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Integrated HIV Serological and Behavioral Surveillance among Persons Attending Alcohol Consumption Venues in Gaborone, Botswana

INTEGRATED HIV SEROLOGICAL AND BEHAVIORAL SURVEILLANCE AMONG PERSONS ATTENDING ALCOHOL CONSUMPTION VENUES IN GABORONE, BOTSWANA

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ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
AUDIT	Alcohol Use Disorders Identification Test
BOTUSA	Botswana-USA Partnership
CCP	Center for Communication Programs
CDC	Centers for Disease Control and Prevention
HTC	HIV Testing and Counseling
HIV	Human Immunodeficiency Virus
HRDC	Health Research Development Committee
MIMS	Motlabaseyo Integrated Management Services
MOH	Ministry of Health
MOTI	Ministry of Trade and Industry
NGO	Non-Governmental Organization
R2P	Research to Prevention
STI	Sexually Transmitted Infection
TLS	Time-Location Sampling
USAID	United States Agency for International Development
VDT	Venue-Day Time
WHO	World Health Organization

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EXECUTIVE SUMMARY

Background and aims

The link between alcohol use and sexually transmitted infections (STIs), including HIV, is well documented. Several studies have demonstrated an association between drinking alcohol and engaging in sexual risk behaviors that may indirectly contribute to the transmission of STIs and HIV infection, including behaviors such as low rates of condom use, multiple sexual partners, and exchanging sex for money or goods (Ghebremicheal et al., 2009; Fisher et al., 2008; Kalichman et al., 2007). In Botswana, studies have shown that alcohol consumption is associated with increased HIV prevalence and HIV-associated risk behaviors (Central Statistics Office, 2009; Weiser et al., 2006b; Campbell, 2003; Talbot et al., 2002). The link between alcohol consumption and positive HIV status has also been noted in other regional countries, including Tanzania (Fisher et al., 2008), Uganda (Mbulaiteye et al., 2000), and Zimbabwe (Fritz et al., 2002). Substantial attention has been directed towards the venues where alcohol use and abuse is common, and where people might meet new sexual partners. In South Africa, study participants who reported meeting their sex partners at *shebeens* (illegal and informal drinking venues usually operating without a license) reported more alcohol consumption, sex partners, and inconsistent condom use than participants who did not meet their partners at *shebeens* (Kalichman et al., 2008).

Botswana has historically high levels of drinking among its population (WHO, 2011). In response to national polices enacted by the government and strict regulations related to the sale and consumption of commercial and non-commercial alcohol, the number of venues registered and licensed to sell alcohol in the country decreased in the last decade; however, alcohol consumption remains very prevalent in the country (Pitso & Obot, 2011; Mirkovic, 2012). A recent study by the National AIDS Coordinating Agency in Botswana showed that almost two-thirds of males (64.4%) and more than a third of females (35.5%) voluntarily drank alcohol (Mirkovic, 2012). Data from the Botswana Ministry of Trade and Industry suggested that 54% of current drinkers were binge drinkers who consumed more than five drinks on one day in the last week (Mirkovic, 2012).

Despite the persistent high prevalence of drinking among Batswana[1] and the evidence linking alcohol consumption with sexual risk behaviors and HIV infection, few studies have explored the relationship between alcohol use and behaviors that contribute to HIV risk in Botswana. There is little information on the types of individuals who access alcohol-based venues (e.g., bars, nightclubs, and recreational clubs), their HIV-associated risk behaviors, or the level of interest among these patrons to be tested for HIV infection at alcohol consumption venues. As a result, little is known about rates of HIV infection and behaviors among alcohol consumers in Botswana and whether environmental factors in alcohol venues modify such behaviors.

This venue-based study aimed to describe HIV risk behaviors among patrons of alcohol venues in Botswana and increase understanding of the relationships between alcohol use, risk behaviors, and HIV

[1] "People from Botswana, or members of the Tswana people". From Oxford Advanced Learner's Dictionary

status. The goal of the study was to estimate prevalence of HIV infection and HIV risk behaviors among patrons of alcohol consumption venues in Gaborone, Botswana. Specifically, the study aimed to

1. Estimate HIV prevalence among patrons of alcohol consumption venues (such as bars, nightclubs, and recreational clubs)
2. Estimate risk behaviors associated with HIV transmission among patrons of alcohol consumption venues.

Results of the study might be used to inform the development of HIV prevention interventions for patrons of the licensed alcohol venues in the sampling frame.

Methods

Study location and participants

The study was conducted in alcohol consumption venues in Gaborone, Botswana. The study consisted of two phases: Phase I was completed in 2011 and included a contextual assessment of the study area and an alcohol venue screening of 120 legally registered and licensed alcohol consumption venues in Gaborone to determine eligibility for inclusion in the sampling frame. In Phase II, study participants were recruited via Time-Location Sampling (TLS) procedures from fifty-three alcohol consumption venues included in the sampling frame. Participants were 18 years of age and older who patronized these venues and agreed to participate in the study. This report describes Phase II of the study.

Data collection tools

A quantitative behavioral surveillance instrument was used to collect demographic information, as well as information on alcohol use, other HIV-associated risk behaviors, and history of HIV testing among patrons of participating alcohol consumption venues. Domains of inquiry included: demographic data; patterns and amount of alcohol use; alcohol expectancies (individual beliefs about the effects of alcohol on interpersonal interactions, sexual desires and performance, and condom use that shape experiences); sexual behavior after alcohol consumption including HIV risk behaviors; history of HIV testing; and knowledge of HIV prevention behaviors. Additionally, HIV testing and counseling (HTC) was conducted on site to estimate the prevalence of HIV infection among patrons of alcohol consumption venues.

Data analysis

Data were weighted to adjust for unequal selection probabilities at different venues and analyzed using SPSS statistical software version 20. The demographic characteristics of the sample were described and prevalence estimates for drinking and sexual risk behaviors were derived. Alcohol consumption defined by level of drinking was analyzed as a dependent variable as well as a primary independent variable. The primary transmission risk variable was unprotected sexual intercourse after drinking alcohol. Other risk variables of interest included partner types, number of partners, concurrent partners, spontaneous sex and condom use/non-use after drinking alcohol.

Key Findings

Description of the sample

Of 896 participants recruited, 67.3% were male, about one-fourth (25.2%) resided in Gaborone Central and another fourth (23.7%) in Gaborone West areas of the city. The majority of participants were 20 to 29 years old (61.6%) and about a fourth were 24.8% were 30 to 39 years. Most participants were single (75.1%) and almost all of them had completed secondary school or greater (94.5%). Most of the participants were Christians (69.9%) and a majority (67.5%) was employed.

Drinking behaviors

The majority of patrons drank alcohol at the venue where they were interviewed on weekends or on a monthly basis, and most visited venues early in the evening. Most drinking occurred in the social context of friends, and beer was the alcoholic beverage of choice for the majority of patrons (81.1%). More than half of the patrons usually drank 350 ml bottles of alcohol and more than a third drank 720 ml bottles.

Almost half of the participants reported they usually drank alcohol only on weekends (45.5%); however, about a fifth of participants drank alcohol at least three times a week (21.6%). Only 10.2% of participants reported that they drank alcohol daily.

Level of drinking

Overall, more than half (45.8%) of the participants drank alcohol at least twice a week, and among these, 35.2% drank alcohol four or more times a week. More males (84.0%) than females (77.9%) drank more than five standard units of alcohol on a typical day (p=0.001). More than ten standard units of alcohol were consumed by 29.2% of participants on a typical drinking day. Mean assessment score on the Alcohol Use Disorders Identification Test (AUDIT) was significantly higher for males at 12.6 points (SD: 6.3) compared to females (11.02 points, SD: 6.27) (p=0.002). A quarter of participants (25.8%) were classified as Low risk level of drinking; however, almost half (46.9%) were classified at Excess risk.

Sexual behaviors

In the last 12 months, 43.3% of participants had met at least one of their sexual partners after drinking alcohol, and more than a quarter (25.8%) had met two or more partners. Among those who had met at least one sexual partner after drinking alcohol, the majority (82.2%) reported that they were single, followed by those who stated they were in cohabiting relationships (12.4%). Significantly more males (29.7%) than females (20.4%) had met two or more sexual partners at alcohol venues (p=0.004) in the last 12 months. Similarly, the majority of these patrons were single (83.1%), and in cohabiting relationships (13.4%). The overwhelming majority of participants reported *ever* having sex after drinking alcohol (96.3%). For the majority of these participants, their last sexual encounter after drinking alcohol was with their girlfriend or boyfriend (64.3%) or with a casual partner (17.3%).

Overall, 26.4% of patrons reported they had a risky sexual partner (casual, new, or sex worker) the last time they drank alcohol and had sex, and 35.2% of patrons had had sex with a partner the same night that they had first met them at the alcohol venue. 48.6% of patrons had two or more sexual partners after drinking alcohol in the last year, and about a third (33.7%) stated that the sexual relationships had occurred concurrently (33.7%).

A high proportion (79.8%) reported they had used a condom the last time they had sex after drinking alcohol, and 48.5% of those surveyed stated that in the last 12 months, they had always used a condom when they had sex after drinking alcohol. Significantly more females (17.7%) who did not use a condom the last time they had sex after drinking alcohol tested HIV-positive compared to males (10.1%).

Use of a condom at last sex after drinking decreased from 83.3% for participants assessed as "Low risk" to 74.8% for participants with alcohol "Possible Dependence" (p=0.038).

HIV knowledge, testing and prevalence

The majority of patrons (98.2%) had heard about HIV, and 96.4% attained scores indicative of good knowledge of HIV transmission and prevention. Although over 90% of the sample knew that having sex after drinking alcohol increased one's risk of HIV infection, only 51.1% believed that they were at risk of acquiring HIV infection when they were drinking.

Overall, 83.7% of patrons had previously tested for HIV. Among participants who reported having been tested for HIV before, the majority (89.3%) reported that their test result was negative, 5.9% had positive results, 1.2% reported indeterminate results, 1.2% stated they had not returned for their HIV test results, and 2.4% refused to answer the question. During the study, 71.2% of patrons were tested for HIV. The weighted HIV prevalence estimate was 12.7%. Significantly more first-time testers were HIV-positive (18.8%) compared to repeat testers (11.6%; p=0.052).

A significantly higher proportion of females (17.7%) tested positive for HIV compared to males (10.1%). Positive HIV status was highest among patrons who were 50 years of age and older, those having only a primary level of education, and divorced individuals.

HIV prevalence did not vary by volume of alcohol consumed on a typical day or by AUDIT level of drinking. Prevalence also did not vary by mean alcohol expectancy score or risk behavior score.

Discussion

The study sought to quantify prevalence of HIV infection and risk behaviors that may contribute to HIV transmission among patrons of alcohol consumption venues in Gaborone, Botswana. It also sought to explore the relationship between drinking and HIV risk. Our results suggest that alcohol consumption venues in Botswana continue to be places where social and sexual networks interact and individuals purposefully meet sexual partners. More than a quarter (27.7%) of study participants, especially males, reported meeting two or more sexual partners at alcohol consumption venues in the last 12 months. Two studies conducted in South Africa (Morojele et al., 2006; Weir et al., 2003) have produced similar

results; 75% of study participants identified local drinking places as public venues where people went specifically to meet new sexual partners and with the intention to engage in sex.

Fewer Batswana in our study drank on at least four days of the week compared to estimates reported in the current Botswana STEPS survey (WHO, 2007). This finding is consistent with the WHO (2011) report that average per capita drinking in the country is decreasing. However, those who did drink reported engaging in heavy and binge drinking, and the majority achieved an AUDIT assessment of "Excess Risk" from drinking. Patrons classified at "Harmful" or "Possible Dependence" drinking—levels above "Excess Risk"—had significantly fewer spousal sexual partners as well as more sexual partners who were casual or new during their last sex after drinking alcohol. In addition, overall, as AUDIT level of drinking increased, the proportion of patrons with two and with three or more partners increased substantially while the proportion that used condoms with last sex after alcohol decreased. Similar findings have been documented by other studies on alcohol and HIV risk. Weiser et al. (2006b) showed that the odds of having unprotected sex and multiple partners were higher among heavy drinkers compared to moderate drinkers in Botswana. Our results also showed that more males than females met sexual partners at venues, had sex with a risky partner the last time they drank alcohol, had sex with a partner on the same night of meeting them, and did not use a condom at last sex after drinking alcohol. However, a higher proportion of females who tested HIV-positive (17.1%) engaged in these behaviors compared to males (10.1%).

There were several associations between drinking alcohol and engaging in sexual behaviors that facilitate the transmission of HIV infection, specifically: having sex with a risky partner (casual, new, or sex worker), meeting new sexual partners at venues, having a higher number of partners in the last 12 months, and not using a condom at last sex. These findings are consistent with studies on alcohol use and sexual risk behaviors conducted in the region (Ghebremicheal et al., 2009; Fisher et al., 2008; Kalichman et al., 2007; Weir et al., 2003). HIV prevalence for the study sample was lower than that derived for the population; the study estimated HIV prevalence at 12.7% compared to the 2008 Botswana AIDS Impact Survey III, which yielded a national HIV prevalence of 17.6 (Central Statistics Office, 2009). It is possible that the lack of unlicensed and unregistered alcohol consumption venues in the study sample may account for the lower HIV prevalence observed in the study, as risk for HIV infection may be higher in such venues.

Conclusion

Data collected from key populations at alcohol consumption venues present new opportunities to understand the context of risk that influences behaviors contributing to HIV transmission. Sexual risk-taking continues to be prevalent, and a key feature of the social setting of many alcohol consumption venues in Botswana. In these settings, high levels of drinking remain intricately associated with specific sexual risk behaviors and HIV-positive status. Implementing venue-based interventions that are tailored to impact the social and sexual networking that occurs among patrons of alcohol consumption venues presents opportunity for an innovative approach to HIV prevention. The venue setting might be an effective gateway for reaching a population at risk with prevention interventions designed to decrease individual behaviors that help transmit HIV infection.

INTRODUCTION

Background and rationale

The link between alcohol use and sexually transmitted infections (STIs), including HIV, is well documented. This association is of interest to HIV prevention research and programs because alcohol use is a modifiable risk factor for HIV infection. In Botswana, population- and clinic-based studies have shown that alcohol consumption is associated with increased HIV prevalence and HIV-associated risk behaviors (Central Statistics Office, 2009; Weiser et al. 2006b, Campbell, 2003; Talbot et al., 2002). Although alcohol use has been shown to be a risk factor for HIV infection and associated sexual behaviors, there is little information on the types of individuals who access alcohol-based venues (e.g., nightclubs, and recreational clubs), their HIV-associated risk behaviors, and the level of interest among these patrons to be tested for HIV infection at alcohol consumption venues. To the best of our knowledge, no prior studies in Botswana have accessed the population through drinking venues, studied behavioral and HIV serological risk among patrons of such venues, or explored whether risk behaviors differ at or across these venues.

Several studies have shown an association between drinking alcohol and engaging in sexual risk behaviors that indirectly contribute to the transmission of STIs and HIV infection such as low rates of condom use, multiple sexual partners, and exchanging sex for money or goods (Ghebremicheal et al., 2009; Fisher et al., 2008; Kalichman et al., 2007; Zablotska et al., 2006; Simbayi et al., 2006; Fritz et al., 2002). Furthermore, alcohol consumption has been associated with positive HIV status among individuals in studies in Botswana (Talbot et al., 2002), Tanzania (Fisher et al., 2008), Uganda (Mbulaiteye et al., 2000; Zablotska et al., 2006), Zimbabwe (Fritz et al., 2002), and India (Dandona et al., 2008). Substantial attention has been directed towards the venues where alcohol use and abuse is common, and where people might meet new sexual partners. In South Africa, study participants who reported meeting their sex partners at *shebeens* (illegal and informal drinking venues usually operating without a license) reported more alcohol consumption, sex partners, and inconsistent condom use than participants who did not meet their partners at *shebeens* (Kalichman et al., 2008). In another South African study conducted at alcohol venues, a third of the participants who had reported a new sexual partner in the last month also stated that they had met the new partner at a drinking establishment (Weir et. al., 2003). In a study in Zimbabwe, a visit to a beer hall in the last month was associated with increased HIV infection, higher numbers of total sexual partners, and higher numbers of new sexual partners in the last year (Lewis et al., 2005).

The 2011 World Health Organization (WHO) report on global trends in drinking (2011) reported that the per capita consumption of pure alcohol among the population of 15-year-olds and older in Botswana is decreasing. Nevertheless, the estimate remains high, averaging 8 liters from 2003 to 2005, compared to the WHO Africa Region estimate of 6.2 liters. In response to national polices enacted by the government and strict regulations related to the sale and consumption of commercial and non-commercial alcohol sale, the number of venues registered and licensed to sell alcohol in the country has decreased in the last decade; however, alcohol remains very prevalent (Pitso & Obot, 2011; Mirkovic, 2012). A study by the National AIDS Coordinating Agency in Botswana showed that almost two-thirds of

males (64.4%) and more than a third of females (35.5%) voluntarily drank alcohol (Mirkovic, 2012) and data from the Botswana Ministry of Trade and Industry showed that 54% of current drinkers were binge drinkers who consumed more than five drinks on one day in the last week (Mirkovic, 2012).

Despite the persistent high prevalence of drinking among Batswana and the evidence that links alcohol consumption with sexual behaviors that may contribute to HIV infection, few studies have explored the relationship between alcohol use and behaviors in Botswana. A population-based study found that alcohol use was the strongest predictor of inconsistent condom use, having more than one sexual partner and transactional sex (Weiser et al., 2006b), and a qualitative study demonstrated an association with gender-based violence (Phorano et al., 2005). Apart from this scant literature, little is known about rates of HIV infection and risk behaviors among alcohol consumers in Botswana and specifically, among consumers who drink at alcohol consumption venues. To our knowledge, this is the first venue-based behavioral and serological survey of alcohol consumers in the capital city of Gaborone, Botswana. This approach recognizes that risk behaviors may differ within a physical context that supports drinking behaviors compared to other environments.

Objective and specific aims

This study sought to estimate prevalence of HIV risk behaviors and HIV infection among patrons of alcohol consumption venues in Gaborone, Botswana. Results could be used to inform the development of HIV prevention interventions for patrons of the licensed alcohol venues in the sampling frame. The primary hypothesis was that rates of HIV-associated sexual risk behaviors will vary depending on the level of drinking among patrons.

The specific aims of the study were to

1. Estimate HIV prevalence among patrons of alcohol consumption.
2. Estimate risk behaviors associated with HIV transmission among patrons of alcohol consumption venues.

METHODS

Study design and participants

The study project had two phases. Phase I was completed in 2011 and included a contextual assessment of the study area and venue screening. The assessment consisted of a desk review, in-depth interviews, and alcohol venue screening for eligibility for inclusion in the sampling frame. One hundred and twenty (120) legally registered and licensed alcohol consumption venues in Gaborone were mapped and screened for eligibility and willingness to participate in Phase II (risk survey and biomarker data collection) of the study. The venues in the sampling frame were included based on the following criteria: licensed and registered bars, nightclubs and recreational clubs[2]; venues where alcohol was both sold and consumed by patrons on the premises; and venues that were screened in Phase I and deemed both eligible and willing to participate in Phase II of the study. A sampling frame of sixty (60) venues and their venue-day-time (VDT) units was developed for use in Phase II. This report describes Phase II of the study, which involved a behavioral risk survey and HIV testing of participants recruited from venues in the sampling frame.

Time-Location Sampling (TLS) procedures were used to collect data on behavioral risk factors and HIV status from patrons attending alcohol consumption venues in Gaborone, Botswana. The TLS sampling strategy was developed to apply approximate probability sampling to the study of hard-to-reach/hidden populations. TLS involves enrolling participants at places where they congregate versus where they live. For TLS methodology, location and space define the sampling unit, where location refers to the venue, and space refers to the day and time. For this study, the ”spaces” for each venue were divided into four-hour time segments of operation, and these VDT sampling units were constructed for each venue. The VDTs are then randomly selected for recruitment of patrons into the study.

For the purposes of the study—specifically, to obtain information regarding where patrons resided and also to facilitate the logistics of carrying out the research—the study area was divided into the following geographic areas: Area 1: Gaborone North (Broadhurst, Ledumang and Phakalane areas); Area 2: Gaborone East (Village and Riverwalk areas); Area 3: Gaborone South (Phase IV, Block 9, Kgale view); Area 4: Gaborone West (G, West and Phase 2); and Area 5: Gaborone Central (Main Mall, Bontleng, Extension 10).

Study participants were drawn from adults 18 years of age and older who patronized the legally registered and licensed alcohol consumption venues in Gaborone that were included in the study sampling frame.

[2] The government of Botswana enacted a national alcohol policy with measures to regulate alcohol consumption in the country (Pitso & Obot, 2011), and all alcohol consumption venues are required to be registered and licensed. The study was supported by the government of Botswana and the Ministry of Health, and therefore could not include venues that the government was taking action to eliminate. Consequently, the sample was limited to patrons from legal alcohol consumption venues that are registered with the Botswana Ministry of Trade and Industry.

Community mobilization

A community awareness campaign was implemented prior to the start of data collection. The purpose of the campaign was to inform venue owners, staff, and surrounding community about the study and give them the opportunity to have their concerns and questions addressed. It also served to delink the study from ongoing national measures being implemented to control drinking in the country, and also to assure venue staff that the research team would not interfere with routine business activities at the venues during data collection.

A locally known community advocate coordinated meetings that introduced the study to stakeholders in the target communities including the local leadership (Members of Parliament, Parliamentary Health Committee, *Ntlo ya Dikgosi* [House of Chiefs], District Health Management Teams, Councilors, and Ward/Village Development Committees). Meetings were also conducted with venue owners and their staff to discuss the study procedures and promote buy-in and participation. Local police authorities were also informed of the study so they could be available as needed during data collection.

Informational posters and flyers were developed by the local contractor and distributed within public areas of the target community and at venues approximately a month prior to the start of data collection. The purpose of these materials was to promote awareness of planned activities among patrons and the community.

Data collection tools

Behavioral risk survey

A quantitative behavioral surveillance instrument developed in collaboration with the Botswana Ministry of Health (MOH), CDC Botswana, the study technical working group and Motlabaseyo Integrated Management Services (MIMS), a local contracting organization, was used to collect information from patrons of participating alcohol consumption venues. Domains of inquiry included: demographic data; patterns and amount of alcohol use; alcohol expectancies (individual beliefs about the effects of alcohol on interpersonal interactions, sexual desires and performance, and condom use that shape experiences), sexual behavior after alcohol consumption including HIV risk behaviors; history of HIV testing; and knowledge of HIV prevention behaviors. (See **Appendix I**: Behavioral Risk Survey).

The Alcohol Use Disorders Identification Test (AUDIT) (Babor et al., 2001) was incorporated into the survey to assess level of drinking among participants. The AUDIT tool is a ten-item screening test developed to characterize drinking patterns on a typical day or within the past 12 months, and to assist in the identification of individuals with hazardous and harmful patterns of alcohol consumption. Questions 1–3 assess hazardous alcohol use, questions 4–6 assess dependence symptoms, and questions 7–10 assess harmful alcohol use. AUDIT responses are scored according to the following escalating categories of risk: 1) low risk drinking or abstinence for scores less than eight; 2) excess risk for scores from eight to fifteen; 3) harmful or hazardous drinking for scores from sixteen to nineteen; and 4) possible dependence for scores of twenty and greater.

Serological survey

HIV testing was conducted to estimate the prevalence of HIV infection among patrons of alcohol consumption venues. HTC services were offered to consenting participants and a rapid HIV test was conducted according to the Botswana HIV rapid testing algorithm. Each of the field teams was equipped with a mobile HIV testing van for the serological study. To protect participant privacy, the van did not have any obvious information on it that could link it to the study or to HTC activities.

The Government of Botswana testing algorithm for rapid HIV tests employs a dual-test strategy with two tests administered in parallel (KHB and Unigold) and a tie-breaker test (Oraquick HIV 1/2) as necessary for discordant results[3].

Quality assurance for HIV rapid testing

Lay counselors who conducted HIV Testing and Counseling (HTC) for the study were nationally certified technicians with established experience providing HTC services to the population. In addition, the BOTUSA Laboratory Technical Advisor and his staff of counseling and testing specialists successfully validated the skills of the lay counselors in a practical laboratory session.

The study also participated in the national quality assurance (QA) program for rapid testing. Random samples from the study were retested by the national laboratory using Murex HIV 1.2.0 test and Vironostika Uniform II plus O EIA in parallel. Any discordant result during the QA was resolved by using western blot (E. C. Bile, personal communication, August 6, 2012). During the study, dried blood spot samples were taken from a random 20% of the participants who consented to and completed an HIV rapid test. 120 samples were forwarded to the national laboratory for results validation and yielded a test results agreement rate of 100% for both ELISA and Western Blot.

The research team

A local contractor, Motlabaseyo Integrated Management Services (MIMS), worked with Research to Prevention (R2P) technical staff to conduct the study. The local research team included two field teams each comprising of one enumerator, three survey interviewers, one lay counselor, and one team leader. The data collectors were experienced in survey research and the lay counselors were certified in HTC and had been trained to administer rapid HIV tests according to Botswana national guidelines.

In addition, a Technical Working Group of local experts and stakeholders convened by the Botswana MOH provided advice and guidance regarding the local context to facilitate a successful study.

Team training

A training workshop was conducted for the research team on the technical aspects of conducting the study. Training included content on TLS methodology, the study survey instruments, assessing level of sobriety among participants, and use of global positioning satellite units (GPS) and android mobile phones for behavioral and serological data collection. It also included training on effective and non-judgmental approaches to obtaining information on sensitive topics such as alcohol use, sexual risk

[3] Discordant rates for Rapid HIV testing in the country are about 2% (personal communication with Laboratory Technical Advisor, CDC-BOTUSA, 4 November, 2010).

behaviors, and HIV status, as well as logistical processes for fieldwork, safety in the field, quality assurance, and database development.

The training workshop included a one-day field-based component to allow for a practical post-training application of the study methodology and learned concepts by the study team. The practical component also served as a pilot of the TLS methods and data collection instruments in the field, and provided critical information about local terms and phrases regarding alcohol use and HIV that helped to contextualize the quantitative survey. The pilot testing was conducted, though it did not result in any changes to the survey instrument, recruitment or data collection methods.

Sampling

Sample size estimation

The target sample size calculated was 896 participants. For this study, the characteristic of interest for sample size calculation was the proportion of individuals engaging in any HIV risk behavior after alcohol consumption, such as failure to use a condom during sexual activity. However, minimal data is currently available from Botswana on proportions of people engaging in risky behaviors overall, or having unprotected sex after drinking alcohol or attending an alcohol consumption venue. In the absence of specific and current information on estimates for risk behaviors among individuals who have consumed alcohol in the study area for sample size estimation, we assumed a proportion of 50% in the proportion of individuals engaging in any risk behavior after alcohol consumption (P1) to maximize variability.

Using 50% for the characteristic of interest (P1), a design effect of 2 to accommodate the cluster design, alpha level of 0.05, and power set at 80%, we required a sample of 338 adults to address the key aims of the study. We estimated a refusal rate of 35% as the study detracts from the primary purpose for respondents' presence at alcohol consumption venues. This increased the expected sample size from 338 to 520. We oversampled by 3.5% to compensate for any surveys that could not be used, further increasing the sample size to 538. A TLS survey conducted in *shebeens* in Namibia (Glenshaw & DeLuca, 2010) estimated an effect size of 15% for the local population, comparable to our estimate for change in risk estimates over survey waves. As we expected more participants to consent to the risk survey than to the HIV testing, we increased the sample size by about 40%. This yielded a total sample of 896 participants.

Validating the sampling frame

Prior to starting data collection, community walk-throughs were conducted to identify new venues and those that were no longer in operation to update the sampling frame. Visits were made to all of the 60 venues in the sampling frame to verify that each venue still met the initial inclusion criteria, the owner/manager was still willing to participate in the study, and the venue contact information was valid. Venue inclusion criteria for the study were that the venue had been screened and included in the sampling frame. Exclusion criteria were that the establishment was not registered and licensed with Botswana Ministry of Trade and Industry; had no facilities to both sell and consume alcohol on site; the owner/manager refused to give consent for participation in the study; or the establishment had not been included in the sampling frame.

At the completion of the validation of the sampling frame, there were 53 venues that remained eligible and willing to participate in the study. Of the original 60 venues in the sampling frame, four had closed down, one had relocated to an unknown location, one had changed ownership and the new owners did not want to participate, and one had burned down. No new venues were added to the sampling frame.

Enumeration and recruitment

Sampling calendars

Sampling calendars with sampling events that indicated VDTs to be visited for participant recruitment were created each month during the data collection phase. Venues and their VDTs were randomly selected from the sampling frame without replacement each month, with two alternate VDTs for each sampling event as back-up locations. This was necessary for instances where venues may be inaccessible, closed, refuse participation, or produce too few potential participants. Where a randomly selected venue had multiple VDT sampling units for a specific day, random selection of the VDTs for that site was conducted. Each field team was provided a sampling calendar for each month of data collection and each team worked simultaneously at different venues during data collection.

Venue enumeration

The data collection team assessed the environment around the entrance to the venue, and noted the different approaches used by patrons to enter the venue. The team constructed an invisible enumeration line close to the entrance(s) that captured the most number of approaches and patrons approaching the venue entrance. At the start of the VDT sampling unit, the enumerator used a clicker to count all the patrons crossing the invisible enumeration line; individuals who crossed this "line" were considered to have intent to enter the venue. These individuals were consecutively approached by data collectors for recruitment into the study. When all data collectors were engaged with patrons the enumerator continued to count with the clicker all the patrons that crossed the enumeration line; these counts reflected attendance patterns and probabilities of selection, and were used to weight the data during data analysis. The team leader also kept counts of all patrons approached by interviewers who were not eligible for participation, who refused participation, and who gave their consent to participate in either the behavioral survey, serological survey, or both.

At the end of each VDT period, the enumerator calculated the rates for attendance, patron screening, refusals, eligibility, and consents given.

Recruitment

At the time of recruitment, patrons were asked whether they had had any alcohol to drink prior to coming to the venue. Their level of sobriety was subjectively assessed by looking for signs of impairment by alcohol such as the smell of alcohol on the breath or person, unsteady gait, glazed eyes, close personal distance, and slurred speech. Potential participants who presented with obvious symptoms of being under the influence of alcohol were denied participation in the study. Only those who were subjectively judged to not be impaired by alcohol according to the above indicators were screened for eligibility to participate in the study. Criteria for individual participation included the following: Participant was 18 years of age or older; resided in Gaborone; was patronizing an alcohol consumption

venue that was included in the sampling frame with the intent to purchase and drink alcohol on the premises; was subjectively assessed to not be under the influence of alcohol; and gave informed consent. Individuals were excluded if they were younger than 18 years of age; did not reside in Gaborone; did not intend to purchase and drink alcohol at the venue; were subjectively assessed to be under the influence of alcohol and thus unable to give consent; and if they declined to participate in the study.

Patrons who were eligible to participate and who provided informed oral consent were provided a unique code for their participation and then were escorted to a quiet and private area near the venue to complete the behavioral risk survey.

Consent process

Informed oral consent was obtained prior to data collection and HIV testing by the trained data collectors. For each eligible individual being recruited into study, the data collector read the approved consent form in either English or Setswana, depending on the preference of the participant. All potential participants were encouraged to ask questions about the study. Data collectors also provided written information about the study to all eligible participants.

Lay counselors also obtained informed oral consent from participants who were interested in HIV testing prior to the collection of the blood specimen for the rapid HIV test. Participants who declined the HIV test and participated only in the behavioral risk survey, and vice versa, were not excluded from the study. Participants who declined HTC services were provided information about where they could get tested for HIV in the future.

Data collection

The risk survey took about thirty minutes to complete and the data were captured electronically on android mobile phones using the EpiSurveyor software program. The use of mobile phone technology to collect the data helped to minimize perceptions of obtrusiveness at the venues, promoted privacy, and minimized data entry omissions and errors.

For participants who were willing to complete both the survey and get tested for HIV, the data collector suggested that HTC services could be conducted first, and the quantitative survey was completed while the participant was waiting for the results of the HIV test. However, the choice to either complete the risk survey or the HIV test first was the participant's to make.

Participants verbalizing interest in HTC services were assigned a unique code by the team leader, and escorted to the onsite lay counselors for pre-counseling, informed oral consent, rapid testing, and post-counseling with referrals as needed. The team leader provided the assigned unique code to the lay counselor who used this code for all information and test results related to the participant. The code was entered into the data collection form on the mobile phone and verified by the team leader.

While waiting for test results, participants who expressed an interest in completing the risk survey were escorted to a data collector to do so. The team leader provided the participant's unique code previously

assigned during HIV testing to the data collector to enable linking of the survey and serological data. The code was entered into the mobile phone used by the data collector and double-checked by the team leader. At the completion of the risk survey, participants returned to the lay counselor to receive their HIV test results, post counseling and referral services. As part of standard HTC services offered in Botswana, counselors were knowledgeable about contact and referral information for local resources, advocacy groups, and organizations that study participants might find useful after they received their HIV testing results. These resources included treatment services, support groups, drug rehabilitation centers, and health centers.

After completing the behavioral risk survey, and/or the HIV test, participants were given a t-shirt as a token of appreciation.

Data security

Mobile phones used to collect the data were password protected. The risk of data loss was minimized by supplying two memory cards for each mobile phone. The phones were collected by the study team leader at the end of each day of data collection and transported to the MIMS office where the data were downloaded to a secure password protected computer. After the data were downloaded, all data from the memory card were erased. Data in the computer was backed-up to a portable hard disk daily.

All copies of the database, data files, and data storage devices were password protected and kept in a locked file cabinet in the field supervisor's office, which was locked when unoccupied. Only members of the study team had access to the data, including investigators, research assistants, and interviewers.

Data analysis

Calculation of weights:

Data were weighted to adjust for unequal selection probabilities at different venues. Assigning probability weights permitted generalization to the population of persons who attended locations in the sampling frame (Raymond et al., 2010; Karon, 2005). TLS is considered an approximation of random sampling in that each venue/VDT has an equal chance of inclusion. Nonetheless, differences in the attendance pattern at different venues could potentially introduce different sampling probabilities and clustering, of which the weighting attempts to adjust for.

Weighting was achieved by using the enumeration count of each event as the basis for the weight. This was calculated as the ratio of the number of persons enrolled to the number of eligible persons at each recruitment event. The following steps were carried out for each VDT in the database:

1. Calculated the probability of being enumerated: The total count for attendance at the venue during the VDT divided by the grand total count for attendance at all venues during the study.

2. Calculated the probability of being interviewed: The total number of interviews conducted during the VDT divided by the total number of interviews conducted for the study.

3. Calculated the weight for each VDT:

$$\text{pWeight} = \frac{\text{probability of being enumerated}}{\text{probability of being interviewed}}$$

We did not employ additional statistical adjustments during analysis for several reasons. First, although adjusting standard errors in TLS data is ideal for population-level inference, we believe that our results cannot be generalized to the larger population of licensed venues and results are relevant only to our sample for the following reasons: half of the licensed venues approached in Phase I for screening either refused or were not eligible to participate (possibly not representative of licensed venues), and 30% of the patrons approached, refused HTC (possibly not representative of all patrons of venues). Karon and Wejnert (2010) describe two publications derived from TLS data, one estimating prevalence and the other using logistic regression analyses, show that TLS data were regarded as simple random samples where potential clustering within venues and weighting is not considered. Consequently, estimates from the analyses could only be used to describe a population resembling the sample. For this study, although venues and VDTs were randomly selected to the sampling calendars, we believe that our results may not be transferable to the larger population of patrons of licensed venues and can only be used to describe our sample.

Second, according to Raymond et al., (2010), TLS usually produces many small clusters (rather than a few large homogenous clusters) and this tends to minimize design effects and changes between crude and adjusted estimates. We had included a moderate design effect of 2 in the sample calculation to counteract any homogeneity, if present, within venues. The authors also posit that in typical practice, where the numbers of venues is high, the number of subjects per venue is small and there is heterogeneity at the venues, minimal adjustments to standard errors are required. Our study produced many small clusters (specifically 44 venues) and sub-clusters (specifically 126 VDTs), an average of 20 participants per venue, with a good mix of gender, age, marital status and demographic characteristics across venues. We did not have any venues that were specifically patronized by a sub-group of individuals defined by behavior or demographic characteristic.

Analytical methods:

Data were analyzed using SPSS statistical software version 20. The characteristics of the sample were described by demographic data and prevalence estimates for drinking and sexual risk behaviors were derived. Alcohol consumption defined by level of drinking was analyzed as a dependent variable as well as a primary independent variable. The primary transmission risk variable was unprotected sexual intercourse after drinking alcohol. Other risk variables of interest included partner types, number of partners, concurrent partners and condom use/non-use after drinking alcohol.

A review of the sampling frame developed during Phase I showed that the distributions for venue-type and venue location were greatly skewed..Consequently, we did not conduct sub-group analysis by venue type or venue location. In keeping with IRB requirements, participants were offered the choice to refuse to respond to any of the questions. Small groups of individuals refused to respond to some of the questions. We excluded from the analysis those numbers of refusals that were so low they affected the accuracy of sub-group categorical association analysis (chi squares).

Pearson chi-square tests were used to assess associations among categorical variables. Unadjusted and multiple logistic regressions were also used to identify significant correlates of level of drinking and HIV status. Analysis was also conducted among sub-groups of interest specifically by gender, first-time testers for HIV infection, and participants who stated that they were aware of their HIV status at the time they participated in the study.

Categorical composite scores were computed for the following:

1. **HIV knowledge score**: Fourteen knowledge-based questions were used to assess HIV knowledge. Correct responses were summed up and a knowledge score variable was created. More than 50% of the sample achieved 13 correct responses and the median was also 13. We therefore used the difference in frequencies between each score to identify a change in the frequency curve to select a cut-off point for creating a dichotomous variable. At a score of nine, there was a marked increase in the frequency of correct responses among participants. We created a dichotomous variable for "some knowledge" (for participants who scored nine points or less) and "good knowledge" (for participants who had a score of ten points or more).
2. **Alcohol expectancies score:** Nine questions were used to assess alcohol expectancies. Participant responses were re-coded into a new variable that reflected a score of one point for every response that reflected an expectancy that increased risk of HIV infection. Total scores were calculated for all participants and the frequency distribution of the raw scores was used to create a categorical variable for No/Minimal (0), Moderate (1-2), and High (3 or more) expectancies.
3. **Risk behavior score:** Nine questions from the survey that assessed risk behaviors after drinking alcohol among participants were used to create a risk behavior score. The risk-related questions included sex after drinking alcohol, partner type, number of sexual partners in the past year, concurrency of partners, number of partners met at venues and after drinking in the past year, sex with a person met at an alcohol venue on the day of first meeting, condom use/non-use and frequency of condom use, both after drinking alcohol. Participant responses were re-coded into a new variable that reflected a score of one point for the presence of a behavior that increased risk for HIV infection. Total scores were calculated for all participants and categorized into a dichotomous variable reflecting "Few" risk behaviors (score of 0-5) and "Many" risk behaviors (score of 6-9).
4. **Level of drinking:** Ten questions comprised the AUDIT tool. Scores were calculated and a categorical variable was created based on the following established risk categories for interpreting the tool[4]: Low Risk (score of less than 8 points), Excess Risk (score of 8 to 15 points),

[4] *Excess Risk*: causes illness and distress to the drinker and his or her family and friends. Hazardous Drinking: increases the risk of harmful consequences for user or others. *Harmful Drinking*: results in consequences to physical and mental health. *Possible Dependence*: a strong desire to consume alcohol, impaired control over its use, persistent drinking despite harmful consequences, higher priority given drinking over obligations, increased tolerance and physical withdrawal symptoms. (Source: Babor, T., Higgins-Biddle, J., Saunders, J. & Monteiro, M. (2001). *AUDIT: the alcohol use disorders identification test, guidelines for use in primary care (Second Edition)*. Geneva, Switzerland: World Health Organization.)

Harmful/Hazardous (score of 16-19 points), Possible Dependence (score of 20 points or more). The total possible score is 40 points.

Analyses were conducted based on the raw score variables as well as the categorical variables.

Ethics and institutional approvals

Institutional Review Board approvals for the study were obtained from the Health Research and Development Committee of the MOH in Botswana, the Division of Human Research Protection, Office of the Associate Director for Science/Laboratory Science at the Center for Disease Control and Prevention, Atlanta, Georgia, and the Johns Hopkins University School of Public Health in Baltimore, Maryland.

The study investigators as well as all the field team members were trained and certified in ethical issues for conducting human subjects' research.

RESULTS

Recruitment

A total of 7,546 individuals were enumerated from 44 venues that were randomly selected for participation from a sampling frame of 53 venues; this represented about 83% of the venues in the sampling frame. A total of 126 VDTs were randomly selected from these venues and scheduled for data collection.

Of the 7,546 patrons enumerated, 1894 patrons were intercepted by a data collector. 1,504 (80%) accepted the interception and were screened for eligibility. Three hundred and ninety declined interest and rejected the interception resulting in a refusal rate of 20%. Of those screened for eligibility, 1191 (79%) were eligible to participate. Main reasons for ineligibility included previous participation (21%), perceived to be drunk (19%), not drinking at the venue (6%), not meeting minimal age criteria (6%), and not purchasing alcohol (4%).

The final sample size was 896 patrons who consented to participate. This reflected a recruitment rate of 75%. Among these, 258 (28.8%) consented to just the survey, eight (0.9%) consented to just HIV testing, and 630 (70.3%) consented to both the survey and HIV testing.

Description of participants

Demographic characteristics

Table 1 summarizes the demographic characteristics of the participants. Of the 896 participants, 67.3% were male. Approximately one-forth (25.2%) resided in Gaborone Central and one-forth (23.7%) in Gaborone West; Gaborone East, North, and South areas accounted for 18.8%, 16.9%, and 15.4%, respectively. Sixty percent of participants were 20 to 29 years old (61.6%), 24.8% were 30 to 39 years, 7.3% were 40 to 49 years old, while less than 20 year olds and greater than 50 year olds accounted for a minority.

Almost half of the participants reported that they were single (75.1%), 14.0% were cohabiting, and 9.4% were married. The majority of the participants were educated with more than half (54.0%) reporting that they had completed secondary education and 40.5% reporting education beyond secondary school. Most of the participants were Christians (69.9%), while about a fifth (18.9%) reported having no religion.

Over two-thirds (67.5%) of participants were employed; among these, 39.2% were employed in professional jobs, 19.7% were in unskilled jobs, and 15.5% were artisans. Entrepreneurs, students, farmers, disciplined force members, and other occupations accounted for about one-quarter of employed participants (n=151).

Drinking behaviors

Venue patronage:

The majority of participants (70.1%) reported that they drank alcohol at the venue where they were

interviewed either on weekends or on a monthly basis compared to a few (9.0%) who visited that venue on a daily basis. Similar proportions of participants (72.4%) also visited other venues on weekends or monthly. Most of the participants visited the venue between six and seven o'clock in the evening (32%); however, substantial proportions also arrived at venues between four and six in the afternoon (23.3%) or after seven o'clock in evening (27.5%). More than two-thirds of the participants usually visited the venue with their friends (68.5%) while a fifth reported going to the venues on their own (20%). Few participants reported going to alcohol venues with their relatives, work mates, or girl/boyfriends.

Types and amount of alcohol:

The majority of participants reported that in the last 12 months they mostly drank beer, draft, or lager (81.1%), followed by cider (12.8%). Similar proportions were reported for the last time participants drank alcohol. Very few participants had consumed chibuku, spirits, wine, or traditional brews within the past year or at the last time they drank alcohol. Over half of the participants (57.2%) usually drank 350ml bottles of alcohol and more than a third (36.8%) usually drank 720 ml bottles of alcohol.

Patterns of alcohol use:

Almost half of the participants reported that they usually drank alcohol only on weekends (45.5%). However, almost one-fifth of all participants drank alcohol at least three times a week (21.6%). Only 10.2% of participants reported that they drank alcohol daily. Over half (58.1%) of the participants drank alcohol in the evening and also usually drank alcohol with their friends (76.2%). More than 12% drank alone, and very few drank alcohol with relatives, work mates, or their girl- or boyfriends. The main reasons for drinking alcohol cited by participants included to have fun (55.9%), to relax (30.1%), and to relieve stress (6.8%).

Three-fourths of all participants stated that they usually did not share their alcoholic drinks with anyone. Among those who shared their alcoholic drinks, the majority did so with two or more others (79.6%).

Level of drinking:

A total of 887 (99%) participants completed the AUDIT screening tool. Participant responses to the AUDIT screening tool are presented in Appendix III. Overall, just under half (45.8%) of the participants drank alcohol a minimum of twice a week; among these, 35.2% drank alcohol four or more times a week. A majority of males and females reported having five or more standard units of alcohol on a typical drinking day; however, more males (84.0%) than females (77.9%) drank more than five standard units of alcohol on a typical day ($p=0.001$). More than ten standard units were consumed by 29.2% of participants on a typical drinking day.

The majority of participants reported that they had: never been unable to stop drinking once they had started (70.2%); not failed to do what was expected of them because of drinking (69.2%); never needed a first drink in the morning (78%); never felt guilt or remorse after drinking (55.4%); never forgotten the previous night's activities because of drinking (71.7%); not suffered or caused injury to others as a result of their drinking (70.0%); and not had others express concern over their drinking or suggest that they cut back (50.3%).

Composite scores for AUDIT ranged from 3-38 points with a mean of 12.1 points (SD: 6.35). A quarter of participants (25.8%) were classified as "Low Risk," almost half (46.9%) had "Excess Risk," over 13.0% demonstrated "Harmful" or "Hazardous" drinking, and 13.0% were classified as having "Possible Dependence." When assessed by gender, the mean score for males (12.6; SD: 6.3) was significantly higher than that for females (11.02; SD: 6.27) (p=0.001).

Alcohol expectancies:

Participants responded to nine questions about whether alcohol improved, did not affect, or worsened specific personal, interpersonal, and sexual experiences. For all questions, the majority of participants stated that drinking alcohol did not change their expectancies or experiences. However, almost one-third of participants (32.0%) stated that their desire to have sex with their spouse or regular partner improved after drinking alcohol, more than a quarter (26.2%) had "improved" desire to have sex with a casual partner, 25.6% had "improved" sexual pleasure, and about one-third (31.1%) reported "improved" sexual performance.

The courage to approach someone for sex "improved" after drinking alcohol for over a quarter of participants (28.4%). However, the ability to resist sexual advances worsened for a similar proportion (24.7%). There was also a worsening of the desire to use condoms (14.3%), ability to remember to use condoms (13.1%) and ability to correctly use condoms (15.2%). Of note, slightly more participants perceived that drinking alcohol improved (rather than worsened) their desire to use condoms, ability to remember to use condoms, and ability to correctly use condoms (25.0%, 23.6%, and 17.2%, respectively).

Composite scores for alcohol expectancies were calculated for participants and ranged from zero to eight with a mean score of 1.9 (SD: 1.99). About a third of the participants each had "Minimal" expectancies (n=309; 34.8%), "Moderate" expectancies (n=279; 31.4%) and "High" expectancies (n=300; 33.8%).

Sexual behaviors

Alcohol-related sexual behaviors:

Over forty percent of participants reported they met at least one of their sexual partners during the last 12 months after drinking alcohol, and 25.8% reported meeting two or more partners. Among those who had met at least one sexual partner after drinking alcohol, the majority (82.2%) reported that they were single, 12.4% reported they were in a cohabiting relationship, less than 5% reported that they were married, and less than 1% reported that they were divorced. More than a quarter of patrons (27.7%) reported they had met two or more of their sexual partners at alcohol venues in the last year. Significantly more men (29.7%) than females (20.4%) had met two or more partners at alcohol venues (p=0.004). The majority of these patrons were single (83.1%), 13.4% reported being in a cohabiting relationship, and 3.5% stated they were married. The overwhelming majority of participants reported ever having sex after drinking alcohol (96.3%). For the majority of these participants, their last sexual encounter after drinking alcohol was with their girlfriend or boyfriend (64.3%) or with a casual partner

(17.3%). Spouses and new partners accounted for about 8% each. Only two participants reported sex with a commercial sex worker the last time they had sex after drinking alcohol.

Overall, more than a quarter of participants (26.4%) reported that their sexual partner was casual, new, or a sex worker the last time they drank alcohol and had sex; significantly more males (28.6%) than females (19.6%) reported having sex with this type of partner (p=0.006) the last time they drank alcohol and had sex. More than a third (35.2%) of participants reported that they had had sex with a partner the same night that they had first met them at the alcohol venue; significantly more males (41.7%) than females (23.4%) reported that they had done so (p=0.001). Almost half of the participants (48.6%) had two or more sexual partners after drinking alcohol in the last year, and more than a third of participants who had multiple partners stated that the relationships occurred concurrently (33.7%).

More than three-fourths of the participants (79.8%) stated that they had used a condom the last time they had sex after drinking alcohol. In addition, almost half (48.5%) of those surveyed stated that in the last 12 months, they had always used a condom when they had sex after drinking alcohol. Almost all of the participants (95.6%) said they would like to see condoms made available at alcohol venues and 88.5% said they would use condoms that were available at alcohol venues.

Risk Behavior Scores: Composite scores for numbers of risk behaviors were calculated for participants and ranged from one to nine, with a mean score of 5.3 behaviors (SD: 1.3). The majority of participants (59.5%) had five or less risk behaviors compared with 40.5% with more than five risk behaviors.

Differences in sexual behaviors were assessed for those who participated in HTC and those who did not during the study. More patrons who tested for HIV during the study reported that the last time they had sex after drinking alcohol was with a risky partner (28.6%) compared to those who did not get tested for HIV during the study (19.4%) (p=0.002). In addition, more patrons who did get tested reported they did not always use a condom during sex (49.6%) compared to non-testers (40.2%) (p=0.006). There was marginal significance between the testing group (18.3%) and non-testing group (12.2%) for not using a condom during their last sexual encounter after drinking alcohol (p=0.057). There were no differences between the two groups for sex after drinking alcohol, number of sexual partners in the last 12 months, having concurrent partnerships, and number of sexual partners met at venues or after drinking alcohol.

HIV Infection

Knowledge of HIV:
Participants responded to fourteen questions about individual beliefs about HIV infection, transmission, and prevention. The results are summarized in **Table 2**.

Almost every participant (98.2%) had heard about HIV. The majority of participants agreed that: a person with multiple partners had a higher risk of acquiring HIV (97.5%); a person could be unaware that they had HIV (97.1%); always using a condom during sexual activity could reduce one's risk of HIV infection (96.4%); a healthy looking person could have HIV (94.0%); condoms are the best protection against HIV infection (91.4%); having sex after drinking alcohol could increase one's risk of HIV infection

(90.4%); abstinence prevents HIV infection (86.2%); one sexual encounter with an infected individual could transmit HIV (86.1%); and HIV infection is permanent (82.4%).

The majority of participants disagreed that: HIV was caused by witchcraft and supernatural means (93.6%), circumcised men did not need to use condoms (95.4%), one does not have HIV infection if their partner has a negative HIV test result (90.5%), bathing would rid one of HIV infection (80.0%), and mosquitoes can transmit HIV infection (70.5%).

Although over 90% of the sample knew that having sex after drinking alcohol increased one's risk of HIV infection, just over half of the participants (51.1%) believed that they were at risk of acquiring HIV infection when they were drinking.

Composite scores were generated for HIV knowledge with scores ranging from five to fourteen points with a mean score of 12.6 points (SD: 1.5). Almost all the participants (96.4%) demonstrated "good knowledge" of HIV (score of ten or more points).

Awareness of HIV status:

A large proportion of participants reported that they had been tested for HIV in the past (83.7%). Common reasons for getting an HIV test among those who had been tested before included routine testing (45%), participating in a risk behavior (12.9%), and during pregnancy (10.6%). The majority of participants received their HIV counseling and testing in a public health facility (41.6%), a Tebelopele VCT[5] site (19%) or a VCT site (17%). Minimal numbers were tested by mini Tebelopele, private facilities, or door-to-door services.

Among participants who reported having been tested for HIV before, the majority (89.3%) reported that their test result was negative, 5.9% had positive results, 1.2% reported indeterminate results, 1.2% stated they had not returned for their HIV test results, and 2.4% refused to answer the question.

Prevalence of HIV among patrons of alcohol consumption venues

HIV prevalence by participant demographics

A total of 638 (71.2%) participants consented to and received HTC services during the study. Ninety-four participants (14.7%) had positive HIV test results. There was one indeterminate result[6], which was removed from analysis of the "HIV status" variable. The weighted HIV prevalence estimate was 12.7% (n=79). **Table 3** below shows HIV status by demographics of the sample.

Gender, age, education, and marital status, were significantly associated with HIV status. Specifically, a significantly higher proportion of females (17.7%) tested HIV-positive compared to males (10.1%) (p=0.007). No participants who were younger than 20 years of age tested HIV-positive. Additionally,

[5] Tebelopele Voluntary Counseling and Testing Centre (TVCT) is Botswana's largest non-governmental provider of voluntary HIV counseling and testing services.

[6] The indeterminate result was explained to the client with a recommendation that they get re-tested within one business day. The client was provided referral information for further HTC services. (See Appendix II: Botswana National Algorithm for Rapid HIV Testing).

prevalence of HIV was higher among participants who were 35 years of age and older, and highest among those who were 50 years of age and older.

HIV-positive status was also highest among participants who reported having only a primary level of education; proportions who were HIV-positive decreased as level of education increased. Positive HIV status was lowest among married individuals; however half of participants who tested for HIV and reported being divorced were HIV-positive.

Gaborone North and Central areas had the highest proportions of HIV-positive participants; however, HIV status did not vary significantly by community where participants lived. There was no significant difference in HIV status by religion or by employment.

HIV prevalence among first-time testers

Table 4 summarizes HIV prevalence by results of participants' prior HIV test. There was a strong association between HIV status based on testing results from the study and self reported results from a prior HIV test (p=0.001). A majority of HIV-positive participants who had sero-positive results from the study also reported a prior HIV-positive test (77.8%), whereas 6.7% of individuals who said they were HIV-negative at a prior test tested HIV-positive during the study.

More than a fifth of participants (20.2%) who were not aware of their status (i.e., had never been tested, did not return for their prior test results, or tested indeterminate) tested HIV-positive during the study.

Ninety-six participants (16.1%) reported that they had never been tested for HIV. There was a marginally significant association between HIV prevalence and ever having had an HIV test (p=0.052). Among these first-time testers, a higher proportion were HIV-positive (18.8%) compared to participants who were repeat testers (11.6%).

HIV prevalence by level of drinking

Table 5 summarizes HIV prevalence by level of drinking as defined by AUDIT. Although proportions for HIV-positive status were observed to be highest among participants classified as having a "Possible Dependence" level of drinking, there was no significant association between HIV status and level of drinking. There was also no significant association between HIV status and Low Risk level of drinking compared to Excess Risk or worse (i.e., all other level of drinking categories) (p=0.519) overall and when stratified by gender. Additional analysis by volume of alcohol consumed showed that there was no significant change in HIV prevalence by volume of alcohol measured in standard units of alcohol consumed on a typical drinking day for all the participants (p=0.389). When stratified by gender, HIV prevalence increased among men as volume of alcohol consumed increased beyond 3-4 standard units of alcohol (p=0.005).

HIV prevalence by knowledge of HIV

Chi Square associations between HIV Status and composite scores for HIV-related knowledge, alcohol expectancies, risk behaviors are displayed in **Table 6**. Only three of the fourteen HIV knowledge questions showed a significant association with HIV prevalence. HIV prevalence varied significantly for

the question on male circumcision ("*If a man is circumcised, he does not need to use condoms"*). Over ten percent (11.8%) of participants who gave the correct answer tested HIV-positive, compared with 31.6% of participants who answered incorrectly (p=0.01). HIV prevalence was significantly higher (p=0.025) among participants who did not know the answer to the question "*If your sex partner tests negative for HIV, then you know you do not have HIV*", (41.7%) compared to those who answered "true" (11.8%) or "false" (12.2%). HIV prevalence was also marginally significant (p=0.050) and higher (19.4%) among participants who did not know the answer to "*A person can get the HIV virus from mosquito bites*" compared to those who answered it incorrectly (16.3%) or correctly (10.4%).

There was no significant difference between the mean HIV knowledge score for participants who tested HIV-negative versus positive (p=0.41). HIV prevalence also did not vary significantly by category of HIV knowledge, as similar proportions of participants with "some knowledge" and "good knowledge" of HIV tested HIV-positive (12.5% and 12.7%, respectively; p=0.972).

HIV prevalence by alcohol expectancies

There was no significant difference in the mean alcohol expectancies scores for participants who tested HIV-negative versus HIV-positive (2.09, and 1.97, respectively; p=0.65). Similarly, there was no difference in HIV prevalence by alcohol expectancies. Approximately 13% of participants with minimal level of expectancies were HIV-positive, compared with 15% with moderate level of expectancies, and 10% of participants with a high level of expectancies (p=0.349).

HIV prevalence by risk behavior scores

There was no difference in the mean risk behavior scores for participants who tested HIV-negative compared to HIV-positive (5.31 versus 5.55; p=0.16). Similarly, the Pearson chi-square association between HIV prevalence and categorized risk behaviors was not significant: Among participants who received an HIV test, 11.6% of those with few risky behaviors tested positive and 14.2% of those with high number of risky behaviors tested positive (p=0.356).

Sexual behaviors associated with HIV infection among patrons of alcohol consumption venues

For all participants, there were no significant associations for HIV status by having sex after drinking, type of sexual partner, number of sexual partners in the last 12 months, concurrent sexual partners, rates of condom use with last sex, and frequency of condom use. Additional analysis by demographic subgroups (gender, age, community, education, marital status, employment status) was conducted and is presented in **Table 7** and summarized below.

Had sex after drinking

Participants responded "yes" or "no" to a question on whether they had ever had sex after drinking alcohol. Gender, age, education and marital status were significantly associated with HIV status. Among participants who reported ever having had sex after drinking alcohol, significantly more females (18.1%) were HIV-positive compared to males (10.5%) (p=0.011).

Among participants who reported they had ever had sex after drinking alcohol, age was significantly related to HIV positive status (p=0.001). Almost a third of the participants who were 35-39 years old (31.1%) and 50 years old and older (33.3%) tested HIV-positive. In addition, about a quarter of those who were 40-44 years old (25.7%) and 45-49 years old (23.1%) also tested HIV-positive.

For this group of participants, those who reported having only a primary level of education had the highest proportion of HIV-positive participants (28.1%) (p=0.001). Participants with a secondary level of education had HIV-positive prevalence of 15.5%. Half of the divorced participants in this sub-group tested HIV-positive compared to 11.8% of single and 20.2% of cohabiting individuals. Less than ten percent (9.1%) of married participants in this sub-group tested HIV-positive.

"Risky partner" at last sex after drinking

Participants were asked to describe their last sexual partner the last time they had sex after drinking alcohol. Those who responded with casual, new, or commercial sex worker were classified as having had sex with a risky partner. Age, gender, and marital status of participants were significantly associated with HIV status for this group of participants.

A third of females (33.3%) who had had a risky partner the last time they drank alcohol and had sex tested HIV-positive compared to 11% of males (p=0.001).

Among those who reported that they had sex with a risky partner the last time they drank alcohol, the proportions who were HIV-positive increased with age (p=0.041): specifically, 8.5% of 20-24 year olds, 15.3% of 25-29 year olds, 17.9% of 30-34 year olds, 36.4% of 35-39 year olds and of 40-44 year olds, and the only participant who was 45-49 years old, were HIV-positive. A third of the participants who were at least 50 years old were HIV-positive.

Among participants who had had a risky sexual partner the last time they had drank alcohol and had sex, all those who reported they were divorced were HIV-positive (p=0.016). A quarter (25%) of the married participants and 16.9% of the single participants were also HIV-positive.

Had more than one sexual partner in the last 12 months

Among participants who reported having more than one sexual partner in the last 12 months, gender, age, community, and level of education were significantly related to HIV status.

Significantly more females (17.6%) were HIV-positive compared to males (9.7%) (p=0.048). The majority of participants who had more than one sexual partner in the last 12 months and who were HIV-positive were between 25 years and 44 years of age. Overall, HIV-positive status increased with age and peaked among the 35-39 year old group and decreased to zero percent among the 45-49 year old group (p=0.008). Almost one in three (31.2%) participants who were between 35-39 years of age was HIV-positive. There was a second peak in HIV-positive status among participants who were 50 years of age and older (25%).

A significantly higher proportion of participants who had more than one sexual partner and who reported that they lived in Gaborone North (n=8, 17.4%) and Gaborone Central (21.9%) areas were HIV-positive compared to other areas of Gaborone (p=0.016).

Among those with more than one sexual partner, HIV-positive status was significantly higher for those with secondary level of education (16.8%), compared to having no, primary, or beyond secondary level education (p=0.028).

Had concurrent sexual partners

Participants responded "yes" or "no" to a question on whether any of the sexual partnerships they had in the last year had occurred at the same time. Among participants who reported having concurrent sexual partnerships, gender of participant was significantly associated with HIV status; more females (22.6%) compared to males (6.2%) tested positive for HIV (p=0.020).

Met two or more sexual partners at alcohol venues

Participants reported on the number of partners that they had met at alcohol venues in the last 12 months. Participants who reported that they had met two or more sexual partners at an alcohol venue were classified as having engaged in a risk behavior. Participants reported a range of partners from zero to 75. The mean number of partners was not significantly different (t=0.115; p=0.909) for participants who tested HIV-positive (Mean: 5.57; SD: 8.5) compared to those who tested HIV-negative (Mean: 5.32; SD: 10.32).

Among this group of participants, gender, age, community, and education level were significantly related to HIV status. Significantly more females (n=11; 26.2%) who had met two or more sexual partners at venues were HIV-positive compared to males (n=14; 11.9%) (p=0.028).

Overall, among those who met two or more partners at venues in the last year, rates for HIV-positive status increased with age and were higher in the 35-39 years old group (36.4%) and 40-44 years old group (42.9%) (p=0.026).

Gaborone North (19.4%) and Central (30.2%) areas had significantly higher rates of HIV-positive participants compared to other areas (p=0.007), among those who met two or more partners at venues in the last year.

Among those who met two or more of their sexual partners at venues in the last year, more participants who reported having primary level education only were HIV-positive (75.0%) compared to other levels of education (p=0.001). Those with secondary level of education and beyond had HIV prevalence of 18.9% and 5.0% respectively.

Partners met after drinking alcohol

Participants who reported that they had met one or more partners after drinking alcohol in the last 12 months were classified as having engaged in a risk behavior. Participants reported a range for sexual partners met after drinking alcohol within the last year of 0 – 56. The mean number of partners among

those who tested HIV-positive was 2.53 (SD: 2.39) and among those who tested HIV-negative it was 3.02 (SD: 5.1), though this difference was not statistically significant (t- test 0.500; p value = 0.618).

Among this sub-group of participants, gender, age, education level and community, were significantly related to HIV status. Significantly more females (n=15; 19.2%) who had one or more sexual partners after drinking alcohol were HIV-positive compared to males (n=17; 8.9%) (p=0.017).

Among this sub-group, all participants who were 50 years or older tested positive for HIV. Prevalence of HIV was also high among 35-39 year old s (23.8%) and 25-29 year olds (20.5%) compared to other age groups (p=0.001).

Gaborone North (15.2%) and Central (20.3%) areas had significantly higher rates of HIV-positive participants compared to other areas (p=0.045), among those who met two or more partners at venues in the last year.

Among those who reported that they had met one or more sexual partners after drinking alcohol within the last year, more participants who had primary level education only were HIV-positive (n=3; 33.3%) compared to other levels of education. Those with secondary level of education and beyond had HIV prevalence of 15.9% and 1.1% respectively.

Had sex with a new partner met at venue on night of meeting

Participants responded to the question *"In the last 12 months, have you ever had sex with a person you met at a drinking venue on the same night of that meeting?"* Participants who responded "yes" were classified as having engaged in a risk behavior. Among this group of participants, gender, age, education level, and marital status were significantly related to HIV status.

Significantly more females (37.1%) who reported they had sex with a partner they met at a drinking venue on the night of the meeting tested HIV-positive compared to males (11.0%) (p=0.001).

Overall, among this sub-group, a quarter of both 25-29 and 40-44 year olds tested positive for HIV compared to 6.9% each for 20-24 and 30-34 years old groups (p=0.042). In addition, almost a fifth of those with secondary level of education tested HIV-positive (18.4%). The HIV prevalence among those who had primary level or beyond secondary level of education was 16.7% and 10.4%, respectively (p=0.062).

Among this sub-group, three-quarters of those who reported they were divorced tested positive for HIV. A quarter of cohabiting participants who had engaged in this risk behavior also tested HIV-positive. None of the married participants, however, tested HIV-positive.

Did not use condom during last sex after drinking alcohol

Participants who did not use a condom the last time they had sex after drinking alcohol were classified as having engaged in a risk behavior. Among this group of participants, there was a significant relationship between HIV status and gender, age, education level, and marital status.

Significantly more females (17.9%) who did not use a condom the last time they had sex after drinking alcohol tested HIV-positive compared to males (10.1%) (p=0.016). Overall, HIV prevalence was higher in the older age groups: Specifically half of those 50 years or older, a third of 35-39 year olds, and more than a quarter of 40-44 year olds (p=0.001).

Among this sub-group, almost a fifth of participants with primary level of education tested HIV-positive (19.0%), while for those with secondary level of education or more than secondary level of education, the HIV prevalence was of 15.9% and 6.0%, respectively (p=0.021). None of the participants with no level of education tested HIV-positive. In addition, half of participants who reported they were divorced were HIV-positive, almost a quarter of cohabiting participants (22.7%). Approximately one-tenth of the single (11.3%) and married participants (8.35%) in this sub-group also tested HIV-positive (p=0.003).

Inconsistent condom use

Participants who reported that they did not always use a condom during sex after drinking alcohol were classified as having engaged in an HIV-related risk behavior. Among these participants, there was a significant relationship between HIV status and their age and education.

Significantly more older participants tested HIV-positive in this sub-group (p=0.001): Specifically, 40.7% of 35-39 year olds, 33.3% of 40-44 year olds, 40% of 45-49 year olds and 50% of participants 50 years or older tested HIV-positive. In addition, HIV prevalence was highest among those with primary level of education (31.8%) and was lower in all the other education levels (p=0.013) specifically, 14.1% among those with secondary level and 6.6% among those with a post-secondary level of education.

Behavioral risk among target sub-groups

Problem drinkers

Pearson chi-squares were used to test the association between level of drinking and risk behaviors (**Table 8)**. There was a significant association between level of drinking and type of partner, number of partners, and using a condom at last sex. As the level of drinking increased, sex with a spouse decreased from 8.5% in those classified as “Low Risk” to 2.7% in those classified as “Possible Dependence,” and sex with a casual partner increased from 11.8% (Low Risk) to 28.3% (Possible Dependence). In addition, sex with boyfriend or girlfriend decreased from 69.2% (Low Risk) to 55.8% (Possible Dependence), and it increased with a new partner (8.1% for Low Risk to 12.4% for Possible Dependence) (p<.001). Sex with one partner decreased from 50.5% (Low Risk) to 25.2% (Possible Dependence). Sex with three or more partners also increased from 16.2% (Low Risk) to 60.9% (Possible Dependence) (p<0.001).

Use of a condom at last sex after drinking decreased from 83.3% at Low risk to 74.8% at Possible Dependence level (p=0.038).

Awareness of HIV-positive status

Sexual risk behaviors were assessed among those who reported they had had a prior positive HIV test. Of the nine risk behaviors assessed in the survey, only having a risky partner (casual, new, sex worker) was associated with HIV awareness of HIV status. Specifically, 29.3% of participants who reported they had a prior positive HIV test also stated that they had a risky partner the last time they had sex after

drinking alcohol (p=0.02) compared to 23.2% of those who reported a prior negative HIV test and 35.8% of those who were unaware of their HIV status.

First-time testers

Sexual risk behaviors were assessed among participants who tested for HIV for the first time. Of the nine risk behaviors assessed in the study, ever had sex after drinking alcohol, use of condom with last sex after drinking, and frequency of condom use in the last 12 months during sex after drinking were significantly different among first-time testers compared to other participants.

Specifically, fewer first-time HIV testers reported ever having had sex after drinking alcohol compared to other participants (90.6% versus 96.5%, respectively, p=0.013). However, more first-time testers reported that they did not use a condom the last time they had sex after drinking alcohol compared to other participants (26.0% versus 15.3%, respectively, p=0.013). The proportion of first-time testers who stated they had not always used a condom during sex after drinking alcohol in the last 12 months (54.7%) was significantly higher than the proportion for repeat testers (44.1%) (p=0.023).

Factors associated with HIV infection

Demographic factors

Univariate and multivariate logistic regressions models were used to assess the odds of being HIV-positive. As shown in **Table 9**, the odds of males being HIV-positive was significantly lower than that for females (OR=0.525, p=0.009). For every one-year increase in age, there was a 7.6% increase in the odds of being HIV-positive (p=0.001). Participants who were divorced had 6.67 higher odds of being HIV-positive compared to those who were single (p=0.025).

Participants who stated that they lived in communities in Gaborone West had 0.395 the odds of participants who lived in Gaborone Central of being HIV-positive (p=0.020). There was no significant association between education, religion, and employment and HIV sero status.

Drinking behaviors

Participants who reported that they drank alcohol only on weekends had a significantly lower odds of being HIV-positive compared with those who reported that they drank alcohol on a monthly or less basis (OR=0.548; p=0.046).

Compared to participants who reported that they drank chibuku, those who drank beer, draft or lager had a lower odds of being HIV-positive (OR=0.149; p=0.001); those who drank cider had 0.181 lower odds of being HIV-positive (p=0.003); those who drank spirits had lower odds of being HIV-positive (OR=0.077; p=0.063) and those who drank wine had 0.145 odds of being HIV-positive (p=0.078).

Participants who reported that they usually drank alcohol from a liter jug had an over seven-fold higher odds of being HIV-positive compared to those who drank their alcohol from a glass or cup (p=0.03).

Composite scores

Knowledge of HIV: Knowledge of HIV was not a significant correlate of HIV status overall, or when stratified by gender.

Level of drinking: Raw scores were not significant overall or by gender. With low risk as the reference category, level of drinking was not a significant correlate of being HIV-positive. However, among male participants only, the odds of being HIV-positive among those classified as having possible dependence was 2.95 times the odds among low risk participants (p=0.058).

Alcohol expectancies: Alcohol expectancies were not significant correlates of HIV status overall or when stratified by gender.

Behavior risk: Overall risk score was not a significant correlate of HIV status (p=0.146). However, among females, for every one-point increase in total number of risk behaviors, there was a 1.430 increase in the odds of being HIV-positive (p=0.014). Male scores were not predictive of being HIV-positive.

Multivariate regression analysis

Confounders adjusted for in the multivariate models were age, marital status, education, and community where the participant resided. Results from the multivariate regression showed that increased age, being divorced, and living in Gaborone Central area conferred higher odds of being HIV-positive.

For every one-year increase in age, there was a 1.105 increase in the odds of being HIV-positive (p=0.001). Males had 4.55 higher odds than females of being HIV-positive (p=0.005).

Participants who were divorced had 7.57 higher odds of being HIV-positive compared to single participants (p=0.036). Compared to the reference area of Gaborone Central, the odds of being HIV-positive were lower among participants who reported they lived in Gaborone South (OR: 0.433; p=0.049)

The same model run for males only, showed a similar trend as the overall model. However, among females, only age was associated with an increase in the odds of being HIV-positive (OR: 1.189; p=0.000).

A second multivariate model assessing the impact of composite scores (knowledge, alcohol expectancies, number of risk behaviors, and level of drinking-AUDIT score) and gender on HIV sero status was developed. Gender was the only significant correlate of HIV status (OR: 0.482; p=0.005). The model was developed separately for males and females; in the model for females, a high behavior risk score was a significant correlate of being HIV-positive (OR: 1.494; p= 0.009).

A third combined multivariate model for significant demographic and composite scores and AUDIT scores was developed (gender, age, marital status, community, HIV knowledge, behavior risk score, alcohol expectancies). Males compared to females (OR: 0.384; p=0.001), age (OR: 1.110; p=0.000), and living in Gaborone South compared to Gaborone Central area (OR: 0.431; p=0.050) were significant correlates of being HIV-positive.

Among males, the final model showed that age (OR: 1.082; p=0.001), being divorced compared to being single (OR: 19.6; p=0.02), and living in Gaborone South (OR: 0.277; p=0.018) and living in Gaborone East (OR: 0.315; p=0.05) compared to Gaborone Central area were significant correlates of being HIV-positive.

Among females, the final model showed that age (OR: 1.210; p=0.000) and behavior risk score (OR: 1.578; p=0.016) were significant correlates of being HIV-positive.

A final multiple regression model was developed with covariates that were significant in the unadjusted logistic regressions (age, gender, community, marital status, behavior risk score). The findings are summarized in Table 10. In this model, males had significantly lower odds (OR: 0.398) of being HIV-positive compared to females (p=0.001). In addition, age (OR: 1.101; p=0.001) and behavior risk score (OR: 1.224; p=0.044) were significant correlates of being HIV-positive.

When this model was regressed among males only, age was associated with increased odds of being HIV-positive (OR: 1.069; p=0.002), and participants who reported living in Gaborone South (OR: 0.360; p=0.049) and Gaborone East (OR: 0.313; p=0.047) had increased odds of being HIV-positive compared to those living in Gaborone Central area.

DISCUSSION

This study used TLS methods to conduct a behavioral and HIV serological risk survey among patrons of alcohol consumption venues in Gaborone, Botswana. Our analysis explored how prevalence of risk behaviors and HIV status differed by demographics and among sub-groups of the sample.

Patterns of drinking

Patterns of drinking among Batswana who drink at venues showed that most drinking occurred mostly in the evenings, on weekends, and among friends. Although about a fifth of participants who completed the behavioral risk survey reported drinking alcohol at least three times a week, few participants (ten percent) drank alcohol on a daily basis. Participants were predominantly beer drinkers and the consumption of spirits and wine was low. This is consistent with national survey data from a WHO report (2011) on drinking in Botswana. However, the proportion of beer drinkers in the sample was substantially higher (81%) than the estimate in the WHO report (57%). This higher percentage may be related to the fact that cheaper traditional brews have historically been available through informal, unlicensed, and unregulated facilities such as *shebeens* and *spotos* (which were not sampled for this study), rather than at the licensed venues (ICAP, 2012). In addition, the choice to drink beer, wine, and spirits over other alcohol beverages is perceived by locals to convey a measure of social class and status (ICAP, 2012), and the majority of the sample had completed secondary level education and were employed.

The social context of drinking in Botswana provides new opportunities for public health interventions that take advantage social context of drinking at venues. Alcohol use prevention interventions at venues that are structured to include friends such as social networking and peer education strategies, and interventions that generate buzz and group discussions may be effective in these social settings.

Levels of drinking

Fewer Batswana in the study reported drinking alcohol on at least four days of the week compared to the estimate of 19.6% that was reported in the most recent Botswana STEPS survey (2007), a population-based survey of adults 25-54 years if age. This may be reflective of decreased per capita consumption of alcohol in Botswana, which is reported in the WHO (2011) report on global trends in drinking. Nevertheless, heavy drinking appears to remain the norm for most Batswana who drink. Binge drinking in Botswana is defined as five or more drinks for males and four or more drinks for females on any day in the last week (STEPS, 2007). More males than females reported binge drinking in our study, which is similar to the findings from the Botswana STEPS survey (2007). However, substantially more males (84%) reported having at least four standard units of alcohol on a typical day in our study compared to the STEPS survey of estimate of 54.1% of males in the population. Differences in coding scheme did not permit a comparison among females; however, analysis showed that it is likely that the proportion of females who reported having at least three standard units of alcohol on a typical day (94.6%) will be higher than that derived in the STEPS population-based survey. We are not aware of any studies that assess the motivations for women's drinking behaviors at alcohol consumption venues in Botswana. However, the high level of drinking among women at bars in the study may be explained by

reports that females with economic insecurities may patronize bars to solicit drinks and favors from males (IRIN, 2009). In addition, a rapid assessment (BAAP, 2004) on the views of youth on alcohol use and abuse and HIV showed that male youth perceived that females were worse in terms of alcohol abuse and that female youth drank more alcohol than their male counterparts.

Given these findings, assessing the possibility of implementing interventions for youth and women to prevent them from frequenting bars for purposes of material gain may be an important prevention strategy to decrease their risk of HIV infection. Empowerment programs that give these key sub-populations the necessary skills and resources to mitigate economic insecurities may also be effective in preventing behaviors commonly practiced at alcohol venues that increase youth and womens' risk of HIV infection.

The majority of participants were classified by the study as having at least "Excess Risk" from drinking and more than a quarter reached "Harmful" and "Possible Dependence" levels of drinking. The WHO (2011) reported a moderate drinking score for Botswana (score of three out of five); however, only 1.8% of males and 0.2% of females were classified as having alcohol use disorders. Our results suggest that individuals with higher alcohol-related risk may be more readily found at venues were alcohol is available compared to the general population. In addition, the social environment of drinking at venues may encourage more drinking compared to other settings were drinking occurs such as in the home.

The study found that patrons reaching "Harmful" or "Possible Dependence" levels of drinking had significantly fewer spousal sexual partners—and more sexual partners who were casual or new partners—during their last sex after drinking alcohol. In addition, the proportion of patrons with two and with three or more partners in the last year increased substantially for participants in these levels of drinking, while the proportion that used condoms with last sex after alcohol decreased. Similar findings have been documented by studies in Botswana and other countries: Weiser et al. (2006b) showed that the odds of having unprotected sex and multiple partners were higher among heavy drinkers compared to moderate drinkers in Botswana.

Sexual risk behaviors

There were several associations between drinking alcohol and engaging in sexual behaviors that facilitate the transmission of HIV infection, including having sex with a risky partner (casual, new, or sex worker), meeting new sexual partners at venues, an increased number of partners in the last 12 months, and not using a condom at last sex. These findings are consistent with studies on alcohol use and sexual risk behaviors conducted in the Region (Ghebremicheal et al., 2009; Fisher et al., 2008; Kalichman et al., 2007; Weir et al., 2003).

An overwhelmingly high proportion of participants in the study reported ever having sex after drinking alcohol (96.3%), suggesting that alcohol consumption venues continue to be places where social and sexual networks interact and individuals purposefully meet sexual partners. More than a quarter (27.7%) of the study participants, especially males, reported meeting two or more sexual partners at alcohol consumption venues in the last 12 months. A study by Suggs (1996) showed that in Botswana, cultural perceptions about venues and gender roles influence the expectation among men that if a woman

allows them to purchase alcohol for her, she is communicating her sexual interest in them. Such culturally based attitudes and perceptions about women who drink at venues may persist today and could underlie sexual behaviors observed at alcohol consumption venues. Two more recent studies conducted in South Africa (Morojele et al., 2006; Weir et al., 2003) also showed that 75% of study participants identified local drinking places as public venues where people went specifically to meet new sexual partners and with the intention to engage in sex, and a report on alcohol use in Gaborone documented that many men expected sexual favors from the women they met and bought drinks for at bars (IRIN, 2009).

A recent study of commercial and non-commercial alcohol use in Botswana (ICAP, 2012) showed that 34% of the participants admitted that their drinking of alcohol had influenced them to engage in sexual risk behaviors. This study also showed that having sex with a casual partner, new partner, or sex worker during last sex after drinking occurred among more than a quarter (26.4%) of the study participants. In addition, over a third of participants (35.2%) had had sex with a partner they met at a drinking venue on the same night of the meeting. A cross-cultural study of alcohol use and sexual behavior in eight countries by the WHO (2005) documented that in Kenya, alcohol use encouraged risky sex. The report also identified bars and establishments were alcohol is available as venues where interactions between alcohol and sexual encounter may lead to increased risk of HIV infection. Our study data shows this may still be true among alcohol consumption venues in Gaborone. Several other studies have also documented transactional sex after drinking alcohol at venues (Fisher et al., 2008; Weiser et al., 2006b); however, our study found that very few patrons of the venues had sexual encounters with sex workers the last time they drank alcohol and had sex.

Although there is much evidence showing a relationship between alcohol use and decreased and inconsistent use of condoms (e.g., Kalichman et al., 2008; Weiser et al., 2006b), the majority of participants in this study reported that they had used a condom the last time they had sex after drinking alcohol. In addition, frequency of condom use after drinking alcohol in the last year was not associated with level of drinking through AUDIT scores. This is contrary to Weiser et al.'s (2006b) population-based study in Botswana that showed that alcohol use was the strongest predictor of inconsistent condom use. It is possible that in the high-risk context of venue-based drinking there is increased sexual contact with unfamiliar partners, resulting in a heightened awareness of risk of HIV. The high proportion of patrons aware of their HIV status and high percentage of reported condom use at last sex after drinking may be reflective of the benefits of HTC services among those with a prior history of HIV testing (i.e., who consequently take action to protect themselves from HIV infection). Nevertheless, the study did show that use of a condom *at last sex* after drinking alcohol decreased as the level of drinking increased. This is consistent with the study by Weiser et al. (2006b) that found that among both men and women, heavy alcohol consumption was associated with higher odds of unprotected sex. In addition, more first-time testers did not use a condom at last sex after drinking compared to others in the study. It may be that this groups lacks the benefit of HIV counseling and education that those who have been tested for HIV in the past receive during the HTC process. Nevertheless, interpretation of these findings and the attribution of alcohol use to unprotected sex must consider the fact that the study did not ask

participants about condom use in general; individuals who do not use condoms when having sex are unlikely to use them when having sex after drinking alcohol.

In general, patrons who frequent alcohol consumption venues had high rates of sexual risk behaviors. While most of them reported higher rates of condom use at last sex after drinking compared to other studies, high proportions also reported meeting their sexual partners after drinking alcohol and at venues, and more reported having more than two sexual partners and sex with risky sexual partners all in the last year.

HIV knowledge

Knowledge about HIV infection, prevention, and transmission was high in our sample, and almost all participants had heard about HIV. This is not surprising in the context of a country with several mass media campaigns relaying messages on prevention of HIV infection. Myths about HIV regarding bathing after sex to prevent HIV and mosquitoes being able to spread the HIV virus persist. Mean scores for knowledge of HIV were not significantly related to HIV status or risk behaviors. Nevertheless, some important contradictions emerged from the data. For instance, the majority of participants demonstrated correct knowledge that having many sexual partners increased one's risk of HIV, yet more than a third of participants reported having more than two sexual partners in the last year. Also of significance is the fact that although over 90% of participants agreed that having sex after drinking alcohol increased one's risk of HIV infection, only about half of them believed that they were at risk of acquiring HIV infection when they were drinking. Perhaps factors other than knowledge may have stronger influences on risk behaviors. Cultural attitudes and beliefs about drinking, perceptions of gender roles, and perceived benefits of drinking through alcohol expectancies may have influences on individual behavior in spite of knowledge about an issue.

HIV prevention intervention programs can take advantage of the high levels of knowledge related to HIV risk, prevention, and transmission shown in this study and re-structure knowledge-centered interventions to move individuals along the behavior change continuum by implementing strategies to promote change in ideation and eventually behavior or action.

HIV testing at venues

There was a high rate of prior HIV testing among the patrons of venues who participated in the study: 84% of participants stated that they had been tested for HIV in the past, compared to 56.7% reported in the 2008 BAIS III (Central Statistics Office, 2009). This study reported testing rates at alcohol consumption venues that were similar to rates associated with individuals' acceptance of routine HIV testing derived for the general population. The majority of the study participants (45%) who had been tested for HIV infection in the past reported they did so routinely. Routine testing has remained widely accepted in the population and appears to be true among vulnerable groups such as users of alcohol. Weiser et al. (2006a) found that 81% of participants in a cross-sectional population-based study in Botswana reported being extremely or very much in favor of routine testing, and Cockcroft et al. (2007) found that 94% of participants in a household survey in Gaborone were accepting of routine HIV testing. Botswana has implemented polices and media campaigns to encourage routine testing in the country

and has also increased access to services to facilitate HTC. The Zebras Test for Life Campaign (CDC, 2007) was implemented in December 2006 to promote favorable attitudes towards testing and encourage increased routine testing among the population. The high testing rates seen in the study four years after the BAIS III survey may be indicative of successful strategies.

Overall, HIV prevalence did not vary by level of drinking or by volume of alcohol consumed on a typical day in standard units. However, an individual's drinking patterns vary over the course of a year making it difficult to establish temporality between their average volumes of alcohol consumed on a typical day with HIV prevalence. The study did find that HIV prevalence increased among men who drank more than three to four standard units of alcohol among men only. In this regard, alcohol use may potentially be a good predictor of men who may be at-risk of HIV infection. Working with venue owners to identify regular patrons who consume a lot of alcohol may be an effective strategy to reach males who drink a lot of alcohol and who may be at increased risk of HIV infection with HIV prevention interventions.

Although overall most patrons had had a prior HIV test, the study showed that there remained a small group of first-time testers who exhibited high rates of risk behaviors including ever having sex after drinking alcohol, non-use of condom with last sex after drinking alcohol, and "not always" using a condom during sex after drinking in the last year. Botswana has a successful record of using peer educators at public and national events to encourage spontaneous testing for HIV. Adapting this strategy to reach and provide non-testers patronizing alcohol consumption venues with HTC services may help decrease their risk of HIV infection. Venue-based HIV prevention interventions, including spontaneous HIV testing, proved to be feasible, accepted and desired by patrons of venues in the sample. The study was able to achieve perfect agreement with laboratory quality control checks also indicating that the licensed alcohol venue could be an appropriate setting for providing HTC to hard-to-reach at-risk groups.

HIV prevalence

There are several comparisons between HIV prevalence for the study and estimates reported in BAIS III. HIV prevalence for the study sample was lower than that derived for the population: the study estimated HIV prevalence at 12.7% compared to the 2008 Botswana AIDS Impact Survey III, which yielded a national HIV prevalence of 17.6 (Central Statistics Office, 2009). While it is empirically documented that there is an increased risk of HIV infection at alcohol consumption venues, it is possible that the lack of unlicensed and unregistered alcohol consumption venues in the study sample—where risk may be higher—may account for the lower HIV prevalence observed in the study. Collaboration and cooperation of venue owners was also required for a venue to be screened for eligibility to be included in the sampling frame. The formative research supporting the study showed that regulatory measures enacted by the Government to curb alcohol consumption in the country had led to a prevailing air of suspicion and mistrust of government intentions among alcohol venue owners. Perhaps the owners of venues with environments that were characterized by higher levels of drinking and risky behaviors among patrons were more fearful and distrusting of authority and more likely to decline participation in the study compared to owners of venues were risk behaviors among patrons were lower. In such situation, the characteristics of patrons between the two venue types would also probably differ.

In addition, about 30% of patrons refused to participate in the HTC portion of the study, however, the study showed that those who tested for HIV during the study had significantly more risk behaviors compared to those who refused to be tested by the study. Specifically, significantly more testers had had sex with a risky partner, and did not always use a condom, and there was marginal significance for not using a condom during sex after drinking alcohol. There were no differences between the two groups for sex after drinking alcohol, number of sexual partners in the last 12 months, having concurrent partnerships, and number of sexual partners met at venues or after drinking alcohol. These finding appear to suggest that the setting (i.e., legal versus illegal establishment) may play a role in prevalence of HIV. The study also found higher HIV prevalence among females (17.7%) compared to males (10.1%), which are lower but consistent with HIV prevalence reported in BAIS III (20.4% among females and 14.2% among males) (Central Statistics Office, 2009).

In BAIS III, the 30-34 year old category for both males and females had the highest HIV prevalence; while in this study highest HIV prevalence was in the 35-39 year old category (Central Statistics Office, 2009). However, the 35-39 year old group in this study would, in 2012, represent the same age cohort that had the highest HIV prevalence in 2008. Also in BAIS III, HIV prevalence was high among those with non-formal and no education, and was lower among those with higher education levels. This study found similar results in that HIV prevalence was highest among those with primary level education. This is consistent with other study findings about risk behaviors, specifically having sex after drinking, having sex with a risky partner, meeting two or more partners at alcohol venues in the past year, and non-use and inconsistent use of condoms during sex after alcohol in the past year, which were all observed to be higher among participants with lower levels of education.

The study also found HIV prevalence to be lower among the single (never married) and married participants and higher among cohabiting and divorced participants. The BAIS III survey reported similar results in that prevalence was lower among those who never married and highest among cohabiting, separated, and widowed populations (Central Statistics Office, 2009). In both surveys, more participants who were either in uncommitted relationships (cohabitating), or had experienced an interruption to a committed relationship (divorced, separated, widowed) were HIV-positive. There is no literature suggesting reasons for high HIV prevalence among groups who have had interrupted committed relationships; it is possible that the freedom that accompanies these significant life events may also influence individuals to participate in risk behaviors that they had not been free to participate in when they were in a committed relationship. This provides support for program strategies to target HIV prevention counseling activities towards couples experiencing marital strain, separation, or divorce proceedings, and individuals who are recently divorced, separated or widowed. Prevalence of HIV in the study was also higher among participants who were 35 years of age and older, and highest among those who were 50 years of age and older. Government figures from 2008 show that HIV infections in Selebi-Phikwe, as in most of Botswana and across southern Africa, are highest among young women and older men—demographics that tend to be replicated in the bars (IRIN, 2009). Other studies have shown that younger women with economic hardships (as uneducated women are likely to be) may go to drinking venues in search of wealthier patrons for favors, relationships, and, ultimately, sex (WHO, 2005). A study in Botswana and Swaziland (Weiser et al., 2007) hypothesized that food insecurity increased sexual risk-

taking and risk of HIV infection among marginalized and poor women who were dependent on others for resources; another showed an association between economic status of females and increased number of sexual partners (Dintwa, 2012).

This study and other studies conducted in Botswana (Weiser et al., 2006b) suggest that men have higher levels of risk behaviors than females. Our study showed that more males than females met sexual partners at venues, had sex with a risky partner the last time they drank alcohol, had sex with a partner on the same night of meeting them, and did not use a condom at last sex after drinking alcohol. However, a higher proportion of females who tested HIV-positive (17.1%) engaged in these behaviors compared to males (10.1%). In addition, more female patrons than males in this study had more sexual partners after drinking alcohol in the last year. Some studies have documented the decreased power women have to negotiate safe sex or to refuse sexual advances that occur frequently in alcohol consumption venue settings (Simbayi et al., 2006, 2004). In addition, drinking alcohol can impair one's ability to negotiate or resist advances effectively. Sex worker activities at alcohol consumption venues may help explain the high number of partners reported by female patrons in the study; however, this study did not asked female patrons if they were sex workers. On the contrary, the finding that significantly more males than females had met at least two of their sexual partners at alcohol venues could also suggest that the majority of female patrons sampled may not necessarily have been sex workers.

Intergenerational sex was not assessed in this study; however, the study did show that older educated men had highest HIV prevalence, as well as younger women with no education. These results suggest a need for integrating HIV prevention interventions with formal education, including direct prevention strategies such as including information in formal school curricula, as well as the benefits of indirect strategies, such as programs that enable young girls to attend school, stay enrolled, and complete their education.

The study results provide information about an emerging potential at-risk sub-group for HIV infection that can be located at alcohol venues, specifically, first-time testers. About 20% of participants who were unaware of their status at the time of the study tested positive during the study, and significantly more first-time testers for HIV infection tested positive during the study compared to repeat testers. The prevalence of HIV among first-time testers was also higher than the estimate derived for the study population (12.7%). Although the study did not provide any data on reasons for not getting tested in a context of high acceptance of HTC, these findings do show that conducting HTC at alcohol consumption venues is feasible and may be a good way to capture a sub-population at risk for HIV.

Adjusted correlates of being HIV-positive among patrons of alcohol venue were male gender, increasing age, being resident in Gaborone, being divorced, and practicing zero risk behaviors. The study found that male patrons had lower odds, while older patrons and engaging in risk behaviors conferred higher odds, of being HIV-positive. Among male patrons only, significant correlates were, older age, and living in Gaborone South or East area; among females only, significant correlates were increasing age and engaging in risk behaviors. Alcohol consumption has been associated with an increased probability of being HIV-positive in studies in several countries including in Botswana: Talbot et al. (2002) found that

HIV patients at a tuberculosis clinic were more likely to be female and also to state that they or their partner drank alcohol prior to sex. In Zimbabwe, Fritz et al. (2002), found that men who visited beer halls had an HIV prevalence rate of 30%, and that having sex while intoxicated was strongly associated with recent HIV sero-conversion. A similar association from a study in rural Uganda showed that respondents who were HIV-positive reported a history of higher alcohol consumption than respondents who were HIV-negative (Mbulaiteye et al., 2000).

The high rates of risk behaviors among females may be explained by the dis-inhibiting power of alcohol as well as prevailing cultural norms and attitudes around multiple sexual partnerships. A cross-cultural multi-country study on alcohol use (WHO, 2005) reported that alcohol use increased women's involvement in risky sexual encounters. Participants in this study perceived that after drinking alcohol, the courage to approach someone for sex "improved" for over a quarter of participants while the ability to resist sexual advances "worsened" for a similar proportion. Perhaps women who have had alcohol to drink or who have received alcoholic beverages as gifts from interested patrons may have decreased capacity to reject sexual advances, and also decreased power to effectively negotiation the use of condoms during sex after drinking alcohol.

Limitations

Certain limitations of the study must be taken into consideration when interpreting the findings. First, informal and unregistered alcohol consumption venues such as *shebeens* and spotos were not included in the study. We expect that these unregulated venues might have higher levels of drinking and rates of sexual risk behaviors than were observed at the registered and licensed venues. Venue-related factors and how they may perpetuate or mitigate risk behaviors were not fully explored in this study. The study findings cannot be generalized to all types of drinking venues in Botswana. Not all licensed venues participated in the study; thus, the study sample is possibly not representative of all licensed venues in Gaborone or of patrons who frequent licensed venues. The cross sectional design of the study prevents inferring causality, and self-reporting approach may introduce social desirability bias. In addition, patrons who declined to participate in the HIV testing component of the study and people who previously tested HIV-positive might have been more likely to decline HIV testing than those who had previously tested negative or who had never been tested. This could have potentially skewed associations with HIV status in the study. The sampling frame developed during Phase I was also heavily skewed towards bars, and we were consequently unable to explore sub-group analysis by venue type.

External validity of the sampling frame was an issue and statistical adjustment for standard errors was not conducted; the study results are only generalizable to the population of venues in the sampling frame. Although it does not provide a true probability sample, the TLS approach used in this study was a necessary and a successful approach to gain access to a hard-to-reach sub-population with increased risk for HIV infection.

The study also encountered a few challenges during implementation. The VDTs in the sampling frame had to be revised to conform to new national policy on hours of operation for venues. This resulted in several late night VDTs being removed from the sampling frame. We expect that patrons' level of

drinking and perhaps rates for risk behaviors observed late at night would differ from the same observed during early evening hours. The study also occurred during the rainy season and overlapped the Christmas and New Year holidays, when many city residents left for the more rural cattle posts.

Summary and conclusion

We conducted a cross-sectional study to assess behavioral risk and HIV prevalence among patrons of registered and licensed alcohol consumption venues in Gaborone, Botswana. Despite the institution of national policies and regulations to curb alcohol sales and consumption among the population, the level of drinking of alcohol at venue remains high. Venues continue to be perceived as a place to meet sexual partners and to have spontaneous sex, and a substantial proportion of patrons had multiple sexual partners.

The overwhelming majority of patrons reported ever having had sex after drinking alcohol; however, the majority of them also stated that they used a condom the last time they had sex after drinking alcohol. Nevertheless, higher levels of drinking alcohol were associated with decreased condom use at last sex after drinking alcohol. Although knowledge of HIV and perceptions that drinking alcohol increased risk of HIV were high, many patrons admitted to having multiple sexual partners and sex with new partners, casual partners, or sex workers in the last year. The majority of patrons had ever been tested for HIV and the prevalence of HIV among patrons was 12.7%; about a fifth of first-time testers were HIV-positive and more females than males overall had positive HIV test results. Participant demographics that were associated with positive HIV status included being female, older, divorced, separated or cohabiting, and engaging in risk behaviors after drinking alcohol. Higher HIV prevalence rates were also observed in specific areas of the city.

Continued focus on eliminating risk behaviors as a vehicle for HIV transmission is warranted among patrons of alcohol consumption venues in Gaborone. Feasibility of implementing HTC services and HIV prevention strategies in alcohol consumption venues appears good.

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TABLES

Table 1: Participant demographics. Unweighted Data

Characteristic	n	(%)
GENDER		
Male	597	67.3
Female	290	32.7
AGE		
<20	40	4.5
20-29	546	61.6
30-39	220	24.8
40-49	65	7.3
≥ 50	16	1.8
COMMUNITY		
North	150	16.9
South	136	15.4
East	166	18.8
West	210	23.7
Central	223	25.2
HIGHEST LEVEL OF EDUCATION		
None	10	1.1
Primary	39	4.4
Secondary	479	54.0
Beyond Secondary	359	40.5
MARITAL STATUS		
Single or dating	666	75.1
Cohabiting	124	14.0
Married	83	9.4
Divorced	10	1.1
Widowed	1	0.1
Refused to answer	3	0.3
RELIGION		
None	168	18.9
Christian	620	69.9
Moslem	16	1.8
Traditional	69	7.8
Other	9	1.0
Refused to answer	5	0.6
EMPLOYMENT STATUS		
Employed	599	67.5
Unemployed	282	31.8
Refused to answer	6	0.7

Table 2: Frequency of correct response to HIV knowledge questions (Unweighted data)

HIV knowledge questions	Correct Response (n)	%
A person who has many sexual partners has a higher risk of getting HIV	865	97.5
It is possible for a person to have HIV and not know that you have it	861	97.1
A person can reduce their risk for HIV by using a condom every time they have sex	855	96.4
A healthy looking person can have HIV	834	94.0
If a person is sexually active, condoms are the best protection against HIV	811	91.4
Drinking alcohol and having sex can increase a person's risk for getting infected with HIV	802	90.4
Not having sexual intercourse is one way to prevent getting the HIV virus	765	86.2
You can get infected with HIV by having sex one time with a person who is HIV-positive	764	86.1
Once you get HIV, you cannot get rid of it	731	82.4
HIV is caused by witchcraft or other supernatural means	830	93.6
If a man is circumcised, he does not need to use condoms	846	95.4
If your sex partner tests negative for HIV, then you know you do not have HIV	803	90.5
Bathing after having sex is a good way to get rid of the HIV virus	710	80.0
A person can get the HIV virus from mosquito bites	625	70.5

Table 3: Associations for HIV Status of Participants by Demographics (Pearson Chi-Squares; Weighted data)

Characteristic	HIV Pos		HIV Neg		p-value
	n	(%)	n	(%)	
GENDER					0.007
Male	39	10.1	349	89.9	
Female	37	17.7	172	82.3	
AGE					0.000
<20	0	0.0	28	100.0	
20-24	10	5.3	180	34.5	
25-29	26	14.0	160	86.0	
30-34	11	12.5	77	87.5	
35-39	14	29.2	34	70.8	
40-44	9	25.1	27	75.0	
45-49	3	23.1	10	76.9	
≥ 50	3	33.3	6	66.7	
EDUCATION					
None	0	0.0	4	100	0.001
Primary	9	28.1	23	71.9	
Secondary	56	15.0	317	85.0	
> Secondary	11	5.9	177	94.1	
MARITAL STATUS					
Single	52	11.6	395	88.4	0.009
Dating and cohabiting	17	18.5	75	81.5	
Married	4	8.2	45	91.8	
Divorced	3	50.0	3	50.0	
RELIGION					
None	17	13.3	111	86.7	0.358
Christian	48	12.0	351	88.0	
Moslem	0	0.0	7	100.0	
Traditional	10	18.9	43	81.1	
Other	0	0.0	9	100.0	
COMMUNITY					
Gabs North	15	17.7	75	83.3	0.113
Gabs South	10	9.8	92	90.2	
Gabs East	15	12.7	103	87.3	
Gabs West	10	7.7	122	92.4	
Gabs Central	26	16.9	129	83.2	
EMPLOYMENT STATUS					
Yes	58	14.3	347	85.7	0.079
No	17	9.1	169	90.9	

Table 4: Associations of Study HIV Test Results by Prior HIV Testing Results (Pearson Chi Squares; Weighted data)

Characteristic	HIV Pos (75)		HIV Neg (521)		p-value
	n	(%)	n	(%)	
PRIOR HIV TESTING					
I have never been tested	18	18.6	79	81.4	
Did not return for results	0	0.0	2	100.0	
Positive	21	77.8	6	22.2	0.001
Negative	31	6.7	429	93.3	
Indeterminate	3	60.0	2	40.0	
Refused to answer	2	40.0	3	60.0	

Table 5: Associations of HIV Prevalence by Level of Drinking (AUDIT) (Pearson Chi-Squares; Weighted data)

Characteristic	HIV Pos (75)		HIV Neg (521)		p-value
	n (75)	(%)	n (521)	(%)	
LEVEL OF DRINKING					0.160
Low risk	17	11.3	134	88.7	
Excess risk	38	14.0	234	86.0	
Harmful	7	7.4	88	92.6	
Possible Dependence	14	18.2	63	81.8	

Table 6: Chi Square associations between HIV Status and composite scores for Knowledge, alcohol expectancies, risk behaviors (Weighted Data)

COMPOSITE SCORE	HIV Pos		HIV Neg		p-value
	n	(%)	n	(%)	
KNOWLEDGE OF HIV SCORES					
Some knowledge (5-9 points)	3	12.5	21	87.5	0.972
Good knowledge (10-14 points)	73	12.7	500	87.3	
ALCOHOL EXPECTANCIES					
Minimal expectancies	24	12.8	164	87.2	0.349
Moderate expectancies	30	15.2	168	84.8	
High expectancies	22	10.4	190	89.6	
NUMBER OF SEXUAL RISK BEHAVIORS					
Few (<5)	40	11.6	304	88.4	0.356
Many (5-9)	36	14.2	218	85.8	

Table 7: Matrix of Chi Square Associations between HIV Status and Demographics among Participants who Reported Engaging in Sexual Risk Behaviors (Weighted Data)

	Did ever have sex after drinking	Had a risky partner at last sex after drinking	Had >1 sexual partners in 12 mos	Had concurrent partners in 12 mos	Met ≥ 2 sexual partners at venues (12 mos)	# Partners met after drinking alcohol (12 mos)	Had sex with partner met at venue on same day of meeting (12 mos)	Did not use condom last time had sex after drinking	Inconsistent use of condoms (12 mos)
Gender	0.011*	0.001**	0.048*	0.020*	0.028*	0.017*	0.001	0.016*	0.130
Age	0.001***	0.041*	0.008**	0.482	0.026*	0.001***	0.042*	0.001	0.001***
Community	0.114	0.139	0.016**	0.504	0.007**	0.045*	0.062	0.116	0.172
Education	0.001**	0.414	0.028**	0.171	0.001***	0.001***	0.523	0.021*	0.013*
Marital status	0.007**	0.016**	0.326	0.444	0.731	0.235	0.003**	0.003**	0.607
Employment status	0.152	0.889	0.840	0.284	0.906	0.081	0.127	0.088	0.362

P values: *≤ 0.05; **≤0.01; ***≤0.001

Table 8: Associations of Sexual Risk Behavior by Level of Drinking (AUDIT) (Pearson Chi-Squares)

	Low Risk	Excess Risk	Harmful	Possible Dependence	
	n (%)	n (%)	n (%)	n (%)	p value
SEXUAL PARTNER LAST TIME HAD SEX AFTER DRINKING ALCOHOL					
Spouse	18 (8.5)	37 (9.7)	3 (2.4)	3 (2.7)	0.001
Girl/Boyfriend	146 (69.2)	249 (65.0)	92 (74.2)	63 (55.8)	
Casual	25 (11.8)	63(16.4)	21 (16.9)	32 (28.3)	
New Partner	17 (8.1)	26 (6.8)	7 (5.6)	14 (12.4)	
sex worker	0 (0)	0 (0)	0 (0)	1 (0.9)	
NUMBER OF PARTNERS IN LAST 12 MONTHS					
None	17 (7.7)	44 (11.1)	5 (3.9)	3 (2.6)	0.001
1 Partner	112 (50.5)	171 (43.0)	55 (43.3)	29 (25.2)	
2 Partners	48 (21.6)	76(19.1)	11 (8.7)	12 (10.4)	
3 or more partners	36 (16.2)	91 (22.9)	48 (37.9)	70 (60.9)	
USED CONDOM WITH LAST SEX AFTER DRINKING?					
Yes	186 (83.3)	322 (81.1)	98 (77.2)	86 (74.8)	0.038
No	26 (11.7)	60 (15.1)	28 (22.0)	26 (22.6)	

Table 9: Summary of Significant Correlates of HIV-positive Status from Unadjusted Logistic Regressions of Demographics on HIV Status

Characteristic	Odds Ratio	Confidence interval		p-value
		Lower limit	Upper limit	
Gender (male)	0.525	0.323	0.853	0.009
Age (in years)	1.076	1.045	1.108	0.001
Being Divorced	6.670	1.268	35.082	0.025
Living in Gaborone West	0.395	0.181	0.864	0.020

Reference Groups: female, single, living in Gaborone Central.

Table 10: Significant Correlates of being HIV-positive from Multiple Logistic Regression of Demographic Factors on HIV Status

Characteristic	Odds Ratio	Confidence interval		p-value
		lower limit	Upper limit	
Gender (male)*	0.398	0.231	0.688	0.001***
Age(in years)	1.101	1.063	1.141	0.001***
Community				
Gaborone North	.978	.465	2.058	.954
Gaborone South	.520	.229	1.182	.118
Gaborone East	.715	.339	1.507	.378
Gaborone West	.479	.212	1.083	.077
Marital status (divorced)	2.836	0.470	17.111	0.256
Behavior Risk Score	1.224	1.005	1.490	0.044*

*Reference Group: female. Divorced, Living in Gaborone Central, zero risk behaviors

APPENDICES

APPENDIX I: Behavioral Risk Survey

Integrated HIV Serological and Behavioral Surveillance
among Persons Attending Alcohol Consumption Venues in Gaborone, Botswana

Code: _____

Venue ID: _____

VDT Period:_____

Staff ID: _____

Interview Date: ☐☐/☐☐/☐☐
DD / MM / YY

Interview Start time:_____
Interview End time: _____

Eligible: ☐ No ☐ Yes
Consent: ☐ No ☐ Yes

Before we begin the interview, I would like to ask you a few questions about yourself. We are not keeping a record of your name and all your responses are confidential. You can refuse to answer any questions you do not feel comfortable responding to, and you may stop the interview at any time.

DEMOGRAPHIC INFORMATION

Gender:

Male
Female

Language of interview:

English
Setswana

How old are you today?

_____ years

In what community do you live?

_____

What is the highest level of education you have completed?

None
Primary: Grades 1-7
Junior Secondary: Forms 1-3

Senior Secondary: Forms 4-5/ O-Levels
Tertiary: Brigade/Vocational/Business
Advanced: University/College/Technikon
Post Graduate
Refused to answer

What is your marital status?

Single
Dating someone but not living with them
Dating someone and living with them
Married
Divorced
Widowed
Refused to answer

What is your religion?

None
Christian
Moslem
Traditional
Other:_____(Specify)
Refused to answer

Are you employed?

No (Skip to Q #:)
Yes
Refused to answer

What is your main occupation?

Unskilled/Informal
Artisan
Professional
Disciplined Forces
Entrepreneur/businessman/woman
Student
Housewife/husband (Homemaker)
Farmer
Other: _____(Specify)
Refused to answer

PATTERNS OF ALCOHOL USE

READ ALOUD: Now, I will ask you some questions about your usual drinking habits and experiences in the last 12 months.

How often do you drink?

Daily

About three times a week
Weekly
Weekends
Once a month
Other: _____(Specify)
Refused to answer

How often do you drink at this venue (bar)?

Daily
About three times a week
Weekly
Weekends
Once a month
Other: _____(Specify)
Refused to answer

How often do you drink at other venues (bars)?

Daily
About three times a week
Weekly
Weekends
Once a month
Other: _____(Specify)
Refused to answer

Which of the following best describes the time when you usually visit this bar?

When it opens (time_____)
Early afternoon (Before 4pm)
Late afternoon (4pm-6pm)
Evening (6pm-7pm)
At night (After 7pm)
Refused to answer

When do you USUALLY drink alcohol? Select one option only

Daytime
Evenings
Weekends
Holidays
At festive events, a party
At any time
Other _____
Refused to answer

Who do you usually visit this venue with? Select one option only

Alone
Friend(s)
Relatives
Work mates
Acquaintances met at the venue
Girlfriend/Boyfriend
Other: _____(Specify)
Refused to answer

Who do you usually drink alcohol with? Select one option only

Drink alone
Friend(s)
Relatives
Work mates
People I meet at the bar
Girlfriend/Boyfriend
Other: _____(Specify)
Refused to answer

Which type of alcohol did you drink the most during the last 12 months?

Chibuku
Beer/Draft/Lager
Cider
Spirits (whiskey, brandy etc)
Wine
Traditional brew
Other_____(Specify)
Refused to answer

Which type of alcohol did you have the last time you drank alcohol?

Chibuku
Beer/Draft/Lager
Cider
Spirits (whiskey, brandy etc)
Wine
Traditional brew
Other_____(Specify)
Refused to answer

What size container do you usually use when drinking? *[Show Alcohol Units card*] (See Appendix IV: Standard Units of Alcohol)

Liter jug
350-ml bottle
750-ml bottle

Glass or cup
Other_____(Specify)
Don't know
Refused to answer

Do you usually share these drinks with anyone?

Yes
No (Skip to Q#____)
Refused to Answer

How many people do you usually share your drinks with?

One
Two
Three
Four
Five
Six (6)
Don't know
Refused to answer
Not Applicable

LEVEL OF DEPENDENCE ON ALCOHOL

The Alcohol Use Disorders Identification Test (AUDIT):
READ ALOUD: Now I am going to ask you some questions about your use of alcoholic beverages during this past year." Explain what is meant by "alcoholic beverages" by using local examples of beer, wine, vodka, etc

[AUDIT 1] How often do you have a drink containing alcohol?

(0) Never [Skip to Q 9-10]
(1) Monthly or less
(2) 2 to 4 times a month
(3) 2 to 3 times a week
(4) 4 or more times a week
Refused to answer

[AUDIT 2] How many drinks containing alcohol do you have on a typical day when you are drinking? [*calculate and enter standard units]* (See Appendix IV: Standard Units of Alcohol Reference)

(0) 0-2 standard units
(1) 3-4 standard units
(2) 5-6 standard units
(3) 7-9 standard units
(4) 10+ standard units
Don't know
Refused to answer

#_____drinks x _____container type

_____ = ____ standard units

[AUDIT 3] Do you ever have _____drinks on one day? How often in the last year?
[*use response to AUDIT 2 to determine the equivalent of 6 standard units for the participant*]

(0) Never
(1) Less than monthly
(2) Monthly
(3) Weekly
(4) Daily or almost daily
Refused to answer

[AUDIT 4] Have you found that you were not able to stop drinking once you had started? How often during the last 12 months have you found that you were not able to stop drinking once you had started?

(0) Never (Skip to Q#___)
(1) Less than monthly
(2) Monthly
(3) Weekly
(4) Daily or almost daily
Refused to answer

[AUDIT 5] Have you failed to do what was normally expected from you because of drinking? How often in the last 12 months have you failed to do what was normally expected from you because of drinking?

(0) Never (Skip to Q#___)
(1) Less than monthly
(2) Monthly
(3) Weekly
(4) Daily or almost daily
Refused to answer

[AUDIT 6] Have you needed a first drink in the morning to get yourself going after a heavy drinking session? How often in the last 12 months have you needed a first drink in the morning to get yourself going after a heavy drinking session?

(0) Never (Skip to Q# ___)
(1) Less than monthly
(2) Monthly
(3) Weekly
(4) Daily or almost daily
Refused to answer

[AUDIT 7] Have you had a feeling of guilt or remorse after drinking? How often in the last 12 months have you had a feeling of guilt or remorse after drinking?

(0) Never (Skip to Q#____)
(1) Less than monthly
(2) Monthly

(3) Weekly
(4) Daily or almost daily
Refused to answer

[AUDIT 8] Have you been unable to remember what happened the night before because you had been drinking? How often in the last 12 months have you been unable to remember what happened the night before because you had been drinking?

(0) Never (Skip to Q#___)
(1) Less than monthly
(2) Monthly
(3) Weekly
(4) Daily or almost daily
Refused to answer

[AUDIT 9] Have you or someone else been injured as a result of your drinking? When was that?

(0) No (Skip to Q#___)
(2) Yes, but not in the last year/12 months (Skip to Q3___)
(4) Yes, during the last year/12months
Refused to answer

[AUDIT 10] Has a relative or friend or a doctor or another health worker been concerned about your drinking or suggested you cut down? When was that?

(0) No (Skip to Q#___)
(2) Yes, but not in the last year/12 months (Skip to Q#___)
(4) Yes, during the last year/12 months
Refused to answer

KNOWLEDGE OF HIV PREVENTION

READ ALOUD: Now I will ask you some questions about HIV.

Have you ever heard of an infection called HIV?

No
Yes
Don't know
Refused to answer

READ ALOUD: Now I will read some statements about HIV. Please tell me if you think these statements are True or False

A healthy looking person can have HIV.

True
False
Don't know
Refused to answer

A person can get the HIV virus from mosquito bites?

True
False
Don't know
Refused to answer

It is possible for a person to have HIV and not know that you have it?

True
False
Don't know
Refused to answer

A person who has many sexual partners has a higher risk of getting HIV.

True
False
Don't know
Refused to answer

A person can reduce their risk for HIV by using a condom every time they have sex?

True
False
Don't know
Refused to answer

Once you get HIV, you cannot get rid of it.

True
False
Don't know
Refused to answer

Not having sexual intercourse is one way to prevent getting the HIV virus

True
False
Don't know
Refused to answer

HIV is caused by witchcraft or other supernatural means

True
False
Don't know
Refused to answer

You can get infected with HIV by having sex one time with a person who is HIV-positive.

True
False
Don't know
Refused to answer

Bathing after having sex is a good way to get rid of the HIV virus

True
False
Don't know
Refused to answer

If a man is circumcised, he does not need to use condoms.

True
False
Don't know
Refused to answer

If your sex partner tests negative for HIV, then you know you do not have HIV.

True
False
Don't know
Refused to answer

If a person is sexually active, condoms are the best protection against HIV.

True
False
Don't know
Refused to answer

Drinking alcohol and having sex can increase a person's risk for getting infected with HIV?

True
False
Don't know
Refused to answer

BEHAVIORAL RISK: ALCOHOL SEX EXPERIENCES

READ ALOUD: Now I would like to ask you some more questions about drinking alcohol. Let me assure you again that your answers are completely confidential and will not be told to anyone. If we should come to any question that you do not want to answer, just let me know and we will go to the next

What is the MAIN reason you drink alcohol?

To relax
To feel more open
To have fun
To increase my confidence to pursue sexual opportunities
The people I am with are drinking
I am stressed about my personal life
Because I am angry or irritable
Because I am sad or lonely
I quarreled with my friend/ relative/ partner
Because I want to escape or forget problems
Other: _____(Specify)
Refused to answer

What social activities have you USUALLY chosen to do after consuming alcohol? Check all that apply.

Hang out with friends, talk, socialize
Dance
Have sex
Go to commercial sex worker
Go home and sleep
Other _____(Specify)
Refused to answer

What social activities did you chose to do the last time you drank alcohol? Check all that apply.

Hang out with friends, talk, socialize
Dance
Have sex
Go to commercial sex worker / pay for sex
Go home and sleep
Other _____(Specify)
Refused to answer

READ ALOUD: I am now going to read some statements about sex and alcohol. After I read each statement please tell me if drinking alcohol changes the way you feel in a given situation. Please tell me if the situation improves, remains the same, or worsens after you have been drinking alcohol. [Show visual prompt, e.g. thumbs up, thumbs down]

Do you feel that you are at risk for HIV infection when you have been drinking alcohol?

No
Yes
Don't know
Refused to answer

When you drink alcohol, your desire to have sex with your spouse or regular partner:

Improves
Remains the same as when you are not drinking
Worsens
Don't know
Refused to answer

When you drink alcohol, your desire to have sex with a casual partner:

Improves
Remains the same as when you are not drinking
Worsens
Don't know
Refused to answer

When you drink alcohol, the pleasure you feel from sexual intercourse:

Improves
Remains the same as when you are not drinking
Worsens
Don't know
Refused to answer

When you drink alcohol, your sexual performance:

Improves
Remains the same as when you are not drinking
Worsens
Don't know
Refused to answer

When you drink alcohol, your ability to resist sexual advances:

Improves
Remains the same as when you are not drinking
Worsens
Don't know
Refused to answer

When you drink alcohol, your courage to approach someone for sex:

Improves
Remains the same as when you are not drinking
Worsens
Don't know
Refused to answer

When you drink alcohol, your *desire to use* condoms with sexual partners:

Improves
Remains the same as when you are not drinking

Worsens
Don't know
Refused to answer

When you drink alcohol, your ability to *remember to use* condoms with sexual partners:

Improves Remains the same as when you are not drinking
Worsens
Don't know
Refused to answer

When you drink alcohol, your ability to *use condoms correctly* with sexual partners:

Improves
Remains the same as when you are not drinking
Worsens
Don't know
Refused to answer

Have you ever had sexual intercourse after drinking alcohol?

No (Skip to Q # ___)
Yes
Refused to answer

Thinking about the last time you drank alcohol and before sex, how would you describe your sexual partner?

Spouse
Girlfriend/Boyfriend)
Casual partner
New partner
Commercial sex worker
Other _____
Refused to answer

In the last 12 months, how many sexual partners have you had? This includes 1-night stands or brief encounters...

None (Skip to Q # ____)
1 partner *(Skip to Q # ____)*
2 partners
3 or more partners
Not sure
Refused to answer

Were any of these sexual relationships occurring at the same time?

No
Yes

Refused to answer
Not Applicable

In the last 12 months, how many of your sexual partners did you meet at bar, nightclub, or other alcohol venue?

_____
Don't know
Refused to answer

In the last 12 months, how many of your sexual partners did you meet after drinking alcohol?

_____
Don't know
Refused to answer

In the last 12 months have you had sex with a person you met at a drinking venue on the same night of that meeting?

No
Yes
Refused to answer

Did you use a condom the last time you had sex after drinking alcohol?

No
Yes (Skip to Q# _____)
Refused to answer

What was the MAIN reason for not using a condom the last time you had sex after drinking alcohol?

Forgot to use condom
Don't like using condoms
My partner does not like to use condoms
I want to show love/be close to my partner
I/My partner is trying to become pregnant
Condom not available
Happened too fast
Condom broke
Condom slipped off
Could not get the condom on
Had sex with a regular partner
Don't remember reason
Decided not to use it
Other: _____(Specify)
Refused to answer
Not applicable

In the last 12 months how often did you use a condom when having sex after drinking alcohol?

Always
Not always
Occasionally / Sometime
Not often
I don't remember
Never
Refused to answer

Do you have a condom on your person today while visiting the alcohol consumption venue?

No
Yes
Refused to answer

Are condoms readily available at this venue (bar)?

No
Sometimes
Yes
Don't know
Refused to answer

Would you like to see condoms made available at alcohol consumption venues (bars)?

No
Yes
Don't know
Refused to answer

Would you use condoms made available at alcohol venues?

No
Yes
Don't know
Refused to answer

HISTORY OF HIV TESTING
READ ALOUD: Now I am now going to ask you some questions about your experiences with HIV testing.

Have you ever been tested for HIV?

No (Skip to Q # ___)
Yes
Refused to answer

When was the last time you were tested for HIV?

_____(month and year)
Don't know/Can't remember
Refused to answer

What was your reason for getting tested for HIV?

□ I engaged in risky behavior
□ Partner engaged in risky behavior
□ Partner is HIV +
□ Partner is HIV -
□ Exposed to blood
□ Condom burst
□ Sexually abused/rape
□ Significant other has symptoms/died
□ Family planning
□ Prerequisite: employment, education
□ Parent / guardian encouraged them to test
□ Refused to answer
□ Prerequisite: circumcision
□ Marriage
□ New relationship
□ Pregnancy
□Routine testing
□ 2nd test (window period)
□ I am a caregiver
□ Partner encouraged them to test
□ Accessing care and treatment
□ Parent is HIV+
□Other _____

Where were you last tested for HIV?

VCT site
TVCT sites
Public Health Facility
Other:_____(Specify)
Refused to answer
Private Health Facility
Door to door facility
Mini Tebelopele

What were the results of your last HIV test?

I have never been tested
I did not return for my results
Positive
Negative
Indeterminate
Refused to answer
Not Applicable

Thank you very much for your time. We really appreciate your participation. Do you have any questions or anything you would like to add? Inform the respondent about the Serological survey and ask if they would participate in the next phase?

Would you be willing to receive HIV counseling and testing services now?

No
Yes

(Inform participant that the test would take approximately 30 minutes and this includes a counseling session with a qualified counselor)

(If yes, complete the questionnaire then escort them to the HTC officer in the testing area. If no, complete the questionnaire and thank them for their time and hand IEC material)

End of Interview

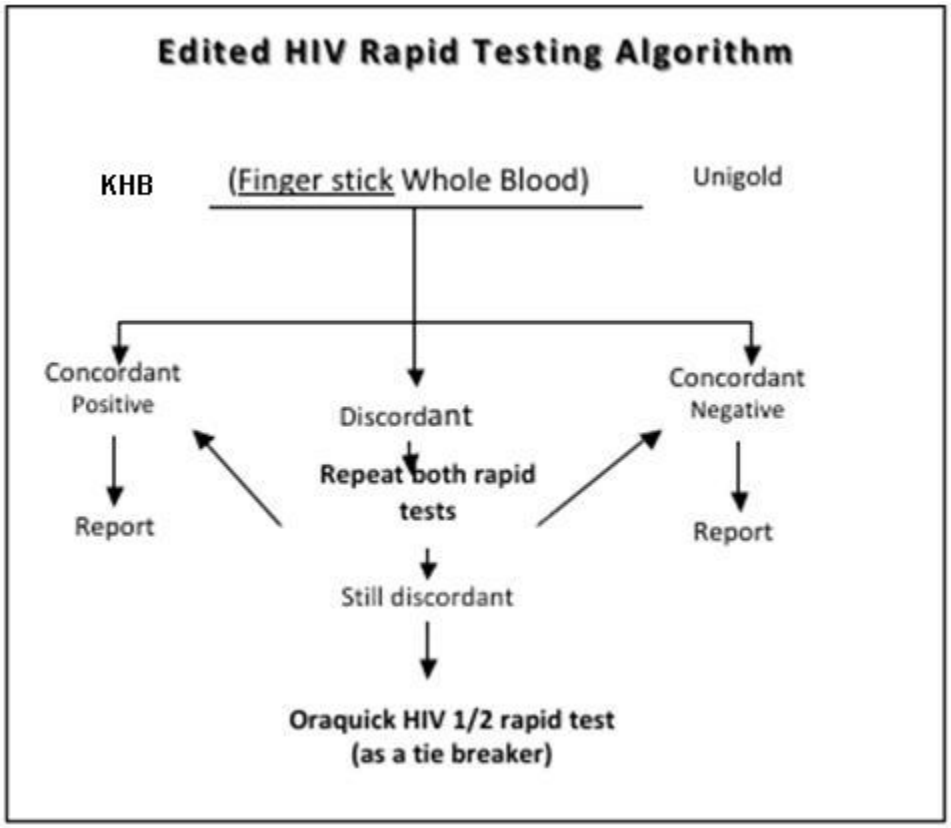
Integrity statement

I certify that this interview has been personally carried out by me and that all the information included herein is truthful and correct. I further certify that the respondent was chosen according to the sample specifications and instructions provided. I understand that any discrepancies found during back-checking of this questionnaire by the project supervisor may result in the forfeiting of part payment of this day's work and at the discretion of the project manager, the whole days pay if the work is considered substandard. I, the undersigned, fully understand and accept the above.

Interviewer signature: _____Date _____

Quality Assured by: _____Date _____

APPENDIX II: Botswana National Algorithm for Rapid HIV Testing



APPENDIX III: Participant Responses to the AUDIT Screening Tool

	Unweighted data		Weighted data	
	n	(%)	n	(%)
[AUDIT 1] How often do you have a drink containing alcohol?				
Monthly or less	177	20.0	180	20.8
Two to four times a month	377	42.5	374	43.1
Two to three times a week	206	23.2	182	20.9
Four or more times a week	112	12.6	114	13.1
Refused to Answer	15	1.7	18	2.0
[AUDIT 2] How many drinks containing alcohol do you have on a typical day when you are drinking?				
0-2 standard units	29	3.3	40	4.6
3-4 standard units	112	12.6	113	13.1
5-6 standard units	218	24.6	200	23.2
7-9 standard units	252	28.4	270	31.3
10+ standard units	259	29.2	228	26.4
Don't know	8	0.9	7	0.9
Refused to Answer	9	1.0	4	0.5
AUDIT 3] Do you ever have _____drinks on one day? How often in the last year?				
Never	81	9.1	74	8.6
Less than monthly	216	24.4	199	23.1
Monthly	221	24.9	244	28.3
Weekly	288	32.5	282	32.7
Daily or almost daily	70	7.9	56	6.5
Refused to Answer	11	1.2	6	0.7
[AUDIT 4] How often during the last 12 months have you found that you were not able to stop drinking once you started?				
Never	623	70.2	616	71.4
Less than monthly	105	11.8	92	10.6
Monthly	42	4.7	42	4.9
Weekly	82	9.2	85	9.9
Daily or almost daily	24	2.7	22	2.5
Refused to Answer	11	1.2	6	0.7
[AUDIT 5] How often in the last 12 months have you failed to do what was normally expected from you because of drinking?				
Never	614	69.2	590	68.4
Less than monthly	166	18.7	156	18.1
Monthly	48	5.4	53	6.1
Weekly	46	5.2	57	6.6
Daily or almost daily	5	0.6	4	0.4
Refused to Answer	8	0.9	3	0.3
[AUDIT 6] How often in the last 12 months have you needed a first drink in the morning to get yourself going after a heavy drinking session?				
Never	692	78.0	672	77.9
Less than monthly	96	10.8	91	10.6
Monthly	25	2.8	28	3.2

	Unweighted data		Weighted data	
	n	(%)	n	(%)
Weekly	52	5.9	58	6.8
Daily or almost daily	15	1.7	11	1.3
Refused to Answer	7	0.8	2	0.2
[AUDIT 7] How often in the last 12 months have you had a feeling of guilt or remorse after drinking?				
Never	491	55.4	481	55.8
Less than monthly	200	22.6	168	19.5
Monthly	95	10.7	105	12.1
Weekly	68	7.7	81	9.3
Daily or almost daily	24	2.7	25	2.9
Refused to Answer	9	1.0	3	0.4
[AUDIT 8] How often in the last 12 months have you been unable to remember what happened the night before because you had been drinking?				
Never	636	71.7	621	72.0
Less than monthly	146	16.5	125	14.5
Monthly	46	5.2	50	5.8
Weekly	33	3.7	44	5.1
Daily or almost daily	15	1.7	16	1.9
Refused to Answer	11	1.2	6	0.7
[AUDIT 9] Have you or someone else been injured as a result of your drinking? When was that?				
No	621	70.0	622	72.1
Yes, but not in the last year (12 months)	130	14.7	114	13.2
Yes, during the last year (12 months)	125	14.1	121	14.1
Refused to Answer	11	1.2	5	0.6
[AUDIT 10] Has a relative or friend or a doctor or another health worker been concerned about your drinking or suggested you cut down? When was that?				
No	446	50.3	426	49.4
Yes, but not in the last year (12 months)	185	20.9	175	20.3
Yes, during the last year (12 months)	245	27.6	256	29.7
Refused to Answer	11	1.2	5	0.6