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Harmful alcohol use in rural Uganda: a pilot study from the Kigezi sub-region

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Abstract

Introduction Currently, Uganda has the highest per capita alcohol consumption in Africa, and the negative effects of harmful use of alcohol are quite prevalent. Some rural areas face a complex set of underlying factors that may be responsible for this trend, including unemployment and easy access to cheap alcohol. Kigezi sub-region is one of the areas most affected by the harmful use of alcohol. This paper characterizes harmful use of alcohol in form of patterns of use, timing for drinking, types of drinks; and identifies factors associated with it in the sub-region's tourist area around Lake Bunyonyi.

Methods This was a cross-sectional study. A two-stage stratified sample survey was carried out and yielded 339 participants from 34 villages. It had standard questions on alcohol use and included the WHO's Alcohol Use Disorders Identification Test (AUDIT) score. Harmful alcohol use was assessed using two measures. First, we calculated the proportion of participants with AUDIT scores between 8 and 40, indicating medium- to very high-risk alcohol use (MHA). Second, we used a proxy measure for alcohol use disorder (AUD), defined as the proportion of participants who, in the past 12 months, reported experiencing at least monthly any of the following: loss of control over drinking, alcohol-related failure to meet obligations, or the need for a morning drink after heavy alcohol consumption. The inclusion criteria for participants were adults aged ≥ 18 years, who consented to the study, while the exclusion criterion was withdrawal of consent during the interview process. The factors associated with harmful use of alcohol were determined using multilevel mixed effects generalised linear models that account for the clustering at the village level.

Results The prevalence of AUD was 17.7% and of MHA was 28%. The prevalence of MHA was significantly lower among women (APR=0.47, 0.28–0.76) and higher among those whose relatives or friends condoned alcohol consumption (APR=1.77, 95% CI: 1.12–2.81), and it increased with improved income level ($p < 0.001$). Other factors included being more educated, a reduced frequency of engagement with religious activities, and earning a living through skilled trades. Key reasons for stopping alcohol include religious commitment, family background, and observed negative experiences. Most drinkers drink local brew/unrecorded alcohol and prefer to drink at the weekend. Although a few drinkers start drinking before 8am, the number grows to 50% and 60% by 4pm and 5pm respectively.

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Conclusion Harmful use of alcohol prevalence is higher than what is found in the WHO's recent nationwide study and other epidemiological studies. The drinking culture leans towards drinking at weekends and daytime drinking and consumption of local brew. The factors associated with harmful use of alcohol include family and friends' influence, higher income level, and reduced religiosity.

Keywords Harmful use of alcohol, Uganda, Rural, Prevalence, Two-stage stratified sample, AUDIT score, Mixed effects modelling

Introduction

Harmful use of alcohol is one of the 10 leading risk factors for the global burden of disease and is responsible for about 3 million deaths annually [1]. It is a significant barrier to achieving several Sustainable Development Goals (SDGs), including the prevention and treatment of non-communicable diseases (NCDs), mental health ailments, and injuries [2]. SDG 3 promotes healthy lives and well-being for all ages [3], and includes target 3.5, which specifically aims to strengthen the prevention and treatment of harmful alcohol use, and to reduce alcohol consumption per capita by 2030. Alcohol use globally has not decreased over the past three decades, and predictions forecast an increase in use until at least 2030 [4]. In Africa, harmful use of alcohol poses an even greater challenge as it accounts for more deaths and disability-adjusted life years (DALYs) lost than in any other region [5].

According to the WHO's global alcohol status report for 2023, alcohol consumption in Uganda is now the highest in Africa, at an average of 12.20 L of pure alcohol per person per year (19.9 L for men and 4.9 L for women), and an alcohol use disorder level of 10% [5, 6]. Many studies in the country have linked alcohol use to road traffic injuries [7], risky sexual behaviours [8], infectious diseases such as tuberculosis [9], domestic violence [10] and poverty [11]. Uganda's National Development Plan III (FY 2020/21–2024/25) is aligned with SDG 3 and outlines priority interventions to advance its achievement [12]. Some of the priority interventions aim to reduce the rates of NCDs, to which alcohol contributes heavily, from 40% to 30%, and alcohol abuse from 5.8% to 4.0%. The Ministry of Health Sector Development Plan 2015–2020 [13] also recommended the establishment of a comprehensive program targeting the major risk factors contributing to the disease burden, including alcohol/substance use disorders.

Kigezi is one of the sub-regions most affected by the harmful use of alcohol in Uganda. It borders the Democratic Republic of Congo in the West and Rwanda in the South and East. According to a 2019/2020 survey, the sub-region recorded a multidimensional poverty rate of 48.4%, representing the most rapid increase among all sub-regions in the country [14]. Several studies in the sub-region have found a strong contribution of harmful use of alcohol to poor socio-economic status and poverty [15, 16], domestic violence [16], child neglect [17], family

instability [18] and childhood malnutrition [19]. In addition, child neglect, which includes inadequate provision of basic needs such as food, physical abuse, and rejection [17] is increasing among people engaged in harmful use of alcohol.

The area around Lake Bunyonyi in Kigezi is a typical example of vulnerability to harmful use of alcohol. It has a high population density (> 300 people per km²) [20] and the lowest land acreage per household in Uganda (0.2 hectares per household [21]). As the population grows, the arable land decreases, thus creating poverty and economic inactivity [22]. The area has attracted many alcohol selling outlets due to increasing tourism and the leisure industry [23]. Although it is a popular tourist destination, employment in the tourism industry is limited to a few young, educated people, leaving the majority unemployed [24]. The lake is very deep (the second deepest lake in Africa), and hence, it has limited fishing activity [25]. The co-investigators know this area well, and during their visits have witnessed many people in villages who spend all day drinking alcohol, with no productive economic activity. It appears that poverty is a consequence, as well as a potential cause, of excessive alcohol consumption in the area. However, it is also known that in some circumstances, employment, high income and higher educational attainment per se may not prevent harmful use of alcohol [26]. There is a paucity of research on the harmful use of alcohol in similar rural settings in Uganda and the region.

This paper characterises harmful use of alcohol in form of patterns of use, timing for drinking, types of drinks, and identifies factors associated with it in the sub-region's tourist area around Lake Bunyonyi. The information from the study is meant to feed into the development of an intervention to address the problem. There is also a renewed call to re-table the alcohol control bill of 2023 [27, 28] that was rejected on the grounds of paucity of information on unregulated alcohol and financial implications to the economy. The details of drinking provide more evidence for a case against unregulated alcohol and long, unproductive time spent on drinking.

Methods

We carried out a cross-sectional survey on alcohol use patterns in March 2025. The study was implemented in three administrative units (Sub-counties/Town council)

surrounding Lake Bunyonyi, namely Kitumba Subcounty, Muko Subcounty and Hamuhambo Town Council. These units were purposively selected due to the high concentration of alcohol outlets and tourism facilities. A stratified two-stage sampling technique was then applied for the random selection of villages and households. Of the 3 selected administrative units, the primary sampling units were villages and the secondary sampling units were households. The number of villages randomly selected from each parish was proportionate to the total number of villages in that parish. In each sampled village, a list of all households (identified by names of head of household) was obtained from the local council chairperson, and a random selection of households was carried out. Within each randomly selected household, the research assistant entered all available adults (aged 18+) in the Open Data Kit (ODK) system, and one adult was randomly selected by the system. The sample size was computed using a formula by Bennet et al. [29]. At an estimated prevalence of 10% for alcohol use disorder in the country [6, 30], a design effect of 1.49, a cluster size of 10 households per village, a precision of 0.041 and anticipated non-response of 10%, the formula yielded 340 households from 34 villages. The inclusion criteria were adults aged 18+ and consenting, while the exclusion criterion was withdrawal of consent in the middle of the interview.

The data collection was through face-to-face interviews carried out by trained graduate-level research assistants (RAs) who spoke Rukiga, the local language in the area. The training focused largely on the use of the AUDIT questionnaire [31–34]. Prior to commencement of data collection, engagement with community stakeholders was carried out to identify the most appropriate ways of asking questions and general conduct of the research. The stakeholders included selected local council members, community health workers (CHWs), opinion leaders, counsellors and survivors of alcohol abuse. The information gathered was incorporated into the training of study staff.

The study tool included sections on background characteristics, social networks and drinking patterns. It was pre-programmed onto the ODK app that was installed on the Android mobile smartphones of the RAs. ODK is an open-source Android application that can be used to capture individual data using a mobile phone and is immediately accessible using appropriate login credentials [35].

WHO's total AUDIT score ranges from zero to 40, and it is derived from a ten-item screening questionnaire where each item carries a maximum score of 4. The total score is categorised into low/no risk (0–7), medium/increasing risk (8–15), high risk (16–19), and possible dependence (20–40) [36]. Those who drank alcohol answered all questions on the AUDIT tool. According to the WHO [36], scores between 8 and 15 (medium

risk) are most appropriate for simple advice focused on the reduction of hazardous drinking. Scores between 16 and 19 (high risk) require brief counselling and continued monitoring. AUDIT scores of 20 or above (possible dependence) warrant further diagnostic evaluation for alcohol dependence. Referral to a specialist for diagnostic evaluation and treatment is recommended.

Harmful use of alcohol was measured in two ways: one as a proportion of participants who scored 8–40 on AUDIT (medium-very high-risk range alcohol use-MHA) and another as a proxy measure of alcohol use disorder (AUD). The MHA measure allows for comparison with the most recent national STEPS study sponsored by WHO [30]. The AUD uses the proportion of participants that, over the 12 months preceding the interview, at least once a month, had been unable to stop drinking alcohol once they had started drinking, and/or failed to do what was normally expected of them because of drinking alcohol, and/or needed an alcoholic drink first thing in the morning to get going after a heavy drinking session. The proxy measure is adopted from Kabwama et al. [30]. This definition enables comparison with the previous nationwide study, and it is close to the AUD diagnostic assessment criteria [37]. However, the definition is a slight deviation from a more formal definition of AUD as a medical condition characterised by an impaired ability to stop or control alcohol use despite adverse social, occupational, or health consequences, with a wider range of symptoms [37].

Independent variables included socio-demographic characteristics (age, gender, marital status, education, occupation), current residence, cultural factors (religion and religiosity), influence of friends and family, and having people to talk to. These were also suspected confounding factors as found in previous studies. All data were stored on a cloud-based, password-protected server and were only accessible by authorized users. User roles and access control were defined and managed in ODK to ensure that authorised users could only access information specific to their roles and responsibilities. Participants' data were encrypted to make it unreadable to unauthorised users. The data collection tools had built-in range and consistency checks.

A relative distribution of the study participants by background characteristics is presented, followed by prevalence estimations of harmful alcohol use patterns for AUD and MHA measures. Patterns of harmful use are stratified by sex since most studies show a stark difference in alcohol intake between men and women. Frequencies for weekly drinking patterns and types of alcohol drinks were computed.

Bivariate associations between background characteristics and patterns of alcohol use were examined through Wald chi-square tests, which allowed the identification

Table 1 Background characteristics of the participants

Characteristics	Men n (%)	Women n (%)	All n (%)	Chisq test <i>p</i> -value
All	137 (100.0)	202 (100.0)	339 (100.0)	
Subcounty				
Hamuhambo TC, Rubanda district	31 (22.6)	48 (23.8)	79(23.3)	<i>P</i> =0.81
Kitumba, Kabale district	67 (48.9)	103 (51.0)	170 (50.2)	
Muko, Rubanda district	39 (28.5)	51(25.3)	90 (26.6)	
Age group (years)				
18–24	18 (13.1)	20 (9.9)	38 (11.2)	<i>P</i> =0.72
25–34	25 (18.3)	40 (19.8)	65 (19.2)	
35–44	36 (26.3)	45 (22.3)	81 (23.9)	
45–54	23 (16.8)	36 (17.8)	59 (17.4)	
≥ 55	35 (25.6)	61 (30.2)	96 (28.3)	
Education attainment				
None	12 (8.8)	41 (20.3)	53 (15.6)	<i>P</i> =0.002
Primary	83 (60.6)	128 (63.4)	211 (62.2)	
Secondary	32 (23.4)	23 (11.4)	55 (16.2)	
Tertiary	10 (7.3)	10 (5.0)	20 (5.9)	
Marital status				
Single	18 (13.1)	9 (4.5)	27 (8.0)	<i>P</i> <0.001
Married/Cohabiting	109 (79.6)	128 (63.4)	237 (69.9)	
Widowed/Separated	10 (7.3)	65 (32.2)	75 (22.1)	
Religion				
Catholic	45 (32.9)	92 (45.5)	137 (40.4)	<i>P</i> =0.06
Protestant	89 (65.0)	106 (52.5)	195 (57.5)	
Other	3 (2.2)	4 (2.0)	7 (2.1)	
Occupation				
Petty trader	10 (7.3)	16 (7.9)	26 (7.7)	<i>P</i> <0.001
Peasant farmer	75 (54.7)	157 (77.7)	232 (68.4)	
Other (Trades like saloon, carpenter)	52 (38.0)	29 (14.4)	81 (23.9)	
Income level (UGX) per month				
0–20,000	20 (14.6)	51 (25.3)	71 (20.9)	<i>P</i> <0.001
20,001–50,000	21 (15.3)	61 (30.2)	82 (24.2)	
50,001–100,000	19 (13.9)	49 (24.3)	68 (20.1)	
100,001–200,000	32 (23.4)	24 (11.9)	56 (16.5)	
≥ 200,001	45 (32.9)	17 (8.4)	62 (18.3)	
Drinking-AUDIT Score				
Don't drink (0)	37 (27.1)	133 (65.8)	170 (50.2)	<i>P</i> <0.001
Low risk (1–7)	35 (25.6)	39 (19.3)	74 (21.8)	
Medium (8–15)	40 (29.2)	12 (5.9)	52 (15.3)	
High (16–19)	15 (11.0)	4 (2.0)	19 (5.6)	
Dependence (20–40)	10 (7.3)	14 (6.9)	24 (7.1)	
Has alcohol use disorder (AUD)				
No	97 (70.8)	182 (90.1)	279 (82.3)	<i>P</i> <0.001
Yes	40 (29.2)	20 (9.9)	60 (17.7)	
Social networks ^a condoned drinking				
No	62 (45.3)	149 (73.8)	211 (62.2)	<i>P</i> <0.001
Yes	75 (54.7)	53 (26.2)	128 (37.8)	
Social networks ^a encouraged drinking				
No	51 (37.2)	121 (59.9)	172 (50.7)	<i>P</i> <0.001
Yes	86 (62.8)	81 (40.1)	167 (49.3)	
Age at first drinking ^b				

Table 1 (continued)

Characteristics	Men n (%)	Women n (%)	All n (%)	Chisq test <i>p</i> -value
≤ 20	63 (60.6)	47 (65.3)	110 (62.5)	<i>P</i> =0.53
> 20	41 (39.4)	25 (34.7)	66 (37.5)	

^aSocial networks refer to friends, relatives and close people

^bThose who drank in the previous 12 months (176)

of candidate variables for inclusion in a multilevel mixed effects generalised linear model. This model was used to account for cluster sampling of households, adjusting for correlations within sample subgroups (i.e., villages), and allowing randomness of the parameters, thus producing better estimates [38]. Backward elimination methods were used to build a final model. Candidate variables were first entered into the model if they were associated with AUD or MHA from bivariate analysis using a cut-point of $p < 0.2$. Next, variables were further excluded from the multivariable model if $p > 0.1$. However, excluded variables were considered for inclusion if they were identified as potential confounders based on previous studies [39].

STATA V16 was used and standard statistical modelling [40] procedures were followed. All hypothesis tests were two tailed and the level of significance was fixed at $\alpha = 0.05$. Prevalence ratios for harmful use of alcohol for AUD and MHA measures were calculated, with corresponding 95% confidence intervals (CIs).

The study may have had recall and social desirability biases. The former may have been due to questions that asked about drinking in the previous 12 months while the later could have resulted from stigma associated with harmful use of alcohol. These biases were minimised through sufficient training and selection of research assistants that had an experience with similar studies.

Results

Description of the participants

The targeted number of participants was 340 and 339 consented, resulting in a response rate of 99.7% (339/340). The study participants were equally distributed by district, with 50.2% from Rubanda and 49.8% from Kabale district (Table 1). Half of the participants were from one subcounty and the other half from the other two sub-counties. The distribution by age group was not significantly different. It ranged from 11.2% in the 18–24-year age group to 28.3% among those aged ≥ 55 years. Neither the age group nor the subcounty distribution significantly changes by gender. However, 59.6% of the participants were women.

Most of the participants (84.4%) had attained at least a primary level of education, but only 22.1% had attained a secondary level of education. The education level was higher among men than women, as only 16% of the

women had attained secondary education compared to 30.7% among men ($p = 0.002$).

The participants were mostly married (69.9%), peasant farmers (68.4%), and mainly either protestant (57.5%) or Catholic (40.4%) by religion. Only 34.8% earned at least 100,000 Uganda shillings (UGX) (USD 27.20) per month. Half of the respondents didn't take alcohol, while 12.7% had a high level of alcohol use (AUDIT score 16–40). There was significant variation between men and women in terms of proportion married (63.4% women vs. 79.6% men), peasant farmers (77.7% women vs. 54.7% men), income level of at least 100,000 (USD 27.22) per month (19.3% women vs. 56.3% men) and those with high AUDIT [16–39] (8.9% women vs. 18.3% men). The distribution by religion did not significantly change by gender.

Alcohol use disorder

Table 2 shows the AUD measured as explained earlier in the methods [30]. The overall AUD prevalence was 17.7% and it was significantly different by gender (men 29.2%, women 9.9%) [$p < 0.001$], by occupation, with the highest prevalence among those engaged in trades like running hair salons and lowest among the petty traders (29.6% vs. 15.4% [$p = 0.005$]). Prevalence increased by income level from 4.2% among those with little/no income to 29% among those earning UGX 200,000+ (USD 54+) ($p = 0.001$) and reduced with increased attendance of church services from 18.2% among those who never attend religious services to 5.0% among those who attend 4+ services weekly ($p = 0.006$).

Patterns of medium to very high-risk range alcohol use

Table 3 shows the patterns of medium-very high-risk alcohol use (MHA). The prevalence of MHA did not significantly vary by subcounty, age group, religion, or marital status. Overall, 28% of participants fell in the MHA category (8–40) of the AUDIT score. The proportion was significantly higher among men than women [47.5% vs. 14.9%] ($p < 0.001$), rose by education level from 15.1% among the uneducated to 35% among those who have attained tertiary education ($p = 0.008$), varied by occupation and was lowest among farmers and highest among those in trades like salon operating [22% vs. 46.9%] ($p < 0.001$). The prevalence increased by income level from 11.3% among the lowest income earners to 46.8% among the highest earners ($p < 0.001$) and reduced with increased

Table 2 Patterns of alcohol use disorder

Characteristics	AUD		All n (%)	Chi sq. test p-value
	Yes n (%)	No n (%)		
All	60(17.7)	279 (82.3)	339 (100.0)	
Subcounty				
Hamuhambo TC	10(12.7)	69 (87.3)	79(100.0)	P=0.35
Kitumba	31 (18.2)	139 (81.8)	170 (100.0)	
Muko	19 (21.1)	71 (78.9)	90 (100.0)	
Gender				
Men	40 (29.2)	97 (70.8)	137 (100.0)	P<0.001
Women	20 (9.9)	182 (90.1)	202 (100.0)	
Age group				
18–24	4 (10.5)	34 (89.5)	38 (100.0)	P=0.52
25–34	15 (23.1)	50 (76.9)	65 (100.0)	
35–44	12 (14.8)	69 (85.2)	81 (100.0)	trend p=0.69
45–54	11 (11.6)	48 (81.4)	59 (100.0)	
≥ 55	18 (18.8)	78 (81.3)	96 (100.0)	
Education attainment				
None	8(15.1)	45 (84.9)	53 (100.0)	P=0.61
Primary	35 (16.6)	176 (83.4)	211 (100.0)	
Secondary	13 (23.6)	42 (76.4)	55 (100.0)	trend p=0.28
Tertiary	4 (20.0)	16 (80.0)	20 (100.0)	
Religion				
Catholic	22 (16.1)	115 (83.9)	137 (100.0)	P=0.33
Protestant	38 (19.5)	157 (80.5)	195 (100.0)	
Other	0 (0.0)	7 (100.0)	7 (100.0)	
Occupation				
Petty trader	4 (15.4)	22 (84.6)	26 (100.0)	P=0.005
Peasant farmer	32 (13.8)	200 (86.2)	232 (100.0)	
Other (trades-saloon, etc.)	24 (29.6)	57 (70.4)	81(100.0)	
Marital status				
Single	2 (7.4)	25 (92.6)	27 (100.0)	P=0.20
Marital status	47 (19.8)	190 (80.2)	237 (100.0)	
Other	11 (14.7)	64 (85.3)	75 (100.0)	
Income level per month (UGX)				
0–20,000	3 (4.2)	68 (95.8)	71 (100.0)	P=0.005
20,001_50,000	14 (17.1)	68(82.9)	82 (100.0)	
50,001–100,000	14 (20.6)	54 (79.4)	68 (100.0)	trend p=0.001
100,001–200,000	11 (19.6)	45 (80.4)	56 (100.0)	
> 200,000	18 (29.0)	44 (71.0)	62 (100.0)	
Attendance of Religious activities				
Never	4 (18.2)	18 (81.8)	22 (100.0)	P=0.018
Monthly/Less	17 (28.3)	43 (71.7)	60 (100.0)	
2–4 times a month	35 (18.8)	151 (81.2)	186 (100.0)	trend p=0.006
2–3 times a week	3 (5.7)	50 (94.3)	53 (100.0)	
4+ times a week	1 (5.6)	17 (94.4)	18 (100.0)	
Social networks ^a condoned drinking				
No	18 (8.5)	193 (91.5)	211 (100.0)	P<0.001
Yes	42 (32.8)	86 (67.2)	128 (100.0)	
Social networks ^a encouraged drinking				
No	15 (8.7)	157 (91.3)	172 (100.0)	P<0.001
Yes	45 (27.0)	122 (73.1)	167 (100.0)	

Table 2 (continued)

Characteristics	AUD		All n (%)	Chi sq. test <i>p</i> -value
	Yes n (%)	No n (%)		
Age at first drinking ^b				
≤ 20	42 (38.2)	68 (61.8)	110(100.0)	<i>P</i> =0.14
> 20	18 (27.3)	48 (72.7)	66 (100.0)	

^aSocial networks refer to friends, relatives and close people

^bThose who drank in the previous 12 months (176)

attendance of religious activities from 40.9% among those who never attend to 5.6% among regular attenders ($p < 0.001$). The pattern of MHA was nearly the same as that for AUD. All factors associated with MHA are also associated with AUD except for education attainment.

Weekly drinking pattern

Analysis of the weekly drinking pattern shows that nearly two-thirds (63.6%) of the drinkers drank on Sundays, while 16.5% drank on Saturdays (Fig. 1). Very few drank on other days of the week. More than a third (35.8%) drank on any day.

Time of drinking on Sundays

Figure 2 shows the cumulative percent of drinkers who start drinking by a particular time on Sunday. In general, a small proportion start before 8 am (6.8%), but at 4 pm, almost 50% of the drinkers have started drinking and by 5 pm EAT, around 60% have started.

Types of drinks

Figure 3 shows that the most common types of alcohol taken were Beers, Local gin, and regular local beer made from grains grown in the area. The most common (55.1%) was Omuramba (locally brewed from sorghum, estimated at 6–9% alcohol [41]), followed by industry-made beers (42%), Enturire (locally brewed from sorghum and honey, estimated 4–9% alcohol) (24.4%), waragi (local gin, made from bananas or sugar cane, estimated 40% alcohol), and tonto (banana beer, estimated 6–10% alcohol [42])

Multivariable analysis

Table 4 shows the results of both crude and adjusted prevalence ratios (PR) for MHA (AUDIT 8–40) by different levels of key independent factors from the multi-level modelling that adjusts for clustering effects at the village level. The crude results show significantly lower prevalence of AUD among women (PR=0.31, 95%CI 0.20–0.48) compared to men, increased PR with higher education, higher income, reduced attendance of religious services, having friends or relatives who condone (PR=4.0, 95%CI:2.79–6.86) or encourage alcohol use (PR=2.23, 95%CI: 1.45–3.43).

In the final multivariable results, factors persistently associated with AUD are being male, having a relatively

higher income, and having a friend or relative who condones or encourages alcohol consumption.

Reasons for the choice of abstinence and suggestions for reducing harmful use of alcohol

Reasons for not drinking

To understand demotivators for alcohol use and eventual harmful use, we examined the main reasons for not drinking among those who had never taken alcohol. Figure 4 shows that reasons for abstaining were observed problems with those who drink (32.5%), family influence (26.5%) and religious belief (13.3%).

Table 5 shows what participants thought could be done to reduce alcohol related problems. The most frequent responses were sensitisation (38.6%), regulation of alcohol use (25.7%) and creating more job opportunities (8.3%).

Discussion

The results show that 17.7% of participants had an alcohol use disorder based on the AUD measurement, and 28% fell in the category of medium-very high-risk alcohol use based on the MHA measurement. The results further show that the prevalence of MHA is significantly higher among men, more educated people, those earning a relatively higher income, and those whose relatives or friends condone or encourage alcohol consumption. Most drinkers drink on weekends and by 4pm a half of them have started drinking. Key reasons for abstinence include religious commitment, family background, and observed negative experiences.

The prevalence of harmful use of alcohol is higher than what has been found in several studies in Uganda. A nationwide study carried out in 2014 found the prevalence of AUD among adults was 9.8% and the prevalence of MHA was 18.9%, while in our study, they are 17.7% and 28% respectively [30]. A study using 2017–2020 data from rural central Uganda found AUD level at 13% among clients of a health facility [43] and another study in rural northern Uganda found a prevalence of 2.3% among women [44]. A cross-sectional study of adolescents in Ibanda district found MHA alcohol prevalence at 39.9% [45]. The higher risk of AUD among men compared to women is a very common phenomenon, and it

Table 3 Patterns of harmful use of alcohol (Medium-very high range alcohol use)

Characteristics	Medium-very high range alcohol use (MHA)		All n (%)	Chisq test
	Yes n (%)	No n (%)		
All	95 (28.0)	244 (72.0)	339 (100.0)	
Subcounty				
Hamuhambo TC	15(19.0)	64 (81.0)	79(100.0)	P=0.12
Kitumba	53 (31.2)	117 (68.8)	170 (100.0)	
Muko	27 (30.0)	63 (70.0)	90 (100.0)	
Gender				
Men	65 (47.5)	72 (52.6)	137 (100.0)	P<0.001
Women	30 (14.9)	172 (85.2)	202 (100.0)	
Age group				
18–24	7 (18.4)	31 (81.6)	38 (100.0)	P=0.28
25–34	22 (33.9)	43 (66.2)	65 (100.0)	
35–44	21 (25.9)	60 (74.1)	81 (100.0)	
45–54	21 (35.6)	38 (64.4)	59 (100.0)	
≥ 55	24 (25.0)	72 (75.0)	96 (100.0)	
Education attainment				
None	8(15.1)	45 (84.9)	53 (100.0)	P=0.03 trend: p=0.008
Primary	58 (27.5)	153 (72.5)	211 (100.0)	
Secondary	22 (40.0)	33 (60.0)	55 (100.0)	
Tertiary	7 (35.0)	13 (65.0)	20 (100.0)	
Religion				
Catholic	37 (27.0)	100 (73.0)	137 (100.0)	P=0.12
Protestant	57 (29.2)	138 (70.8)	195 (100.0)	
Other	1 (14.3)	6 (85.7)	7 (100.0)	
Occupation				
Petty trader	6 (23.1)	20 (76.9)	26 (100.0)	P<0.001
Peasant farmer	51 (22.0)	181 (78.0)	232 (100.0)	
Other (trades-saloon, etc.)	38 (46.9)	43 (53.1)	81(100.0)	
Marital status				
Single	7 (25.9)	20 (74.1)	27 (100.0)	P=0.10
Marital status	74 (31.2)	163 (68.8)	237 (100.0)	
Other	14 (18.7)	61 (81.3)	75 (100.0)	
Income level per month (UGX)				
0–20,000	8(11.3)	63 (88.7)	71 (100.0)	P<0.001
20,001_50,000	21 (25.6)	61(74.4)	82 (100.0)	
50,001–100,000	20 (29.4)	48 (70.6)	68 (100.0)	
100,001–200,000	17 (30.4)	39 (69.6)	56 (100.0)	
> 200,000	29 (46.8)	33 (53.3)	62 (100.0)	
Attendance of Religious activities				
Never	9 (40.9)	13 (59.1)	22 (100.0)	P=0.001 trend p<0.001
Monthly/Less	23 (38.3)	37 (61.7)	60 (100.0)	
2–4 times a month	57 (30.7)	129 (69.4)	186 (100.0)	
2–3 times a week	5 (9.3)	48 (90.6)	53 (100.0)	
> 4 times a week	1 (5.6)	17 (94.4)	18 (100.0)	
Social networks ^a condoned drinking				
No	26 (12.3)	185 (87.9)	211 (100.0)	P<0.001
Yes	69 (53.9)	59 (46.1)	128 (100.0)	
Social networks ^a encouraged drinking				
No	30 (17.4)	142 (82.6)	172 (100.0)	P<0.001
Yes	65 (38.9)	102 (61.1)	167 (100.0)	

Table 3 (continued)

Characteristics	Medium-very high range alcohol use (MHA)		All n (%)	Chisq test
	Yes n (%)	No n (%)		
Age at first drinking ^b				
≤ 20	65 (59.1)	45 (40.9)	110 (100.0)	
> 20	29 (43.9)	37 (56.1)	66 (100.0)	P=0.05

^aSocial networks refer to friends, relatives and close people

^bThose who drank in the previous 12 months (176)

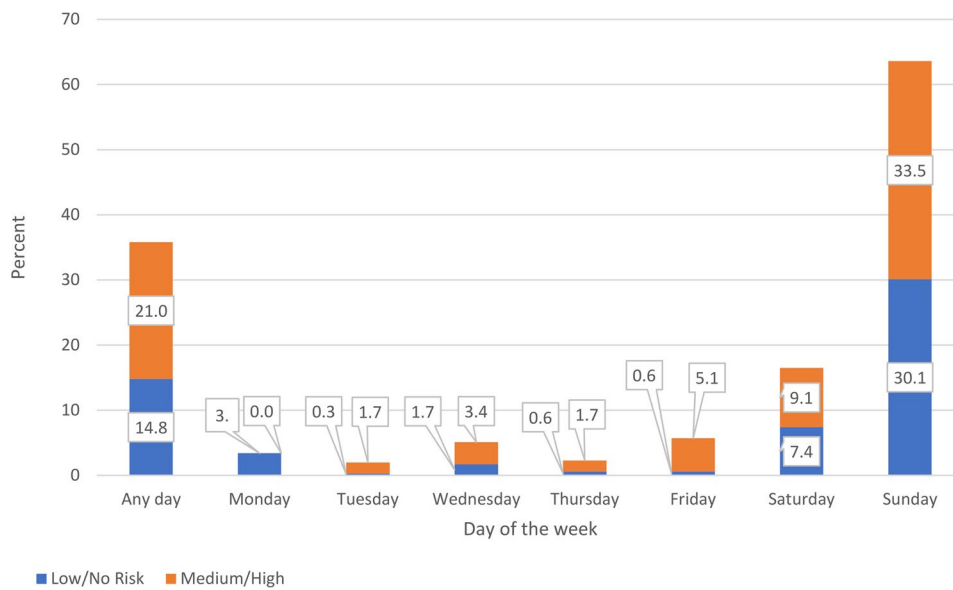


Fig. 1 Weekly pattern of drinking: Percent of the drinkers who drink on each day of the week

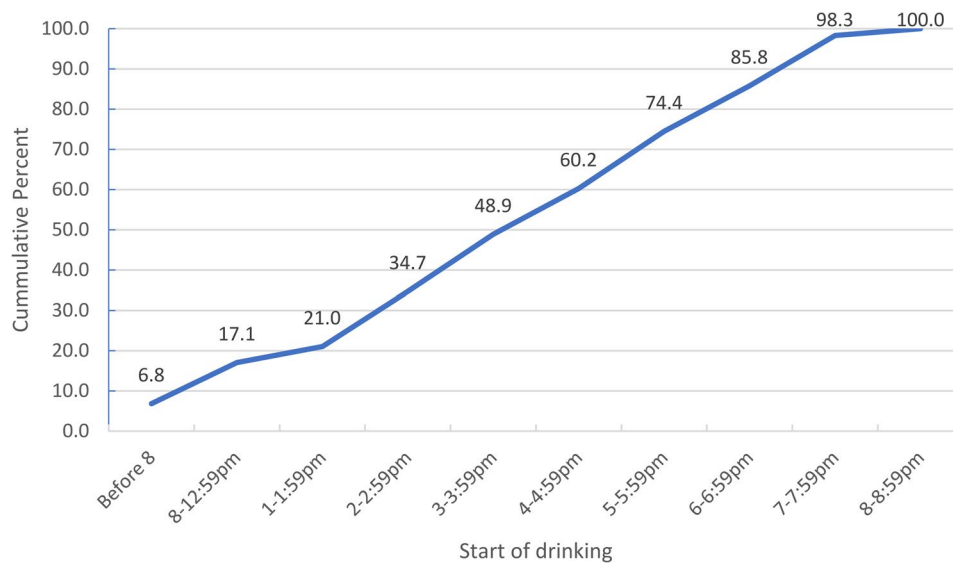


Fig. 2 Time of start of drinking on Sundays

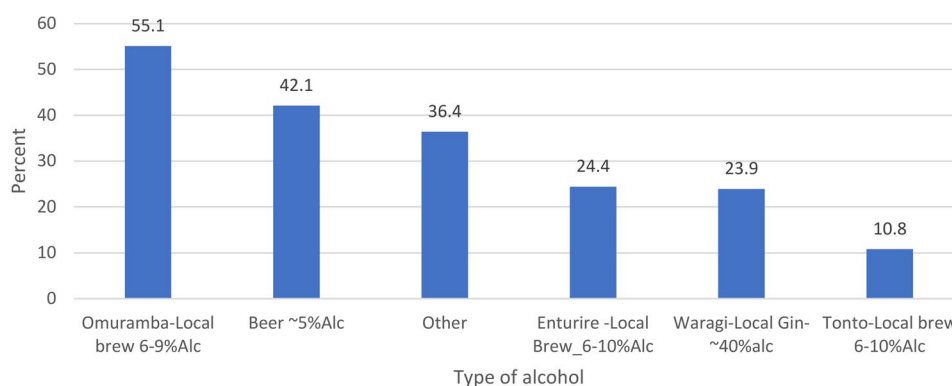


Fig. 3 Types of drinks taken by participants

can be observed among people in rehabilitation centres and in population-based cross-sectional studies [45, 46].

The general drinking culture of the Lake Bunyonyi area suggests there is strong preference for local brew, drinking on weekends, and drinking during day time. These findings reflect research from other studies and indicate a long-term problem in the country. A study in 2012 found that about 63% of respondents in a semi-nationwide study in the country had ever drunk alcohol before 5pm on weekends [47], while in this study about 60% started drinking by 5pm. Among men, drinking early in the day has been associated with alcohol related problems in a study carried out in Uganda, Costa Rica, UK and Isle of Man [47]. Occurrence of most drinking on Sunday (>60%) contrast with recent studies in several countries where drinkers don't wait for Sundays but rather make the whole weekend from Friday a high consumption time (Friday 51%, Saturday 63% and Sunday-28%) [48].

The association of encouragement or condoning alcohol consumption by family members or social networks with harmful use of alcohol is well established in studies in Uganda and outside. WHO's nationwide STEPS survey in Uganda showed pressure from peers or social network was closely associated with harmful use of alcohol [47, 48]. A more recent study in the Lira district in Northern Uganda found that peer pressure was strongly associated with harmful use among young people aged 15–25 years [49]. It should also be noted that social networks can lead to positive changes in life style choices. A study in Kampala, Uganda found that peer networks that disapproved of drinking were protective against intent to drink [50].

While several studies within Uganda, the region, and outside show higher harmful use of alcohol prevalence with lower income levels [49] and lower educational attainment [50–52] there have been a few that show the reverse [45, 53]. A study carried out in central and western parts of Uganda during 2021–2022 found that employment as a vendor in a restaurant or bar was associated with harmful use of alcohol [26]. The people engaged in skilled trades mostly get paid daily, and the

transaction is mainly by cash. Having cash at hand may also be an inducement for alcohol consumption and unplanned expenditure [54, 55]. It should be noted that “high” income is only relative to the local salaries.

Increased religiosity has been widely associated with reduced alcohol consumption. Studies among the fisherfolk [56] and the general population [57] in Uganda have shown similar associations. However, in our multivariable model, this association was not observed.

Strengths and limitations

The stratified two-stage random sampling of households was conducted rigorously, so the households should be representative of those in this area. However, women were over-represented, suggesting that men were more likely to be away from home at the time of the survey. Men with AUD may be more likely to be away from home, as some may go to bars and start drinking early in the morning. Therefore, it is likely that the overall prevalence reported is an underestimate of the true prevalence of MHA and AUD in this area. In future surveys visiting the households in early morning may minimise the challenge.

The definition of AUD was based on available data from three items of the AUDIT questionnaire, which is not a definitive clinical diagnosis. There were no direct questions about withdrawal symptoms. More in-depth interviews and clinical assessment of the high-scoring participants would be needed to determine which of them have a diagnosis of alcohol dependence.

Implications for policy and practice

The high levels of AUD and MHA confirm that this is a significant public health problem in this area. This calls for services to assess and manage harmful use of alcohol, as well as public health interventions to prevent harmful use from progressing to alcohol dependence. There is some evidence from LMICs that brief interventions may be effective for reducing MHA [58], but these are unlikely to be sufficient for patients who have reached the stage

Table 4 Final multivariable table. Prevalence ratios for medium-very high range alcohol use versus low/no risk, adjusted for clustering

Characteristics	Crude PR-Bivariable	Adjusted PR (Multivariable)
Gender		
Men	1	1
Women	0.31 (0.20–0.48) ***	0.47 (0.28–0.76) **
Education attainment		
None	1.0	1.0
Primary	1.82 (0.87–3.81)	1.19 (0.56–2.53)
Secondary	2.65 (1.18–5.95) *	1.35 (0.58–3.15)
Tertiary	2.32 (0.84–6.39)	1.41 (0.48–4.14)
Income per month (UGX)		
0–20,000	1.0	1.0
20,001_50,000	2.27 (1.01–5.13) *	1.99 (0.87–4.54)
50,001–100,000	2.61 (1.15–5.92) *	2.66 (1.16–6.09) *
100,001–200,000	2.69 (1.16–6.24) *	2.16 (0.92–5.11)
> 200,000	4.15 (1.90–9.08) ***	2.42 (1.06–5.53) *
Attendance of religious functions		
Never	1.0	1.0
Monthly/Less	0.94 (0.43–2.02)	1.03 (0.47–2.26)
2–4 times a month	0.75 (0.37–1.51)	0.91 (0.43–1.89)
2–3 times a week	0.23 (0.08–0.69) **	0.38 (0.12–1.21)
> 4 times a week	0.14 (0.02–1.07)	0.16 (0.02–1.26)
Social networks ^a encouraged drinking		
No	1	1.0
Yes	2.23 (1.45–3.43) ***	1.77 (1.12–2.81) *
Social networks ^a condoned drinking ^b		
No	1.0	
Yes	4.0 (2.79–6.86) ***	
Age group		
18–24	1.0	
25–34	1.84 (0.78–4.30)	
35–44	1.41 (0.60–3.31)	
45–54	1.93 (0.82–4.54)	
≥ 55	1.36 (0.58–12.42)	
Religion		
Catholic	1.0	
Protestant	1.08 (0.72–1.64)	
Other	0.53 (0.07–3.86)	
Occupation		
Petty trader	1.0	
Peasant farmer	0.95 (0.41–2.22)	
Other (Trades like saloon, carpenter)	2.03 (0.86–4.81)	
Marital status		
Single	1.0	
Married/Cohabiting	1.20 (0.55–2.61)	
Other	0.72 (0.29–1.78)	

Each of them is significant in the multivariable model, but not when both are in the model

^aSocial networks refer to friends, relatives and close people

^bHighly correlated with friends/relatives encouraging drinking

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

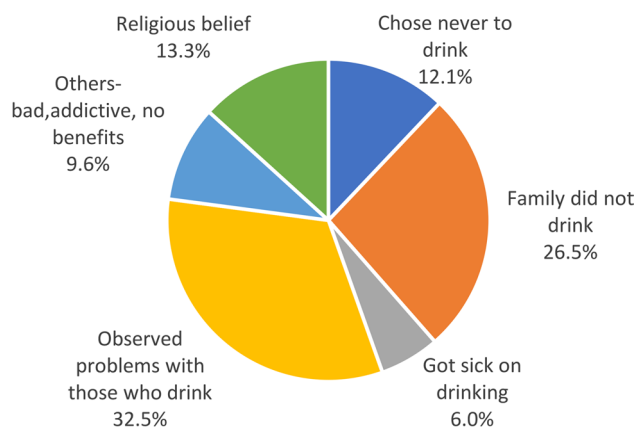


Fig. 4 The main reason for not drinking (n=83)

Table 5 What can be done to reduce alcohol related problems

Suggestion	Freq.	Percent
Sensitization	131	38.6
Regulate alcohol use	87	25.7
Create more job opportunities	28	8.3
Ban factories for alcohol (Some/all)	21	6.2
Ban alcohol use	20	5.9
Ban sales	8	2.4
Increase taxes	8	2.4
Ban bars	5	1.5
Religious interventions	4	1.2
Punitive measures	3	0.9
Others	10	2.9
Missing/Nothing	5	2.5
Doesn't know	9	2.7
Total	339	100.00

of dependence and experience withdrawal symptoms. There is a need for medically assisted alcohol detoxification and rehabilitation for those who are dependent on alcohol, as well as psychosocial interventions to maintain abstinence. May be worthwhile to integrate alcohol interventions in on-going Government's socio-economic interventions like the Parish Development model (PDM) [59] and similar programs of religious institutions.

Priorities for further research

A more in-depth qualitative study is needed to arrive at a deeper understanding of the factors driving harmful alcohol use in these communities and their impact. It will be important to purposively select the affected families and to recruit not only from homes but also from other locations where alcohol drinkers are likely to congregate, such as bars. It is also important to understand local perspectives about treatments and interventions which are available or could be acceptable in the cultural context. This would help us to co-develop intervention(s) to reduce the harmful use of alcohol in this area.

Conclusion

The levels of harmful use of alcohol in Lake Bunyonyi tourist area are higher than the estimated national average and those found in epidemiological studies in Uganda. This suggests areas of similar setting in the sub-region and country could also be high alcohol burden hotspots. Drinking is socially re-enforced and not just individually driven as family/friends as social network was found to be a strong predictor. The drinking pattern is structurally harmful as most people drink on weekends, and that by 4 pm half of them have started drinking and this signals loss of productive time. Unregulated local alcohol is central to the problem. Other determinants of harmful alcohol use were being male and being at a higher income level are independently associated with harmful use of alcohol. The most common suggestions for reduction of harmful use include sensitization and more regulation of alcohol use. There are also signals that religiosity plays a key role in preventing harmful use of alcohol. High alcohol consumption, widespread availability of all forms of alcohol point to the absence of a strong regulatory framework. This information is important in designing an intervention in the study area and other areas with a similar setting.

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Disclaimer

The views expressed in this publication are those of the authors and not necessarily those of the NIHR or the UK government.

Authors' contributions

NMT: Conceptualization, design, data collection, data analysis, writing—original draft. VM: Conceptualization, Design, data collection, writing. WK: Conceptualization, Design, data collection, writing. AN: Conceptualization, Design, data collection, writing. SM: Conceptualization, Design, writing. AM: Conceptualization, Design, writing. CG: Conceptualization, writing. MM: Design, writing. CN: Data collection, writing. MW: Conceptualization, Design, data collection, writing.

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Data availability

The dataset is provided as a supplementary file to this paper submission. The questionnaire is provided too.

Declarations

Ethics approval and consent to participate

This study was approved by Makerere University School of Public Health Research Ethics Committee (MakSPH-REC) with a reference number SPH-2024-290 and lastly by the Uganda National Council for Science and Technology (UNCST) with reference number HS5521ES. The latter is the final approval level for all research in the country.

The research was conducted in accordance with the principles of the Declaration of Helsinki [60].

All participants provided written informed consent to participate in the study. This was after explaining the nature, purpose, and potential risks of the study. The consent form complied with the national and international standards and thus included a text that showed the respondent was free to decline the interview or stop anytime during the interview.

Consent for publication

This paper does not include any individual data. Therefore, the request for consent for publication is not applicable.

Competing interests

The authors declare no competing interests.

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