people is essential to curbing secondary HIV transmission.

Methods—We surveyed 3819 HIV-positive patients during their first visit to an urban wellness clinic and a rural wellness clinic.

Results—Urban residents were more likely than rural residents to have current regular sex partners (75.1% vs. 46.0%; χ^2 odds ratio [OR] = 3.531; $P < 0.001$), to have any current sexual partners (75.3% vs. 51.2%; χ^2 OR = 2.908; $P < 0.001$), and to report consistent condom use with regular partners (78.4% vs. 48.3%; χ^2 OR = 3.886; $P < 0.001$) and with casual partners (68.6% vs. 48.3%; χ^2 OR = 2.337; $P < 0.001$). In multivariate analysis, independent predictors of consistent condom use with regular partners included across gender, urban residence, and higher education levels; for women, disclosure and younger age; and for men only, no history of alcohol consumption. Male and female participants with a casual sexual partner were less likely to use a condom consistently with regular partners. Additionally, urban residence and a CD4 count greater than 200 cells/mm^3 as well as (for women only) a higher household income and a history of alcohol consumption were predictors of having a regular sexual partner.

Conclusions—HIV prevention programs in South Africa that emphasize the importance of condom use and disclosure and are tailored to the needs of their attending populations are critical

Correspondence to: Mark Lurie, PhD, Department of Community Health, International Health Institute, Warren Alpert Medical School of Brown University, Box GS-121, 121 South Main Street, Providence RI 02912 (mark_lurie@brown.edu).

The opinions expressed herein are those of the authors and do not necessarily reflect the views of USAID or other project funders.

given the potential for HIV-infected individuals to resume risky sexual behavior with improving health.

Keywords

condom use; HIV prevention; positive prevention; sexual behavior; South Africa; urban-rural

More than 60% of the world's HIV-infected population lives in sub-Saharan Africa,[1] and South Africa, with a national antenatal HIV prevalence of 30.2%,[2] is host to one of the world's worst HIV epidemics. The predominant mode of HIV infection throughout southern Africa is unprotected heterosexual intercourse.[3] Prevention programs that target secondary transmission between those known to be HIV-positive and their sexual partners have recently gained favor[4] but are still underdeveloped in generalized epidemic settings.[3,5,6] Better understanding patterns of sexual behavior among individuals who know their HIV status remains central to informing these efforts.

Studies from industrialized countries suggest that some HIV-infected individuals, even after learning of their positive status, continue to engage in risky sexual behavior.[7–12] In developing countries, experience is limited, although similar patterns are emerging. Research from West Africa and Uganda suggests that patterns of high-risk activity are common among those with known and unknown HIV status.[13–16] In KwaZulu/Natal, South Africa, nearly 50% of HIV-infected patients in a single clinical setting were sexually active and 30% of those reported having unprotected sex in the previous 3 months.[17]

Increasing access to antiretroviral therapy (ART) has magnified the importance of addressing risk-taking behavior among HIV-infected adults. Few people in low- and middle-income countries were on ART before 2001; however, by the end of 2005, an estimated 1.3 million were on treatment, with 190,000 individuals on treatment in South Africa alone.[1] Although the clinical benefits of ART are well established,[18] the impact of treatment on preventing secondary transmission is less well understood. Although less infectious, people on treatment live considerably longer, thereby increasing the duration of potential exposure. Mathematic models predict that although high levels of ART coverage could potentially reduce HIV incidence, its benefits could be overshadowed by simultaneous increases in risky sexual behavior.[6,19,20] In industrialized countries, concerns have emerged regarding increased risk behavior possibly attributable to ART treatment optimism[21–23] and improving health; such data on the impact of care and support programs on patterns of sexual behavior are limited in developing countries.[24] Furthermore, there are few available data on how these behaviors may differ in rural versus urban settings.

This research assessed sexual behavior among HIV-positive South Africa patients attending a rural clinic and an urban clinic. We explored the determinants of and factors associated with safe sexual behavior, highlighting implications for prevention programs to reduce secondary transmission that target those living with HIV.

METHODS

Study Sites

HIV-infected patients were recruited to participate in the study at HIV care and support sites in urban and rural South Africa. The urban Wellness Clinic, located at Chris Hani Baragwanath Hopital in Soweto, where antenatal prevalence is 31%,[25] has an average of 550 patient visits per month. Approximately 1000 adults previously seen at the urban Wellness Clinic have been transitioned to ART since early 2004. The rural clinic is based at Tintswalo Hospital in Acornhoek, within the densely settled Bushbuckridge region of South

Africa's rural northeast. The rural clinic sees approximately 1200 patients per month, 500 of whom have been started on ART after it became available at Tintswalo in September 2005. Although 75% of patients came from an area within a 10- to 20-km radius from the rural site, approximately 25% are from as far as 50 km away. Antenatal HIV prevalence in Acornhoek is also near 30% (P. Pronyk, personal communication, 2007). Patients are referred to the HIV clinics from hospital wards and voluntary counseling and testing programs within the hospitals and from surrounding primary health care clinics. HIV-positive status was confirmed by a laboratory-based enzyme-linked immunosorbent assay (ELISA) or a 2-test rapid algorithm at the urban site and 2 blood-based rapid tests at the rural site.

Procedure

From June 2003 until April 2006, nurses administered a structured questionnaire, identical at the urban and rural sites, to all consenting patients at the time of their first visit. All individuals were aware of their HIV status in advance of these visits. This questionnaire was overseen by trained clinical staff and providers and was designed to capture, among other things, sociodemographic characteristics and risk behavior. Data were double-entered into a master database and then validated.

Sociodemographic variables included age, education level, marital status, and household income. The presence of sexually transmitted infection (STI) symptoms at the time of the first visit was assessed by means of self-report, with syndromic management provided as necessary according to national guidelines. Behavioral questions focused on whether or not participants had a regular sexual partner at the time of the first clinic visit, whether they had a casual sexual partner at the time of the first visit, the frequency of condom use with casual and regular partners, whether or not they had ever disclosed their HIV status to anyone, and whether or not they had ever used alcohol. Sexual risk behavior was assessed by examining the frequency of condom use and self-report of having or not having casual and regular sexual partners. Condom use for each partner type was collected using categoric variables, and consistent condom use was defined as always using a condom with a sexual partner. Previous research on sexual risk behavior in Africa has used similar indicators.[14,27–29] Finally, blood samples were collected for CD4 cell count and rapid plasma reagin (RPR) and full blood counts and were analyzed on-site according to standard laboratory procedures.

Statistical Analyses

SPSS 14.0 (SPSS, Chicago, IL) software was used to perform bivariate analyses of sociodemographic and behavioral differences between urban and rural patients, patients who used condoms consistently or inconsistently with their regular sexual partners at the time of their first clinic visit, and patients who had or did not have a sexual partner (regular or casual) at the time of their first clinic visit. In addition to exploring condom use and sexual activity among men and women, we also examined these variables in the urban and rural sites separately within gender groups. In determining sociodemographic and behavioral differences between urban and rural participants, bivariate tests included χ^2 and Student t tests; in predicting consistent condom use and sexual activity, single predictors were entered separately into logistic regression models. Results for all analyses were considered statistically significant if $P < 0.05$. With regard to available CD4 cell count data, we restricted our analysis to those clients who had their CD4 cell count tests performed within 90 days of their first visit (excluding n = 739).

Furthermore, we constructed gender- and site-specific models using entry-method logistic regression (likelihood ratio) to determine predictors of the existence of a sexual partner (regular or casual) and predictors of consistent condom use with regular partners at the time

of the patient's first clinic visit. Because not everyone had a current regular or casual sex partner, we were interested first in what factors were associated with having a current regular or casual partner. We then examined factors associated with condom use among those with current partners; those who did not have a current sexual partner were not eligible for this analysis.

Multivariate model input variables included site, age, marital status, education level, history of alcohol consumption, disclosure, STI symptoms, and CD4 cell count. The model predicting consistent condom use included an additional predictor: whether or not the participant had a casual sexual partner. For bivariate and multivariate analyses of condom use with regular partners, those participants who claimed not to have regular partners were excluded from the analysis.

Predictors with *P* values less than 0.15 in the bivariate logistic regression models were entered into a multivariate logistic regression model. The results of this model were examined, and insignificant predictors were manually eliminated stepwise based on the magnitude of predictors' *P* values. Only predictors with a *P* value <0.05 were included in the final multivariate logistic regression models.

Ethical Review

This research was approved by the Human Research Ethics Committee (Medical) at the University of the Witwatersrand and the Brown University Institutional Review Board. No payment or other incentive was offered to participants.

RESULTS

First visit data from 3819 individuals with known HIV status were used in this analysis. Refusal to participate was rare: <1% in the rural site and <3% in the urban site. The study participants were predominantly from the urban site (69.5%) and were predominantly female (76.4%). Only 2.4% of all patients were on ART at their first clinic visit.

Sociodemographics and Sexual Behavior

Sociodemographic and Behavioral Differences Between Urban and Rural Patients—Table 1 compares the sociodemographic characteristics and sexual behavior of urban and rural HIV-infected men and women. Compared with their rural counterparts, urban participants were an average of 3 years younger; were less often married, divorced, separated, or widowed and more likely to have never married; had higher household incomes (57.5% of urban participants vs. 16.2% of rural participants earned more than R800 per month; χ^2 odds ratio [OR] = 7.080; $P < 0.001$); were better educated (75.4% of urban participants vs. 43.4% of rural participants had an education level of grade 8 or higher; χ^2 OR = 3.997; $P < 0.001$); and were more likely to have a history of alcohol consumption (42.6% vs. 24.7%; χ^2 OR = 2.268; $P < 0.001$). The patterns of observed differences for all relations by site were consistent for men and women.

With respect to reproductive health indicators, 82% of participants had disclosed their HIV status to at least 1 person, and urban patients were more likely to have disclosed their HIV status (91.3% vs. 61.2%; χ^2 OR = 6.68; $P < 0.001$), to have current regular sex partners (75.1% vs. 46.0%; χ^2 OR = 3.531; $P < 0.001$), and to report consistent condom use with regular partners more often (78.4% vs. 48.3%; χ^2 OR = 3.886; $P < 0.001$) as well as with casual partners (68.6% vs. 48.3%; χ^2 OR = 2.337; $P < 0.001$). Urban patients were also more likely than rural patients to have any current sexual partners (75.3% vs. 51.2%; χ^2 OR = 2.908; $P < 0.001$).

The median CD4 count overall was 240 cells/mm^3 (interquartile range [IQR]: 114 to 410 cells/mm^3). A greater proportion of urban participants had a CD4 count of 200 cells/mm^3 or higher compared with rural participants (60.2% vs. 43.5%; χ^2 OR = 1.965; $P < 0.001$). Furthermore, women were more likely to have a CD4 count of 200 cells/mm^3 or higher than men (59.1% vs. 46.9%; χ^2 OR = 1.637; $P < 0.001$). Median CD4 cell counts did not differ significantly at the urban site for people attending before ART becoming available compared with those who attended after treatment was available (293.7 vs. 314.2 cells/mm^3; $P = 0.17$); however, at the rural site, median CD4 cell counts were higher among those who attended before treatment becoming available compared with those who attended after treatment was available (253.9 vs. 171.0 cells/mm^3; $P < 0.001$). Finally, fewer urban participants had STI symptoms at first visit than rural participants (21.1% vs. 24.3%; χ^2 OR = 0.831; $P = 0.028$).

Predictors of Consistent Condom Use With Regular Partners—In the bivariate analysis of men, urban site, younger age, being married or living together (compared with being divorced or separated), an education level higher than grade 8, higher household income (more than R800 or US $110 per month), the absence of a casual sex partner, and having disclosed HIV status were all associated with consistent condom use (Table 2A). In the site-stratified bivariate analysis, urban male participants who were younger, had a higher level of education, and did not have a casual partner and rural men who were not divorced or separated, had never consumed alcohol, and did not have a casual sexual partner were more likely to use condoms consistently.

In multivariate analyses, consistent condom use with regular partners for men was significantly associated with urban site, increased level of education, and the absence of a casual partner. A history of alcohol consumption also was a significant predictor of consistent condom use in the final multivariate model. For urban male participants, being young and not having a casual partner remained significant in the multivariate model, whereas for rural men, being married or living together, never having consumed alcohol, and not having a casual partner were all significantly associated with consistent condom use.

In the bivariate analysis for women, consistent condom use (see Table 2B) was associated with urban residence, age younger than 45 years, having never been married (compared with being married or living together), being married or living together (relative to being widowed), grade 8 level of education or higher, greater household income, not having a casual sex partner, not having STI symptoms, and having disclosed HIV status. The same pattern held for urban women, excluding marital status and household income, whereas for rural women in the bivariate analysis, only age younger than 35 years, education level higher than grade 8, and having disclosed HIV status were associated with consistent condom use.

In the adjusted multivariate model for all women, significant associations persisted between consistent condom use and urban residence, younger age, increased education, the absence of a casual sex partner, and disclosure. In the final multivariate model for urban women, age younger than 45 years, higher level of education, lack of a casual partner, and having disclosed continued to predict consistent condom use with a regular partner, whereas for rural women, only age 26 to 35 years (compared with age older than 45 years) and disclosure remained significant.

Predictors of Having Any Sexual Partners (Regular or Casual)—Table 3A presents predictors of sexual activity among men. A total of 73.2% of men reported currently having any sexual partners. In the bivariate analysis, men who were from the urban area, were aged 26 to 35 years (compared with older than 45 years), had completed grade 8

or higher, had a higher household income, had disclosed their HIV status, and had a CD4 count greater than 200 cells/mm^3 were more likely to report having a current sexual partner at their first clinic visit. Additionally, overall in the bivariate analysis and at urban and rural sites, men who were married or living together were more likely to have sexual partners than those who had never married, whereas those who were widowed were less likely to be sexually active than those who had never married. Apart from marital status, other factors that were significantly associated with sexual activity at the urban site in the bivariate analysis for men included younger age (26 to 35 years old compared with 45 years old), higher income, and higher CD4 cell count; at the rural site, apart from marital status, only having STI symptoms was significantly associated with sexual activity.

After adjusting for potential confounders, associations with marital status persisted overall as well as at the separate sites. Living at the urban site remained a significant predictor of sexual activity for all men, as did younger age and higher CD4 cell count. At the urban site, younger age and higher CD4 cell count also remained significant, whereas being divorced or separated became positively associated with having a sexual partner. In the rural multivariate model, having STI symptoms continued to predict sexual activity.

Table 3B presents predictors of sexual activity among women. A total of 66.7% of women reported having a sexual partner. In the bivariate and multivariate analyses, overall and for urban women, and in the bivariate analysis, for rural women, younger age and having a household income greater than R800 were positively associated with being sexually active. Furthermore, for all women and in bivariate and multivariate analyses, being married or living together (compared with never having married) and having a CD4 count greater than 200 cells/mm^3 were positively associated with having a sexual partner, whereas being widowed was negatively associated with currently having a partner. Overall, in the bivariate analysis, women who lived in the urban area, had never married (compared with being divorced or separated), had a higher level of education, had ever consumed alcohol, and had disclosed their HIV status were more likely to be sexually active; associations with urban residence and history of alcohol use persisted in the overall multivariate model. Having ever consumed alcohol was also a significant predictor of sexual activity in the urban multivariate model, whereas higher education and being divorced or separated (compared with having never married) were positively and negatively (respectively) associated with sexual activity in the rural bivariate analysis. In the rural multivariate model, the association with education and with age younger than 25 years persisted.

DISCUSSION

This study provides insights into the sexual risk behavior and sociodemographic profile of HIV-positive patients receiving care in 2 areas that reflect the contrasting realities typical of much of South Africa: the urban township and rural former “homeland” setting.

We found significantly higher rates of consistent condom use among HIV-positive participants at the urban site (81% of men and 78% of women) than at the rural site (52% of men and 46% of women). Although more likely to be sexually active, urban patients are also clearly taking steps to protect themselves and are more likely to use condoms consistently. Data contrasting rural and urban African sites are scarce, but a Ugandan study suggests that the patterns of risk behavior among HIV-positive patients at an urban site and a rural site[15,16] are similar to those observed in our study. In addition, our data are consistent with urban-rural differences described in recent population-based studies in South Africa.[30] For example, condom use at last sex in the general population was slightly higher in urban areas (39% of male participants and 33% of female participants) than in rural areas (34% of male participants and 31% of female participants). This may reflect wider exposure in urban areas

to health promotion messages through schools, the media, or social marketing,[30] or the concurrent shifting of social norms around sexual behavior. Clearly, more attention needs to be placed on broadening exposure to prevention efforts in rural areas. Notably, levels of reported condom use are substantially higher among the clinic attenders in this study than in the general population,[30] demonstrating that care and support programs may have a protective effect on risk behavior.

The relations between HIV infection, education, and income are complex and variable. Prior research in Africa suggests that early on in the HIV epidemic, those who were better educated, more affluent, and more mobile had higher levels of infection. This pattern now seems to be shifting, such that those with higher levels of education are more likely to adopt protective behavior.[31] Our data suggest that HIV-infected adults with higher levels of education had higher levels of condom use with their regular partners. Those with higher levels of education may have more exposure to health interventions and may better integrate the messages of prevention campaigns into their lives.[32–34] Other research from our group suggests that school enrollment is strongly associated with protective sexual behavior and lower risk of HIV infection.[35] In our analysis, higher household income and education levels were significantly associated with having a current sexual partner, especially for women, perhaps reflecting the continued vulnerability of the relatively affluent to HIV infection and the need for women to maintain sexual partnerships to secure their livelihoods.[36]

Our data show a strong association between disclosure of HIV status and protective patterns of condom use, especially among women. Overall, levels of disclosure were high: 90% at the urban site and 60% in the rural setting. Disclosure to a partner or family member is a healthy coping mechanism for HIV-infected individuals, often leading to increased social support and reflecting personal acceptance of the disease and a sense of responsibility to and trust in a partner.[37–39] Fear of stigmatization, abandonment, or domestic violence is a major impediment to disclosure,[40–42] however, particularly for African women, whose reproductive choices are often influenced, and potentially controlled, by their male partners.[41,43,44] The results of this study and others suggest that programs aimed at creating a healthy environment for disclosure, such as support groups or couple counseling, remain a key adjunct to care and support programs for reducing secondary transmission among those living with HIV.[45,46]

The positive association between alcohol consumption and irregular condom use among male participants and increased sexual activity among female participants is consistent with the results of previous studies demonstrating close links between substance use and risky sexual behavior among HIV-infected individuals.[11,47–50] Alcohol use decreases sexual inhibitions and further disempowers women,[50] placing both partners at risk of infection. HIV prevention counseling programs in rural and urban areas need to discourage substance abuse, and counter peer pressure and strong advertising messages among youth to consume alcohol,[50] especially in urban areas, where high-risk substance abuse is more prevalent.[30]

Among men and women at the rural and urban sites, a higher CD4 cell count was strongly associated with having a sexual partner. Our result is supported by data from elsewhere suggesting that sexual activity declines with increased physical disability linked to advancing HIV disease.[14,44,51] This relation underscores the importance of sexual behavior and its potential to influence HIV transmission in southern Africa among populations in which ART is being introduced. If these relations persist, patients returning to health after ART initiation may re-engage in risky sexual relationships. Incorporating ongoing clear risk reduction messages into ART literacy programs and ensuring that adequate condom supplies are available and accessible to HIV-positive patients are priorities for reducing secondary transmission.

Our study has clear limitations. The cross-sectional nature of the data limits the ability to draw inferences around causality. Furthermore, because the sample includes only patients who are involved in care and support programs and who are exposed to ongoing counseling and support, response bias may influence accurate reporting of patterns of partnering and sexual behavior.[52] Moreover, additional confounding factors that were not included in our multivariate models could be associated with condom use and sexual activity, such as more sensitive measures of well-being apart from CD4 cell count and self-reported STI symptoms,[14] further indicators of sexual behavior (eg, number of sexual partners, involvement in commercial sex),[10,14] power dynamics in sexual decision making,[53] desire for children,[44] partner serostatus, and emotional states.[10,54] Nonetheless, this remains one of the first studies to use similar data collection tools among a substantial sample of HIV-positive patients in 2 different urban and rural settings. Better understanding of changes in sexual behavior over time and exposure to evolving care and support programs remain of central relevance in the region.

In conclusion, substantial differences exist in the behavior and sociodemographic profile of urban and rural HIV-infected clinic attendees. Stark disparities in education level, household income, health status, levels of disclosure, and rates of condom use between the 2 clinic sites highlight the need for prevention strategies that take cognizance of the different realities faced by these populations. Our data suggest that HIV testing and clinical programs should encourage disclosure of HIV status when it is a safe option, particularly for women, and that ART programs should ensure that prevention messages and condom promotion are reinforced alongside adherence messages. Furthermore, appropriate popular media and prevention programs should extend their reach to rural areas to promote condom use, disclosure, and wider discussion of HIV and to reduce HIV-related stigma. Finally, and more broadly, policies and programs that maximize school enrollment and retention at school, reduce economic dependency on migrant labor, reduce alcohol abuse, and support household incomes in rural areas need to be enhanced.

Acknowledgments

Supported in part by a National Institutes of Health (NIH) Career Development Award to M. Lurie (grant 1K01 MH069113-O1A1) and an NIH Training Grant to the Miriam Hospital (grant 5T32 DA 113911). Patient care is funded by the President's Emergency Plan for AIDS Relief, through the US Agency for International Development (USAID) under the terms of award 674-A-00-05-00003-00.

References

1. UNAIDS. 2006 Report on the Global AIDS Epidemic. Geneva, Switzerland: UNAIDS; 2006.
2. Department of Health. National HIV and Syphilis Antenatal Seroprevalence Survey in South Africa 2005. Pretoria, South Africa: Department of Health; 2006.
3. UNAIDS, WHO. AIDS Epidemic Update. Geneva, Switzerland: UNAIDS, WHO; 2005.
4. Center for Disease Control and Prevention. Incorporating HIV prevention into the medical care of persons living with HIV: recommendations of CDC, the Health Resources and Services Administration, the National Institutes of Health, and the HIV Medicine Associations of the Infectious Diseases Society of America. MMWR Morb Mortal Wkly Rep. 2003; 52(RR-12):1–32.
5. Indyk D, Golub S. The shifting locus of risk-reduction: the critical role of HIV infected individuals. Soc Work Health Care. 2006; 42:113–132. [PubMed: 16687378]
6. Janssen R, Holtgrave D, Valdiserri R, et al. The serostatus approach to fighting the HIV epidemic: prevention strategies for infected individuals. Am J Public Health. 2001; 91:1019–1024. [PubMed: 11441723]
7. Kalichman S, Kelly J, Rompa D. Continued high-risk sex among HIV seropositive gay and bisexual men seeking HIV prevention services. Health Psychol. 1997; 16:369–374. [PubMed: 9237089]

8. Simon P, Thometz E, Bunch J, et al. Prevalence of unprotected sex among men with AIDS in Los Angeles County, California 1995–1997. AIDS. 1999; 13:987–990. [PubMed: 10371181]
9. van der Straten A, Gomez C, Saul J, et al. Sexual risk behaviors among heterosexual HIV serodiscordant couples in the era of post-exposure prevention and viral suppressive therapy. AIDS. 2000; 14:F47–F54. [PubMed: 10770532]
10. Kalichman S. HIV transmission risk behaviors of men and women living with HIV-AIDS: prevalence, predictors, and emerging clinical interventions. Clin Psychol Sci Pract. 2000; 7:32–47.
11. Morin S, Steward W, Charlebois E, et al. Predicting HIV transmission risk among HIV-infected men who have sex with men: findings from the Healthy Living Project. J Acquir Immune Defic Syndr. 2005; 40:226–235. [PubMed: 16186742]
12. Aidala A, Lee G, Howard J, et al. HIV-positive men sexually active with women: sexual behaviours and sexual risks. J Urban Health. 2006; 83:637–655. [PubMed: 16770702]
13. Nebie Y, Meda N, Leroy V, et al. Sexual and reproductive life of women informed of their HIV seropositivity: a prospective cohort study in Burkina Faso. J Acquir Immune Defic Syndr. 2001; 28:367–372. [PubMed: 11707674]
14. Moatti J, Prudhomme J, Traore D, et al. Access to antiretroviral treatment and sexual behaviours of HIV-infected patients aware of their serostatus in Cote d'Ivoire. AIDS. 2003; 17(Suppl 3):S69–S77. [PubMed: 14565612]
15. Bateyanga M, Colfax G, Shafer L, et al. Antiretroviral therapy and sexual behavior: a comparative study between antiretroviral-naive and -experienced patients at an urban HIV/AIDS care and research center in Kampala, Uganda. AIDS Patient Care STDS. 2005; 19:760–768. [PubMed: 16283836]
16. Bunnell R, Ekwaru J, Solberg P, et al. Changes in sexual behavior and risk of HIV transmission after antiretroviral therapy and prevention interventions in rural Uganda. AIDS. 2006; 20:85–92. [PubMed: 16327323]
17. Kiene S, Christie S, Cornman D, et al. Sexual risk behaviour among HIV-positive individuals in clinical care in urban Kwazulu-Natal, South Africa. AIDS. 2006; 20:1781–1784. [PubMed: 16931945]
18. Palella F, Delaney K, Moorman A, et al. Declining morbidity and mortality among patients with advanced immunodeficiency virus infection. N Engl J Med. 1998; 338:853–860. [PubMed: 9516219]
19. Blower S, Bodine E, Kahn J, et al. The antiretroviral rollout and drug-resistant HIV in Africa: insights from empirical data and theoretical models. AIDS. 2005; 19:1–14. [PubMed: 15627028]
20. Montaner JS, Hogg R, Wood E, et al. The case for expanding access to highly active antiretroviral therapy to curb the growth of the HIV epidemic. Lancet. 2006; 368:531–536. [PubMed: 16890841]
21. Elford J, Bolding G, Maquire M, et al. Combination therapies for HIVand sexual risk behavior among gay men. J Acquir Immune Defic Syndr. 2000; 23:266–271. [PubMed: 10839663]
22. Van de Ven P, Rawstorne P, Nakamura T, et al. HIV treatment optimism is associated with unprotected anal intercourse with regular and with casual partners among Australian gay and homosexually active men. Int J STD AIDS. 2002; 13:181–183. [PubMed: 11860696]
23. Kennedy C, O'Reilly K, Medley A, et al. The impact of HIV treatment on risk behaviour in developing countries: a systematic review. AIDS Care. 2007; 19:707–720. [PubMed: 17573590]
24. Ostrow D, Fox K, Chmiel J, et al. Attitudes towards highly active antiretroviral therapy are associated with sexual risk taking among HIV-infected and uninfected homosexual men. AIDS. 2002; 16:775–780. [PubMed: 11964534]
25. Struthers, H.; Violari, A.; Myeni, Z., et al. PMTCT in Soweto: a large scale intervention. Presented at: PEPFAR HIV/AIDS Implementers' Meeting; 2006; Durban.
26. Deleted in proof.
27. Konde-Lule J, Wawer M, Sewankambo N, et al. Adolescents, sexual behavior and HIV-1 in rural Rakai district, Uganda. AIDS. 1997; 11:791–799. [PubMed: 9143612]
28. Lagarde E, Auvert B, Chege J, et al. Condom use and its association with HIV/sexually transmitted diseases in four urban communities in sub-Saharan Africa. AIDS. 2001; 15(Suppl 4):S71–S78. [PubMed: 11686468]

29. Matovu J, Gray R, Makumbi F, et al. Voluntary HIV counseling and testing acceptance, sexual risk behavior, and HIV incidence in Rakai, Uganda. AIDS. 2005; 19:503–511. [PubMed: 15764856]
30. Shisana, O.; Rehle, T.; Simbayi, L., et al. South African National HIV Prevalence, HIV Incidence, Behaviour and Communication Survey, 2005. Cape Town, South Africa: HSRC Press; 2005.
31. Hargreaves JR, Glynn JR. Educational attainment and HIV infection in developing countries: a systematic review. Trop Med Int Health. 2002; 7:489–498. [PubMed: 12031070]
32. Kilian A, Gregson S, Ndyanabanqi B, et al. Reductions in risk behaviour provide the most consistent explanation for declining HIV-1 prevalence in Uganda. AIDS. 1999; 13:391–398. [PubMed: 10199230]
33. Fylkesnes K, Musonda R, Kasuma K, et al. The HIV epidemic in Zambia: socio-demographic prevalence patterns and indications of trends among childbearing women. AIDS. 1997; 11:339–345. [PubMed: 9147426]
34. Lagarde E, Carael M, Glynn J, et al. Educational level is associated with condom use within non-spousal partnerships in four cities in sub-Saharan Africa. AIDS. 2001; 15:1399–1408. [PubMed: 11504961]
35. Hargreaves JR, Morison LA, Kim JC, et al. The association between school attendance, HIV infection and sexual behaviour among young people in rural South Africa. Epidemiol Community Health. 2008; 62:113–119.
36. Walker, L.; Reid, G.; Cornell, M. Waiting to Happen. HIV/AIDS in South Africa. Boulder, CO: Lynne Rienner Publishers; 2004.
37. Holt R, Court P, Vedhara K, et al. The role of disclosure in coping with HIV infection. AIDS Care. 1998; 10:49–60. [PubMed: 9536201]
38. Serovich J, Mosack K. Reasons for HIV disclosure or nondisclosure to casual sexual partners. AIDS Educ Prev. 2003; 15:70–80. [PubMed: 12627744]
39. Parsons J, VanOra J, Missildine W, et al. Positive and negative consequences of HIV disclosure among seropositive injection drug users. AIDS Educ Prev. 2004; 16:459–475. [PubMed: 15491957]
40. Lester P, Partridge J, Chesney M, et al. The consequences of a positive prenatal HIV antibody test for women. J Acquir Immune Defic Syndr Hum Retrovirol. 1995; 10:341–349. [PubMed: 7552496]
41. Aka-Dago-Akribi H, Desgrees du Lou A, Msellati P. Issues surrounding reproductive choice for women living with HIV in Abidjan, Cote d'Ivoire. Reprod Health Matters. 1999; 7:20–29.
42. Mitchell H, Stephens E. Contraceptive choice for HIV positive women. Sex Transm Infect. 2004; 80:167–173. [PubMed: 15169996]
43. Agyei W, Midgadde M. Demographic and sociocultural factors influencing contraceptive use in Uganda. J Biosoc Sci. 1995; 27:47–60. [PubMed: 7876295]
44. Feldman R, Maposhere C. Safer sex and reproductive choice: findings from "Positive Women: Voices and Choices" in Zimbabwe. Reprod Health Matters. 2003; 11:162–173. [PubMed: 14708407]
45. Heyward W, Batter V, Malulu M, et al. Impact of HIV counseling and testing among child-bearing women in Kinshasa, Zaire. AIDS. 1993; 7:1633–1637. [PubMed: 8286073]
46. Painter T. Voluntary counseling and testing for couples: a high-leverage intervention for HIV/AIDS prevention in sub-Saharan Africa. Soc Sci Med. 2001; 53:1397–1411. [PubMed: 11710416]
47. Kennedy C, Skurnick J, Wan J, et al. Psychological distress, drug and alcohol use as correlates of condom use in HIV-serodiscordant heterosexual couples. AIDS. 1993; 7:1493–1499. [PubMed: 8280417]
48. Marks G, Crepaz N. HIV-positive men's sexual practices in the context of self-disclosure of HIV status. J Acquir Immune Defic Syndr. 2001; 27:79–85. [PubMed: 11404524]
49. Olley B, Seedat S, Stein D. Self-disclosure of HIV serostatus in recently diagnosed patients with HIV in South Africa. Afr J Reprod Health. 2004; 8:71–76. [PubMed: 15623121]
50. Morojele N, Brook J, Kachieng'a M. Perceptions of sexual risk behaviours and substance abuse among adolescents in South Africa: a qualitative investigation. AIDS Care. 2006; 18:215–219. [PubMed: 16546781]

51. McClelland R, Baeten J, Richardson B, et al. A comparison of genital HIV-1 shedding and sexual risk behavior among Kenyan women based on eligibility for initiation of HAART according to WHO guidelines. J Acquir Immune Defic Syndr. 2006; 41:611–615. [PubMed: 16652035]

52. Ankrah E. AIDS: methodological problems in studying its prevention and spread. Soc Sci Med. 1989; 29:265–276. [PubMed: 2762857]

53. Jones D, Ross D, Weiss S, et al. Influence of partner participation on sexual risk behavior reduction among HIV-positive Zambian women. J Urban Health. 2005; 82(Suppl 4):iv92–iv100. [PubMed: 16107445]

54. Olley B, Seedat S, Gxamza F, et al. Determinants of unprotected sex among HIV-positive patients in South Africa. AIDS Care. 2005; 17:1–9. [PubMed: 15832829]

J Acquir Immune Defic Syndr. Author manuscript; available in PMC 2013 October 29.

TABLE 1

Sociodemographic Characteristics, Sexual Behavior, and Reproductive Health of Urban and Rural HIV-Infected Patients

	Men			Women		
	Urban (N = 572)	**Rural (N = 329)**	**OR***	**Urban (N = 2081)**	**Rural (N = 837)**	**OR***
Age (y), mean ± SD (N)	36.20 ± 7.67 (572)	39.56 ± 9.96 (328)	≠	32.31 ± 7.44 (2080)	35.32 ± 9.61 (832)	≠
Age (y), n/N (%)			≠			≠
≤25	36/572 (6.29)	19/328 (5.79)	2.25	354/2080 (17.02)	116/832 (13.94)	3.08
26 to 35	264/572 (46.15)	109/328 (33.23)	2.88	1128/2080 (54.23)	352/832 (42.31)	3.23
36 to 45	198/572 (34.61)	112/328 (34.15)	2.1	475/2080 (22.84)	240/852 (28.17)	2.0
>45	74/572 (12.94)	88/328 (26.83)	1	123/2080 (11.39)	124/832 (14.90)	1
Marital status, n/N (%)			≠			≠
Married/living together	215/572 (37.59)	167/310 (53.87)	1	446/2081 (21.43)	204/789 (25.86)	1
Never married	311/572 (54.37)	51/310 (16.45)	4.74	1425/2081 (68.48)	286/789 (36.25)	2.79
Divorced/separated	30/572 (5.24)	64/310 (20.64)	0.04	108/2081 (5.19)	170/789 (21.55)	0.29
Widowed	16/572 (2.80)	28/310 (9.03)	0.44	102/2081 (4.90)	129/789 (16.35)	0.36
Household income, n/N (%)			4.62≠			8.43≠
≤R800/month	244/562 (43.42)	124/159 (77.99)		863/2057 (41.95)	384/447 (85.91)	
>R800/month	318/562 (56.58)	35/159 (22.01)		1194/2057 (58.04)	63/447 (14.09)	
Education level, n/N (%)			4.76≠			3.68≠
<Grade 8	163/569 (28.65)	214/326 (65.64)		487/2077 (23.45)	442/834 (53.00)	
≥Grade 8	406/569 (71.35)	112/326 (34.36)		1590/2077 (76.55)	392/834 (47.00)	
Ever consumed alcohol: yes	433/571 (75.83)	176/291 (60.48)	2.05≠	698/2081 (33.54)	82/754 (10.88)	4.08≠
Disclosed to anyone: yes	519/571 (90.89)	191/320 (59.69)	6.74≠	1895/2072 (91.46)	508/822 (61.80)	6.62≠
Current STI symptoms: yes	72/562 (12.81)	47/313 (15.02)	0.83 NS	477/2043 (23.35)	225/805 (27.95)	0.69 NS
CD4 count (cells/mm^3)			2.04≠			1.92≠
0 to 199	223/459 (48.58)	108/164 (65.85)		568/1529 (37.15)	249/468 (53.20)	
200+	236/459 (51.42)	56/164 (34.15)		961/1529 (62.85)	219/468 (46.79)	
Current regular sexual partner: yes	446/564 (79.08)	174/302 (57.62)	2.78≠	1522/2057 (73.99)	327/786 (41.60)	3.99≠
Condom use among those with regular partners			≠			≠
Never	58/446 (13.00)	67/174 (38.50)	1	223/1522 (14.65)	144/327 (44.04)	1

	Men			Women		
	Urban (N = 572)	**Rural (N = 329)**	**OR***	**Urban (N = 2081)**	**Rural (N = 837)**	**OR***
Occasionally	25/446 (5.60)	16/174 (9.20)	1.81	119/1522 (7.82)	32/327 (9.78)	2.4
Always	363/446 (81.39)	91/174 (52.30)	4.61	1180/1522 (77.53)	151/327 (46.20)	5.05
Current casual sexual partner: yes	69/564 (12.23)	41/299 (13.71)	1.14 NS	205/2056 (9.97)	79/783 (10.09)	1.01 NS
Condom use among those with casual partners			†			†
Never	14/69 (20.30)	17/41 (41.46)	1	59/205 (28.78)	33/79 (41.77)	1
Occasionally	6/69 (8.70)	6/41 (14.63)	1.21	7/205 (3.41)	6/79 (7.59)	0.65
Always	49/69 (71.01)	18/41 (43.90)	3.31	139/205 (67.80)	40/79 (50.63)	1.94
Any current sexual partners: yes	449/564 (79.61)	185/302 (61.26)	2.74‡	1524/2057 (74.09)	370/783 (47.25)	3.19‡

*P value: NS indicates not significant;

†<0.05;

‡<0.001.

TABLE 2A

Consistent Condom Use With Regular Partners: Men

	All Men			Urban			Rural		
	Bivariate (n = 620)		Multivariate (n = 596)	Bivariate (n = 446)		Multivariate (n = 445)	Bivariate (n = 174)		Multivariate (n = 152)
Predictors	**Consistent Condom Use With Regular Partners [%]**	**OR [95% CI]***	**OR [95% CI]***	**Consistent Condom Use With Regular Partners [%]**	**OR [95% CI]***	**OR [95% CI]***	**Consistent Condom Use With Regular Partners [%]**	**OR [95% CI]***	**OR [95% CI]***
Site									
Rural	91/174 [52.30]	1	1						
Urban	363/446 [81.39]	3.99 [2.7–5.8]§	3.69 [2.4–5.7]§						
Age (y)									
≤25	23/24 [67.7]	1.53 [0.7–3.5]		19/26 [73.1]	1.21 [0.4–4.3]	1.45 [0.5–4.3]	4/8 [50.0]	1.17 [0.3–5.2]	
26–35	219/277 [79.1]	2.77 [1.7–4.5]		189/221 [85.5]	2.63 [1.3–5.3]	2.94 [1.4–6.0]§	30/56 [53.6]	1.35 [0.6–2.9]	
36–45	152/205 [74.2]	2.1 [1.3–3.5]		119/147 [80.9]	1.89 [0.9–3.9]	2.04 [1.0–4.2]	33/58 [56.9]	1.54 [0.7–3.3]	
>45	60/104 [57.7]	1		36/52 [69.23]	1	1	1		
Marital status//									
MLT	235/324 [72.5]	1		162/202 [80.2]	1		73/122 [59.8]	1	1
NM	182/230 [79.1]	1.44 [1.0–2.1]		176/214 [82.2]	1.14 [0.7–1.9]		6/16 [37.5]	0.4 [0.1–1.2]	0.35 [0.1–1.2]
DS	28/50 [56.0]	0.48 [0.3–0.9]†		20/25 [80.0]	0.99 [0.4–2.79]		8/25 [32.0]	0.32 [0.1–0.8]†	0.28 [0.1–0.8]†
WID	8/9 [88.9]	3.03 [0.4–24.6]		5/5 [100]	2.47 [0.1–46.1]		3/4 [75.0]	2.01 [0.2–19.9]	2.89 [0.3–32.3]
Education									
<Grade 8	151/242 [62.4]	1	1	94/126 [74.6]	1		57/116 [49.1]	1	
Grade 8+	299/373 [80.2]	2.44 [1.7–3.5]§	1.59 [1.1–2.4]†	266/317 [83.9]	1.78 [1.1–2.9]†		33/56 [58.9]	1.49 [0.8–2.8]	
Household income									
≤R800/mo	175/242 [72.3]	1		137/176 [77.8]	1		38/66 [57.6]	1	
>R800/mo	231/286 [80.8]	1.61 [1.1–2.4]†		219/261 [83.9]	1.48 [0.9–2.4]		12/25 [48.0]	0.68 [0.3–1.7]	
Ever consumed alcohol									
Yes	309/430 [71.9]	1	1	267/334 [79.94]	1		42/96 [43.75]	1	1
No	137/175 [78.3]	1.41 [0.9–2.1]	1.64 [1.1–2.6]†	96/112 [85.71]	1.51 [0.8–2.7]		41/63 [65.08]	2.4 [1.2–4.6]‡	2.23 [1.1–4.5]†

	All Men			Urban			Rural		
	Bivariate (n = 620)		Multivariate (n = 596)	Bivariate (n = 446)		Multivariate (n = 445)	Bivariate (n = 174)		Multivariate (n = 152)
Predictors	**Consistent Condom Use With Regular Partners [%]**	**OR [95% CI]***	**OR [95% CI]***	**Consistent Condom Use With Regular Partners [%]**	**OR [95% CI]***	**OR [95% CI]***	**Consistent Condom Use With Regular Partners [%]**	**OR [95% CI]***	**OR [95% CI]***
Current casual sexual partner									
No	397/518 [76.6]	1	1	319/378 [84.17]	1	1	78/139 [56.12]	1	1
Yes	53/96 [55.2]	0.38 [0.2–0.6]§	0.35 [0.2–0.6]§	43/66 [65.15]	0.35 [0.2–0.6]§	0.33 [0.2–0.6]§	10/30 [33.33]	0.39 [0.2–0.9]†	0.33 [0.1–0.9]†
Disclosed HIV status–anyone									
No	58/100 [58.0]	1		28/37 [75.7]	1		30/63 [47.6]	1	
Yes	395/516 [76.6]	2.36 [1.5–3.7]§		334/408 [81.9]	1.45 [0.7–3.2]		61/108 [56.5]	1.43 [0.8–2.7]	
Current STI symptoms									
Yes	62/90 [68.9]	1		45/59 [76.3]	1		17/31 [54.8]	1	
No	390/527 [74.0]	1.29 [0.8–2.1]		316/385 [82.1]	1.43 [0.7–2.7]		74/142 [52.1]	0.89 [0.4–2.0]	
CD4 count									
<200 cells/mm^3	155/215 [72.1]	1		127/158 [80.4]	1		28/57 [49.1]	1	
200+ cells/mm^3	178/231 [77.1]	1.3 [0.9–2.0]		161/196 [82.1]	1.12 [0.7–1.9]		17/35 [48.6]	0.98 [0.4–2.3]	

*P value:

†0.01–0.05;

‡<0.01;

§<0.001.

‖Marital status: MLT indicates married and living together; NMDS, never married, divorced, or separated; W, widowed.

TABLE 2B

Consistent Condom Use With Regular Partners: Women

	All Women			Urban			Rural		
	Bivariate (n = 1849)		Multivariate (n = 1822)	Bivariate (n = 1522)		Multivariate (n = 1508)	Bivariate (n = 326)		Multivariate (n = 318)
Predictors	**Consistent Condom Use With Regular Partners [%]**	**OR [95% CI]***	**OR [95% CI]***	**Consistent Condom Use With Regular Partners [%]**	**OR [95% CI]***	**OR [95% CI]***	**Consistent Condom Use With Regular Partners [%]**	**OR [95%CI]***	**OR [95% CI]***
Site									
Rural	151/327 [46.18]	1	1						
Urban	363/446 [81.39]	4.02 [3.1–5.2]§	3.18 [2.4–4.2]§						
Age (y)									
≤25	266/354 [75.1]	4.45 [2.7–7.2]§	3.09 [1.8–5.3]§	231/285 [81.0]	4.73 [2.6–8.9]§	3.39 [1.8–6.3]§	35/69 [50.7]	2.83 [1.1–7.2]	2.36 [0.9–6.2]
26–35	752/991 [75.9]	4.63 [3.0–7.3]§	3.07 [1.9–5.0]§	686/856 [80.1]	4.47 [2.6–7.7]§	3.29 [1.9–5.8]§	66/135 [48.9]	2.63 [1.1–6.3]	2.54 [1.1–6.2]†
36–45	275/412 [66.8]	2.96 [1.9–4.7]§	2.32 [1.4–3.8]§	235/322 [73.0]	2.99 [1.7–5.3]§	2.36 [1.3–4.2]‡	40/90 [44.4]	2.20 [0.9–5.5]	2.12 [0.9–5.3]
>45	36/89 [40.5]	1	1	36/52 [69.23]	1	1	1		
Marital status//									
MLT	393/583 [67.4]	1		323/428 [75.4]	1		70/155 [45.2]	1	
NM	825/1081 [76.3]	1.56 [1.3–2.0]§		787/990 [79.5]	1.26 [1.0–1.7]		38/91 [41.8]	0.87 [0.5–1.5]	
DS	67/108 [56.0]	0.79 [0.5–1.2]		44/66 [66.7]	0.65 [0.4–1.1]		23/42 [56.8]	1.47 [0.7–2.9]	
WID	34/62 [54.8]	0.59 [0.4–1.0]		26/38 [68.4]	0.70 [0.3–1.4]		8/24 [33.3]	0.61 [0.2–1.5]	
Education									
<Grade 8	309/504 [61.3]	1	1	249/355 [70.1]	1	1	60/149 [40.3]	1	
Grade 8+	1019/1341 [76.0]	2.00 [1.6–2.5]§	1.39 [1.1–1.8]†	928/1164 [79.7]	1.67 [1.3–2.2]§	1.42 [1.1–1.9]†	91/177 [51.4]	1.57 [1.1–2.4]†	
Household income									
≤R800/mo	499/723 [69.0]	1		444/588 [75.5]	1		55/135 [40.7]	1	
>R800/mo	740/959 [77.2]	1.52 [1.2–1.9]§		724/918 [78.9]	1.21 [1.0–1.6]		16/41 [39.0]	0.93 [0.5–1.9]	
Ever consumed alcohol									
Yes	415/561 [74.0]	1		400/521 [76.8]	1		15/40 [37.5]	1	
No	895/1257 [71.2]	0.87 [0.7–1.1]		780/1001 [77.9]	1.07 [0.8–1.4]		115/256 [44.9]	1.36 [0.7–2.7]	
Current casual sexual partner									

	All Women			Urban			Rural		
	Bivariate (n = 1849)		Multivariate (n = 1822)	Bivariate (n = 1522)		Multivariate (n = 1508)	Bivariate (n = 326)		Multivariate (n = 318)
Predictors	**Consistent Condom Use With Regular Partners [%]**	**OR [95% CI]***	**OR [95% CI]***	**Consistent Condom Use With Regular Partners [%]**	**OR [95% CI]***	**OR [95% CI]***	**Consistent Condom Use With Regular Partners [%]**	**OR [95%CI]***	**OR [95% CI]***
No	1175/1601 [73.4]	1	1	1040/1315 [79.1]	1	1	135/286 [47.2]	1	
Yes	151/239 [63.2]	0.62 [0.5–0.8]‡	0.62 [0.5–0.8]‡	137/203 [67.5]	0.55 [0.4–0.8]§	0.58 [0.4–0.8]‡	14/36 [38.9]	0.71 [0.4–1.5]	
Disclosed HIV status–anyone									
No	122/239 [51.1]	1	1	79/124 [63.7]	1	1	43/115 [37.4]	1	1
Yes	1202/1597 [76.55]	2.92 [2.2–3.9]§	1.78 [1.3–2.4]§	1096/1391 [78.8]	2.12 [1.4–3.1]§	1.80 [1.2–2.7]‡	106/206 [51.5]	1.78 [1.1–2.8]†	1.63 [1.1–2.6]†
Current STI symptoms									
Yes	300/440 [68.2]	1		256/349 [73.4]	1		44/91 [48.4]	1	
No	1021/1396 [73.1]	1.27 [1.1–1.6]†		914/1161 [78.7]	1.34 [1.1–1.8]†		107/235 [45.5]	0.89 [0.6–1.5]	
CD4 count									
<200 cells/mm^3	330/443 [74.4]	1		294/362 [81.2]	1		36/81 [44.4]	1	
200+ cells/mm^3	618/843 [77.3]	0.94 [0.7–1.2]		579/746 [77.6]	0.8 [0.6–1.1]		39/97 [40.2]	0.84 [0.5–1.5]	

*P value:

†0.01–0.05;

‡<0.01;

§<0.001

//Marital status: MLT indicates married and living together; NMDS, never married, divorced, or separated; W, widowed.

TABLE 3A

Currently Has Any Sexual Partners (Regular or Casual): Men

	All Men			Urban			Rural		
	Bivariate (n = 866)		Multivariate (n = 851)	Bivariate (n = 564)		Multivariate (n = 564)	Bivariate (n = 302)		Multivariate (n = 284)
Predictors	**Current Sexual Partner: Yes**	**OR [95% CI]***	**OR [95% CI]***	**Current Sexual Partner: Yes**	**OR [95% CI]***	**OR [95% CI]***	**Current Sexual Partner: Yes**	**OR [95% CI]***	**OR [95% CI]***
Site									
Rural	185/302 [61.3]	1	1						
Urban	449/564 [81.39]	2.47 [1.8–3.4]§	3.93 [2.5–6.1]§						
Age (y)									
≤25	36/51 [70.6]	1.18 [0.6–2.3]	1.4 [0.6–3.1]	27/36 [75.0]	1.13 [0.5–2.8]	1.81 [0.6–5.2]	9/15 [60.0]	0.91 [0.3–2.8]	
26–35	285/361 [79.0]	1.84 [1.2–2.8]‡	2.1 [1.3–3.5]‡	222/263 [84.4]	2.04 [1.1–3.8]†	3.19 [1.5–6.8]‡	63/98 [64.3]	1.09 [0.6–2.0]	
36–45	207/296 [69.9]	1.14 [0.8–1.7]	1.1 [0.6–1.7]	147/192 [76.6]	1.23 [0.7–2.3]	1.43 [0.7–3.0]	60/104 [57.7]	0.82 [0.5–1.5]	
>45	60/104 [57.7]	1	1	53/73 [72.6]	1	1	1		
Marital status//									
NM	237/351 [67.5]	1	1	216/307 [70.4]	1	1	21/44 [47.7]	1	1
DS	51/89 [57.3]	0.65 [0.4–1.0]	1.71 [1.0–3.1]	26/30 [82.2]	2.74 [0.9–9.1]	3.84 [1.2–12.0]†	25/59 [42.4]	0.80 [0.4–1.8]	0.89 [0.4–2.0]
WID	10/43 [32.3]	0.15 [0.1–0.3]§	0.32 [0.1–0.7]‡	5/16 [80.0]	0.19 [0.1–0.6]‡	0.30 [0.1–0.9]†	5/27 [18.5]	0.25 [0.1–0.8]†	0.25 [0.1–0.8]†
MLT	327/368 [88.9]	3.84 [2.6–5.7]§	8.91 [5.4–14.8]§	202/211 [95.7]	9.46 [4.6–19.3]§	12.6 [6.0–26.5]§	125/157 [79.6]	4.28 [2.1–8.7]§	4.49 [2.2–9.3]§
Education									
<Grade 8	249/260 [69.2]	1		127/160 [79.4]	1		122/200 [61.0]	1	
Grade 8+	380/501 [78.9]	1.40 [1.1–1.9]†		319/401 [79.6]	1.01 [0.6–1.6]		61/100 [61.0]	1.0 [0.6–1.6]	
Household income									
≤R800/mo	252/358 [70.4]	1		177/239 [74.0]	1		75/119 [63.0]	1	
>R800/mo	289/351 [82.3]	1.96 [1.4–2.8]§		263/316 [83.2]	1.74 [1.2–2.6]§		26/35 [74.2]	1.70 [0.6–1.6]	
Ever consumed alcohol									
Yes	177/244 [72.5]	1		112/138 [81.2]	1		65/106 [61.3]	1	
No	440/589 [74.7]	1.12 [0.8–1.6]		337/426 [79.1]	0.88 [0.5–1.4]		103/163 [63.2]	1.1 [0.7–1.8]	
Disclosed HIV status–anyone									

J Acquir Immune Defic Syndr. Author manuscript; available in PMC 2013 October 29.

	All Men			Urban			Rural		
	Bivariate (n = 866)		Multivariate (n = 851)	Bivariate (n = 564)		Multivariate (n = 564)	Bivariate (n = 302)		Multivariate (n = 284)
Predictors	**Current Sexual Partner: Yes**	**OR [95% CI]***	**OR [95% CI]***	**Current Sexual Partner: Yes**	**OR [95% CI]***	**OR [95% CI]***	**Current Sexual Partner: Yes**	**OR [95% CI]***	**OR [95% CI]***
No	103/169 [60.9]	1		37/51 [72.6]	1		66/118 [55.9]	1	
Yes	527/689 [76.5]	2.09 [1.5–3.0]§		411/512 [80.3]	1.5 [0.8–3.0]		116/177 [65.5]	1.50 [0.9–2.4]	
Current STI symptoms									
Yes	537/744 [72.2]	1		387/489 [79.1]	1		150/255 [58.8]	1	1
No	92/116 [79.3]	1.48 [0.9–2.4]		59/72 [81.9]	1.20 [0.6–2.3]		33/44 [75.0]	2.1 [1.0–4.3]†	2.51 [1.1–5.8]†
CD4 count									
<200 cells/mm^3	222/323 [67.7]	1	1	159/219 [72.6]	1	1	63/104 [60.6]	1	
200+ cells/mm^3	235/286 [82.2]	2.10 [1.4–3.1]§	2.18 [1.4–3.4]§	198/233 [82.1]	2.14 [1.3–3.4]‡	2.17 [1.3–3.7]‡	37/53 [69.8]	1.51 [0.7–3.1]	

*P value:

†0.01–0.05;

‡<0.01;

§<0.001.

//Marital status: MLT indicates married and living together; NMDS, never married, divorced, or separated; W, widowed.

TABLE 3B

Currently Has Any Sexual Partners (Regular or Casual): Women

	All Men			Urban			Rural		
	Bivariate (n = 2840)		Multivariate (n = 2739)	Bivariate (n = 2057)		Multivariate (n = 2057)	Bivariate (n = 780)		Multivariate (n = 732)
Predictors	**Current Sexual Partner: Yes**	**OR [95% CI]***	**OR [95% CI]***	**Current Sexual Partner: Yes**	**OR [95% CI]***	**OR [95% CI]***	**Current Sexual Partner: Yes**	**OR [95% CI]***	**OR [95% CI]***
Site									
Rural	370/783 [47.3]	1	1						
Urban	1524/2057 [74.1]	3.19 [2.6–3.8]§	2.02 [1.6–2.6]§						
Age (y)									
≤25	358/463 [77.3]	5.18 [3.7–7.3]§	3.6 [2.3–5.4]§	285/351 [81.2]	4.47 [2.9–7.0]§	4.39 [2.6–7.4]§	73/112 [65.2]	4.39 [2.5–7.6]§	
26–35	1015/1440 [70.5]	3.63 [2.7–4.8]§	2.4 [1.7–3.4]§	857/1117 [76.7]	3.41 [2.3–5.0]§	3.08 [1.9–4.9]§	158/323 [48.9]	2.24 [1.4–3.5]§	
36–45	424/969 [60.9]	2.37 [1.8–3.2]§	1.7 [1.2–2.5]‡	323/469 [68.9]	2.29 [1.4–3.4]§	3.09 [1.9–4.9]§	101/227 [44.5]	1.88 [1.2–3.0]‡	
>45	94/237 [39.7]	1	1	59/120 [49.2]	1	1	1		
Marital status//									
NM	1108/1670 [66.4]	1	1	992/1405 [70.6]	1	1	116/265 [43.7]	1	1
DS	115/263 [43.7]	0.39 [0.3–0.5]§	0.83 [0.6–1.1]	66/107 [61.7]	0.67 [0.5–1.0]	0.90 [0.6–1.4]	49/156 [31.4]	0.59 [0.4–0.9]†	0.74 [0.5–1.2]
WID	66/222 [29.7]	0.22 [0.2–0.3]§	0.42 [0.3–0.6]§	38/101 [37.6]	0.25 [0.2–0.4]§	0.36 [0.2–0.6]§	28/121 [23.1]	0.39 [0.2–0.6]§	0.52 [0.3–0.9]†
MLT	590/641 [92.1]	5.87 [4.3–8.0]§	8.78 [6.3–12.3]§	428/444 [96.4]	11.13 [6.7–18.6]§	12.43 [7.4–20.9]§	162/197 [82.2]	5.95 [3.8–9.2]§	6.83 [4.3–10.8]§
Education									
<Grade 8	519/895 [58.0]	1		355/485 [73.2]	1		164/410 [40.0]	1	1
Grade 8+	380/501 [78.9]	1.40 [1.1–1.9]†		1166/1568 [74.4]	1.06 [0.8–1.3]		205/370 [55.4]	1.86 [1.4–2.5]§	1.52 [1.1–2.2]†
Household income									
≤R800/mo	760–1216 [62.5]	1	1	588/852 [69.0]	1	1	172/364 [47.3]	1	
>R800/mo	963/1242 [77.5]	2.07 [1.7–2.5]§	1.52 [1.2–1.9]§	920/1182 [77.8]	1.58 [1.3–1.9]§	1.49 [1.2–1.9]§	43/60 [71.7]	2.82 [1.6–5.1]§	
Ever consumed alcohol									
Yes	1296/2003 [64.7]	1	1	1002/1372 [73.0]	1	1	294/631 [46.6]	1	
No	567/765 [74.1]	1.56 [1.3–1.9]§	1.44 [1.2–1.8]‡	522/685 [79.1]	1.18 [1.0–1.5]	1.44 [1.1–1.8]‡	45/80 [56.3]	1.5 [0.9–2.4]	
Disclosed HIV status–anyone									

	All Men			Urban			Rural		
	Bivariate (n = 2840)		Multivariate (n = 2739)	Bivariate (n = 2057)		Multivariate (n = 2057)	Bivariate (n = 780)		Multivariate (n = 732)
Predictors	**Current Sexual Partner: Yes**	**OR [95% CI]***	**OR [95% CI]***	**Current Sexual Partner: Yes**	**OR [95% CI]***	**OR [95% CI]***	**Current Sexual Partner: Yes**	**OR [95% CI]***	**OR [95% CI]***
No	257/469 [54.8]	1		124/176 [70.5]	1		133/293 [45.4]	1	
Yes	1624/2351 [69.1]	1.84 [1.5–2.3]§		1393/1873 [74.4]	1.22 [0.9–1.7]		231/478 [48.3]	1.13 [0.8–1.5]	
Current STI symptoms									
Yes	1425/2120 [67.2]	1		1162/1562 [74.4]	1		263/558 [47.1]	1	
No	452/689 [65.6]	0.93 [0.8–1.1]		350/477 [73.4]	0.95 [0.8–1.2]		102/212 [48.1]	1.04 [0.8–1.4]	
CD4 count									
<200 cells/mm^3	459/795 [57.7]	1	1	352/560 [62.9]	1	1	97/235 [41.3]	1	1
200+ cells/mm^3	862/1153 [74.8]	2.17 [1.8–2.6]§	1.73 [1.4–2.1]§	748/950 [78.7]	2.03 [1.6–2.6]§	1.77 [1.4–2.3]§	114/203 [56.2]	1.82 [1.2–2.7]‡	1.67 [1.1–2.6]†

*P value:

†0.01–0.05;

‡<0.01;

§<0.001.

//Marital status: MLT indicates married and living together; NMDS, never married, divorced, or separated; W, widowed.