Disclosure, Knowledge of Partner Status, and Condom Use Among HIV-Positive Patients Attending Clinical Care in Tanzania, Kenya, and Namibia

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Abstract

We describe the frequency of and factors associated with disclosure, knowledge of partner's HIV status, and consistent condom use among 3538 HIV-positive patients attending eighteen HIV care and treatment clinics in Kenya, Namibia, and Tanzania. Overall, 42% of patients were male, and 64% were on antiretroviral treatment. The majority (80%) had disclosed their HIV status to their partners, 64% knew their partner's HIV status, and 77% reported consistent condom use. Of those who knew their partner's status, 18% reported their partner was HIV negative. Compared to men, women were significantly less likely to report disclosing their HIV status to their sex partner(s), to knowing their partner's HIV status, and to using condoms consistently with HIV-negative partners. Other factors negatively associated with consistent condom use include nondisclosure, alcohol use, reporting a casual sex partner, and desiring a pregnancy. Health care providers should target additional risk reduction counseling and support services to patients who report these characteristics.

Introduction

THE GLOBAL EXPANSION OF HIV PREVENTION, care, and treatment efforts has contributed to declines in HIV incidence in 39 countries.¹ Despite these advances, 2.5 million individuals were newly infected with HIV in 2011, and an estimated 34 million people are living with HIV worldwide.¹ Effective interventions to reduce new infections are urgently needed. While HIV prevention efforts have traditionally focused on HIV-negative individuals or individuals of unknown serostatus, HIV prevention with people living with HIV (PLHIV) has increasingly been recognized as a core component of a comprehensive, integrated, and effective HIV prevention, care, and treatment strategy.²⁻⁴

Disclosure of HIV status to sex partners has important prevention and care implications for PLHIV. Disclosure expands the awareness of HIV risk to both partners and allows

the couple to make shared decisions on how to protect their health including consistently using condoms.⁵⁻⁷ Disclosure can also serve as the impetus for untested partners and children to seek HIV testing and counseling services. Furthermore, disclosure often leads to support from partner(s) and family members,⁸ which has been shown to improve the uptake of and adherence to HIV care and treatment programs.⁹⁻¹¹ Although studies indicate that the majority of PLHIV experience support and understanding from their partners following disclosure,¹²⁻¹⁴ some PLHIV remain reluctant to disclose due to fear of their partner's reaction.¹² Substantial gender differences in the rates, barriers, and outcomes of disclosure have been found in a number of studies, with women particularly reluctant to disclose HIV-positive results for fear of losing economic support, being abandoned by their partners, and/or being subjected to physical and emotional abuse.^{12,14-16}

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HIV disclosure is also often a prerequisite for knowing the HIV status of a sex partner. PLHIV who have not disclosed their HIV status to their partners are less likely to know their partner's HIV status¹⁷ and between 20–45% of PLHIV in clinical care in sub-Saharan Africa do not know the HIV status of their partners.^{16–18} These findings are particularly troubling, given the high rates of HIV serodiscordance among PLHIV in stable relationships. Estimates suggest that approximately half of PLHIV in married or cohabitating couples live with an HIV-negative partner.¹⁹ This proportion has been reported in both the general population and among women and their partners attending antenatal clinics.^{20–24} PLHIV with untested partners may be unknowingly in a serodiscordant relationship, placing the HIV-negative partner at high risk for acquiring HIV. Alternatively, the partner may be HIV-positive and in need of HIV care and treatment services for their own health, highlighting the importance of knowing the HIV status of both partners.

HIV serostatus disclosure and knowledge of partner's HIV status have also been associated with consistent condom use, with couples unaware of their HIV status reporting the lowest rates of consistent condom use.^{25,26} While rates of consistent condom use among couples who are aware of their status are higher, unprotected sex among these couples is still common^{27,28} and has been shown to be associated with desire for pregnancy²⁹ and alcohol use.³⁰ PLHIV who inconsistently use condoms and who simultaneously have higher viral loads due to non-adherence to antiretroviral treatment (ART) or because they are not yet eligible for ART are at high risk for transmitting HIV to negative sex partners.^{31–33} These individuals are also at higher risk for acquiring other sexually transmitted infections which could compromise their own health.^{34,35} Rates of consistent condom use also vary by gender, with men reporting higher rates than women.^{36,37} Negotiating condom use is particularly difficult for women who have not disclosed their HIV status to their partners.^{19,38}

These studies highlight the need to offer PLHIV prevention messages and services in order to reduce HIV risk behavior among this population. The expansion of HIV care and treatment programs in sub-Saharan Africa has resulted in more PLHIV accessing clinical care. This provides an opportunity to integrate HIV prevention services, including disclosure counseling and support, partner HIV testing services, and sexual risk reduction counseling into the routine care offered to PLHIV. The present study, conducted in 2011–2012, describes the frequency and correlates of HIV risk behaviors including nondisclosure, lack of partner testing, and inconsistent condom use among PLHIV enrolled in HIV care and treatment clinics in three sub-Saharan countries—Kenya, Namibia, and Tanzania—in order to inform HIV prevention efforts with PLHIV in sub-Saharan Africa.

Methods

Setting

This article presents data from the baseline assessment of The HIV Prevention for People Living with HIV Project, a cluster randomized control trial of a clinic-based HIV prevention intervention for people living with HIV in Kenya, Tanzania, and Namibia. All three countries have generalized HIV epidemics with HIV prevalence rates of 6.3%, 5.7%, and 13.1%, respectively.^{1,39,40} These countries were chosen because they

are generally representative of epidemics in sub-Saharan Africa, and all three countries have expanded their HIV care and treatment services in the last few years. Moreover, all three countries face similar challenges with expanding access to HIV prevention, care, and treatment services for PLHIV, including insufficient resources and infrastructure; lack of trained staff; and difficulties in linkage and retention of patients from diagnosis through initiation of antiretroviral treatment. Understanding the prevention needs of PLHIV attending HIV clinical care in these settings will therefore have broader implications for other countries facing similar epidemics and challenges.

Study population and design

In each country, six clinics were paired on key characteristics (e.g., patient volume, provider/patient ratio, services offered, etc.) and then randomly assigned to either an intervention or control arm. At the intervention clinics, health care providers and lay counselors were trained to provide a package of HIV prevention messages and services as part of the routine care offered to HIV-positive patients. Patients in the comparison clinics received standard of care.

At each clinic, approximately 200 sexually active patients were enrolled into the study between October 2009 and April 2010 as part of an evaluation cohort to assess the effectiveness of the clinic-level intervention. To be eligible, participants had to have an HIV-positive diagnosis, have received care at the project clinic at least twice prior to enrollment, be at least 18 years of age, report sexual activity within the past 3 months, and plan to attend the clinic for at least 1 year. Participants also had to be able to complete an interview in English (all countries), Kiswahili (Kenya and Tanzania), Oshiwambo (Namibia), or Afrikaans (Namibia). Women who knew they were pregnant at the time of enrollment and male partners of women pregnant at time of enrollment were excluded from the study. In order to have representation of patients at different clinical stages, each clinic attempted to enroll equal numbers of males and females, as well as equal numbers of participants receiving antiretrovirals (ARVs) and those receiving HIV care but not taking ARVs. However, all countries reported difficulty enrolling men, especially men in care. As a result, the recruitment goals for each clinic were revised from an even 50 participants in the male/female and on ARV/not on ARV groups to 60 males and 60 females on ARVs, 50 females in care only, and 30 men in care only.

Procedures

To recruit participants, study staff selected every third name from the patient sign-in sheet every morning after all patients had registered. Trained interviewers approached selected patients in the waiting room and asked if s/he was interested in learning more about the study. Interested participants were taken to a private area within the clinic where the interviewer introduced the study aims, provided a brief description of participation requirements, and assessed the patient's eligibility. Participants provided written informed consent to complete three interviews during the study (at baseline and 6- and 12-month post-intervention), to allow data to be abstracted from their medical charts, and to provide contact information for participant tracking during the follow-up period. After obtaining consent, the interviewer administered the baseline questionnaire.

The protocol for this study was approved by the Institutional Review Board at the U.S. Centers for Disease Control and Prevention and ethics review committees in each country and at all collaborating organizations including the Columbia University Medical Center, Kenya Medical Research Institute (KEMRI), Namibia Ministry of Health and Social Services (MOHSS), Tanzania National Institute of Medical Research (NIMR), and Zanzibar Medical Ethical Committee (ZAMEC).

Measures

Sociodemographic and health status variables. Sociodemographic variables included age, education level, paid work in the past 6 months, and household monthly income. In addition, participants were asked if they experienced one or more of the following STI symptoms in the past 6 months: discharge from the penis or vagina, sores in the genital area, or (for female patients only) abdominal pain. Participants were asked if they desired a pregnancy (female participants) or desired their female partner to be pregnant (male participants) in the next 6 months. Health status variables including length of time since HIV diagnosis, most recent CD4 count and date, and whether the participant was currently taking antiretroviral medications were abstracted from patients' medical records.

HIV risk behavior variables. Participants were asked to report up to five sex partners with whom they had vaginal sex in the past 3 months. For each named partner, participants were asked to classify the partner into one of three types: spouse (married or cohabitating partner), regular (a non-marital, non-cohabitating partner with whom participant has an ongoing relationship), or casual (a sexual partner with whom the participant has no ongoing relationship). Similarly, participants were asked if they disclosed their HIV status to each named sex partner in the past 3 months and if they knew that partner's HIV status. Participants were dichotomized into two categories: those who knew their partner's HIV status (partner was reported as either HIV-positive or HIV-negative) and those who did not know partner's HIV status (participants who reported that their partner had not been tested, those who did not know if partner had been tested, and those whose partner had been tested but they did not know the partner's status). Consistent condom use was measured by asking how many times the participant had vaginal sex with each named partner in the past 3 months and then asking in how many of these sexual encounters was a condom used. Consistent condom use was defined as using a condom at every reported sexual encounter in the past 3 months with that partner. Alcohol use was measured using the 10-item World Health Organization's Alcohol Use Disorders Identification Test (AUDIT).⁴¹ Participants were categorized into four categories based on their AUDIT score: non-alcohol drinker (zero), non-problem drinker (<8), harmful drinker (>8), and likely dependent (>13 for women, >15 for men).

Data analysis

Descriptive statistics were computed for variables of interest overall and by gender. Because multiple participants were recruited within each clinic and each participant could provide information on up to 5 partners, there was potential for correlation among participants from the same clinic and

multiple observations from the same participant. All statistical models were fit using a mixed model approach with random effects for clinic and participant to adjust the variances of test statistics for these two sources of correlation. Associations between risk behavior variables and gender were examined using the SAS GLIMMIX procedure with gender as the dependent variable, the risk behavior as the independent variable and clinic as a random effect to control for correlation within clinic. To explore the relationships of variables of interest with knowledge of partner status and consistent condom use, mixed model univariate and multiple logistic regression models were fit using PROC GLIMMIX. In the model for consistent condom use, we included an interaction term to test whether the impact of knowledge of partner status on consistent condom use varied by gender. All variables were entered in the multiple regression model, and variables were considered significant with a p value less than 0.05.

Results

A total of 3538 HIV-positive patients were enrolled. A summary of participants' sociodemographic characteristics and current health status are presented in Table 1, both overall and stratified by gender. Most participants (51%) reported a spousal partner, 33% reported a regular partner, and 17% reported a casual partner. The majority of participants (70%) had learned of their HIV diagnosis within the past 3 years, and the mean CD4 count for the sample was 371 cells/mm³. CD4 count was significantly higher for women compared to men (410 vs. 318, $p < 0.0001$). Most participants (64%) were on antiretroviral (ARV) medications with men significantly more likely to be on ARVs compared to women (72% vs. 59%, $p < 0.0001$).

Frequency of HIV Risk Behavior

Table 2 presents the distribution of HIV risk behaviors among study participants both overall and stratified by gender. The vast majority (95%) of participants reported only one sexual partner in the past 3 months, with men more likely to report having multiple partners compared to women (8.2 vs. 3.2%, $p < 0.0001$). Overall, participants reported a total number of 3759 sex partners in the past 90 days. This number ($N = 3759$) formed the basis of all subsequent analyses.

Eighty percent of participants reported that they had disclosed their HIV status to their sex partner(s), and 68% reported that their partner had tested for HIV. Overall, 64% of participants reported knowing their partner's HIV status, with 18% reporting an HIV-negative partner and 46% reporting an HIV-positive partner. Compared to men, women were less likely to report disclosure (77% vs. 83%, $p < 0.0001$) and knowing their partner's HIV status (57% vs. 74%, $p < 0.0001$). Overall, the majority of participants (77%) reported consistent condom use in the past 3 months, with men more likely to report consistent condom use (81%) compared to women (74%, $p < 0.0001$).

Factors associated with disclosure of HIV status to sex partner(s)

Factors associated with HIV serostatus disclosure to sex partner(s) are described in Table 3. Females were less likely to report having disclosed their HIV status to sex partners

TABLE 1. SOCIO-DEMOGRAPHIC AND PHYSICAL HEALTH CHARACTERISTICS OF STUDY PARTICIPANTS

Characteristic	Overall	Male	Female	p Value
Age - mean (SD)	37.2 (8.4)	40.8 (8.6)	34.6 (7.2)	<0.0001
Country - n (%)				
Namibia	1186 (33.5)	514 (34.6)	672 (32.7)	0.4992
Tanzania	1196 (33.8)	479 (32.3)	717 (34.9)	
Kenya	1156 (32.7)	491 (33.1)	665 (32.4)	
Education - n (%)				
No school	340 (9.6)	148 (10.0)	192 (9.4)	0.2640
Primary	1890 (53.5)	787 (53.1)	1103 (53.8)	
Secondary	1215 (34.4)	502 (33.9)	713 (34.8)	
More than secondary	88 (2.5)	45 (3.0)	43 (2.1)	
Partner type - n (%) ^a				
Spouse	1901 (50.6)	931 (57.2)	970 (45.5)	<0.0001
Regular	1239 (33.0)	445 (27.4)	794 (37.2)	
Casual	620 (16.5)	251 (15.4)	369 (17.3)	
Any paid work last 6 months - n (%)				
No	1967 (55.7)	667 (45.0)	1300 (63.4)	<0.0001
Yes	1566 (44.3)	815 (55.0)	751 (36.6)	
Household monthly income - n (%)				
<30 USD	930 (30.9)	314 (23.8)	616 (36.4)	<0.0001
30–99 USD	1131 (37.5)	483 (36.5)	648 (38.3)	
100 USD or more	954 (31.6)	525 (39.7)	429 (25.3)	
Time since HIV diagnosis - n (%)				
<1 year	925 (26.2)	406 (27.4)	519 (25.3)	0.2314
1 to <2 years	807 (22.8)	331 (22.3)	476 (23.2)	
2 to <3 years	723 (20.5)	311 (21.0)	412 (20.1)	
≥3 years	1081 (30.6)	434 (29.3)	647 (31.5)	
CD4 count- mean (SD)	371.2 (240.8)	318.0 (206.9)	409.6 (255.8)	<0.0001
On antiretroviral medications - n (%)				
No	1266 (35.8)	418 (28.2)	848 (41.3)	<0.0001
Yes	2271 (64.2)	1066 (71.8)	1205 (58.7)	

^aParticipants could report on up to 5 partners.

than males (AOR: 0.71, 95% CI: 0.56, 0.90). Time since diagnosis was also related to disclosure. Individuals who had learned of their HIV diagnosis within the past year were less likely to report disclosure than participants who had known their HIV status for more than 3 years (AOR: 0.57, 95% CI: 0.43, 0.80). Participants with two or more sex partners in the past 3 months were less likely to disclose than participants with only one reported sex partner (AOR: 0.50, 95% CI: 0.37, 0.68). Similarly, participants were less likely to report disclosing to a regular (AOR: 0.14, 95% CI: 0.10, 0.18) or casual partner (AOR: 0.03, 95% CI: 0.02, 0.04) compared to a spousal partner.

Factors associated with knowledge of partner's HIV status

As shown in Table 4, several factors were associated with being less likely to know a partner's HIV status including: being female (AOR: 0.38, 95% CI: 0.30, 0.48), having a recent HIV diagnosis (AOR: 0.65, 95% CI: 0.48, 0.88), and reporting more than one partner in the past 3 months (AOR: 0.63, 95% CI: 0.44, 0.90). Participants were less likely to know the HIV status of regular (AOR: 0.44, 95% CI: 0.34, 0.55) or casual partners (AOR: 0.21, 95% CI: 0.15, 0.29) compared to spousal partners. Participants who had disclosed their HIV status to their partner were 23 times more likely to report knowing their partner's HIV status compared to participants who had not disclosed their own HIV status.

Factors associated with consistent condom use

Participants were less likely to report consistent condom use (Table 5) if they had been diagnosed with HIV within the past year (AOR: 0.65, 95% CI: 0.50, 0.84), desired a pregnancy in the next 6 months (AOR: 0.44, 95% CI: 0.35, 0.55), or reported an STI symptom (AOR: 0.70, 95% CI: 0.54, 0.91). Participants were more likely to report consistent condom use with regular (AOR: 1.34, 95% CI: 1.07, 1.69) or casual partners (AOR: 2.49, 95% CI: 1.80, 3.46) compared to spousal partners. Participants who reported disclosing their HIV status to their partners (AOR: 1.45, 95% CI: 1.11, 1.91) were more likely to report consistent condom use. Alcohol use was negatively associated with consistent condom use. Participants who were categorized as either non-drinkers (AOR: 3.08, 95% CI: 1.82, 5.23) or non-problem drinkers (AOR: 2.37, 95% CI: 1.35, 4.16) were significantly more likely to report condom use than participants who were categorized as likely dependent drinkers. There was a significant interaction between gender and knowledge of partner's HIV status on consistent condom use (Table 5). Women with HIV-negative partners were significantly less likely to report consistent condom use than men with HIV-negative partners (AOR: 0.35, 95% CI: 0.20, 0.60).

Discussion

This article presents baseline findings from a multi-country group randomized trial being conducted with PLHIV

TABLE 2. STUDY PARTICIPANTS' REPORTED FREQUENCY OF HIV RISK BEHAVIORS

	Overall	Male	Female	p Value
Number of partners in past 3 months - <i>n</i> (%)				
One partner	3351 (94.7)	1363 (91.9)	1988 (96.8)	<0.0001
Two or more partners	187 (5.3)	121 (8.2)	66 (3.2)	
Disclosed HIV status to partner- <i>n</i> (%) ^a				
No	765 (20.4)	272 (16.7)	493 (23.2)	<0.0001
Yes	2991 (79.6)	1355 (83.3)	1636 (76.8)	
Know partner's HIV status - <i>n</i> (%) ^a				
No	1339 (35.7)	424 (26.1)	915 (42.9)	<0.0001
Yes, HIV-positive	1729 (46.1)	898 (55.3)	831 (39.0)	
Yes, HIV-negative	687 (18.3)	302 (18.6)	385 (18.1)	
Desire pregnancy (female respondents) or partner pregnancy (male respondents) in the next 6 months - <i>n</i> (%)				
No	2871 (83.5)	1127 (80.2)	1744 (85.8)	<0.0001
Yes	567 (16.5)	279 (19.8)	288 (14.2)	
Consistent condom use - <i>n</i> (%) ^a				
No	794 (23.2)	279 (19.0)	515 (26.4)	<0.0001
Yes	2625 (76.8)	1188 (81.0)	1437 (73.6)	
Any STI symptoms, past 6 months - <i>n</i> (%) ^b				
No	3136 (88.7)	1379 (92.9)	1757 (85.7)	<0.0001
Yes	398 (11.3)	105 (7.1)	293 (14.3)	
AUDIT category - <i>n</i> (%)				
Non-alcohol drinker	2827 (80.1)	1099 (74.2)	1728 (84.4)	<0.0001
Non-problem drinker	518 (14.7)	274 (18.5)	244 (11.9)	
Harmful drinker	113 (3.2)	71 (4.8)	42 (2.1)	
Likely dependent	71 (2.0)	37 (2.5)	34 (1.7)	

^aParticipants could report on up to 5 partners.

^bIncludes any of the following symptoms: discharge from the penis or vagina, sores in the genital area, or (for female patients only) abdominal pain.

attending eighteen HIV care and treatment clinics in Kenya, Namibia, and Tanzania. The majority of participants (80%) reported disclosing their HIV status to their sex partners, a similar finding to other studies conducted among PLHIV attending clinical care in Africa.⁴² Disclosure was significantly associated with both knowledge of partner's HIV status and consistent condom use; confirming findings from other studies in sub-Saharan Africa.^{5-7,17} Participants who had disclosed their HIV status were 24 times more likely to know their partner's HIV status highlighting the importance of encouraging partner communication around knowing the HIV status of both partners.

In this study, approximately 20% of patients had not been able to disclose their HIV status to their sexual partner and it is likely that additional support for these patients may be needed. Health care providers and peer counselors can help facilitate disclosure by encouraging patients to disclose their status to their sex partners and by assisting patients to develop a personalized plan for disclosure. For patients uncomfortable disclosing on their own, facilitated disclosure whereby the patient discloses in the presence of a trained provider or counselor may be an option. In this case, the provider or counselor plays an important role in facilitating communication between the partners, diffusing tension, and reducing potentially negative reactions such as blame or anger.

Several findings from this study highlight women's high risk of acquiring other sexually transmitted infections and of passing HIV onto sex partner(s). Women were significantly less likely to report disclosing their HIV status to their sex partner(s), to knowing their partner's HIV status, and to using

condoms consistently. Moreover, after controlling for disclosure, women were less likely to report consistent condom use even when they knew their partner was HIV-negative and were more likely to report experiencing an STI symptom in the past 6 months. Given that a large proportion of women (60%) reported having a negative partner or partner of unknown serostatus, there is an urgent need to target women living with HIV with prevention messages and services. Exploring how the dynamics of partner communication around HIV disclosure and consistent condom use differ by gender is also important to ensure that risk reduction counseling and other HIV prevention services address the unique needs of women living with HIV. Integrating partner and couples HTC services into HIV clinical care settings may also be a strategy for helping women safely disclose their HIV status and learn their partner's HIV status.⁴³ Couples' HTC allows partners to learn their HIV status together and make joint decisions about how to protect their health as individuals, as a couple, and as a family. Linkages between facility- and community-based programs can assist in situations where sexual partners and families do not attend the facility, as community-based programs can offer home-based HTC services for family members of index patients identified at the facility.

Of those participants who knew their partner's status, 28% were in discordant partnerships. This number is likely a low estimate given the high number of PLHIV who did not know their partner's status. This finding highlights the need to identify and target HIV prevention services to discordant couples. Since treatment with ARVs has been shown to reduce the risk of HIV transmission within discordant relationships

TABLE 3. CORRELATES OF DISCLOSURE OF HIV STATUS TO SEX PARTNER(S) (N=3759)

Variable	N (%) who have disclosed to sex partner ^a	Univariate regression models		Multiple regression model	
		OR (95% CI)	p Value	OR (95% CI)	p Value
Age (1-year increase)		1.04 (1.03, 1.05)	<0.0001	1.01 (1.00, 1.03)	0.0689
Gender					
Female	1636 (76.8)	0.67 (0.57, 0.79)	<0.0001	0.71 (0.56, 0.90)	0.0047
Male	1355 (83.3)	ref		ref	
Education					
None	277 (74.9)	ref	0.6182	ref	0.9599
Primary	1573 (78.6)	1.20 (0.91, 1.56)		1.05 (0.73, 1.51)	
Secondary	1062 (82.7)	1.20 (0.89, 1.61)		1.00 (0.67, 1.48)	
More than secondary	73 (77.7)	1.16 (0.67, 2.03)		1.13 (0.56, 2.28)	
Country					
Kenya	968 (78.6)	0.52 (0.34, 0.81)	<0.0001	0.24 (0.14, 0.42)	<0.0001
Tanzania	928 (73.0)	0.38 (0.25, 0.59)		0.20 (0.11, 0.34)	
Namibia	1095 (87.4)	ref		ref	
Time since diagnosis					
<1 year	707 (72.3)	0.57 (0.46, 0.72)	<0.0001	0.59 (0.43, 0.80)	0.0005
1 to <2 years	675 (78.2)	0.76 (0.60, 0.96)		0.85 (0.63, 1.16)	
2 to <3 years	639 (82.4)	0.96 (0.75, 1.24)		1.05 (0.76, 1.44)	
>3 years	968 (85.1)	ref		ref	
CD4 (100 point increase)		1.03 (0.99, 1.07)	0.0941	1.06 (1.02, 1.12)	0.0098
On ARVs					
Yes	1933 (80.4)	1.18 (1.00, 1.39)	0.0554	1.09 (0.86, 1.37)	0.4861
No	1057 (78.2)	ref		ref	
Number of sex partners, past 3 months					
One	2764 (82.8)	ref	<0.0001	ref	<0.0001
Two or more	227 (54.6)	0.24 (0.19, 0.30)		0.50 (0.37, 0.68)	
Partner type					
Spouse	1793 (94.4)	ref	<0.0001	ref	<0.0001
Regular	962 (77.7)	0.13 (0.10, 0.16)		0.14 (0.10, 0.18)	
Casual	233 (38.1)	0.02 (0.02, 0.03)		0.03 (0.02, 0.04)	
AUDIT category					
Non-drinker	2392 (81.2)	3.68 (2.41, 5.63)	<0.0001	1.62 (0.94, 2.77)	0.0974
Non problem drinker	440 (78.0)	2.53 (1.59, 4.01)		1.53 (0.86, 2.73)	
Harmful drinking	94 (68.6)	1.53 (0.88, 2.64)		0.96 (0.48, 1.92)	
Likely dependence on alcohol	56 (57.7)	ref		ref	

^aParticipants could name up to five sex partners.

by approximately 96%,^{31–33} programs should consider prioritizing PLHIV in sero-discordant relationships for lifelong ART initiation at CD4 counts ≤ 350 cells/mm³. In addition, where resources allow, programs should consider expanding ART initiation to HIV-positive partners with CD4 counts > 350 /mm³ as outlined in recent WHO guidelines.⁴³ Providing sexual risk reduction counseling and ongoing support to discordant couples has also been shown to be an effective strategy for reducing sexual risk behavior among discordant couples.^{44–46}

While most participants (77%) reported consistent condom use during the past 90 days, participants who were categorized as likely dependent drinkers or who reported experiencing an STI symptom were more likely to report inconsistent condom use. Moreover, desire for pregnancy was negatively associated with consistent condom use, even after adjusting for knowledge of partner's HIV status. These findings suggest that a certain proportion of PLHIV continue to engage in high risk behaviors, highlighting the need to ensure HIV prevention services are part of the routine clinical care

offered to PLHIV. Ideally these services would be offered to all PLHIV at every routine visit. However, if time and resources are limited, providers should target patients who report frequent alcohol use and/or an incident STI symptom for more intensive risk reduction counseling. Moreover, given the recent evidence that both women⁴⁷ and men⁴⁸ are at increased risk for acquiring HIV during pregnancy and the increased risk of vertical transmission associated with acute infection, safer conception and pregnancy counseling should be offered to all PLHIV and their partners who desire a pregnancy.

Rates of disclosure and consistent condom use differed significantly across the three countries. Both disclosure and consistent condom use were highest in Namibia. One possible explanation for this finding is that Namibia, unlike the other two countries, has community counselors in every HIV clinic whose role is to assist health care providers in delivering HIV prevention services. In contrast, condom use was lowest among participants in Tanzania. The total fertility rate in Tanzania is much higher (5.0) than either Kenya (3.8) or Namibia (2.3), which may account for this difference in condom

TABLE 4. CORRELATES OF KNOWING PARTNER'S HIV STATUS (N=3759)

Variable	N (%) with partner of known HIV status ^a	Univariate regression models		Multiple regression model	
		OR (95% CI)	p Value	OR (95% CI)	p Value
Age (1-year increase)		1.04 (1.03, 1.04)	<0.0001	0.99 (0.98, 1.01)	0.3621
Gender					
Female	1216 (57.1)	0.46 (0.40, 0.53)	<0.0001	0.38 (0.30, 0.48)	<0.0001
Male	1200 (73.9)	ref		ref	
Education					
None	221 (59.9)	ref	0.2167	ref	0.2009
Primary	1249 (62.5)	1.11 (0.88, 1.40)		1.00 (0.70, 1.44)	
Secondary	880 (68.3)	1.23 (0.96, 1.59)		1.22 (0.83, 1.81)	
More than secondary	64 (68.8)	1.50 (0.91, 2.47)		1.68 (0.80, 3.52)	
Any paid work, past 6 months					
Yes	1094 (65.6)	1.00 (0.86, 1.16)	0.9531	1.16 (0.93, 1.43)	0.1779
No	1319 (63.4)	ref		ref	
Country					
Kenya	787 (63.9)	0.72 (0.54, 0.98)	0.0009	0.77 (0.52, 1.16)	0.4467
Tanzania	741 (58.2)	0.56 (0.42, 0.76)		0.83 (0.55, 1.25)	
Namibia	888 (71.0)	ref		ref	
Time since diagnosis					
< 1 year	533 (54.5)	0.58 (0.48, 0.70)	<0.0001	0.65 (0.48, 0.88)	0.0435
1 to <2 years	552 (64.0)	0.85 (0.70, 1.03)		0.80 (0.60, 1.06)	
2 to <3 years	531 (68.3)	1.00 (0.81, 1.22)		0.89 (0.66, 1.18)	
> 3 years	798 (70.3)	ref		ref	
CD4 (100 point increase)		1.01 (0.99, 1.04)	0.3250	1.02 (0.98, 1.07)	0.3732
On ARVs					
Yes	1580 (65.6)	1.19 (1.03, 1.37)	0.0154	0.97 (0.77, 1.21)	0.7660
No	835 (62.0)	ref		ref	
Number of sex partners, past 3 months					
One	2248 (67.3)	ref	<0.0001	ref	0.0123
Two or more	168 (40.6)	0.32 (0.26, 0.40)		0.63 (0.44, 0.90)	
Partner type					
Spouse	1531 (80.8)	ref	<0.0001	ref	<0.0001
Regular	736 (59.6)	0.26 (0.22, 0.31)		0.44 (0.34, 0.55)	
Casual	145 (23.5)	0.06 (0.04, 0.07)		0.21 (0.15, 0.29)	
Consistent condom use					
Yes	1780 (67.9)	2.09 (1.77, 2.46)	<0.0001	2.04 (1.63, 2.56)	<0.0001
No	391 (49.3)	ref		ref	
Disclosed HIV status to partner					
Yes	2355 (79.0)	44.1 (33.4, 58.2)	<0.0001	23.4 (17.6, 33.7)	<0.0001
No	60 (7.9)	ref		ref	
Any sex exchange, past 6 months					
Yes	53 (33.1)	0.26 (0.19, 0.37)	<0.0001	0.96 (0.57, 1.63)	0.8794
No	2358 (65.8)				
AUDIT category					
Non-drinker	1931 (65.4)	2.60 (1.72, 3.93)	<0.0001	0.97 (0.52, 1.80)	0.9885
Non problem drinker	358 (64.0)	2.19 (1.41, 3.41)		0.98 (0.51, 1.89)	
Harmful drinking	79 (57.7)	1.65 (0.97, 2.80)		0.89 (0.39, 1.98)	
Likely dependence on alcohol	44 (45.4)	ref		ref	

^aParticipants could name up to five sex partners.

use.⁴⁹ While our study is not able to pinpoint the exact reasons behind these observed country level differences, these findings highlight the importance of understanding the economic, social, and cultural norms and practices that may affect HIV risk behavior and act as barriers to HIV prevention services. Understanding these epidemic drivers and then tailoring interventions accordingly can maximize the success of HIV prevention programming.^{4,50}

This study had a number of limitations. Most of the data for this analysis were taken from patient self-reports. Participant's responses may have been affected by social desirability and recall bias. However, the high rates of disclosure and condom use observed in this analysis are consistent with other studies conducted among PLHIV who knew their HIV status and were attending clinical care.^{51–53} All participants in this sample were PLHIV attending clinical care in a country with a

TABLE 5. CORRELATES OF CONSISTENT CONDOM USE (N=3759)

Variable	N (%) reporting consistent condom use	Univariate regression models		Multiple regression model		
		OR (95% CI)	p Value	OR (95% CI)	p Value	
Age (1-year increase)		1.02 (1.01, 1.04)	<0.0001	1.00 (0.99, 1.01)	0.7174	
Education						
None	243 (73.6)	ref	0.1549	ref	0.3523	
Primary	1372 (73.9)	0.95 (0.72, 1.25)		0.96 (0.71, 1.30)		
Secondary	934 (81.9)	1.16 (0.85, 1.58)		1.13 (0.80, 1.59)		
More than secondary	71 (81.6)	1.41 (0.77, 2.59)		1.46 (0.74, 2.91)		
Any paid work, past 6 months						
Yes	1250 (81.9)	0.63 (0.53, 0.76)	<0.0001	0.67 (0.54, 0.82)	0.0004	
No	1372 (72.6)	ref		ref		
Country						
Kenya	909 (76.8)	0.54 (0.39, 0.74)	<0.0001	0.57 (0.40, 0.81)	0.0013	
Tanzania	850 (69.3)	0.37 (0.27, 0.50)		0.50 (0.35, 0.72)		
Namibia	866 (85.9)	ref		ref		
Time since diagnosis						
<1 year	604 (66.9)	0.48 (0.38, 0.60)	<0.0001	0.65 (0.50, 0.84)	0.0005	
1 to <2 years	600 (75.9)	0.74 (0.59, 0.94)		0.89 (0.68, 1.16)		
2 to <3 years	584 (81.0)	0.98 (0.76, 1.26)		1.02 (0.77, 1.34)		
>3 years	837 (83.4)	ref		ref		
CD4 (100 point increase)		0.99 (0.96, 1.02)	0.5847	1.00 (0.96, 1.03)	0.7649	
On ARVs						
Yes	1759 (79.6)	1.61 (1.36, 1.90)	<0.0001	1.36 (1.11, 1.66)	0.0028	
No	865 (71.6)	ref		ref		
Number of sex partners, past 3 months						
1	2327 (76.8)	ref	0.9363	ref	0.0852	
2 or more	298 (77.0)	1.01 (0.78, 1.30)		1.37 (0.98, 1.91)		
Partner type						
Spouse	1303 (75.4)	ref	0.1823	ref	<0.0001	
Regular	862 (77.7)	0.93 (0.77, 1.12)		1.34 (1.07, 1.69)		
Casual	454 (78.8)	1.17 (0.93, 1.48)		2.49 (1.80, 3.46)		
Disclosed HIV status to partner						
Yes	2139 (79.4)	1.74 (1.44, 2.09)	<0.0001	1.45 (1.11, 1.91)	0.0130	
No	478 (66.9)	ref		ref		
Desire pregnancy or partner's pregnancy in next 6 months						
Yes	358 (64.9)	0.49 (0.40, 0.60)	<0.0001	0.44 (0.35, 0.55)	<0.0001	
No	2192 (79.4)	ref		ref		
Any STI symptoms past 6 months ^c						
Yes	278 (67.8)	0.58 (0.46, 0.73)	<0.0001	0.70 (0.54, 0.91)	0.0031	
No	2344 (78.0)	ref		ref		
AUDIT Alcohol screening test category						
Non-drinker	2097 (77.6)	3.63 (2.35,5.61)	<0.0001	3.08 (1.82, 5.23)	0.0001	
Non- harmful drinking	384 (77.3)	3.20 (1.99, 5.14)		2.37 (1.35, 4.16)		
Harmful drinking	90 (74.4)	2.41 (1.34, 4.34)		1.94 (0.98, 3.84)		
Likely dependence on alcohol	49 (53.9)	ref		ref		
Interaction of gender and partner status on consistent condom use						
	N(%) of men reporting condom use	N(%) of women reporting consistent condom use	Univariate regression models ^a		Multiple regression model ^a	
Partner's HIV status			OR (95% CI)	p Value	OR (95% CI)	p Value
HIV-negative	247 (92.2)	284 (80.0)	0.33 (0.20, 0.56)	0.0062	0.35 (0.20, 0.60)	0.0134
HIV-positive	659 (81.8)	590 (79.5)	0.84 (0.65, 1.09)		0.87 (0.65, 1.16)	
Unknown HIV status	281 (71.7)	559 (65.8)	0.78 (0.60, 1.02)		0.76 (0.55, 1.05)	

^aMales are the reference group for both regression models.^bParticipants could name up to five sex partners.^cIncludes any of the following symptoms: discharge from the penis or vagina, sores in the genital area, or (for female patients only) abdominal pain.

generalized HIV epidemic. The generalizability of these findings to PLHIV not enrolled in HIV clinical care and/or to PLHIV in non-generalized epidemics may be limited. For some participants (17%), the last available CD4 test result predated the baseline interview by more than 7 months. For these participants, CD4 count may have been a less reliable measure of current health status at the time of the baseline interview. Men in care and on treatment are under-represented in this sample despite aggressive efforts to target them for enrollment.

Despite these limitations, this article identifies HIV prevention needs in a cohort of PLHIV from a large multi-country group randomized trial. Integrating HIV prevention messages and services into HIV clinical care settings offers an opportunity to address many of the HIV prevention needs of PLHIV identified in this analysis. These services can be provided by health care providers during their routine contact with HIV-positive patients and by peer supporters who can assist providers in delivering these messages and services. This analysis has also identified characteristics of PLHIV most at risk for engaging in ongoing sexual risk behavior and experiencing poorer health outcomes. These findings can inform targeted and strategic efforts to intervene with patients who are at greatest risk for engaging in high risk behavior and who may need additional support to reduce their HIV risk behavior. Ideally all patients should receive HIV prevention messages and services at every clinic visit as well as through community-based services such as support groups. However, these findings offer suggestions for which patients should be prioritized for risk reduction counseling and support if resources and time are limited.

Acknowledgments

The authors express their gratitude for the extraordinary efforts of the study interviewers, program coordinators, and data management staff in the three countries without whom this study could not have taken place. The authors would also like to thank the Ministries of Health in Kenya, Tanzania, and Namibia, as well as ICAP and CDC staff in these three countries for all the support they provided to this project. The authors are also grateful to Jan Moore for her insightful comments on earlier drafts of this manuscript. Finally, the authors would like to thank all of the health care providers, lay counselors, and clinic patients that participated in this study for their willingness to share their experiences with us. This work received funding support from the President's Emergency Plan for AIDS Relief (PEPFAR) through the Centers for Disease Control and Prevention.

Author Disclosure Statement

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the U.S. Centers for Disease Control and Prevention. No competing financial interests exist.

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