

Assessment of Health-Related Effects of Khat (Catha Edulis) Consumption Among Residents of Bushenyi-Ishaka Municipality, Bushenyi District Western Uganda

Ahumuza Nicholus Mavine

ahumuza.marvin@kiu.ac.ug

Kampala International University

Matthew C. Igwe

Kampala International University

Bot Yakubu Sunday

Kampala International University Western Campus

Idehen Iyore Charles

Kampala International University Western Campus

Herbert Malemo

Kampala International University

Isa Asiiimwe

Kampala International University

Solomon A. Mbina

Kampala International University

Umar Ibrahim

Federal University Dutse

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Abstract

Background

Despite local and national efforts against Khat use, the habit continues to escalate mainly among young people in Uganda; especially those in urban and peri-urban areas. This is compounded by limited understanding of health related effects of Khat use which could have detrimental effects to the users, their families and community as a whole. This study aimed at assessing the health-related effects of Khat (*Catha edulis* Forsk) consumption among residents of Bushenyi-Ishaka Municipality, South western Uganda.

Methodology

A community based cross sectional study design was conducted on 384 study participants residing or working in Bushenyi-Ishaka Municipality. Using structured questionnaires and a cluster sampling method, data was obtained on Khat consumption; its patterns, health effects and associated factors. Data was analyzed using SPSS version 27.0 for both descriptive and inferential statistics. Statistical significant association was set at a p-value of ≤ 0.05 .

Results

A 16.9% and 15.1% lifetime and current prevalence of Khat consumption respectively was observed among the participants. The most reported health related effects of Khat use were GUS effects with a mean of 2.0578 ± 0.442 , however it was CVS health effects which showed a significant association to Khat use ($\beta = 0.201$, $P < 0.001$). This study also showed that Khat use was positively associated with age 18–43 years ($\beta = 0.189$, $P = 0.001$), age 31–43years ($\beta = 0.205$, $P = 0.002$), primary level of education ($\beta = 0.221$, $P = 0.006$), being a traditional believer ($\beta = 0.221$, $P = 0.014$), being a driver ($\beta = 0.348$, $P < 0.001$) or a merchant ($\beta = 0.356$, $P = 0.006$) as an occupation and living with people than one's parents ($P < 0.001$). On the other hand, Khat use was negatively associated with being a student as occupation ($\beta = -0.934$, $P < 0.001$), and earning a higher monthly income ($P < 0.001$).

Conclusion

Lifetime and current prevalence of Khat consumption was 16.9% and 15.1% respectively with CVS health effects as the only positively and significantly associated health effects with Khat chewing. Khat chewing was also significantly associated with age, education level, religion, occupation, income level and type of people someone lives with.

Introduction

Khat, also known as *Catha edulis* Forsk, is a psychotropic herb that is widely grown & used as a stimulant, medicinal herb, good for trade, for dowry, and dispute resolution within Eastern Africa and the

Arabian Peninsula [1]. The herb is commonly referred to as Mairungi in Uganda, Miraa in Kenya, khat in Ethiopia, Qaad/jaad in Somalia and qat or gat in Yemen [2, 3].

Chronic Khat use has become a public health concern with many health related effects. Khat use among young people is escalating despite the rising public health concerns. Globally, Khat is reportedly regularly used by more than 20 million people ($\approx 3/1000$) [4]. This is expected to exponentially increase over time in low and middle income countries [5]. In Sub-Saharan Africa (SSA), Khat use ranges from 14.5% – 21.6% and is anticipated to rise over time [6]. This rate is similar to Khat use among the youths in Uganda (15.6%) but lower than level of Khat use among adult Uganda (22.4%) in adults [7].

Chewing Khat leaves exposes users to alkaloid Cathinone and Cathine the active ingredients that cause health effects among Khat users including euphoria, excitement, alertness, low appetite and improving social connection [8, 9]. Further studies have also associated excessive Khat consumption to Cardiovascular (CVS) health-related effects (Tachycardia, Hypertension, stroke), Gastro-intestinal Tract (GIT) effects (constipation, liver disorders), Genito-urinary System (GUS) effects (urinary retention) and Central Nervous System (CNS) effects (anxiety, depression, psychosis and mental alterations), among others [8, 10, 11 12].

The Bushenyi district in western Uganda passed the Bushenyi District '*Mairungi*' Trade and usage Control Ordinance, 2006 in response to the effects of Khat trade and usage. Despite these local interventions against Khat and substance use, Bushenyi District remains the axis and an important route of Khat supply to major towns and cities such as Mbarara City and there is no evidence showing that if khat use has decreased in the district [13]. This is compounded with paucity of published data on health-related effects of Khat consumption among residents of Bushenyi District Southwestern Uganda hence the need to conduct this study aimed at assessing the potential health effects of khat (*Catha edulis* Forsk) use among Bushenyi-Ishaka municipality inhabitants.

Methods and Materials

2.1 Study Setting and Population

This study on Khat use was carried out among youths (18–30years) and adults (30–59years) men and women of different occupations who reside or work in Kizinda, Ishaka, St. Kagwa, Bushenyi and Nyakabirizi towns of Bushenyi-Ishaka municipality, in South western Uganda.

2.2 Study Design, Variables and Sampling

A community based cross sectional study design was conducted between April to August, 2024 to assess self-reported level of Khat use (dependent variable), Self-reported health-related effects of Khat (dependent variable) among youths and adults and Self-reported associated factors of Khat use (independent variable).

A study sample size of 384 participants (220 youths and 164 adults) was determined using Cochran's formula (1977) i.e. $n = \frac{z^2 p(1-p)}{e^2}$; Where $Z = 1.96$, $P = 50\%$ and $e = 0.05$ (at 95% Confidence level);

$$n = \frac{1.96^2 \times 0.5(1-0.5)}{(0.05)^2} = 384 \text{ youth and Adults.}$$

According to UBOS 2016, Bushenyi-Ishaka municipality's population aged 18 to 30 years was 10,820 and the population aged 31 to 59 years was 8,096. Therefore to have a representative sample of 384 participants, $n1 = \frac{10,820}{18916} \times 384 = 220$ of 384 participants were between 18 to 30 years of age while $n2 = \frac{8096}{18916} \times 384 = 164$ of 384 participants were between the ages of 31 to 59 years.

Cluster sampling technique was used to recruit eligible participants until a desired sample was reached.

2.3 Data Collection procedure

The study used interviewer-administered structured questionnaires to obtain quantitative data on self-reported Khat consumption, Khat chewing patterns and the associated factors (**see attached Data tool 1**) whereas the self-reported health effects of Khat use (among the Khat users) were obtained using a 5-point Likert scale as adopted from WHO steps instrument guide for NCDs 2020 (**see attached Data tool 2**). Responses were collapsed dichotomously with agree/strongly agree responses coded as an endorsement and all other responses (neutral/disagree/strongly disagree) coded as not endorsing the proposed effect of Khat use on each specified health outcome.

2.4 Statistical Analysis

The Statistical Package for Social Sciences (SPSS) version 27.0 was used for both descriptive statistical analysis to obtain prevalence of Khat use, self-reported health effects of Khat use and also inferential statistics to assess the associated factors of Khat chewing at bivariate and multivariate regression analysis. Statistical significant association was set at a p-value of ≤ 0.05 .

2.5 Ethical Approval

Ethical clearance was sought from Institutional Research Ethics Committee of Kampala International University (KIU-REC). Ethical approval and accreditation number: KIU-2024-295.

Study Results

3.1 Socio-demographic characteristics of study participants

The study showed that most (94.3%) of the participants were male, over half (57.3%) were aged 18–30 years and about (40.1%) had attained secondary level education. About 45.3% of participants were

singles by marital status, over half (53.6%) were Moslems by religion and majority (52.6%) were living alone. Finally, about 44.3% of participants were commercial cyclists by occupation and most (47.7%) of them were earning a monthly salary of UGX 100,000–300,000 (**See Fig. 01 below**).

3.5. Factors Associated With Khat Consumption

At bivariate analysis, it was age 18–30 (9.5%), age 31–43 (17.0%), primary education (14.4%), being divorced (19.0%), being a Moslem (24.6%), being a traditional believer (34.8%), being a driver (17.1%), being a commercial cyclist (14.9%), staying with your own family (61.6%), staying with relatives (72.3%), staying with friends (71.2%) or staying alone (76.6%) that increased the tendency to use Khat among the residents of Bushenyi-Ishaka municipality. On the contrary, having secondary education (14.1%), earning between UGX 100,000 - <300,000 (19.1%) or earning more than UGX 600,000 (31.9%) per month decreased the tendency to chew Khat among the resident of the municipality (**see Table 05 below**).

At multivariate analysis, age 18–30 (18.9%), age 31–43 (20.5%), primary education (22.1%), being a traditional believer (22.1%), staying with own family (61.4%), staying with relatives (70.1%), staying with friends (78.3%), staying alone (70.5%), being a driver (34.8%) or merchant (35.6%) by occupation increased the tendency to chew Khat among the residents of the municipality whereas being a student (93.4%) and earning a monthly salary of UGX 100,000 and above (97.6% – 138.2%) decreased the tendency to chew Khat among the residents of Bushenyi-Ishaka municipality (**see Table 05 below**).

3.3 Pattern of Khat Consumption

Amongst the participants who reported chewing Khat, majority reported supply of Khat from Khat vendors (78.5%); most had chewed Khat for a period of more than 6months to 3 years (64.6%); mainly chew one bundle per session (53.8%); chew 4–6 times a week (66.2%); use between UGX 5000–10,000 per single consumption (53.8%) with a monthly average ranging between UGX 100,000–150,000 (53.8%) whereas all those who reported Khat chewing mentioned taking a period of more than 2 hours during the chewing session. Regarding the other substances consumed alongside Khat, majority of the Khat users mentioned chewing gum (53.8%) and most mentioned reasons for Khat chewing was to be alert (76.9%) as portrayed (**See table 02 below**).

3.4 Health Related Effects of Khat Consumption

The explored health related impacts ranged from CVS effects to GIT, GUS and CNS effects assessed using a standard five point likert scale of Agree, Strongly agree, Neutral, Disagree and Strongly Disagree respectively scored from 1–5. The most confirmed health related effects of Khat use were GUS effects with a mean of 2.0578 ± 0.442 followed by the CVS effects (1.9809 ± 0.270) while the least confirmed health related effects were CNS ones with a mean of 1.9297 ± 0.158 . Generally, most participants confirmed (median = 2.000) the occurrence of the assessed health effects after Khat use. The mean health effects for CVS, GIT, and GUS were skewed to the right while that CNS ones was skewed to the left. Minimum mean score for the health related effects ranged between Agree and strongly agree (1.40)

while the maximum mean score for the health related effects ranged from neutral to disagree (3.40) with variations between the type of health effects assessed (**see table 03 below**). However during the regression analysis, it was only CVS health related effects which portrayed a positive and significant association ($\beta = 0.201$; $P < 0.001$) to Khat use (**see table 04 below**).

Discussion of Results

4.1 Prevalence of Khat consumption among study participants

This study showed 16.9% Lifetime prevalence of Khat consumption. This was higher than the lifetime pooled prevalence of Khat use in SSA (14.5%) among the youth [6]. However, this was lower than a 44.6% lifetime prevalence of Khat use in Kenya [14], a 26.7% lifetime prevalence of Khat use in Ethiopia [15] and a 21.4% lifetime prevalence of Khat use in South Africa [16].

Further, the study indicated a 15.1% Current prevalence of Khat Chewing which was higher than a 12.5% current prevalence of Khat use in South Africa [16]. However, this was lower than a 24.5% current prevalence of Khat use in Kenya [14] and a 17.5% current prevalence of Khat use in Ethiopia [15]. By and large, the prevalence of Khat use were lower than in most of other areas of study, which could be because Ishaka – Municipality is a growing town as compared to where related studies have been conducted. We also noted a slight decline in Khat chewing by 1.8% (from 65 to 58 users in 384 study participants). This could be because of failure of users to sustain the expenses, discouraging health related effects and changes in social status.

4.2 Health related Effects of Khat Use among study participants

This study showed that the most reported health related effects of Khat use were GUS effects with a mean of 2.0578 ± 0.442 , followed by CVS effects with a mean of 1.9807 ± 0.270 . While the least reported health related impacts were CNS effects with a mean of 1.9297 ± 0.158 . A regression analysis with β -coefficient revealed that only CVS health related effects were positively associated to Khat use ($\beta = 0.201$, $P < 0.001$). This was Consistent with Studies in Ethiopia [12], Kenya [14], and Tanzania [17] where erectile dysfunction, decreased libido, urinary retention and sexual dysfunction among men were respectively reported GUS health effects of Khat use. Also, agreed with a study in Tanzania [17] where Khat use was significantly associated with CVS effects such as High Blood pressure and heart disease. However, This Contrasted with studies in Ethiopia [12] and Uganda [7] where CNS effects such as depression, anxiety & stress were most reported among Khat users. Also, deviated from findings of a study in Tanzania [17] where CVS effects were the least reported health related effects of Khat use. This disparity in results of reported health effects of Khat use could be due to difference in assessment tools and subjectivity in response. Also, the duration of Khat use among participants was relatively short to notice CNS effects which are usually long term in nature.

4.3 Factors associated with Khat Use among study participants

This study revealed that Khat use was positively associated with Age 18–43 years, though there was a greater association for adults aged 31–43years. This was consistent with a systematic review [18] where there was a positive association between advancing age and Khat use globally. Also, agreed with results of a review in SSA [6] and findings from a cross sectional study in Uganda by [7]. This could be linked to socio-generational drive, ability to afford cost & sustain use of Khat.

This study also indicated that Khat use was positively associated with primary level of education and negatively associated with secondary level of education. This was consistent with findings of a world Drug Report (2019) which revealed that lower education was positively associated with Khat Use and a study [17] in Tanzania that showed that Higher education level was negatively associated with Khat Use. This could be due to improved knowledge & awareness on health effects of Khat use with higher levels of education.

Further, the study indicated that Divorced study participants had increased chances of Khat use compared to their married counterparts. This was consistent with results from a review in SSA [6] where Divorce was positively associated with Khat Use and findings of studies in Ethiopia [12]. However, this contrasted with a study [17] & [7] which indicated that there was No significant association between divorce and Khat Use. This could be connected to psychosocial frustration & coping mechanisms in divorced individuals.

On religious affiliation, the study revealed that Khat use was positively associated with traditional beliefs. This was consistent with a systematic review [19] which indicated that traditional belief was positively associated with Khat Use globally and Findings in Tanzania [17]. However, this contrasted with a study [18] which indicated that there was No association between traditional belief & Khat use. This could be linked to a ritualistic activity or due to traditional belief in Khat as herbal remedy.

Besides, Khat use was found to be positively associated with drivers. This was consistent with: Findings of a systematic review [19] and a study in Uganda where drivers had higher odds of Khat use [7]. However, this contrasted with a study in Uganda that indicated that there was no association between Driving and Khat Use [20]. Drivers, especially long distance drivers and those who drive day & night could be chewing Khat more to keep alert while driving.

Finally, Khat use was negatively associated with high income level. This was consistent with studies in Ethiopia where users from High income had lower odds of Khat Use [12, 21]. This also agreed with a cross sectional study in Uganda [11]. This could be linked to social stigma, occupational constraints and alternative leisure activities and coping mechanisms of persons with high income.

Conclusion

The study concludes that life time and current prevalence of Khat consumption was 16.9% and 15.1% respectively. Khat users mostly reported GUS and CVS health effects, and least reported CNS health effects. Only CVS Health effects were positively associated with Khat chewing. Khat chewing was

significantly associated with advancing age, primary education level, divorce marital status, traditional beliefs, driving or merchant occupation as well as high monthly income earnings.

Declarations

Ethical Approval and Consent to participate

Ethical clearance was sought from Institutional Research Ethics Committee of Kampala International University (KIU-REC). Ethical approval and study accreditation number: KIU-2024-295. Data collection and the entire research process proceeded with reference to the Helsinki guidelines were; respect for individuals (the residents of Bushenyi-Ishaka Municipality) and the right to make informed decisions (study participants) were strictly adhered to. Participation in study was voluntary with written informed consent obtained from all study participants.

Consent of publication

Not applicable since no images or patient's information has been included in this manuscript.

Availability of Data and Materials

The dataset used to establish these findings can be availed on request. The corresponding author should be contacted via email and such request forwarded to his address as stated in the manuscript.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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Authors' Contributions

All Authors contributed to the study. The corresponding Author (Ahumuza Nicholus Mavine) conceptualized the study, proposed the study design, and was involved in data collection and analysis and writing of the manuscript with support from the listed co-authors. Co-authors include; Mathew C Igwe participated in conceptualization of study and design, results interpretation, manuscript drafting and review. Bot Yakubu Sunday participated in conceptualization of study and design, results interpretation and manuscript approval. Idehen Iyore Charles participated in conceptualization of study and design, results interpretation and manuscript approval. Malemo Herbert participated in data analysis and interpretation, manuscript drafting and review. Isa Asiimwe participated in data analysis and interpretation, manuscript drafting and review. Solomon A Mbina in conceptualization of study and design, results interpretation, manuscript drafting and review. Umar Ibrahim participated in

conceptualization of study and design, results interpretation, manuscript drafting and review. All Authors participated in manuscript review and approval.

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Tables

Table 01
showing Khat Consumption among the participants

Variable		Frequency	%
Ever Chewed Khat	Yes	65	16.9
	No	319	83.1
Currently Chewing Khat	Yes	58	15.1
	No	7	10.8
	N/A	319	83.1
Who Introduced You to Khat Chewing	Friend	51	78.5
	Workmate	14	21.5
	Nobody	0	.0

Table 02
Khat Chewing Patterns among the Khat users

Variable		Frequency (N = 65)	%
Means of Khat Supply	Friends	14	21.5
	Khat vendor	51	78.5
How long been chewing Khat	> 6 months – 3 years	42	64.6
	4–6 years	15	23.1
	Over 6 years	8	12.3
Quantity Chewed in single session	One bundle	35	53.8
	> 2 bundles	30	46.2
Khat Chewing Frequency	Daily	22	33.8
	4-6times a week	43	66.2
Time spent chewing	> 120 minutes	65	100.0
Amount spent on single consumption	> UGX 5000 - UGX 10000	35	53.8
	> UGX 10000	30	46.2
Average amount spent per month	>UGX 100000 - UGX 150000	35	53.8
	> UGX 150000	30	46.2
Substance used together with Khat	Alcohol	22	33.8
	Chewing gum	35	53.8
	Cigarette	8	12.3
Reason for chewing Khat	To be alert	50	76.9
	To be accepted by peers	15	23.1

Table 03
Descriptive Statistics of health Effects of Khat consumption

	CVS Effects	GIT Effects	GUS Effects	CNS Effects
N = 65	65	65	65	65
Mean	1.9807	1.9560	2.0578	1.9297
Median	2.0000	1.9000	2.0000	2.0000
Std. Deviation	.26989	.20043	.44204	.15833
Skewness	.061	.571	.758	– .207
Std. Error of Skewness	.125	.125	.125	.125
Minimum	1.40	1.60	1.40	1.50
Maximum	2.60	2.50	3.40	2.50
N = 65participants who have ever used Khat were used to assess Health effects of Khat consumption				

Table 04: Linear regression analysis of health-related effects of Khat use and Khat use

Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
CVS EFFECTS	0.280	0.071	0.201	3.949	< 0.001
GIT EFFECTS	-0.023	0.095	-0.012	-0.242	0.809
GUS EFFECTS	-0.042	0.043	-0.049	-0.958	0.339
CNS EFFECTS	0.001	0.120	0.000	0.005	0.996

Table 05
showing regression analysis of socio-demographic factors and Khat chewing

Variable	EVER CHEWED KHAT			
	Bivariate Analysis		Multivariate Analysis	
	Coefficients (β)	P-value	Coefficients (β)	P-value
Gender Male	0.158	0.055		
Female	Ref.			
Age (years) 18–30	0.095	0.046	0.189	0.001
31–43	0.170	0.004	0.205	0.002
44–56	Ref.		Ref.	
Education Level No formal	0.044	0.435	0.124	0.240
Primary	0.144	0.014	0.221	0.006
Secondary	-0.141	0.003	-0.057	0.363
Tertiary	Ref.		Ref.	
Marital Status Married	Ref.		Ref.	
Single	0.029	0.522	0.142	0.126
Separated	-0.022	0.702	0.052	0.562
Divorced	0.190	0.027	0.200	0.063
Religion Christian	0.037	0.647	0.089	0.254
Moslem	0.246	0.002	0.142	0.088
Traditional	0.348	< 0.001	0.221	0.014
Others	Ref.		Ref.	
Lives with..... Family	0.616	< 0.001	0.614	< 0.001
Relatives	0.723	< 0.001	0.701	< 0.001
Friends	0.712	< 0.001	0.783	< 0.001
Parents	Ref.		Ref.	
Alone	0.766	< 0.001	0.705	< 0.001
Occupation Civil servant	Ref.		Ref.	
Entry into Multivariate model was $P \leq 0.05$ at Bivariate. Thus, Age, Education, Marital status, Religion, Occupation, Monthly income and People stayed with, were taken to the multivariate model.				

Variable	EVER CHEWED KHAT			
Student	0.110	0.142	-0.934	< 0.001
Driver	0.171	0.008	0.348	< 0.001
Commercial cyclist	0.149	0.009	-0.030	0.703
Peasant	-0.045	0.624	-0.069	0.526
Merchant	-0.194	0.070	0.356	0.006
Monthly income (UGX) <100,000	Ref.		Ref.	
100,000 - <300,000	-0.191	0.004	-0.976	< 0.001
300,000–600,000	-0.083	0.243	-1.057	< 0.001
> 600,000	-0.319	< 0.001	-1.382	< 0.001
Entry into Multivariate model was $P \leq 0.05$ at Bivariate. Thus, Age, Education, Marital status, Religion, Occupation, Monthly income and People stayed with, were taken to the multivariate model.				

Figures

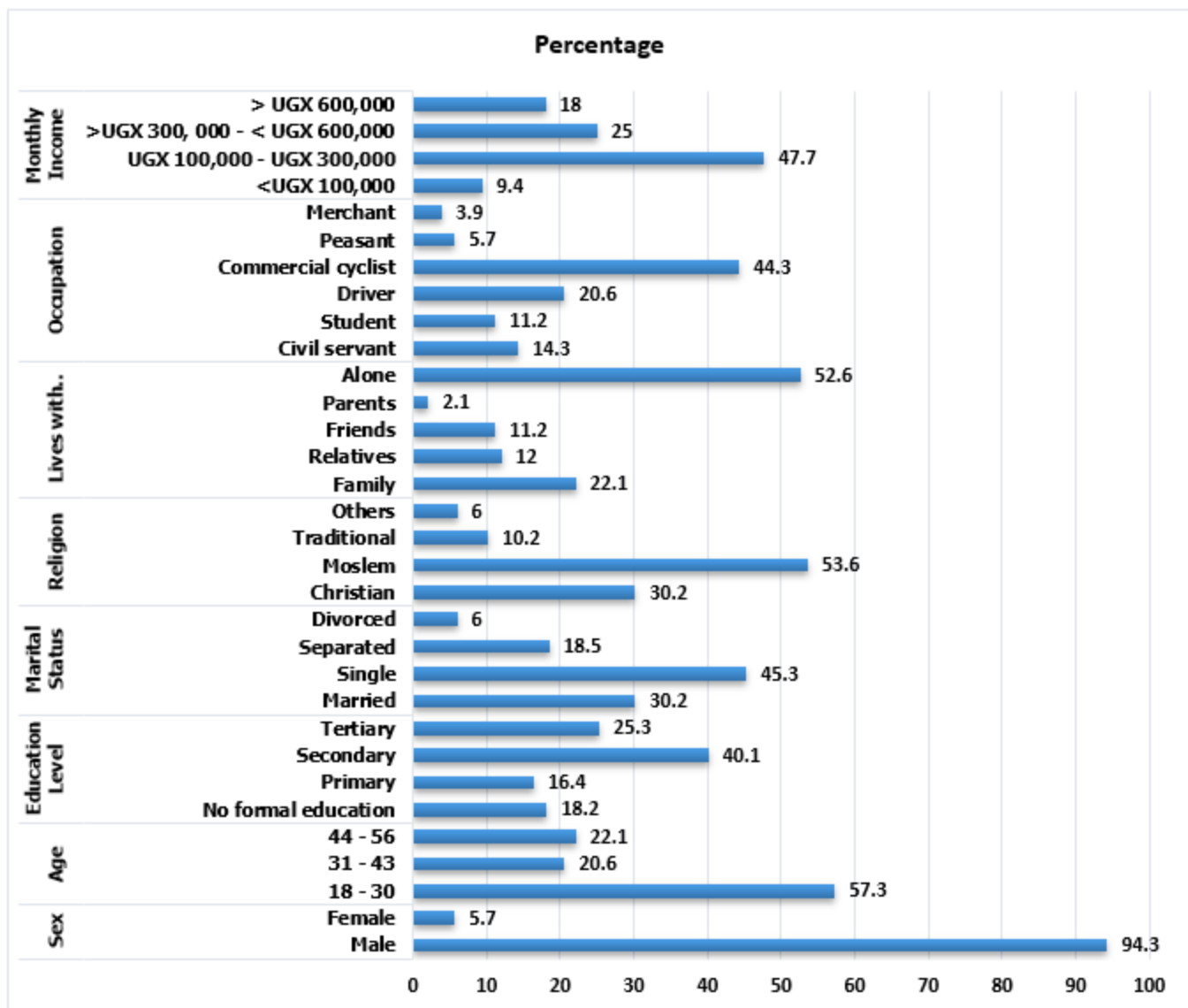


Figure 1

Socio-demographic characteristics of study participants