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## Continued High Risk Sexual Behavior Following Diagnosis with Acute HIV Infection in South Africa and Malawi: Implications for Prevention

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## Abstract

Understanding sexual behavior following diagnosis of acute HIV infection (AHI) is key to developing prevention programs targeting individuals diagnosed with AHI. We conducted separate qualitative and quantitative interviews with individuals newly diagnosed ( $n = 19$ ) with AHI at 1-, 4- and 12-weeks post-diagnosis and one qualitative interview with individuals who had previously been diagnosed with AHI ( $n = 18$ ) in Lilongwe, Malawi and Johannesburg, South Africa between October 2007 and June 2008. The majority of participants reported engaging in sexual activity following diagnosis with AHI with a significant minority reporting unprotected sex during this time. Most participants perceived to have changed their behavior following diagnosis. However, participants reported barriers to condom use and abstinence, in particular, long term relationships and the need for disclosure of sero-status. Understanding of increased infectiousness during AHI was limited. Participants reported a desire for a behavioral intervention at the time of AHI diagnosis, however, there were differences by country in the types of interventions participants found acceptable. Studies are underway to determine the feasibility, acceptability and potential effectiveness of interventions designed for individuals with AHI.

## Keywords

HIV; Africa; Sexual behavior; Condom use

## Background

Acute HIV infection (AHI) is a brief window of time after HIV acquisition during which the virus replicates rapidly, leading to high concentrations of HIV RNA in blood and genital secretions [1–3]. Consequently, the probability of HIV transmission during unprotected intercourse is very high [4–6]. An analysis of transmission events among discordant couples in Rakai, Uganda found the transmission rate to be 26 times greater than during established HIV infection [5, 7].

Many adults with HIV infection continue to engage in unprotected sex after diagnosis [8–11]. In a cross-sectional survey done among 3,819 HIV positive patients in South Africa, 54% of sexually active HIV-infected adults reported having unprotected sex in the previous 6 months [12]. In another cross-sectional survey among 146 HIV positive out-patients in South Africa, between 47–80% of participants reported a current sexual partner and 42–80% reported always using condoms [11].

Prevention strategies for people living with HIV/AIDS (PLWA), also called Positive Prevention, can reduce sexual behaviors associated with transmission risk. Positive prevention strategies in persons with HIV infection have reduced transmission risk behaviors. In a recent meta-analysis, positive prevention interventions significantly reduced unprotected sex and decreased the acquisition of new sexually transmitted infections (STIs) [13].

To date, no intervention trials have been completed for persons with AHI. However, identification of persons with AHI provides a unique opportunity to equip individuals with appropriate behavioral strategies to reduce HIV transmission during this highly infectious period, as well as throughout the course of their disease.

We conducted a mixed methods study with 37 individuals who had been diagnosed with AHI in Johannesburg, South Africa and Lilongwe, Malawi with the aim of better understanding the sexual behaviors of individuals around the time of diagnosis with AHI in

order to develop prevention strategies focused on this unique time. This is the first study to date to report on the sexual behaviors of individuals with AHI from sub-Saharan Africa.

## Methods

### Detection of Subjects with AHI

The NIH Center for HIV/AIDS Vaccine Immunology (CHAVI) studies biological events occurring during HIV transmission. As part of CHAVI 001, subjects with AHI were identified using HIV rapid testing (RT) in STD clinics in Johannesburg and Lilongwe. Those with negative or parallel discordant RT results and providing informed consent underwent nucleic acid amplification testing. Subjects with negative, indeterminate or discordant antibody tests and detectable HIV RNA within 45 days of study entry could enroll. Stage of AHI was determined by serial p24 antigen, HIV antibody and Western blot testing [3].

As part of the CHAVI study, participants were scheduled to attend study visits at weeks 1, 2, 3, 4, 8, 12, 16, 24, 36, 48, 60, 72, 84 and 96. Post-test counseling was provided for all individuals and standard HIV risk reduction messages were provided at follow-up CHAVI visits.

### Assessment of behavior

Interviews were conducted with individuals with AHI between October of 2007 and June of 2008 at two of the CHAVI 001 sites—Johannesburg, South Africa ( $n = 18$ ) and Lilongwe, Malawi ( $n = 19$ ) (see Table 1). Sample size was determined by the number of individuals identified with AHI by June 2008.

Two groups of individuals with AHI were interviewed. The first group included all individuals identified with AHI between October 2007 and June 2008; these individuals are referred to as “newly diagnosed with AHI” ( $n = 19$ ). The second group of participants included individuals who were already enrolled in CHAVI 001 when this study started; these individuals are referred to as “previously diagnosed with AHI” ( $n = 18$ ). Among these individuals, the average time since AHI diagnosis at the time of interview was 9 months (range 2–13) in Johannesburg and 7 months (range 2–13) in Lilongwe.

Among the individuals newly diagnosed with AHI, a separate qualitative interview and quantitative survey were conducted at one-, four- and twelve-weeks post-diagnosis. Individuals who had previously been diagnosed with AHI only took part in the qualitative interview.

### Qualitative Interview

A semi-structured interview guide was used in the qualitative in-depth interviews allowing interviewers to probe further to explore emerging information. In the in-depth interviews, participants were asked to describe the context surrounding their sexual behavior at the time before and after diagnosis with AHI. At the week 1 interview for newly diagnosed individuals, participants were asked to describe the circumstances for having or not having sex post-diagnosis. If having sex, participants were asked to describe their sexual encounters (i.e., who the partner/s were, reasons for having sex, reasons why condoms were used or not used, changes to sexual behaviors before and after diagnosis, and concerns about transmitting the virus). If they had not had sex, they were asked to discuss the reasons. The week 4 and 12 interviews explored changes in behavior since the previous interview, primarily focusing on the context of sexual encounters. In the week 1 interview, participants were also asked to discuss their understanding of acute HIV infection and their interest in a

behavioral intervention for individuals with AHI, including their opinions on different strategies for a behavior change intervention. Specifically, as part of the process for framing an intervention for individuals with AHI, we asked participants about two hypothetical situations, one being an intervention where they were asked to abstain from sex for a 3 month period after diagnosis with AHI and another where they were asked to use condoms for all sex acts for 3 months following AHI diagnosis. The single interview for individuals who had been previously diagnosed with AHI explored topics similar to those described above; however, sexual behaviors were discussed since diagnosis rather than at three time points as was done with participants who were newly diagnosed.

All interviews were conducted in the local language. Qualitative interviews were recorded, and then simultaneously translated and transcribed into English. Data were then coded in Atlas-TI or Nvivo using codes generated primarily from the interview question guide and then from the interview content. Code reports were generated and matrices developed for the major themes and patterns arising from the data related to sexual behavior.

### Quantitative Survey

The interviewer-administered quantitative survey collected information on sexual behavior by partner. At the week 1 interview, individuals were asked to report the number of sex partners in the past 12 weeks (during which time they would have been infected with AHI). Using a partner grid, they were then asked detailed information about each of these partners, such as, number of sex acts in the past month and week, number of times a condom was used during these sex acts in the past month and week, the date of first and last sex with the partner and whether the relationship was ongoing at the time of the interview (to determine concurrency), condom use at last sex with the partner, sex in exchange for money with the partner, age of the partner, type of partner, knowledge of partner's HIV status, and perception of others partners. At the week 4 and 12 week interview, participants were asked to report the number of sex partners since the previous visit/interview and the same partner specific questions as asked at week 1. Data was entered into access and analyzed using SAS 9.1.3 and excel using descriptive statistics.

## Results

### Demographics

Among those diagnosed with AHI ( $n = 37$ ), the mean age was 25.6 and 59.5% were male (Table 2). Overall, 67.6% of individuals reported never being married, 21.6% reported being married and 10.8% being separated or divorced. 37.8% had completed secondary school or higher.

### Sexual Behavior Following Diagnosis with AHI

Among those who were newly diagnosed with AHI ( $n = 19$ ), 58% reported having sex sometime in the first 3 months after diagnosis in the quantitative survey; 45% in Malawi and 75% in South Africa. In Malawi 28.6% reported having sex in the first week after diagnosis compared to 63% in South Africa.

Information on sexual behaviors in those who were previously diagnosed with AHI was collected via in-depth interview. Among these participants ( $n = 18$ ), 78% reported having sex between the time of diagnosis and the interview (this ranged from 2 to 13 months); 63% in Malawi and 90% in South Africa.

**Behavior Change Following Diagnosis with AHI**—After diagnosis with AHI, the majority of participants reported that they had changed their sexual behavior in some way.

Changes reported included abstaining from sex, using condoms consistently or more often, reducing the number of partners, or drinking alcohol less often.

I saw many people do not look after themselves. After telling them that they are HIV positive they start sleeping around without a condom and they end up dying. So I tell myself that I must look after myself not end up like those people.

–Male, South Africa

I would say that I have changed because prior to that I was careless with women and was drinking heavily. My head was wild with alcohol and I was just having sex anyhow and with whomever and with no protection. But now that I'm enlightened I've stopped all that.

–Male, Malawi

There were, however, participants who noted that they had not changed their behavior since their diagnosis, such as female participants in long term relationships:

My behavior is the same as the past, there wasn't any difference. As I have explained, the only person that I have had sex with in the past 10 years is my husband only. I have never had sex with other persons. My behavior has been the same all the time.

–Female, Malawi

**Condom Use**—Of participants who reported having sex after diagnosis, about half of participants reported in qualitative interviews that they used condoms all of the time. The remaining participants reported either not using condoms or using condoms inconsistently. The quantitative survey found that between 17.6 and 31.3% of the newly diagnosed participants reported engaging in unprotected sex at each follow-up visit (Table 3).

Reasons individuals mentioned for using condoms included: to prevent re-infection, to prevent transmission to a partner, to avoid disclosure to a partner and based on partner type (i.e. if the partner was a casual partner).

I was told here that if you have sex unprotected frequently chances are that you may also die faster because you continuously re-infect yourself with more viruses.

–Male, Malawi

I explained to him that now I am HIV positive I need to use condoms when I have sex because if I don't use condoms I will get re-infected. He tried to disagree with then I said if you don't want to use condoms that means we don't have sex, then he ended up understanding (agreeing) with it.

–Female, South Africa

Reasons participants gave for *not* using condoms included: having a partner who is also HIV positive or assumed to be HIV positive, having a partner refuse to use condoms, lack of confidence in the efficacy of condoms, and wanting to get pregnant (only mentioned in South Africa).

A participant explained that she had not used condoms with her husband because he refused to use condoms because she was his wife:

He said he has never used a condom in his life so it is hard to use a condom when we have sex. In addition, he will not have sex with me while using a condom as I

am his wife, for him it's better to use a condom with someone out there [casual partner].

–Female, South Africa

A common theme expressed by participants in the interviews was the difficulty of using condoms with main partners. Some participants noted that it would be difficult to introduce condoms into a relationship where they had not been used before, especially if they had not disclosed their HIV status to their partner. Participants also described that while it was acceptable to use condoms with casual partners, the same was not true for main partners. A participant described both the challenge of using condoms with his main partner compared to casual partners and the issue of disclosure:

I used condoms with them [casual partners] because they were just casual partners  
–I was afraid they could re-infect me further... Because with this one, it was difficult because she was a steady partner. I had been having sex without any protection ever since even the time I had not tested yet. She would have been suspicious that why using condoms today.

–Male, Malawi

Many participants did not know the HIV status of their partners and some assumed that because they were HIV positive their partners must be positive also; this was mentioned as a reason for not using condoms:

I take it that since she is my wife we can do it freely. I believe that if I am infected then she is also definitely infected. So I've just concluded that we can have sex without condoms.

–Male, Malawi

Based on the quantitative survey, only 28.6% of newly diagnosed participants reported knowing the status of any of their sex partners at the week 1 interview (Table 3).

A few participants in South Africa mentioned the desire to have a child as a reason for not using condoms with their partner, this was not mentioned in Malawi:

...we asked the sister if we can have a baby and the sister said yes there is a chance to have a baby. So we are still trying that process and there will be a time when we will have sex without using a condom because we want a baby.

–Male, South Africa

**Number of Sex Partners/Concurrency**—The majority of participants did not report having many partners before or immediately after diagnosis with AHI. However, for those participants who did have multiple partners several reported having fewer partners after learning their HIV status:

At first, I was very much into having sex with girls but I have greatly reduced that now.

–Male, Malawi

In the qualitative interviews, participants reported having main, casual and commercial sex partners following diagnosis with AHI. Overall, the majority of participants reported having main sex partners (even if they had other partners as well). More participants in Malawi reported having engaged in commercial sex in both the qualitative and quantitative interviews compared to South Africa where only one participant reported paying for sex in the quantitative survey, although he did not expand on this in the qualitative interviews.

In the quantitative surveys with newly diagnosed participants, the number of sex partners reported by participants in the 12 weeks before diagnosis was generally low, with the majority of participants reporting 0 or 1 partner (52.7%) (Table 3). The majority of participants (68.4%) reported currently having a main partner at the interview one week after diagnosis with AHI (Table 3). Following diagnosis with AHI, participants reported having had sex with main partners and casual partners. At the week 1 visit, one-third (33.3%) reported exchanging money for sex with at least one of their reported partners—four of these participants were from Malawi and one from South Africa.

**Abstinence Post-Diagnosis**—In the quantitative survey, over half of participants at all time points reported not having had sex although many of these individuals reported having sex partners (Table 3). In the qualitative interviews, of those that had not had sex post-diagnosis, the reasons provided were primarily due to fear of re-infection, but also concerns about transmission, lack of opportunity, and lack of desire to have sex. The majority of individuals who were abstaining from sex mentioned re-infection as a reason; this perception was extremely common among all interviews with individuals with AHI in Malawi, although it was also mentioned by many participants in South Africa.

I just decided to stop this behavior of having sex because I thought I might have sex with someone who is already HIV positive who might re-infect me further.

—Male, Malawi

A number of participants mentioned not having any desire to have sex as a reason they were abstinent.

No I have not had sex yet, this is close to a month now (not sure), I have not had sex and someone has asked me to sleep over their place but I avoided that person. I avoided her just because I am not yet comfortable to have sex with anyone else right now. I am not saying I am not going to have sex any more but right now I am just not comfortable. I don't have that desire for sex at the present moment.

— Male, South Africa

One participant mentioned that the reason he was able to abstain was because his partner was not present:

Interviewer: Or, is also that you didn't have sex during this time because your spouse is away? Respondent: Yes, because if she were here there was no way I could have stayed all this time without sex.

—Male, Malawi

### Infectiousness During AHI

Although most participants understood that they had recently acquired HIV, many were unaware that individuals with AHI are more infectious than individuals with established HIV infection. Some individuals believed that individuals with established infection were more infectious because they had the virus for longer. Many participants described that AHI meant that the virus has not been “activated” or is not “working” yet, and because of this, fewer viruses exist and the person has better immunity and does not show any signs of illness:

Those who have established infection mean that the virus has started working in the body as compared to acute HIV infection. In acute infection, the virus has not really started working in the body.

—Male, Malawi

The difference is that the one who has been infected for a long time with HIV has already been eaten inside by the HIV. The one who has just been infected has some chance to survive for a long time...I would say it's that you have just been infected by HIV that is why they call it acute HIV. Like for myself, I would not say I am HIV positive because there haven't been any changes in my body. If you look at me you would not say I am HIV positive because there is nothing to show that I am positive.

–Female, South Africa

Despite the misunderstandings, there were a small number of participants who did understand that they were more infectious during acute infection.

The way I understand it is when you just get it, it's easy to infect another person, much easier than a person who has had it for a long time. And the one who has just got it has a chance to stay with HIV for a longer time, I don't know but it's the way I understand it.

–Male, South Africa

### Interventions for Individuals with AHI

All but one individual with AHI said that a prevention intervention for individuals with AHI would be a good idea. Participants felt that such an intervention should start within the first week of diagnosis.

When asked about the potential of an intervention where individuals were asked to abstain for 3 months, all individuals in Malawi thought it possible, however, in South Africa, the majority of individuals did not think it would be possible. Malawian participants noted, however, that this would only be achieved with appropriate counseling. Participants most often mentioned their desire for sex as the main barrier to practicing abstinence for three months. Participants also felt that abstinence would be more difficult if an individual had not disclosed their HIV status to their sex partner.

I need to tell her why we are doing this otherwise she may just decide to leave me if I do not tell her why we are abstaining.

–Male, Malawi

Some women also mentioned that their male partners would likely refuse to abstain making such an intervention problematic.

I am okay about that [being abstinent during AHI] but the problem will be my main partner...He will not even want to listen to that one.

–Female, South Africa

Almost all individuals with AHI believed that they would be able to use condoms consistently for the three months post-diagnosis, despite the fact that participants reported that they were not currently using condoms consistently. A few participants commented that while condoms could be used often, using condoms every time they had sex could pose difficulties.

### Discussion

We conducted a mixed methods study with 37 individuals who had been diagnosed with acute HIV infection in Lilongwe, Malawi and Johannesburg, South Africa. The study aimed to better understand sexual behaviors at the time of AHI so as to determine the need for and content of behavior change interventions. The majority of individuals who participated in



this study continued to have sex after diagnosis with acute HIV infection. This finding is similar to other research in developed and developing countries conducted with people living with HIV which has documented significant levels of unprotected sex after diagnosis with HIV [8–11], particularly in the first year after diagnosis with HIV [14].

Diagnosis with HIV is a significant event and has been found to reduce HIV risk behavior in some populations [15]. However, many participants in this study continued to engage in unprotected sex immediately following their diagnosis. That said, the majority of participants reported perceiving to have changed their behavior in some way as a result of AHI. This is similar to studies with MSM in the US diagnosed with AHI and recent infection where the majority of participants reported behavior change following diagnosis with AHI. In these studies most participants reported reductions in partners or sero-sorting as a means of reducing transmission risk [16, 17]. In our setting, depending on the context, participants chose different strategies to reduce HIV risk behaviors. In Malawi, more participants reported abstaining from sex as a means to reduce transmission while in South Africa participants were more likely to discuss using condoms as a prevention strategy, albeit few managed to use condoms consistently. The majority of participants in our study were in long term relationships with a main partner. Because of this, partner reduction was not a major behavior change strategy reported by individuals. Having a main partner was seen to negatively impact on one's ability to abstain from sex and to pose challenges for condom use. A number of participants mentioned that main partners would refuse to use condoms as condom use was perceived to be for casual rather than main partners—participants also mentioned that having a main partner made abstinence difficult.

One important theme that emerged from the interviews was the importance of disclosure in facilitating behavior change. Participants were very supportive of the idea of disclosing ones HIV sero-status to partners and reported that not disclosing their status could make introducing the concept of abstinence or condom use into established relationships particularly difficult. While participants felt it was important to disclose to their sex partners, few participants reported knowing the HIV status of their sex partner and some assumed that because they were HIV positive their partners were also positive thus there was little motivation to use condoms.

There was limited understanding of the increased infectiousness of individuals during acute infection. This finding has also been observed among MSM populations in the US [18, 19]. It is hypothesized that a major motivator for safer sex during AHI would be ensuring that individuals understand that they are very likely to infect anyone that they have unprotected sex with during this time period. While participants in our study did not express a desire to infect sex partners, the primary motivator for safer sex mentioned by most participants was not altruistic but rather a desire to protect themselves from re-infection and a worsening of their illness. It is not clear from our study whether the concern expressed about re-infection among study participants was the result of messages delivered by counselors or clinicians in the study or the result of standard HIV messages being delivered in Malawi and South Africa.

Participants in this study were very interested in a behavior change intervention to be delivered at the time of diagnosis with AHI. We found that there were differences in the potential acceptability of the content of such an intervention depending on the setting. In Malawi, almost all participants reported thinking that the three month abstinence period following diagnosis would be acceptable if accompanied by adequate counseling while few participants in South Africa thought the same. These findings have implications for recent calls for population-wide interruptions of risk behavior for a set period of time to reduce HIV incidence [20].

To have maximal impact, a prevention program directed toward AHI must intervene quickly to minimize onward transmission. Further, sessions must be delivered intensively at the time of diagnosis with the aim of immediate behavior change given the short duration of AHI. An effective immediate intervention would require behavioral modification to limit unprotected sex acts—particular attention in this population may be needed for negotiating condom use or abstinence within the context of long term relationships and the potential importance of support for partner notification and disclosure of sero-status. While some of the content and approaches for an intervention for AHI would likely be similar to existing positive prevention interventions, what is unique about an intervention focused on AHI is the timeframe in which it is to be delivered—specifically, (1) starting on the day that participants are informed of their AHI diagnosis followed by other sessions delivered intensively and in a brief period of time and (2) at a time when individuals are thought to be highly infectious and thus concentrating primarily on reducing risk during a brief and defined period of time as opposed to an indefinite time period as in standard “positive prevention” approaches.

Given its brief duration, the importance of AHI in the epidemiology of HIV infection has been the subject of intense speculation and numerous mathematical models [5, 7, 21–23]. In reality, the potential impact of a program designed to prevent transmission by persons with AHI is unknown. Information gathered from pilot studies and mathematical models informed by empirical evidence are being conducted to better understand the feasibility, acceptability and potential impact of behavioral and treatment interventions for AHI.

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**Table 1**

Interview schedule for study participants in Lilongwe, Malawi and Johannesburg, South Africa, 2007–2008

Group	Quantitative survey			Qualitative interview		
	Week 1	Week 4	Week 12	Week 1	Week 4	Week 12
Newly diagnosed ( <i>n</i> = 19)	x	x	x	x	x	x
Previously diagnosed ( <i>n</i> = 18)						Varied time <sup>a</sup>

<sup>a</sup> average time since diagnosis at the time of interview was 9 months (range 2–13) in Johannesburg and 7 months (range 2–13) in Lilongwe

**Table 2**

Sociodemographics of individuals diagnosed with AHI in Lilongwe, Malawi and Johannesburg, South Africa, 2007–2008

	<b>Total <i>n</i> = 37</b>	<b>South Africa <i>n</i> = 18</b>	<b>Malawi <i>n</i> = 19</b>
Age, Mean (SD)	25.6 (5.2)	25.9 (4.4)	25.3 (5.9)
Gender, <i>n</i> (%)			
Male,	22 (59.5%)	8 (44.4%)	14 (73.7%)
Female	15 (40.5%)	10 (55.6%)	5 (26.3%)
Marital status, <i>n</i> (%)			
Never married	25 (67.6%)	16 (88.9%)	9 (47.4%)
Married	8 (21.6%)	2 (11.1%)	6 (31.6%)
Divorced/Separated	4 (10.8%)	0 (0.0%)	4 (21.1%)
Education, <i>n</i> (%)			
Primary completed	9 (24.3%)	1 (5.6%)	8 (42.1%)
Some secondary completed	14 (37.8%)	8 (44.4%)	6 (31.6%)
Secondary completed	14 (37.8%)	9 (50.0%)	5 (26.3%)

**Table 3**

Sexual behaviors of individuals newly diagnosed with AHI ( $n = 19$ ) at 1, 4 and 12 weeks in Lilongwe, Malawi and Johannesburg, South Africa, 2007–2008

	First visit (Week 1) $n = 19$	Second visit (Week 4) $n = 18$	Third visit (Week 12) $n = 17$
Reports having a "Main" sex partner	13 (68.4%)	–	–
Number of sex partners <sup>a</sup>			
0	1 (5.3%)	1 (5.6%)	4 (23.5%)
1	9 (47.4%)	13 (72.2%)	8 (47.1%)
2–4	7 (36.8%)	3 (16.7%)	4 (23.5%)
5	2 (10.5%)	1 (5.6%)	1 (5.9%)
At least one new sex partner since last visit	–	2 (11.1%)	2 (11.8%)
Ever exchanged sex for money with any current sex partner	5 (33.3%) <sup>b</sup>	In 2/2 individuals with new partners	In 0/2 individuals with new partners
Know HIV status of at least one sex partner	4 (28.6%) <sup>c</sup>	In 0/2 individuals with new partners	In 0/2 individuals with new partners
Total sex acts in last week with up to 5 reported partners			
0 acts	8 (53.3%)	10 (55.6%)	10 (58.8%)
1–2 acts	3 (20.0%)	5 (27.8%)	5 (29.4%)
3 acts	4 (26.7%)	3 (16.7%)	2 (11.8%)
Missing	4		
Mean sex acts in last week (Range)	1.7 (0–14)	1.2 (0–6)	0.8 (0–3)
At least one unprotected sex act in last week	3 (20.0%) <sup>d</sup>	3 (16.7%)	2 (11.8%)

<sup>a</sup>In the last 12 weeks at the first visit, since the first visit at the second visit, since the second visit at the third visit

<sup>b</sup> $n = 15$  due to 3 missing responses and one participant with no current sex partner

<sup>c</sup> $n = 14$  due to 4 missing responses and one participant with no current sex partner

<sup>d</sup> $n = 15$  due to 4 missing responses