

Characterizing alcohol use and sexual risk behaviors across gender and HIV status
among people attending STI clinics in Lilongwe, Malawi

Research Thesis

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Introduction

Alcohol consumption and participation in sexual risk behaviors are commonly discussed risk factors for HIV transmission. This study characterizes the prevalence of these behaviors among a population of STI clinic patients in Lilongwe, Malawi. Additionally, this study examines how these behaviors differ between men and women and patients with positive and negative HIV status. Understanding these behaviors provides insight into the dynamics of HIV transmission among a high-risk group in a country where HIV prevalence is among the highest in the world.

Literature Review

Human Immunodeficiency Virus

HIV is a virus that targets the immune system, causes individuals to become increasingly vulnerable to opportunistic infections and some cancers, and left untreated, leads to the development of AIDS. In 2018, it was estimated that 39.2 million people were living with HIV/AIDS worldwide (*Global Statistics / HIV.gov*, 2019). There are vast efforts in place to increase access to HIV testing and treatment as well as to decrease the spread of new infections. Sub-Saharan Africa carries a disproportionate burden of HIV, accounting for 70% of global infections (Kharsany & Karim, 2016). Malawi is a small country in southeastern Africa with a population of roughly 18 million people. In 2018, UNAIDS estimated that 9.2% of adults aged 15-49 years in Malawi were living with HIV (*Malawi / UNAIDS*, n.d.). HIV infection rates are strongly influenced by the social, behavioral, clinical, and biological factors that contribute to the infection risk environment.

Alcohol use

Alcohol use is a risk factor for many poor health outcomes and a major contributor to the global burden of disease. Each year, harmful alcohol consumption contributes to three million deaths worldwide, representing 5.3% of all deaths (*Alcohol*, n.d.). Alcohol use is a causal or risk factor of infectious diseases, cancer, diabetes, cardiovascular disease, liver and pancreas disease, mental and behavioral disorders, and injuries (*Alcohol*, n.d.; Rehm, 2011).

Roughly 30% of the adult population in sub-Saharan Africa drinks alcohol (Ferreira-Borges et al., 2017). In Malawi, approximately 37% of people over the age of 15 have been reported to consume alcohol (50% of men, 23% of women) (*WHO / Country profiles 2019*, n.d.). Of those who report drinking, nearly half are considered heavy drinkers (57% of men, 22% of women) (*WHO / Country profiles 2019*, n.d.). While women drink less than men, they are prone to suffering more health complications following binge or chronic alcohol consumption (Ceylan-Isik et al., 2010; Martinez et al., 2011).

Some reports show that the gap between men's and women's drinking behaviors is narrowing due to a shift in women's roles in society and targeted advertisement campaigns towards women (Ferreira-Borges et al., 2017). Malawi has enacted programs to decrease the prevalence of heavy drinking including bans on alcohol advertising, restrictions on alcohol availability, and taxes on alcoholic beverages, (*Malawi launches the National Alcohol Policy on 18 August 2017*, n.d.).

Sexual risk behaviors

Sexual risk behaviors include lack of condom use, participation in transactional sex, sexual violence, having a high frequency of sexual encounters, and having a high number of

concurrent sexual partners (Chawla & Sarkar, 2019). These sexual risk behaviors increase an individual's risk of HIV, other STIs, and pregnancy (Mthembu et al., 2019). Participation in sexual risk behaviors is influenced by individual, interpersonal, social, and economic factors (Mirzaei et al., 2016).

Among those living with HIV in Malawi, only 51% of men and 38% of women report consistent condom use (Haddad et al., 2018). Condom use is known to decrease with substance use, condom unavailability (Russell et al., 2019), and the perception that condoms reduce sexual pleasure (Ajayi et al., 2019). Conversely, condom use increases when people discuss HIV/STIs with their partners, know their partner's HIV status, and engage in sex with only steady partners (Ajayi et al., 2019).

In Malawi, it is most common for people to be in long, monogamous relationships (Powers et al., 2011). However, those who have multiple sexual partners, whether in concurrent or consecutive relationships, increase the spread of HIV through the creation of interconnected networks (Genberg et al., 2008; Powers et al., 2011).

Co-occurrence of alcohol use and sexual risk behaviors in the context of HIV

Alcohol use is associated with lowered cognitive ability, impaired decision-making, loss of control, and less concern for the well-being of others (Bello et al., 2017; Lancaster et al., 2018; Rogers et al., 2019). The impacts of alcohol use on judgement can lead to the initiation of high-risk sexual behaviors (Bello et al., 2017; Lancaster et al., 2018) and the likelihood that the a sexual encounter will be unsafe (Critchlow, 1986). For example, alcohol has been found to be a barrier to consistent condom use (Rogers et al., 2019) and can cause people to be unable to recognize condom breakage or lack of condom use (Lancaster et al., 2018).

Alcohol use causes physical changes, such as increased genital viral shedding, that are related to greater risk of HIV transmission during an unprotected sex act (Lancaster et al., 2018). Alcohol also has negative effects on the immune system, contributing to high risk of contracting HIV and a worsening course of HIV (Rehm & Parry, 2009; Shuper et al., 2010). Additionally, alcohol use causes delays in HIV diagnosis and poor adherence to treatment (Lancaster et al., 2018; Shuper et al., 2010).

The prevalence of heavy alcohol consumption is much higher among HIV positive individuals than the general population (Nouaman et al., 2018). Heavy alcohol consumption in one sitting is a better predictor of initiation of sexual risk behaviors than high frequency of alcohol use (Kalichman et al., 2007). In Malawi, people who screened positive for hazardous alcohol consumption were found to have increased odds of participating in sexual risk behaviors such as transactional sex, having multiple sexual partners, or experiencing sexual violence (Tran et al., 2018).

Men are more likely to engage in high levels of alcohol use and riskier sexual behaviors while under the influence of alcohol than women (Kalichman et al., 2007; Nouaman et al., 2018). Women's sexual risks are often associated with their male partner's alcohol consumption (Kalichman et al., 2007), likely due to men exercising more control over daily routines, drug use, and sexual encounters than women (Needle et al., 2008). The overlap of alcohol and other drug use behaviors and sexual risk behaviors creates a potential for accelerated HIV transmission (Needle et al., 2008).

Methods

Data collection

The data used for this thesis were collected at two STI clinics in Lilongwe, Malawi from June 2015 to April 2019. The data were originally collected for a two-armed, randomized cross-sectional study that assessed the benefit of an intervention package for identifying high-risk people who are unaware of their HIV infection status. The intervention package included screening for acute HIV infection, sexual partner referral and tracing, and social contact referral.

All patients attending the STI clinics received group sexual health education, STI treatment, HIV testing and counseling, and referral to HIV treatment if necessary. Patients who were enrolled in the primary study were additionally assessed for their self-reported sexual behaviors, HIV/STI history, and quality of life. They were screened for depression, PTSD, and alcohol and marijuana use. Each patient enrolled in the study also provided information about their sexual partners and social contacts. The length and scope of the administered surveys depended on the HIV status of the participant, whether the participant was an original clinic patient or an original patient's sexual partner or social contact, and which arm of the study the participant was enrolled in. All surveys, HIV tests and STI treatments were administered by Malawian HIV counselors and nurses.

The inclusion and exclusion criteria used for the primary study were also utilized for this secondary data analysis. Participants were eligible if they were 18 years or older, sexually active within the past six months, and lived in Lilongwe, Malawi. Clinic patients were ineligible if they had any serious illness requiring hospitalization, had active drug or alcohol dependence that would interfere with study adherence, or were unwilling or unable to provide informed consent.

The primary study population comprised 15,033 participants. For this thesis, 26 participants were removed due to not meeting inclusion criteria, giving a final population of 15,007 participants.

Measures

Alcohol consumption was assessed using the AUDIT-C, a three-question survey that identifies patients who are hazardous drinkers or have active alcohol use disorders. The AUDIT-C is a modified version of the ten question AUDIT (Alcohol Use Disorders Identification Test). Each question on the AUDIT-C is graded on a four-point scale, making 12 points the highest possible score. Patients were considered positive for hazardous alcohol consumption if they scored greater than or equal to four points for men or three points for women, following guidelines of the AUDIT-C (Bush et al. 1998, Bradley et al. 2003).

Sexual risk behaviors examined in this study included anal sex, condom use at last sexual encounter, whether the patient has someone whom they consider to be their main sexual partner, number of sexual encounters in the past month, and number of sexual partners over multiple time frames (four weeks, three months, six months, and two years).

Data management and analysis

Data collected at the STI clinics was entered into a Microsoft Access database. Data was exported to SAS and cleaned. The data was then exported to Stata version 16. Frequency tests were run for demographic variables (gender, age, marital status, education level, HIV status and whether the participant received any income in the last three months), alcohol consumption and sexual risk behaviors. Stata's "cs" command of the epitab features was used to create

contingency tables to compare hazardous alcohol consumption and sexual risk behaviors across gender and HIV status.

Results

Demographics

The population for this analysis was evenly distributed between men and women (Table 1). The mean age of participants was 29.0 years (SD = 8.0). The age of participants ranged from 18 to 79 years. Most participants had never been married (97% of men, 95% of women). More than 40% of participants reported their highest achieved educational level as “some primary schooling”. Reporting a lower level of schooling was more common among women and men. More than two-thirds of participants received some sort of income in the past three months. Over 80% of men reported receiving an income compared to roughly 55% of women. Approximately 85% of participants were HIV negative (88% of men, 83% of women). It was more common for women to be HIV positive than men, as 17% of women were HIV positive compared to 12% of men.

Alcohol use

Roughly 5% of the population, all of whom were HIV positive, were interviewed about their alcohol consumption (Table 2). Of these participants, approximately 75% reported to abstain from alcohol (55% of men, 89% of women), while others reported to consume alcohol at varying frequencies. Nearly half of interviewed men and women reported to consume one to two standard drinks containing alcohol on a typical day. Others reported to consume three to six drinks (38%) or seven or more drinks (13%) on a typical day. Approximately 60% of

respondents reported to never consume six or more drinks on one occasion (46% of men, 77% of women), while others reported to do this monthly or less (25% of men, 12% of women) weekly (20% of men, 8% of women), and daily or almost daily (8% of men, 2% of women).

Of the HIV-positive population interviewed about their alcohol use, 16% screened positive for hazardous alcohol consumption. Across most of the data, women reported to drink less frequently and less heavily than men. This finding is supported by men having much higher risk of developing hazardous alcohol consumption than women ($RR = 4.273$) as calculated by the AUDIT-C guidelines (Table 3). Compared to only 7% of women, approximately 30% of men interviewed about their alcohol consumption screened positive for hazardous alcohol consumption.

Sexual risk behaviors

Participant self-reported sexual behaviors were compared across gender and HIV status (Table 4). Fewer than 3% of participants reported to have anal sex in their lifetime, with frequencies consistent across men, women, HIV positive participants and HIV negative participants. Most participants reported not having used a condom during their most recent sexual encounter. The risk of not using a condom was similar between men and women ($RR = 0.995$) and between HIV positive and negative participants ($RR = 0.780$) (Tables 5 and 6).

HIV positive participants were asked if they have someone whom they consider to be their main sexual partner. Of these participants, approximately 70% reported to have a main sexual partner, with frequencies consistent across men and women. On average, participants reported that they had sex 7.4 times in the past month ($SD = 8.2$). HIV positive and negative

participants reported similar numbers of sexual encounters in the past month, while men reported slightly higher numbers of sexual encounters than women.

Participants were asked to recall the number of sexual partners they had within the past four weeks, three months, six months, and two years. During each time frame, men reported to have more sexual partners than women, and HIV positive participants reported to have slightly more sexual partners than HIV negative participants. In order to be eligible for the study, participants must have had sex in the past six months. Men were much more likely to have more than one sexual partner in the past six months than women (RR = 3.488) (Table 7). However, having more than one sexual partner in the past six months did not pose a significant risk for having HIV (RR = 1.034) (Table 8).

Discussion

This study characterized alcohol use and multiple sexual risk behaviors among HIV positive and negative men and women who attended two STI clinics in Lilongwe, Malawi. Among this population, most reported to abstain from drinking. Of those who do drink alcohol, men were found to drink more frequently and heavily than women. These findings are largely consistent with trends reported in Malawi other countries in sub-Saharan Africa. When asked about their sexual behaviors, most participants reported not using a condom during their most recent sexual encounter. This sexual risk behavior did not vary greatly between men, women, HIV positive participants, and HIV negative participants. Men reported having more sexual partners in the past six months than women, but this finding was not associated with higher risk of HIV infection. Characterizing the behaviors of Malawian STI clinic patients is important as it provides information on the dynamics involved with HIV transmission among a high-risk group in a country where HIV prevalence is among the highest in the world.

This data analysis was limited due to differing lengths and scopes of the administered surveys, low response rates to many survey questions, and the possible reporting bias of participants. For example, questions about alcohol use were only asked to HIV positive participants, leading to a low number of responses and not allowing for comparison of alcohol consumption across HIV status. Reporting bias likely occurred to some degree when participants were interviewed about their alcohol use and sexual risk behaviors due to cultural differences and tendencies to under-report behaviors.

Gaining a better understanding of the associations between alcohol use and sexual risk behaviors is a public health priority due to the relationships between these behaviors and HIV transmission. Future analyses of this dataset could focus on establishing these associations. This could be done via creating risk patterns ranging from low- to high-risk and comparing them across gender and HIV status. An investigation of the risk behavior patterns of the acute HIV population identified by the primary study and their sexual partners and social contacts may also be done. These findings would assist in the development of programs to prevent HIV transmission and aid in prompt HIV diagnosis and treatment.

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Tables

Table 1: Demographics

	All participants				Men (N=7,484, 50.5%)				Women (N=7,338, 49.5%)			
	N	%	Mean	SD	N	%	Mean	SD	N	%	Mean	SD
Age	14,719		29.0	8.0	7,435		30.0	8.3	7,284		28.0	7.5
Marital status												
Never married	14,231	95.7			7,188	96.8			6,881	94.7		
Married	460	3.1			183	2.5			258	3.6		
Separated/divorced	166	1.1			53	0.7			109	1.5		
Widowed	16	0.1			1	0.01			15	0.2		
Education level												
None	56	7.6			20	6.9			36	8.5		
Some primary	317	42.9			108	37.3			198	46.6		
Completed primary	109	14.7			44	15.2			64	15.1		
Some secondary	165	22.3			59	20.4			99	23.3		
Completed secondary	72	9.7			43	14.9			23	5.4		
Any tertiary	20	2.7			15	5.1			5	1.2		
Income in last 3 months												
Yes	10,244	68.9			6,156	82.9			3,962	54.6		
No	4,626	31.1			1,268	17.1			3,299	45.4		
HIV status												
Positive	2,199	14.7			892	11.9			1,262	17.2		
Negative	12,808	85.3			6,592	88.1			6,076	82.8		

Table 2: Alcohol consumption by gender

	All participants		Men		Women	
	N	%	N	%	N	%
How often do you have a drink containing alcohol?						
Never	540	74.9	155	55.0	370	89.2
Monthly or less	63	8.7	37	13.1	23	5.5
2-4 times a month	39	5.4	32	11.3	6	1.4
2-3 times a week	57	7.9	40	14.2	13	3.13
4 or more times a week	22	3.1	18	6.4	3	0.7
How many standard drinks containing alcohol do you have on a typical day?						
1-2	86	49.4	60	49.2	21	48.8
3-4	39	22.4	26	21.3	10	23.3
5-6	27	15.5	21	17.2	6	14.0
7-9	9	5.2	4	3.3	4	9.3
10 or more	13	7.5	11	9.0	2	4.7
How often do you have six or more drinks on one occasion?						
Never	186	58.9	80	46.2	102	77.3
Less than monthly	34	10.8	23	13.3	9	6.8
Monthly	28	8.9	20	11.5	7	5.3
Weekly	51	16.1	36	20.8	11	8.3
Daily or almost daily	17	5.4	14	8.1	3	2.3

Note: Alcohol consumption questions were only asked to HIV positive men and women. All men and women in the table above are HIV positive.

Table 3: Hazardous alcohol consumption and gender

		Men	Women
Hazardous alcohol consumption	Positive	84	29
	Negative	200	390
	Risk	0.296	0.069
	Risk ratio	4.273	

Note: Alcohol consumption questions were only asked to HIV positive men and women. All men and women in the table above are HIV positive. Hazardous alcohol consumption was calculated following the AUDIT-C guidelines. Please see the “Measures” section for more detail.

Table 4: Sexual risk behaviors by gender and HIV status

	Men				Women				HIV positive				HIV negative			
	N	%	Mean	SD	N	%	Mean	SD	N	%	Mean	SD	N	%	Mean	SD
Have you ever had anal sex?																
Yes	215	2.9			172	2.4			52	2.4			338	2.7		
No	7,167	97.1			7,044	97.6			2,110	97.6			12,283	97.3		
Did you use a condom the last time you had sex?																
Yes	692	9.4			644	8.9			247	11.4			1,107	8.8		
No	6,703	90.6			6,572	91.1			1,913	88.6			11,529	91.2		
Do you have a main sexual partner?																
Yes	199	68.9			298	71.0			515	70.3						
No	90	31.1			122	29.0			218	29.7						
Number of sexual encounters, past 1 month	7,413		7.2	8.1	7,253		7.6	8.4	2,165		7.4	8.6	12,685		7.4	8.1
Number of sexual partners, past 4 weeks	7,425		1.2	0.8	7,261		1.1	2.1	2,175		1.2	2.0	12,696		1.1	1.5
Number of sexual partners, past 3 months	7,425		1.5	1.8	7,261		1.4	3.5	2,175		1.6	3.3	12,696		1.4	2.7
Number of sexual partners, past 6 months	7,413		1.8	3.2	7,240		1.5	4.4	2,166		1.8	4.3	12,696		1.6	3.7
Number of sexual partners, past 2 years	288		2.8	6.0	422		2.4	7.8	734		2.6	7.0				

Table 5: Condom use and gender

		Men	Women
Did you use a condom the last time you had sex?	No	6,703	6,572
	Yes	692	644
Risk		0.906	0.911
Risk ratio		0.995	

Table 6: Condom use and HIV status

	Did you use a condom the last time you had sex?	
	No	Yes
HIV positive	1,913	247
HIV negative	11,529	1,107
Risk	0.142	0.182
Risk ratio	0.780	

Table 7: Number of sexual partners, past 6 months and gender

		Men	Women
Number of sexual partners, past 6 months	>1	2,975	833
	1	4,438	6,407
Risk		0.401	0.115
Risk ratio		3.488	

Table 8: Number of sexual partners, past 6 months and HIV status

	Number of sexual partners, past 6 months	
	>1	1
HIV positive	578	1,588
HIV negative	3,285	9,387
Risk	0.150	0.145
Risk ratio	1.034	