

# Prevalence and factors associated with alcohol consumption among persons with diabetes in Kampala, Uganda: A cross sectional study

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## Research Article

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# Abstract

## Background

The prevalence of Diabetes has been rising more rapidly in middle and low-income countries. In Africa, World Health Organization projections anticipate Diabetes Mellitus to be the seventh leading cause of death in 2030. Alcohol consumption intervene mainly in diabetes evolution, in such a way that it can interfere with self-care behaviors which are important determinants of diabetes prognosis. In this study, we evaluate factors associated with alcohol consumption among persons with Diabetes in Kampala so as to inform management policies and improve comprehensive diabetes care.

## Methodology

A cross-sectional study was conducted systematically among 290 adults with diabetes, attending diabetic clinics at Mulago National Referral hospital and St Francis hospital Nsambya. Data was entered and analyzed in the EPI-INFO version 7 and STATA 13 software. Modified Poisson regression was used to identify factors associated with alcohol consumption among persons with diabetes. All tests were two-sided and the significance level for all the analyses was set to  $p < 0.05$ .

## Results

23.45% of persons with Diabetes are taking alcohol [95%CI: 18.9–28.7%]. Of these, 11.3% [95%CI: 8.1–15.6%] consumed alcohol hazardously last year due to stress (58.8%). Divorced, separated and Widow patients (Adj PR: 0.42, 95% CI: 0.21–0.83), Protestant (Adj PR: 0.44, 95%CI: 0.24–0.82); Muslim (Adj PR: 0.30%CI: 0.14–0.62); and Pentecostal (Adj PR: 0.32, 95%CI: 0.15–0.65) were less likely to consume alcohol. Diabetic patients who spend more than five years with diabetes were more likely to consume alcohol (Adj PR: 1.90, 95%CI: 1.25–2.88)

## Conclusion

The prevalence of alcohol consumption among persons with Diabetes in Kampala is high. The majority of persons with Diabetes consume alcohol hazardously due to stress. Having spent less than five years with diabetes, being widow, Protestant, Muslim and Pentecostal are associated with less consumption of alcohol. Regular screening for stress must be done among persons with Diabetes and affected individuals should be supported to reduce their stress. Sensitization message regarding alcohol consumption among persons with Diabetes should be targeting never married patients and patients who have spent more than five years with diabetes; also religion should be considered as an important avenue for health education in the community.

## 1. Background

Diabetes mellitus is a global public health concern, with a steady increase in incidence (1, 2). In 2012, an estimated 1.5 million deaths were directly caused by diabetes mellitus. Diabetes prevalence has been

rising more rapidly in middle and low-income countries (3). In Africa, 12.1 million people were estimated to be living with diabetes in 2010, and this is projected to increase to 23.9 million people by 2030 (4). According to International Diabetes Federation, in Uganda there were 400,600 cases of diabetes in 2015 compared to about 98,000 in 2000 (5).

Alcohol consumption is detrimental among persons with diabetes and intervenes mainly in diabetes evolution, in such a way that it can interfere with self-care behaviors, which are important determinants of Diabetes prognosis by maintaining a good glycaemic control (6). Addiction to alcohol among diabetic patients has been found to increase the risk of hyperglycemia, hypoglycemia, dehydration, high blood pressure, eyes disease and damage to nerves, injuries and death (7–10).

While, diabetes is expected to increase by more than fifteen times in Uganda over the next decade (Businge, 2010), the prevalence of alcohol consumption remains high (11) despite health education, and existence of alcohol consumption guidelines and legislations. Up to 26.8% of the population in Uganda are current alcohol users, and the highest prevalence were found among people living in urban areas and in Central and Western region, including Kampala (12, 13).

Despite the statistics from UDHS that indicate the increase in diabetes incidence as well as increase in alcohol consumption, information related to alcohol consumption among diabetic patients in Kampala are scanty yet it is a public health problem that can be overcome through durable and steady strategies. Previous literature on alcohol consumption in Uganda focus mainly on people living with HIV (14), psychiatric patients (15) and the general populations (16).

This study fill up an information gap on both alcohol consumption and diabetes by determining the prevalence and identifying factors related to alcohol consumption among persons with Diabetes. We will therefore increase the knowledge of stakeholders, especially diabetic patients 'knowledge about alcohol consumption, we will inform management policies, and we will guide formation of evidence-based health promotion guidelines and strategies for secondary prevention that are necessary to slow down diabetes complications and improve comprehensive Diabetes Care.

## **2. Methods**

### **2.1. Study setting and Design**

A facility based cross sectional study was conducted between May and June 2017 among outpatients with Diabetes, attending the two selected main hospitals (Mulago National Referral Hospital and in St. Francis hospital Nsambya) in Kampala.

Kampala is one of Uganda's districts, with an estimated population of 1,659,600 habitants in 2011 according to UBS (Uganda Bureau of Statistics).

The two main hospitals were selected purposively due to the bigger number of person with diabetes enrolled in their diabetes clinics; they are teaching hospital, receiving patients from different districts, and different socio economic levels. Mulago National Referral Hospital (MNRH)/ Kirudu directorate (receiving almost 100 patients/week) is a public hospital yet St Francis (receiving almost 30 patients/week) is a private not-for-profit hospital run by the Uganda Catholic Medical Bureau Kampala. Both health facilities have diabetic outpatients' clinics that run once a week with good records management and keeping.

## **2.2. Study population**

The study population was persons with Diabetes, who reported to St. Francis hospital, Nsambya and MNRH diabetic clinic, during the study period. The study included all persons with Diabetes aged eighteen and above, followed up for at least 1 year, who reported to the diabetic clinics of St. Francis hospital Nsambya and MNRH during the time of the study. Very sick patients who were unable to respond to the questionnaire and patients who did not sign the consent form were excluded.

## **2.3. Sample size determination**

The sample size was estimated using the formula for cross-sectional studies by Kish Leslie (17) as follows: With 95% confidence interval ( $Z = 1.96$ ), and assuming that 45% of persons with Diabetes consume alcohol (from Saint Francis Nsambya Hospital record, 2016). Assuming an absolute difference ( $d$ ) of 0.06 and a 10% nonresponse rate. A total sample size 290 persons with Diabetes was required.

This sample size was allocated to the number of diabetic patients followed per hospital each week on diabetes clinic day. Therefore 68 patients (15 patients/week) were selected at St Francis Hospital and 222 (50 patients/week) were selected at Mulago. Data was collected at St Francis Hospital Nsambya and at MNRH, on each clinic day, and the systematic sampling approach was used to enroll patients; and regarding the time frame of seven weeks, the sampling interval was two in each hospital. That means every second patient was chosen, until the desired sample size was achieved.

## **2.4. Data collection methods**

Data was collected using a pretested interviewer administered questionnaire in English and in Luganda (The main Ugandan local language).

During patients visit for medical care at the diabetic clinic, the study aim was explained to those who were systematically selected and met the eligibility criteria. All diabetic patients who accepted to participate in the study provided a signed informed consent form in accordance with the Makerere University faculty of medicine Research and Ethics committee (FOMREC) guideline.

The data collection tools was anonymous with a structured questionnaire which was completed by a research assistant, who has good knowledge about Diabetes and who was trained before the commencement of the study in accordance with the study aim, data collection methods and research ethics.

The study involved only quantitative data collection method, which was used to calculate percentages and testing the relationships between variables.

The questionnaire included socio-demographic characteristics of the participant (age, gender, marital status, religion, tribe, occupation, residence, and others), clinical data about Diabetes (type of diabetes, time spent with Diabetes, health education about Diabetes, and others), and level of knowledge on alcohol consumption and Diabetes (sign of alcoholism, effect of alcohol on the body, effect of alcohol on diabetes and others).

For the level of knowledge on diabetes control and alcohol consumption: There were questions about diabetes complications, diabetes management, signs of alcoholism and effects of alcohol consumption on the body and on diabetes that were asked to patients using a structured questionnaire, and those questions were scored. The Sign of alcoholism was scored from 0 to 6 with a score  $> 3$  as high level, the effect of alcohol on the body was scored from 0 to 10, with a score  $> 5$  as high level and the effect of alcohol on glycemic control was scored from 0 to 3, with a score  $\geq 2$  as high level. That helped us to categorize the knowledge into 3 categories: High level of knowledge about sign of alcoholism; High level of knowledge about sign of alcoholism and effect of alcohol on the body; and High level of knowledge about sign of alcoholism, effect of alcohol on the body and effect of alcohol on diabetes.

The health education was about to know if patients receive the health education at the facility during the routine visit (yes or no), who deliver the message, at what frequency (never, always, sometimes) and then to know which exact message was delivered (avoid, reduce or stop alcohol consumption).

About the information on alcohol consumption within the last year:

Firstly it was self-reported by the patients assessed, and then was categorized into binary outcome variable (Yes or No).

Secondly, alcohol consumption was classify in 5 categories, using the Alcohol Use Disorders Identification Test (AUDIT) questionnaire (18): Non-drinkers; Occasional alcohol drinking (scoring less or equal to 2 points on the AUDIT tool); Alcohol misuse (scoring 3 to 7 points for men or 3 to 8 points for women points or higher on the AUDIT tool); Hazardous alcohol drinking (scoring 8 or more points for men and 7 or more points for women on the AUDIT tool) and Binge alcohol drinking (corresponded to 5 or more drinks on a single occasion for men or 4 or more drinks on a single occasion for women at least once last year).

From the AUDIT questionnaire, those who were categorized as non-drinkers and occasional drinkers were considered as non-drinkers as some studies demonstrate the importance of moderate alcohol drinking among persons with Diabetes. According to Blomster et al, 2014, moderate alcohol use, particularly wine consumption, is associated with reduced risks of vascular events and all-causes among persons with type 2 Diabetes (19); and those who were considered as drinkers, were categorized as either alcohol misuser, hazardous alcohol drinkers and Binge alcohol drinkers.

The reasons for alcohol consumption were reported by the patient and categorized into Family influence, pleasure or peer influence and then means of coping from stress (health worries, work stressors, etc.). Also each patient reported the type of alcohol drink he was usually taken and the type of alcohol was categorized into: Beer, Wine, and Spirit/local brews.

## 2.5. Data Analysis

Data was field edited, coded, cleared and checked for consistency. The coding was done to clearly identify the required variables for analysis. The data was entered in the EPI-INFO version 7, transferred to Microsoft excel 13 for cleaning, then exported to STATA 13 software for statistical analyses. Summary statistics included frequencies and proportions for categorical variables were done, and means with their standard deviations (SD) for continuous variables were obtained. We identified factors associated with alcohol consumption (that include only alcohol misuse, hazardous alcohol drinking and binge drinking) among persons with Diabetes, by using both bivariate (to check for associations and relationships between the alcohol consumption and the predictors) and Modified Poisson regression analysis (Poisson regression with a robust error variance), in order to get estimates that are relatively robust to omitted covariates, as the prevalence of alcohol consumption among persons with Diabetes was more than 10% (20).

Variables significant at bivariate analysis were included in Modified Poisson regression model, and the inclusion criteria was  $p \leq 0.05$ . Forward elimination method was then used to build the statistical model and hence to determine factors that were associated with alcohol consumption among persons with diabetes. All statistical tests were two sided. To measure the strength of association, we used the prevalence ratio (PR). We reported crude and adjusted prevalence ratio with their 95% confidence intervals and p values. The significance level for all the analyses was set to  $p \leq 0.05$ .

## 3. Results

### 3.1. Socio-demographic characteristics of participants

This study was done at Mulago National Referral Hospital/Kirudu Directorate and at St Francis Hospital Nsambya in Kampala and data was collected between May and June 2017.

From Table 2, the mean age (SD) of the respondents was 51.4 years ( $\pm 14.8$ ). About 42.4% (123/290) of the study participants were in the age range of 31 to 50 years followed by those with an age range of 51 to 70 years 37.5% (109/290). Majority of the study participants were female and with 52.4% (152/290) and 64.8% (216/290) of the participant were married. Most of the study participants stay in Makindye division 48.2% (140/290), followed by those staying in Kawempe division 28.2% (82/290)

Majority of diabetic patients were self-employed 41% (119/290) and about 34.4% (100/290) of the study participants attained the primary level of education, followed by those who attended the secondary level

with 32.4% (94/290). The majority of the participants 67.2% (195/290) were Baganda for tribe and Catholic for religion 42% (122/290).

Results in Table 1, show that about three quarter of the participants were from public hospital 76.6% (222/290). Among persons with diabetes, 94.8% (275/290) were those with type 2 diabetes yet the patients with type 1 were only 5.8% (17/290), and about 42% (122/290) had spent with diabetes years ranged between one to less than five years.

Most of the participant did not receive health education regarding diabetes when they came for routine visit at the hospital 68.9% (200/290), followed by those who were told to reduce and avoid alcohol consumption with respectively 14.555(23/290) and 8.86% (14%).

From Table 1, the majority 50% (145/290) had high level of knowledge on signs of alcoholism and effects of alcohol on the body, followed by those with high level of knowledge on sign of alcoholism 30.3% (88/290).

**Table 1**  
**Socio-demographic and clinical characteristics of study participants.**

<b>Characteristics</b>	<b>Univariate Analysis</b>		
	<b>Men n = 138</b>	<b>Women n = 152</b>	<b>All Total n = 290</b>
	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>
Age			
18–30	14(10.1)	10(6.5)	24 (8.2)
31–50	64(46.3)	59(38.8)	123 (42.4)
51–70	48(34.7)	61(40.1)	109 (37.5)
>70	12(8.6)	22(14.4)	34 (11.7)
Marital Status			
Never married	20(14.5)	10(6.5)	30 (10.4)
Married	107(77.5)	81(53.3)	188 (64.8)
Divorced/Separated/Widowed			
Level of education			
No education	11(8)	61(40.2)	72(24.8)
Primary	19(13.7)	46(30.2)	65 (22.4)
Secondary	49(35.5)	51(33.5)	100 (34.4)
Tertiary	50(36.2)	44(28.9)	94 (32.4)
Residence (Division)			
Central	20(14.4)	11(7.2)	31 (10.6)
Makindye	72(52.1)	68(44.7)	140 (48.2)
Kawempe	46(33.3)	36(23.6)	82 (28.2)
Nakawa and Rubaga	6(4.3)	14(9.2)	20 (6.8)
Other districts	4(2.8)	13(8.5)	17 (5.8)
Religion			
Catholic	58(42)	64(42.1)	122 (42)
Protestant/Anglican	29(21)	31(20.3)	60 (20.6)
Muslim	28(20.2)	35(23)	63 (21.7)
Pentecostal & Others	23(16.6)	22(14.4)	45(15.5)

Characteristics	Univariate Analysis		
	Men n = 138	Women n = 152	All Total n = 290
	n (%)	n (%)	n (%)
Tribe	94(68.1)	101(66.4)	195 (67.2)
Baganda	9(6.5)	14(9.2)	23 (7.9)
Basoga	17(12.3)	23(15.1)	40 (13.7)
Banyankore/Bakiga	18(13)	14(9.2)	32 (11)
Others			
Occupation	13((9.4)	65(42.7)	78 (26)
Not working	38(27.5)	24(15.7)	62 (21.3)
Salary earner	14(10.1)	17(11.1)	31 (10.6)
Farmer	73(52.8)	46(30.2)	119 (41)
Self employed			
Hospital	29(21)	39(25.6)	68 (23.4)
Private	109(78.9)	113(74.3)	222 (76.6)
Public			
Type of Diabetes	12(8.6)	3(1.9)	17 (5.8)
Type 1	126(91.4)	149(98)	275 (94.8)
Type 2			
Times with Diabetes	53(38.4)	69(45.3)	122 (42)
1 year - <5 years	46(33.3)	25(16.4)	71 (24.4)
5 years - <10 years	16(11.5)	31(20.3)	47 (16.2)
10 years- <15 years	23(16.6)	27(17.7)	50 (17.2)
≥ 15 years			
Health education	98(71)	102(67.1)	200 (68.9)
Never	6(4.3)	5(3.2)	11 (3.7)
Always	34(24.6)	45(29.6)	79 (27.2)
Sometimes			

Characteristics	Univariate Analysis		
	Men n = 138	Women n = 152	All Total n = 290
	n (%)	n (%)	n (%)
Knowledge on alcoholism:	12(8.6)	12(7.8)	24 (8.2)
-Do not have	41(29.7)	47(30.9)	88 (30.3)
-Sign of alcoholism	67(48.5)	78(51.3)	145(50)
-Sign of alcoholism + effects of alcohol on the body	18(13)	15(9.8)	33 (11.3)
-Sign of alcoholism + effects of alcohol on the body + effects of alcohol on diabetes			

## 3.2. Alcohol consumption among patients with Diabetes

Based on the AUDIT questionnaire and alcohol consumption self-reported, 23.45% (68/290) [95%CI: 18.9–28.7%] of persons with Diabetes who reported at Mulago National Referral Hospital and St Francis Hospital Nsambya, were taking alcohol, and the majority were men 66.17% (45/68) [95%CI: 54.06–76.48%] as we can see in Fig. 1.

Most of participants, consume alcohol hazardously 11, 3% (33/290) [95%CI: 8.1–15.6%], followed by those who misused it 8.9% (26/290) [95%CI: 6.1–12.8%] and a binge drinking was reported by 3.1% (9/290) [95%CI: 1.6–5.8%] of the study participants (see FIGURE1).

The FIGURE 2 shows that among persons with Diabetes who were taking alcohol, 77.9% (53/68) took preferably beer, 51.4% (35/68) spirits/local brews and 13.2% (9/68) wine. Men take mostly beer and spirit/ local brews with 75.4% (40/53) and 71.4% (25/35) respectively and 100% (11/11) of patients who take mostly wine were women.

The majority 58.8% (40/68) of patients reported means of coping stress as a major reason of consuming alcohol, followed by pleasure or peer influence 32.3% (22/68) and then the family influence 8.8% (6/68). The major reason of taking alcohol for both men and women was means of coping stress at 67.5% (27/40) and 32.5% (13/40) respectively (see FIGURE 3)

## 3.3. Factors associated with Alcohol consumption among persons with Diabetes.

The multivariable poison regression models were used to analyze factors that were related to alcohol consumption among persons with Diabetes followed at Mulago National Referral Hospital and at Saint Francis Hospital Nsambya.

After controlling for confounders, the variables revealed as the independent predictors for alcohol consumption among persons with Diabetes in Kampala were religion, marital status and time spend with

the disease

After controlling for religion, marital status and time spend with the disease, the prevalence of alcohol consumption among Pentecostal/others and Protestant/ Anglican followers were 68% and 56% less respectively, compare to that among Catholics followers and that was statistically significant (Adj PR: 0.32, 95% CI: 0.15–0.65; Adj PR: 0.44 95% CI: 0.24–0.82). In addition, Muslim were less likely to consume alcohol when compare to Catholics and that was statistically significant (Adj PR: 0.30, 95% CI: 0.14–0.62).

Patients who have spent 5 to 10 years with diabetes were more likely to consume alcohol compare to those who have spent less than 5 years, after controlling for religion, marital status and time spend with the disease. (Adj PR: 1.90, 95% CI: 1.25–2.88).

The prevalence of alcohol consumption among divorced, separated and widow patients was 58% less compare to that among patients who have never been married, after controlling for religion and marital status and time spend with the disease. (Adj PR: 0.42, 95% CI: 0.21–0.83).

Table 2

Factors associated with alcohol consumption (bivariate and multivariable analysis) among persons with Diabetes.

Characteristics	Alcohol consumption		Bivariate Analysis	Multivariate Analysis
	No	Yes	UPR (95%CI)	Adj PR (95%CI)
Sex	93	45	1.0	1.0
Male	129	23	0.46(0.29–0.72)**	0.74(0.48–1.14)
Female				
Age	16	8	1.0	
18–30	87	36	0.87(0.46–1.64)	
31–50	89	20	0.55(0.27–1.09)	
51–70	30	4	0.35(0.11–1.04)	
>70				
Marital Status	19	11	1.0	1.0
Never married	140	48	0.69(0.40–1.18)	0.80(0.51–1.25)
Married	63	9	0.34(0.15–0.73)*	0.42(0.21–0.83)*
Divorced/Separate/Widowed				
Level of education	55	10	1.0	
No education	76	24	1.56(0.79–3.04)	
Primary	69	25	1.72(0.89–3.35)	
Secondary	22	9	1.88(0.85–4.17)	
Tertiary				

\*\*\* Very significant \*\* significant \*weakly significant

Characteristics	Alcohol consumption		Bivariate Analysis	Multivariate Analysis
	No	Yes	UPR (95%CI)	Adj PR (95%CI)
Residence (Division)	27	4	1.0	
Central	100	40	2.21(0.85–5.74)	
Makindye	62	20		
Kawempe	17	3	1.89(0.79–5.09)	
Nakawa and Rubaga	17	1	1.16(0.28–4.66)	
Other districts			0.45(0.55–3.77)	
Religion	76	46	1.0	1.0
Catholic	51	9	0.39(0.20–0.75)*	0.44(0.24–0.82)*
Protestant/Anglican	56	7		
Muslim	39	6	0.29(0.14–0.61)**	0.30(0.14–0.62)**
Pentecostal/Others			0.35(0.16–0.77)*	0.32(0.15–0.65)*
Tribe	147	48	1.0	
Baganda	18	5	0.88(0.39–1.99)	
Basoga	31	9		
Banyankore/Bakiga	26	6	0.91(0.48–1.71)	
Others			0.76(0.35–1.63)	
Occupation	68	10	1.0	1.0
Not working	47	15	1.88(0.91–3.91)	1.35(0.63–2.81)
Salary earner	25	6		
Farmer	82	37	1.50(0.59–3.80)	1.27(0.51–3.16)
Self employed			2.42(1.28–4.59)*	1.67(0.86–3.26)

\*\*\* Very significant \*\* significant \*weakly significant

Characteristics	Alcohol consumption		Bivariate Analysis	Multivariate Analysis
	No	Yes	UPR (95%CI)	Adj PR (95%CI)
Hospital	55	13	1.0	
Private	167	55	1.29(0.75–2.22)	
Public				
Type of Diabetes	12	3	1.0	
Type 1	210	65	1.18(0.41–3.30)	
Type 2				
Times with Diabetes	97	25	1.0	1.0
1 year - <5 years	42	29	1.99(1.27–3.12)*	1.90(1.25–2.88)*
5 years - <10 years	43	4		
10 years- <15 years	40	10	0.41(0.15–1.13)	0.59(0.22–1.55)
≥ 15 years			0.97(0.50–1.88)	1.09(0.58–2.04)
Health education	152	48	1.0	
Never	6	5	1.89(0.94–3.79)	
Always	64	15		0.79(0.47–1.32)
Sometimes				
High level of Knowledge on alcoholism:	152	48	1.0	
-Do not have	55	17	0.89(0.43–1.83)	
-Sign of alcoholism	3	1		0.80(0.40–1.60)
-Sign of alcoholism + effects of alcohol on the body	12	2		
-Sign of alcoholism + effects of alcohol on the body + effects of alcohol on diabetes			0.41(0.13–1.26)	

\*\*\* Very significant \*\* significant \*weakly significant

UPR: Unadjusted Prevalence Ratio Adj PR: Adjusted Prevalence Ratio CI: Confidence Interval

## 4. Discussion

Alcohol consumption remains a long standing public health issue in Uganda. It can be harmful to vulnerable person with Diabetes, by interfering with self-care behaviors and affecting important organs in

the body. Therefore, this study fill a knowledge gap on detecting factors associated with alcohol consumptions among persons with Diabetes in Kampala, to improve comprehensive diabetes care by providing possible strategies and interventions and inform management policies.

Alcohol consumption is a public health issue in Uganda. This study revealed that the prevalence of alcohol consumption among persons with Diabetes in the two selected health facilities (MNRH and St Francis Hospital) in Kampala was 23.45%. This high prevalence of alcohol consumption can be explained by the important significance of alcohol in people's lives. Alcohol use in Uganda is widely accepted in local culture and tradition. Also, Uganda is abundantly supplied with alcoholic beverages (beer, wine, liquor produced in factories in the country or imported and informally produced beer and distilled liquor in local makeshift bars and homes), such as Heineken, Tusker, Guinness, Bell, Nile Special and Club. The findings were similar to a countrywide estimate of the prevalence of alcohol use in Uganda that showed an overall prevalence of current alcohol use of 26.8% (12). But the prevalence of alcohol consumption in this study was much lower than a study conducted among individuals with type 2 diabetes from 20 different countries in the world, where up to 30% patients were found to drink alcohol (19), and another study conducted in Northern California among adults with diabetes with the prevalence of 50% (6). That prevalence was much higher than the one conducted among Croatian, with 5.8% (21). This must be due to difference in sociodemographic and cultural characteristics among the different study populations.

In this study, majority of person with Diabetes, consumed alcohol hazardously (11.7%), followed by those who misused it (9.6%) and those who drink it occasionally (3.9%); the binge drinking was reported among 2.7% of participants. It is important to note that among participants who consume alcohol hazardously and who reported the binge drinking, the main reason of their drinking was the stress. A part from life events that are inherently stressful, diabetic patients have also to overcome the stress of their disease. In the present era of modernization, balancing work, family, leisure time and a chronic disease which is diabetes with all its requirement is a big challenge for patients, it may increase their stress level. Studies revealed that alcohol drinking is strongly associated with stress. It is mostly used as means of coping with life's stresses (22, 23). Chronic stress can therefore interfere with a diabetic patient's capacity to adhere to self-care behaviors which are essential to maintain good health (24). Our findings emphasize the importance of regular screening for stress as a routine diabetes care that will help to identify earlier the patients with stress and the earlier management of stress among persons with diabetes improve Glycemia control as well as quality of life and prognosis.

Majority of persons with Diabetes who take alcohol, consume beer, followed by those who consume spirit and wine. That is different from studies done in USA and Croatian where the majority of patients takes wine followed by those who takes beer and spirits (6, 21), and studies in Uganda among HIV patients (14). Uganda is abundantly supplied with alcoholic beverages that are mostly beers such as Tusker, Guinness, Bell, Nile, eagle and Club. Those beverages are cheaper, they are always available in retail and local shops, and they can also be taken in public places and even at home. Guidelines regulating alcohol

production and commercial sale, time and places restriction for selling alcohol density of outlets and advertisements practices must be followed up.

Religion was significantly associated to alcohol consumption. Catholics were more likely to consume alcohol, compared to patients in others religions (Pentecostal, Protestant/Anglican and Muslims). Catholic religion, does not prohibit alcohol consumption contrary to other religions. Alcoholic beverage is considered as incompatible with a holy life that is why abstaining from alcohol is an obligation of all their adherents. This result is similar to other study done in Uganda (14, 16) and other countries (6, 25, 26) where Catholics followers were more likely to consume alcohol compare to others. According to WHO, religion might play a role in prevention of alcohol consumption (27). Thereby, religion can be used strategically to reduce alcohol related problems among persons with Diabetes. By providing health education to the followers, the information can be disseminate through populations.

The duration of the diseases was significantly associated with alcohol consumption. Diabetic patients who spent with diabetes more than five years were more likely to consume alcohol compare to those who had spent less than five years. This was consistent with other studies done in Asia and Africa where patients with DM duration of  $\leq$  5 years were more adherent to diet especially regarding alcohol intake, than those who had a duration of  $>$  5 years (28–31).

According to Glasgow et al the duration of disease appears to have a negative relationship with diet adherence (32, 33). In 2010 Egede and Ellis showed that despondency can also be a factor influencing poor dietary practice regarding alcohol consumption among diabetic patients (34).

In most of health facilities in Uganda, patients presenting with diabetes are initially encourage to maintain diet which include to avoid alcohol consumption, in order to prevent complications. Over time, health education can be neglected due to lack of motivation, lack of time, absence of family and health care support, also patients might be fed up with following a dietary regimen. In that sense, health professionals need to double their attention to newly as well as to former diabetic patients, in other to provide them solid support in term of health education. They need to deeply discuss with diabetic patients about the importance of self-care behaviors that include to avoid alcohol consumption, because the reason for throwing away or dropping such behavior after five years of the disease duration could be the inadequate diabetic education or consultation and decrease of motivation over time.

This study shows that never married diabetic patients consume more alcohol compare to widow patients. This is similar with a study done in USA in 2016 in general population where never married people were more likely to consume alcohol compare to married and widow people (35).The finding is also similar with a study done among women in Accra (Ghana) (36). Widows have more responsibilities compare to never married people, especially when it comes to take care of children. So instead of purchasing alcohol, they tends to involve the major part of their resources in their children 'needs. At the same time they have to spend less time with friends and coworkers and more time with kids that may encourage their less drinking.

## **Study limitations and strengths**

Recall bias could have occurred as some data, especially from the questionnaire, were self-reported by the person with diabetes. The other limitation in this study is a social desirability bias that could have occurred since in the study, most of information was reported by participants. Persons with Diabetes who also drink alcohol may not disclose fully to the interviewers the extent of their drinking.

The strengths of this study include the use of the AUDIT questionnaire, a standardized internationally-validated tool for alcohol assessment in primary care settings, allowing for cross-study comparability. Furthermore, previous studies were focused on the general population or on some specific groups as HIV and psychiatric patients. This study examined alcohol consumption among persons with diabetes in Kampala, where there is continuous increase in diabetes incidence.

## **5. Conclusion And Recommendations**

About the quarter of persons with diabetes receive at MNRH and St Francis Hospital outpatients diabetes clinic, in Kampala consume alcohol. Being widow, Protestant, Muslim and Pentecostal, and having spent less than five years with diabetes were associated with less alcohol consumption.

Religion is an important avenue for health education against alcohol related problems among persons with Diabetes, by providing regular health education to the followers. The sensitization message regarding alcohol consumption among persons with Diabetes should be targeting mainly never married people and those who have spent more than five years with the disease Stress screening is very important as part of routine diabetes care; affected individuals should be supported to reduce their stress. Further study must be done to identify temporal relationship between gender and religion and alcohol consumption among persons with diabetes.

## **Abbreviations**

### **AUDIT**

Alcohol Use Disorder Identification Test

### **AUD**

Alcohol Use Disorder

### **MNRH**

Mulago National Referral Hospital

### **UDHS**

Uganda Demographic and Health Survey

### **WHO**

World Health Organization

## **Declarations**

## **Ethical approval and consent to participate**

The study was conducted after getting ethical clearance from Makerere University, School of Public Health, Institutional Review Board (ethical committee), and ethical clearance from the Ethical committee and executive director of MNRH and St Francis Hospital. Before the study was carried out, and before giving patients questionnaires to complete, the aims of the study were explained to them, the discretion of participation and the confidentiality of their information was assured, then patients to be included in the study were requested to sign a consent form.

## **Consent for publication**

Not applicable

## **Availability of data and materials**

The dataset used and analyzed during this study is available from the corresponding author.

## **Competing interests**

The authors declare that they have no competing interests.

## **Funding**

Not applicable

## **Authorscontributions**

MAKI S. SIFA is the lead author of the manuscript. She formulated the concept and performed statistical analysis.

NAZARIUS M. TUMWESIGYE, JONH BOSCO ISUNJU, FISTON MUNEZA supervised all stages of the study and the manuscript writing.

Dr DAVID S. KAISHUSHA and Dr SYLVESTER SSEMANDA supervised the data collections.

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## Figures

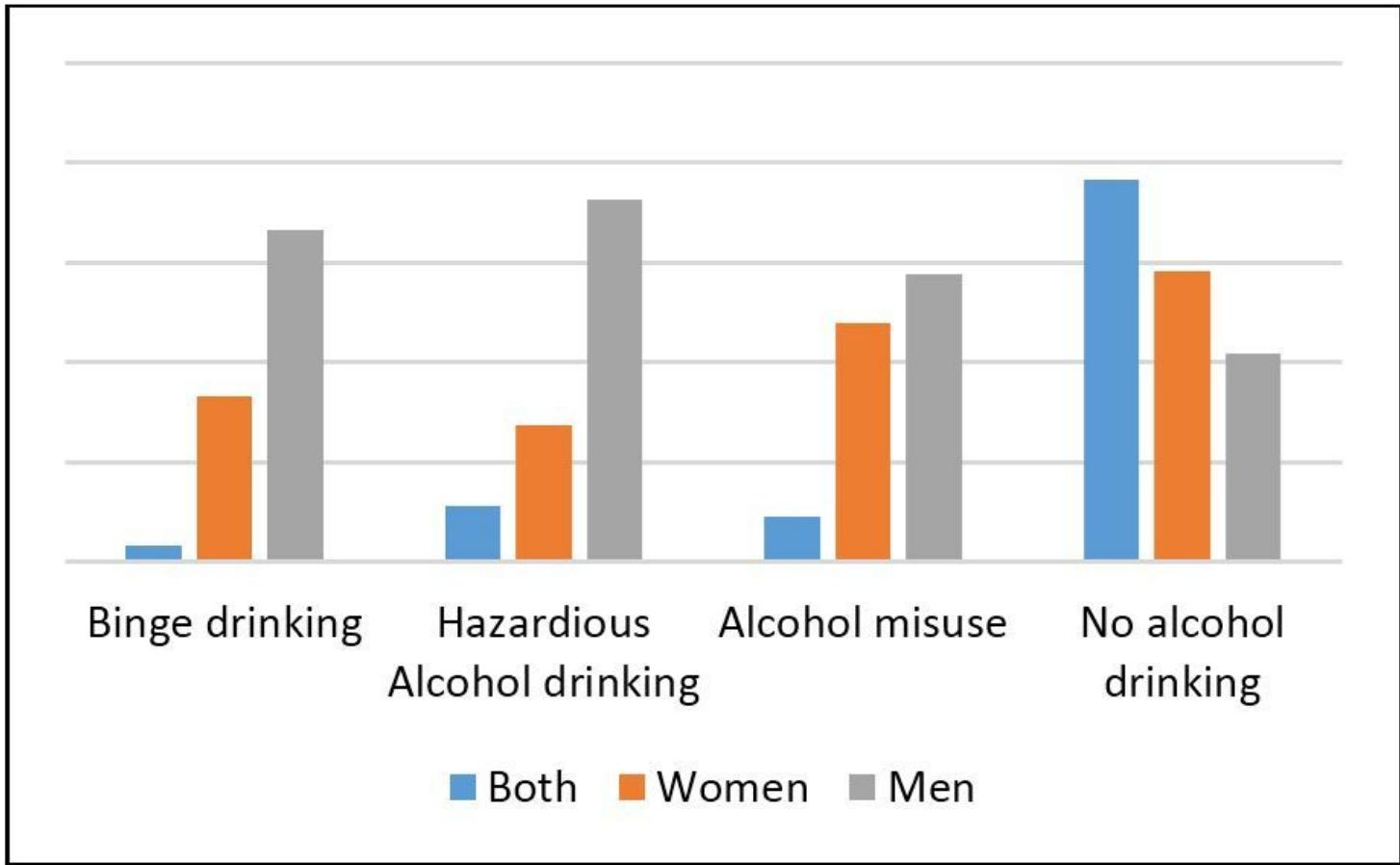
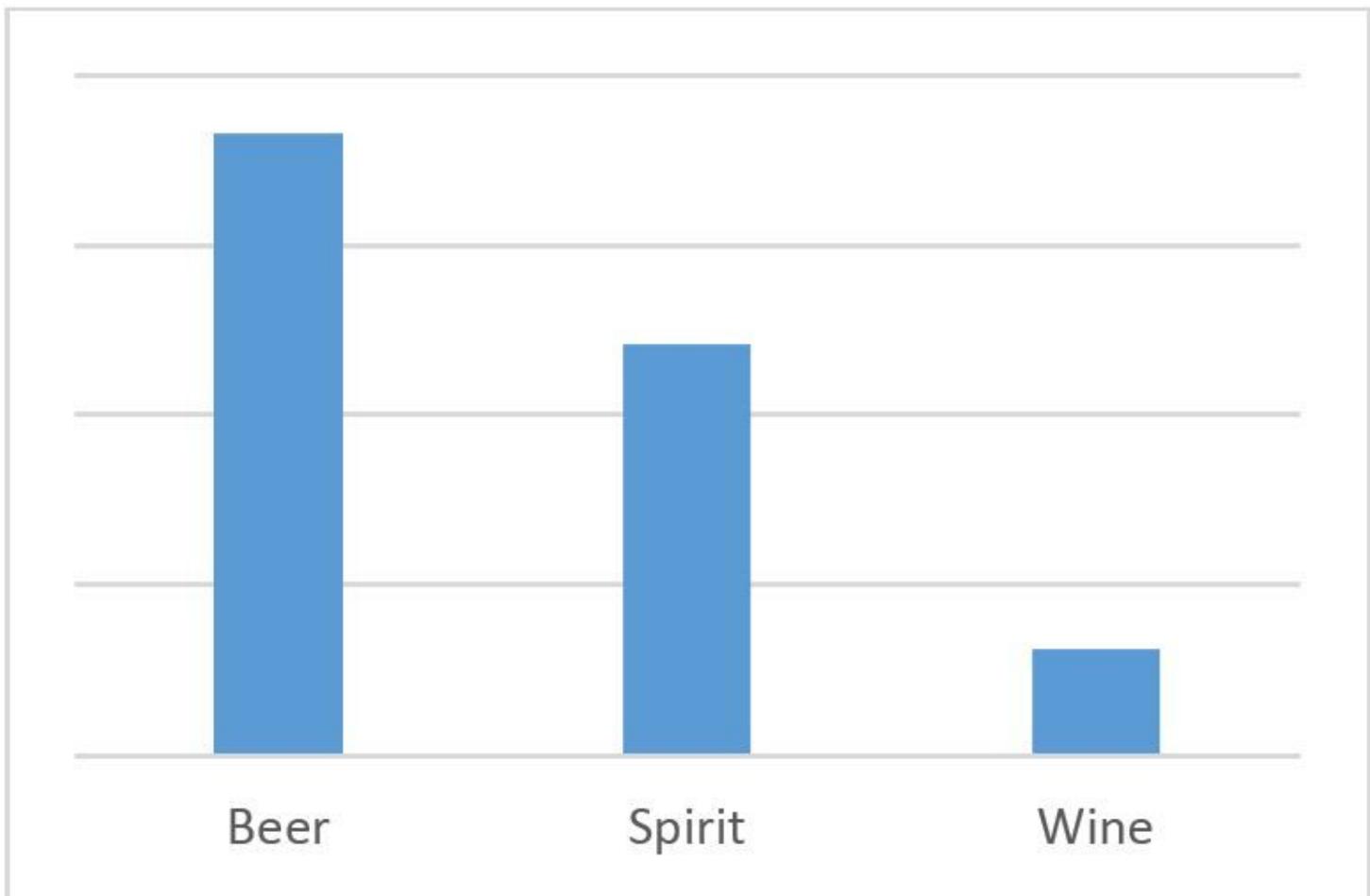


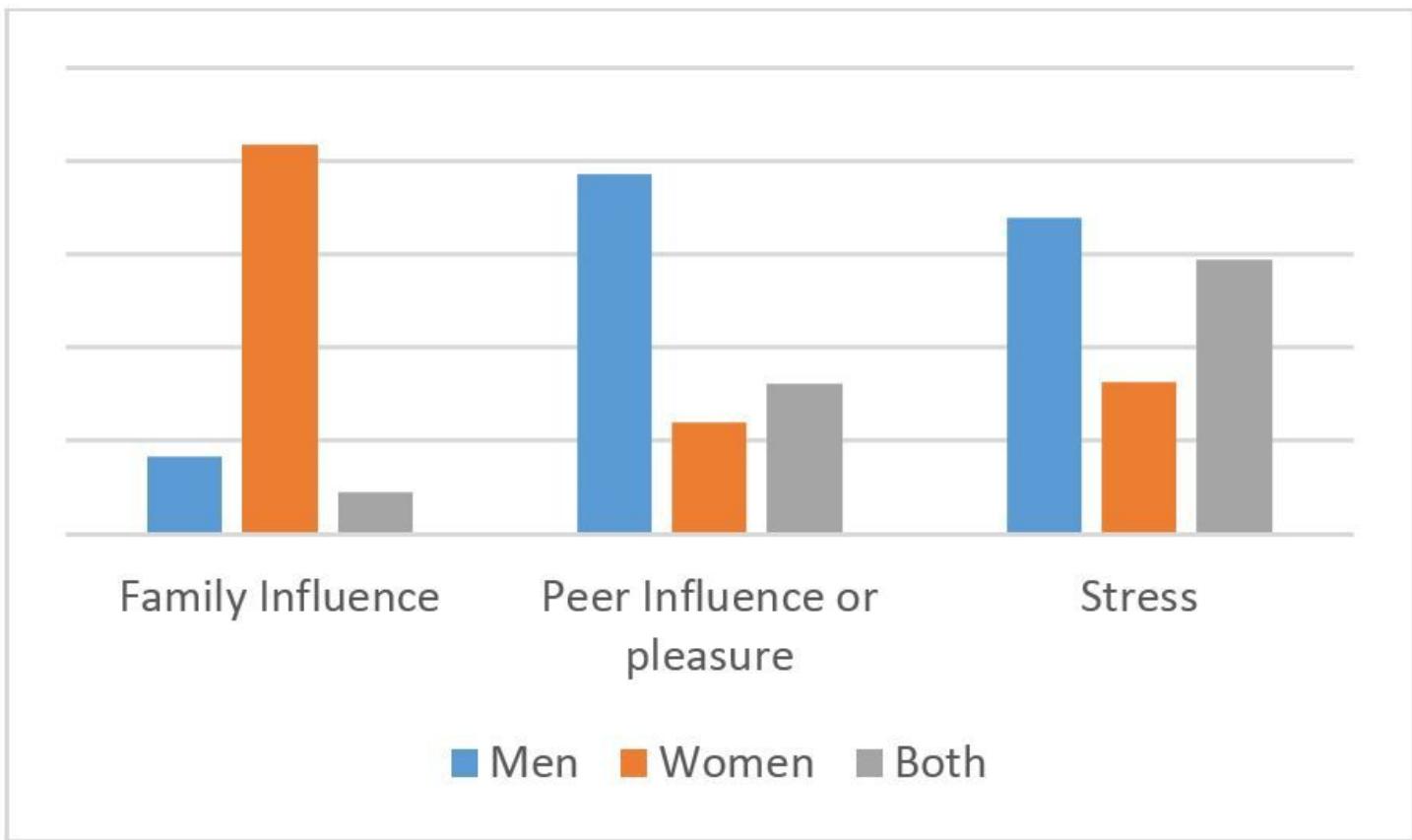
Figure 1

Prevalence and categories of alcohol Consumption among persons with Diabetes



**Figure 2**

Type of alcohol consumption, by sex



**Figure 3**

Reasons of consuming alcohol among diabetic patients, by sex