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Alcohol Consumption and Sexual Risk Behavior in an Aging Population in Rural South Africa

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Abstract

We sought to characterize the relationship between alcohol consumption and sexual risk-taking in an aging population in rural South Africa. A cross-sectional analysis was conducted using baseline data from Health and Ageing in Africa: a Longitudinal Study of an INDEPTH Community (HAALSI) cohort. We elicited information on sexual risk behavior and self-reported frequency of alcohol consumption among 5,059 adults ≥ 40 years old.

Multivariable models showed that more frequent alcohol consumption is associated with a higher number of sexual partners (β: 1.38, $p < .001$) and greater odds of having sex for money (OR: 42.58, $p < .001$) in older adults in South Africa. Additionally, daily drinkers were more likely to have sex without a condom (OR: 2.67, $p = .01$).

Older adults who drank more alcohol were more likely to engage in sexual risk-taking. Behavioral interventions to reduce alcohol intake should be considered to reduce STI and HIV transmission.

Keywords

Sexual risk behavior; Alcohol; HIV; older adults

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Contributorship

LM, XGO, KK, ST, TB and LB were involved in collecting the data. JMG and RV participated in the study design. RV conducted the analysis. All authors contributed regarding the writing and revision of the manuscript. All authors read and gave approval regarding the final manuscript.

Competing interests

The authors have no conflicts of interests to declare.

INTRODUCTION

The United Nations has declared a goal to end the worldwide HIV epidemic by 2030 [1]. One of the targets to achieve this goal is primary prevention of HIV infection. An important component of HIV prevention efforts is reducing high-risk sexual behavior that increases risk of to HIV infection [2].

Sexual risk-taking is widely recognized as an important risk factor for HIV transmission, and includes inconsistent condom use, having multiple partners and not discussing sexual risk before intercourse [3,4]. Evidence has shown that alcohol use is associated with these types of risk behaviors and increased HIV vulnerability, due to its disinhibiting effects and impaired judgement in those who overuse or abuse it [5,6]. Consequently, alcohol consumption decreases the ability to engage in sexual risk reduction activities [7]. For instance, people who drink alcohol are more likely to have sex without a condom compared to those who do not [8,9]. Moreover, alcohol intoxication can decrease a person's ability to negotiate condom use prior to intercourse [4].

In addition to this, evidence has shown an indirect association between alcohol use and sexual risk-taking [10–12]. For instance, social venues that serve alcohol allow individuals to not only buy alcohol but also meet potential sexual partners [10,12]. These settings especially play a role in HIV transmission in South Africa. One example of such social venues is shebeens, which are informal community-based social gathering places in South Africa. Prior research has shown that almost over 90% of the people living in Cape Town reported having met new sexual partners in these shebeens, suggesting they may play an important part in HIV transmission [10].

As a result of the association between alcohol and sexual risk-taking, interventions to reduce alcohol use have been explored as a way to decrease transmission of all sexually transmitted infections (STI), including HIV [13,14]. Given these relationships, it is particularly important to understand the role of alcohol use in driving sexual behavior in regions of high HIV prevalence such as South Africa, which happens to also rank among the top countries in the world with respect to alcohol consumption [15,16]. Earlier literature showed that 33.1% of the South African population drinks alcohol [17]. In addition, approximately one third of the population report heavy, episodic drinking behavior [18]. Major drivers of reported alcohol misuse are the ubiquitous availability of inexpensive alcoholic beverages and their promotion through advertisements and sponsorships of the alcohol industry [19].

Earlier studies have shown consistent associations between alcohol consumption and high-risk sexual behavior in southern Africa [15,20]. While much of this research has focused on alcohol and sexual risk-taking in adolescents and young people, there is minimal evidence to date regarding the relationship between alcohol consumption and HIV vulnerability due to sexual risk-taking among aging populations. However, this older population is an important one given that existing literature has revealed high rates of alcohol consumption among men and women over 50 years old in rural settings [21]. Moreover, there is growing evidence that this population is engaging in sexual risk behaviors, and may underestimate their risk of

STIs including HIV. This has been demonstrated by increasing rates of STIs among older adults in this region [22].

As such, this study sought to evaluate the relationship between alcohol consumption and high-risk sexual behavior in a large cohort of older adults (40 years and above) in rural South Africa. We hypothesized that alcohol consumption may be linked to an increase in high-risk sexual behavior in this population.

METHODS

Study population

This study is a cross-sectional analysis using baseline data from the survey "Health and Aging in Africa: A Longitudinal Study of INDEPTH community in South Africa" (HAALSI). HAALSI is a cohort of adults aged ≥ 40 that was conducted in the Agincourt sub-district of Mpumalanga province, South Africa [23]. The study is nested within a health and socio- demographic surveillance site (HDSS) that includes 116,000 people from 31 villages [24]. Based on predetermined inclusion criteria, this study ultimately surveyed 5,059 randomly selected men and women (n = 2,345, 46.3% men; n = 2,714, 53.7% women). Household interviews were completed between November 2014 and November 2015 and queried the demographics, health- and economic conditions of all individual participants.

Data collection

The questionnaires were developed in English and then translated into the local language, Shangaan. To ensure reliability, the translated answers were back translated [25]. The data was collected via a computer-assisted personal interview (CAPI) with trained, local fieldworkers. The interviews were conducted in Shangaan. The in-person interview included questions about sociodemographic factors, health status, health risk behaviors, and living conditions.

Measures

Alcohol consumption—Alcohol consumption was assessed by asking participants about the frequency with which they consumed at least one alcoholic beverage in the past 30 days. Alcohol consumption was subcategorized into daily drinking, 5–6 days per week, 1–4 days per week, 1–3 days per month, less than once per month and does not currently drink. "Does not currently drink" included participants who did not consume an alcoholic drink in the last 30 days. Quantity of alcohol consumption was not assessed during the interviews.

Sexual risk behavior—We explored several questions that assessed sexual risk behavior, including: (1) Do/did you use a condom with your most recent partner?; (2) Have you ever had sex in exchange for money?; (3) When having sex for money, did you us a condom?; (4) Have you ever had sex without a condom with someone HIV positive?; (5) How many different sex partners have you had in your lifetime?; (6) During the last 24 months, how many sexual partners have you had?.

With respect to the question “Do/did you use a condom with recent partner?”, participants only answered this question if they previously reported that they had a relationship in the last 24 months. All other sexual risk behavior questions were asked to all participants.

The responses to each of the sexual risk behavior questions were coded into binary outcomes that indicated harmful high-risk sexual behavior, except for the question regarding the number of sex partners in the last 24 months and lifetime, which was given in the form of a number. Participants who answered “I do not remember” were excluded from the analysis for that particular question. For the question about condom use (Question 1), the responses ‘always’ and ‘most of the time’ were categorized as high-risk sexual behavior, and “sometimes” and “never” were treated as low risk behavior.

HIV infection—HIV infection in the participants was determined by dried blood spot (DBS) HIV antibody testing [26]. Two categories were defined in the analysis; people without HIV (HIV-) and people with HIV (HIV+).

Demographic variables—Covariates included in the analyses included categorical age (40–49; 50–59; 60–69; 70–79; ≥ 80 years old), sex of the participant (male or female), country of birth (South Africa or Mozambique/other), education (no formal education; some primary (1–7 years); some secondary (8–11 years); secondary or more (≥ 12 years)), wealth quintiles derived from an asset index and marital status (never married; separated/divorced; widowed; currently married) [23].

Missing data

To account for missing data, we performed a complete case regression analysis in which participants were only included if they had complete data regarding the sexual risk behavior of interest and relevant covariates. Missing data are shown in Supplementary Appendix A.

Statistical analysis

The prevalence of each sexual risk behavior was calculated overall and by the frequency of alcohol use. Proportions were compared using a chi-squared test. In addition, multivariable logistic regression models were performed to investigate the adjusted association between alcohol use and high-risk sexual behaviors. A multivariable linear model was used to fit the number of lifetime sexual partners and sexual partners in the last 24 months. All models were adjusted for age, sex, education, marital status and household wealth.

The analyses were conducted using IBM SPSS Statistics 25.

Patient and public involvement

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

Ethics Statement

Ethical approval for this study was granted by the University of Witwatersrand (#M141159), the Harvard T.H. Chan School of Public Health (#13–1608), and the Mpumalanga Provincial Research and Ethics Committee.

RESULTS

Baseline characteristics

Table I shows the characteristics of all participants. Almost half of the participants were men (46.3%), most (69.8%) were born in South Africa, 45.7% did not have a formal education, and 23.0% were living with HIV. In addition, 23.2% of the participants consumed alcohol in the last 30 days, of which 26.0% reported drinking alcohol at least five days per week. There were significant bivariate differences in alcohol consumption by sex ($\chi^2_{df=5} = 638.5$, $p < .001$), age ($\chi^2_{df=20} = 45.8$, $p < .001$), country of birth ($\chi^2_{df=5} = 54.7$, $p < .001$), education ($\chi^2_{df=15} = 46.4$, $p < .001$), marital status ($\chi^2_{df=15} = 93.9$, $p < .001$) and wealth categories ($\chi^2_{df=20} = 176.5$, $p < .001$) (see Table I). However, there was no difference in the frequency of alcohol consumption by HIV status ($\chi^2_{df=5} = 0.7$, $p = 0.98$).

Alcohol consumption and sexual risk behavior

More frequent alcohol consumption was associated with a greater number of sexual partners over the life course and in the past 24 months, as shown in Figure 1 and 2. Controlling for background characteristics, there was a significant association between the number of sexual partners over the lifetime and frequency of alcohol consumption (β: 1.38 95% CI: 1.21–1.55, $p < .001$, see Table II). Moreover, this association was also seen between the number of sexual partners in the past 24 months and frequency of alcohol consumption (β: 0.07 95% CI: 0.06–0.09, $p < .001$, see Table II). In addition, linear regression models showed that women had a fewer number of sexual partners during their lifetime and in the past 24 months as compared to men (β: −6.06 95% CI: −6.52- −5.67, $p < .001$; β: −0.50 95% CI: −0.54- −0.47, $p < .001$). Greater educational attainment was also associated with a greater number of lifetime sexual partners and sexual partners in the last 24 months (β: 0.58 95% CI: 0.35– 0.82, $p < .001$; β: 0.12 95% CI: 0.10– 0.14, $p < .001$). Furthermore, younger age and a greater wealth were associated with a greater number of sexual partners in the last 24 months (β: −0.13 95% CI: −0.14- −0.11, $p < .001$; β: 0.04 95% CI: 0.02–0.05, $p < .001$).

Multivariable logistic regression models of alcohol consumption and sexual risk behavior showed a greater odds of having sex for money for participants that consumed alcohol more frequently (see Table II and in Supplementary Appendix B). Though few people in the cohort reported having sex for money (0.4%), daily drinkers had 46 times greater odds of reporting this behavior than those who did not consume alcohol (OR: 42.58 95% CI: 10.48–173.02, $p < .001$). Moreover, women were more likely than men to have exchanged sex for money, controlling for other risk factors (OR: 3.45 95% CI: 1.15–10.30, $p = .03$).

This study also found that alcohol consumption is associated with having sex without condom for people with HIV(PWH) (Table II and Supplementary Appendix B). The participants who consumed alcohol 1–3 days per month (OR: 2.52 95% CI: 1.17–5.42, p

= .02) and 1–4 days per week (OR: 3.21 95% CI: 1.61–6.44, $p < .001$) had a greater odds of having sex without a condom with PWH than those who drank no alcohol. Moreover, older participants were less likely to engage in this risk behavior (≥ 80 years old; OR: 0.18 95% CI: 0.04–0.83, $p = .03$). Among those who reported sex without a condom, only the participants who reported drinking 1–3 days per month (OR: 1.82 95% CI: 1.13–2.94, $p = .01$) or daily drinkers (OR: 2.67 95% CI: 1.27–5.58, $p = .01$) had a greater odds of ever having sex without condom compared to those who did not currently drink (Table II). In addition, older participants were more likely to have ever had sex without a condom with their most recent partner compared to younger participants (>80 years old; OR: 4.37 95% CI: 1.91–9.99, $p < .001$) as did those who were currently married (OR: 3.44 95% CI: 2.22–5.32, $p < .001$).

DISCUSSION

In this study, we found that more frequent consumption of alcohol was associated with several key high-risk sexual behaviors in a population of older adults living in rural South Africa. Frequent alcohol use was most strongly associated with the number of sex partners, having sex without a condom and having sex for money. These findings are important and novel because this study was conducted among older adults in a region of high HIV prevalence, an often overlooked population in terms of HIV vulnerability. These findings suggest that the reduction of alcohol use may be a potential target for behavioral interventions that aim to reduce sexual risk-taking in older age groups.

According to prior research, South Africa ranks among the countries with the highest consumption of alcohol in the world [27,28]. In this study, 23% of the participants reported current alcohol use. This prevalence is lower than what has been found in previous studies, which have reported that as many as 33.1% of people in South Africa are current alcohol users [17]. This difference might be explained by the fact that this study was conducted in an older population or may have to do with other local differences in alcohol use patterns.

Furthermore, the association between alcohol consumption and sexual risk-taking is consistent with findings from previous studies, most of which have been conducted in younger populations [15,29,30]. In a prior study that explored the relationship between alcohol use and sexual behavior in South Africa, there was a consistent association observed between quantity of alcohol consumption and increased sexual risk-taking [15,30]. Our study adds to these findings and confirms that these relationships are also present in people aged 40 and older. In addition, earlier findings showed that people in South Africa had a higher risk of acquiring HIV when they consume more alcohol [29]. There are several explanations that have been proposed to explain this association, such as the impact of alcohol on decision making that can lead to sexual risk-taking and the biological effects of alcohol consumption on HIV transmission [31]. However, literature has shown that this association is strictly correlated to quantity of alcohol and not frequency of alcohol intake [15,29]. Our study found no differences in the frequency of alcohol use by HIV status, though we did not measure quantity consumed, as in prior studies.

This study showed that sexual risk behavior is also prevalent in this older population in rural South Africa and is linked to drinking behavior. Similar to other studies, older participants were less likely to have sex with a condom compared to younger participants [32–34]. This could be explained by the fact that older adults may lack awareness of the risk factors for acquiring HIV, especially given the relatively little HIV prevention education that targets older populations [35,36]. A study in sub-Saharan Africa found that people older than 50 had lower levels of knowledge regarding HIV prevention compared to younger adults [37]. This indicates that older adults are less well-equipped to make informed decisions about their own sexual risk behavior. However, age seemed to be protective for having sex with someone known to be HIV positive.

This study also found gender differences in sexual risk behavior. Women were more likely to have sex without a condom and have sex for money, whereas men were more likely to have sex without a condom when drunk. This is an interesting finding, since women engage in different kinds of sexual risk behaviors than men and because we found that women drink less than men, which is also consistent with prior research [20,38,39]. The finding that women are more likely to have sex without a condom may also be explained by gender power imbalances that can significantly affect women's ability to decide to use a condom. Previously literature from South Africa has shown that these gender dynamics around condom use are relevant to STI and HIV vulnerability [40,41].

As mentioned above, our findings suggest that interventions to reduce alcohol consumption may be effective to reduce sexual risk-taking [42]. Previous research has begun to explore the effectiveness of various alcohol reduction interventions in older adults (≥ 55 years old). These studies have shown that intensive interventions may be more effective in this population, including physician advice, personalized feedback, educational materials, and follow-up with a physician or other healthcare provider [43–45]. Furthermore, the use of alcohol reduction interventions has been evaluated in sub-Saharan Africa but these types of interventions have not been widely implemented [22]. These studies have also shown that individual models, which have been explored more commonly in high-income settings, do not seem to be fully applicable to collectivist cultures. As such, multi-level interventions may be more effective than individual-level interventions to reduce alcohol use in some communities such as the one in which this study is located [46]. In addition, there is evidence that multi-faceted policy approaches, such as increasing alcohol prices and reducing marketing and availability of alcoholic beverages, may decrease alcohol consumption and in turn reduce high-risk sexual behavior [47–49]. For instance, a study showed that alcohol tax increase in Illinois led to a decrease of 21% of state-wide rates of gonorrhea [48]. A second study showed that the increase in the drinking age in the United States reduced STI rates in youth [49]. Therefore, the evaluation of long-term, multilevel interventions to reduce alcohol consumption in older populations in South Africa is of great importance to determine their effectiveness in reducing sexual risk-taking and other alcohol related harms.

There are several limitations in this study. First of all, alcohol consumption and sexual risk behavior were both self-reported. Consequently, this could lead to recall or reporting bias which could affect the results. In particular, the themes of both alcohol use and sexual risk

behavior could be perceived as shameful or stigmatized, which may further exacerbate under-reporting of these behaviors. Secondly, the data used in this study described frequency of alcohol consumption but did not address quantity or patterns of binge drinking. We were thus unable to explore associations between more infrequent but still harmful drinking behavior, namely that episodic binge drinking is linked to sexual risk-taking and HIV vulnerability [7]. Future studies should include quantity of alcohol consumed in addition to frequency. Lastly, the study was cross sectional and thus we were unable to establish causality or examine these relationships over time.

In conclusion, we show that there is a strong association between alcohol consumption and high-risk sexual behavior in an aging population in rural South Africa with high HIV prevalence. Interventions to reduce alcohol intake have the potential to decrease risk of both STIs and HIV acquisition in South Africa.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
Number of sexual partners over the lifetime per category of alcohol use frequency

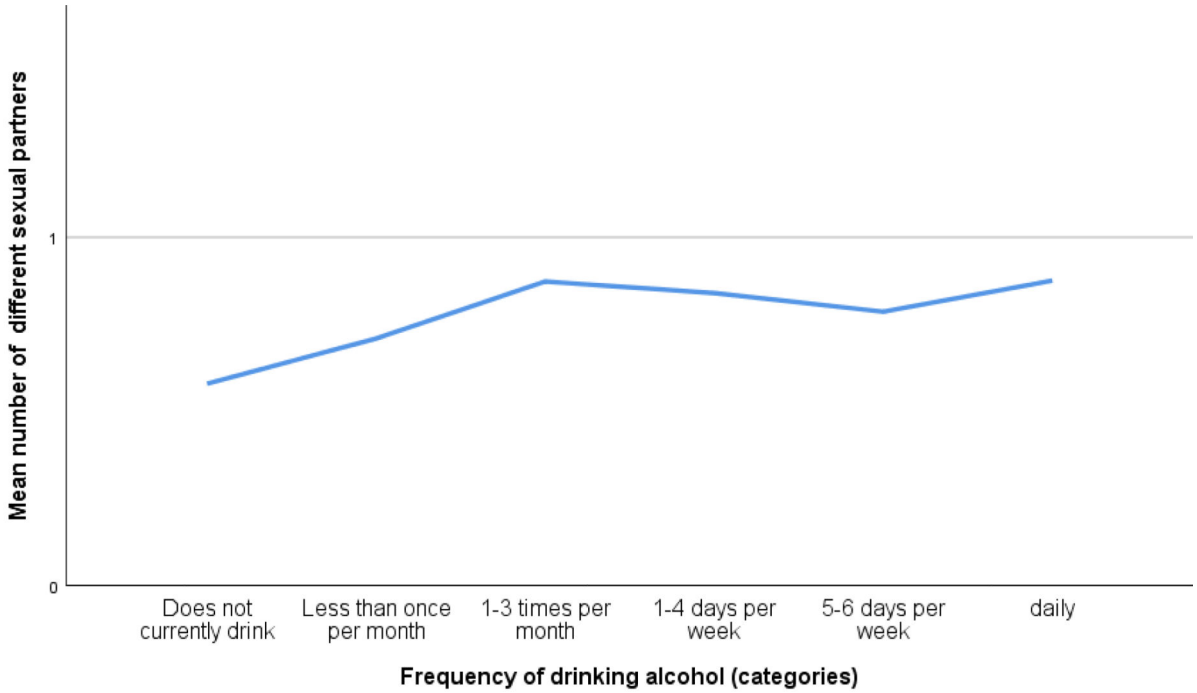

Figure 2.
Number of sexual partners in the last 24 months per category of alcohol use frequency.

Table I

Participant Characteristics per Alcohol Consumption Category

	Daily (n=167) n (%)	5–6 days per week (n=137) n (%)	1–4 days per week (n=315) n (%)	1–3 days per month (n=317) n (%)	Less than once a month (n=234) n (%)	Does not currently drink (n=3885) n (%)	Total (n=5055) n (%)	χ^2 (df)	*p*-value
Sex									
Male	140 (83.8)	111 (81.0)	268 (85.1)	244 (77.0)	148 (6.2)	1431 (36.8)	2342 (46.3)	638.5 (5)	<0.001**
Female	27 (16.2)	26 (19.0)	47 (14.9)	73 (23.0)	86 (36.8)	2454 (63.2)	2713 (53.7)		
Age groups									
40–49	23 (13.8)	24 (17.5)	66 (21.0)	52 (16.4)	37 (15.8)	715 (18.4)	917 (18.1)	45.8 (20)	<0.001**
50–59	44 (26.3)	34 (24.8)	84 (26.7)	77 (24.3)	57 (24.4)	1112 (28.6)	1409 (27.9)		
60–69	62 (37.1)	39 (28.5)	83 (26.3)	80 (25.2)	52 (22.2)	998 (25.4)	1304 (25.8)		
70–79	27 (16.2)	32 (23.4)	54 (17.1)	72 (22.7)	59 (25.2)	634 (16.3)	878 (17.4)		
≥80	11 (6.6)	8 (5.8)	28 (8.9)	36 (11.4)	29 (12.4)	436 (11.2)	548 (10.8)		
Country of birth									
South Africa	95 (56.9)	67 (48.9)	212 (67.3)	213 (67.2)	154 (65.8)	2786 (71.8)	3527 (69.8)	54.7 (5)	<0.001**
Mozambique or other	72 (43.1)	70 (51.1)	103 (32.7)	104 (32.8)	80 (34.2)	1094 (28.2)	1523 (30.2)		
Education									
No formal education	94 (56.3)	87 (63.5)	148 (47.0)	155 (49.2)	118 (50.4)	1702 (44.0)	2304 (45.7)	46.4 (15)	<0.001**
Some primary (1–7 years)	53 (31.7)	30 (21.9)	112 (35.6)	104 (33.0)	78 (33.3)	1339 (34.6)	1716 (34.1)		
Some secondary (8–11 years)	13 (7.8)	13 (9.5)	34 (10.8)	34 (10.8)	28 (12.0)	451 (11.7)	573 (11.4)		
Secondary or more (12+ years)	7 (4.2)	7 (5.1)	21 (6.7)	22 (7.0)	10 (4.3)	378 (9.8)	445 (8.8)		
Marital status									
Never married	17 (10.2)	14 (10.2)	23 (7.3)	27 (8.5)	13 (5.6)	196 (5.1)	290 (5.7)	93.9 (15)	<0.001**
Separated/ divorced	29 (17.4)	25 (18.2)	52 (16.5)	37 (11.7)	32 (13.7)	474 (12.2)	649 (12.8)		
Widowed	33 (19.8)	28 (20.4)	53 (16.8)	71 (22.4)	54 (23.1)	1299 (33.5)	1538 (30.4)		
Currently Married	88 (52.7)	70 (51.1)	187 (59.4)	182 (57.4)	135 (57.7)	1912 (49.3)	2574 (51.0)		
HIV status									
HIV-	113 (75.8)	98 (79.0)	210 (75.8)	223 (77.2)	161 (78.2)	2703 (77.0)	3508 (77.0)	0.7 (5)	0.98

	Daily (n=167) n (%)	5–6 days per week (n=137) n (%)	1–4 days per week (n=315) n (%)	1–3 days per month (n=317) n (%)	Less than once a month (n=234) n (%)	Does not currently drink (n=3885) n (%)	Total (n=5055) n (%)	χ^2 (df)	*p*-value
HIV+	36 (24.2)	26 (21.0)	67 (24.2)	66 (22.8)	46 (22.2)	807 (23.0)	1048 (23.0)		
Wealth index status									
Quantile 1	75 (44.9)	50 (36.5)	93 (29.5)	76 (24.0)	55 (23.5)	694 (17.9)	1043 (20.6)	176.5 (20)	<0.001 **
Quantile 2	39 (23.4)	36 (26.3)	58 (18.4)	78 (24.6)	48 (20.5)	741 (19.1)	1000 (19.8)		
Quantile 3	27 (16.2)	19 (13.9)	65 (20.6)	58 (18.3)	48 (20.5)	774 (19.9)	991 (19.6)		
Quantile 4	10 (6.0)	19 (13.9)	61 (19.4)	51 (16.1)	55 (23.5)	811 (20.9)	1007 (19.9)		
Quantile 5	16 (9.6)	13 (9.5)	38 (12.1)	54 (17.0)	28 (12.0)	865 (22.3)	1014 (20.1)		

* $p < .05$.

** $p < .01$, χ^2 tests were used to compare proportions

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Table II

Multivariable regression to identify the association between alcohol usage and sexual risk behavior

	Multiple logistic regression analysis						Linear regression analysis			
	Sex without condom with recent partner (n=2740)		Sex without condom with someone HIV positive (n=4804)		Sex for Money (n=4872)		Number of sex partners in lifetime (n=4494)		Number of sex partners in the last 24 months (n=4882)	
	OR (95% CI)	*p*-value	OR (95% CI)	*p*-value	OR (95% CI)	*p*-value	B (95% CI)	*p*-value	B (95% CI)	*p*-value
Alcohol usage							1.38 (1.21–1.55)	<0.001 **	0.07 (0.06–0.09)	<0.001 **
Does not currently drink	REF		REF		REF		-	-	-	-
Less than once a month.	1.13 (0.68–1.87)	0.64	1.15 (0.35–3.79)	0.82	0.00 (0.00)	1.00	-	-	-	-
1–3 days per month	1.82 (1.13–2.94)	0.01 *	2.52 (1.17–5.42)	0.02 *	12.05 (2.93–49.62)	<0.001 **	-	-	-	-
1–4 days per week	1.25 (0.82–1.91)	0.30	3.21 (1.61–6.44)	<0.001 **	9.61 (1.97–46.97)	0.04 *	-	-	-	-
5–6 days per week	1.48 (0.75–2.92)	0.25	1.16 (0.27–5.04)	0.84	12.83 (2.08–79.10)	0.01 *	-	-	-	-
Daily drinking	2.67 (1.27–5.58)	0.01 *	1.72 (0.58–5.11)	0.22	42.58 (10.48–173.02)	<0.001 **	-	-	-	-
Sex							−6.06 (−6.52–−5.67)	<0.001 **	−0.50 (−0.54–−0.47)	<0.001 **
Male	REF		REF		REF		-	-	-	-
Female	1.40 (1.08–1.80)	0.01 *	0.80 (0.46–1.39)	0.43	3.45 (1.15–10.30)	0.03 *	-	-	-	-
Age							−0.11 (−0.18–0.20)	0.24	−0.13 (−0.14–−0.11)	<0.001 **
40–49	REF		REF		REF		-	-	-	-
50–59	1.41 (1.07–1.86)	0.01 *	1.14 (0.64–2.05)	0.64	0.52 (0.15–1.77)	0.29	-	-	-	-
60–69	1.98 (1.39–2.83)	<0.001 **	0.52 (0.25–1.09)	0.08	0.48 (0.12–1.87)	0.29	-	-	-	-
70–79	3.37 (2.03–5.60)	<0.001 **	0.25 (0.10–0.73)	0.01 *	1.33 (0.34–5.23)	0.68	-	-	-	-
≥80	4.37 (1.91–9.99)	<0.001 **	0.18 (0.04–0.83)	0.03 *	0.00 (0.00)	0.99	-	-	-	-

	Multiple logistic regression analysis						Linear regression analysis			
	Sex without condom with recent partner (n=2740)		Sex without condom with someone HIV positive (n=4804)		Sex for Money (n=4872)		Number of sex partners in lifetime (n=4494)		Number of sex partners in the last 24 months (n=4882)	
	OR (95% CI)	*p*-value	OR (95% CI)	*p*-value	OR (95% CI)	*p*-value	B (95% CI)	*p*-value	B (95% CI)	*p*-value
Education							0.58 (0.35–0.82)	<0.001 **	0.12 (0.10–0.14)	<0.001 **
No formal education	REF		REF		REF		-	-	-	-
Some primary	1.00 (0.75–1.33)	0.98	1.46 (0.83–2.56)	0.19	1.30 (0.47–3.60)	0.62	-	-	-	-
Some secondary	0.79 (0.56–1.14)	0.21	1.42 (0.66–3.10)	0.37	0.92 (0.18–4.79)	0.92	-	-	-	-
Secondary or more	0.94 (0.62–1.43)	0.76	1.31 (0.51–3.40)	0.57	0.91 (0.09–0.17)	0.94	-	-	-	-
Marital status							0.17 (−0.09–0.43)	0.21	0.30 (0.28–0.32)	<0.001 **
Never married	REF		REF		REF		-	-	-	-
Separated/ divorced	0.73 (0.45–1.20)	0.21	2.19 (0.72–6.69)	0.17	0.50 (0.14–1.79)	0.29	-	-	-	-
Widowed	0.81 (0.47–1.39)	0.44	1.94 (0.61–6.15)	0.26	0.08 (0.01–0.48)	0.01 *	-	-	-	-
Currently Married	3.44 (2.22–5.32)	<0.001 **	1.43 (0.49–4.15)	0.51	0.25 (0.07–0.85)	0.03 *	-	-	-	-
Wealth index status							0.05 (−0.11–0.22)	0.51	0.04 (0.02–0.05)	<0.001 **
Quantile 1	REF		REF		REF		-	-	-	-
Quantile 2	0.65 (0.45–0.93)	0.02 *	0.89 (0.46–1.71)	0.71	0.63 (0.21–1.92)	0.42	-	-	-	-
Quantile 3	0.73 (0.49–1.07)	0.10	0.78 (0.39–1.55)	0.47	0.32 (0.07–1.52)	0.15	-	-	-	-
Quantile 4	0.86 (0.58–1.26)	0.42	0.56 (0.26–1.21)	0.14	0.40 (0.08–1.95)	0.26	-	-	-	-
Quantile 5	0.88 (0.59–1.33)	0.55	0.66 (0.30–1.46)	0.31	0.23 (0.03–2.00)	0.18	-	-	-	-

* $p < .05$.

** $p < .01$.