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ALCOHOL AND TOBACCO CONSUMPTION AMONG KEY POPULATIONS IN TOGO IN 2017: A CROSS-SECTIONAL STUDY

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Abstract

Objectives

The aim of this study was to assess the determinants of alcohol and tobacco consumption among males who have sex with males (MSM), female sex workers (FSW) and drug users (DU) in Togo.

Design, setting and participants

A cross-sectional bio-behavioral study was conducted among 2,115 MSM, FSW and DU in 2017 using a respondent-driven sampling (RDS) method, in the eight biggest towns of Togo. Selection criteria for the MSM were being male and having had oral or anal intercourse with a man in the previous 12 months; for FSW, being a female and having exchanged sex for money in the previous 12 months; and for DU, consuming heroin, cocaine or hashish for MSM, FSW and DU, respectively. All participants had be to at least 18 years old and residing in the territory for the past three months.

Results

The prevalence of alcohol consumption, hazardous/harmful consumption and binge drinking was 64.8 %, 38.4%, and 45.5%, respectively. Current tobacco use was reported by 30.6% of participants and HIV prevalence was estimated at 12.5%. DU (female and male DU) were more likely to engage in binge drinking compared to other key populations (aOR=2.9; 95% CI = [1.2-7.9]; p= 0.05 and aOR=2.0; 95% CI= [1.4-2.8]; p=0.001, respectively). Participants who were identified as having hazardous/harmful alcohol consumption had almost three times the odds of tobacco consumption than those with no risky consumption (aOR=2.6; 95% CI= [2.0-3.4]; p=0.001). Hazardous/harmful alcohol consumption was three times more likely among participants with severe psychological distress compared to those with no psychological distress (aOR= 3.3, 95% CI= [2.2 – 5.1]; p=0.001).

Conclusions

Findings from this study demonstrate the need for the integration of mental health and substance abuse reduction interventions into HIV prevention programs, particularly those geared toward key populations.

Key words: Alcohol, tobacco, HIV, key populations, Sub-Saharan Africa.

Strengths and limitations of this study

- This study is among the first in sub-Saharan Africa exploring the patterns of alcohol and tobacco consumption among the three main groups of key populations
- This study had a consistent sample size
- The use of internationally validated instruments to assess alcohol and tobacco consumption, as well as psychological distress minimized bias
- The main limitation of our study is that it was based on self-reported data which could be a potential source of recall bias or social desirability bias

Introduction

Sub-Saharan Africa (SSA) is the region of the World the most affected by the HIV/AIDS epidemic: with only 12% of the global population, SSA accounts for an estimated 71% of the world's burden of HIV infection and 74% of world's AIDS-related deaths (1). In West and Central Africa, the HIV epidemic is described as generalized and driven by heterosexual sex with an estimated prevalence of 2.2% (2). However, in key populations, populations at higher risk of HIV such as sex workers, men who have sex with men (MSM) and injection drug users, the reported prevalence rates are disproportionally high compared to those of the general population (3,4). In Togo, HIV prevalence among key populations ranges from 11% to 13% compared to 2.1% in the general population (5). Several biological, behavioral and structural risk factors are associated with this high HIV rate among key populations: unprotected sex, presence of other Sexually Transmitted Infections (STIs), lack of access to condoms, multiple concurrent sex partners (males and females for MSM), lack of access to health care and prevention services, physical and sexual violence, challenging legal and sociopolitical environment, poverty, sociopolitical stigma and discrimination (3,4).

Other risk factors associated with sexual risk behaviors and thus contributing to HIV transmission include alcohol and tobacco consumption. Alcohol, a psychoactive substance with dependence-producing properties, has been an integral part of many cultures for several centuries (6). The harmful use of alcohol and its consequences make its consumption a public health problem. More than 200 disease and injury conditions including alcohol dependence, liver cirrhosis, cancers and injuries are the consequences of the harmful use of alcohol (6). In 2012, it was reported that 5.9% of all global deaths and 5.1% of the global burden of disease and injury were the consequences of harmful alcohol consumption (6). Recent research studies have also uncovered a causal relationship between the harmful use of alcohol and infectious diseases, including HIV (6–8). This relation could be attributed to the fact that alcohol influences cognitive abilities and decision making, and affects condom negotiation and correct condom use (9). Among key populations, particularly sex workers, alcohol consumption is seen as a sexual enhancer and work requirement which in many cases leads to an increased likelihood of unprotected sex, economic loss, interference with family responsibilities and sexual violence (8,10,11).

Tobacco consumption is also one of the biggest public health challenges of the 21st century, with a clear, causal link between tobacco use and health. It is estimated that tobacco use kills half of its users and is responsible for the death of more than 7 million people a year. Approximately 80% of tobacco users live in low and middle income countries (12). Tobacco use is one the main risk factors for lung cancer, disability and death from non-communicable chronic diseases, and also an increased risk of death from communicable diseases (13,14). For people living with HIV, tobacco use is a risk factor for HIV-related comorbidities and premature death (15). Estimates in Togo put the prevalence of alcohol and tobacco consumption at 53.7% and 8.5% respectively, in the general population (16).

Both alcohol and tobacco consumption play an important role in the HIV epidemic in SSA. With key populations being an important catalyst of the HIV epidemic in SSA and particularly in West Africa, it is important that patterns of alcohol and tobacco consumption be explored among these populations. However, there is a dearth of data on the consumption of addictive substances such as tobacco and alcohol among the three main key populations in SSA. Of the few studies on key populations completed in Togo, none has explored alcohol and tobacco consumption and very few studies in West Africa have explored alcohol and tobacco consumption across the three key populations. The aim of this study was to identify the determinants of alcohol and tobacco consumption among female sex workers (FSW), MSM and drug users (DU) in Togo.

Methods

Study design, sampling and recruitment

This study was a bio-behavioral cross-sectional study conducted from August to September 2017 in eight towns of Togo. Prior to the study, locations (associations and hot spots) specific to each group of key population were identified during preliminary visits with the help of leaders from these communities. DU and FSW were recruited in drug-dealing/consumption locations and brothels (licensed or not), respectively. MSM were recruited using a Respondent Driven Sampling (RDS) method. MSM community leaders were the first "seeds". A total of 28 seeds were identified at first based on their roles in their community and on their representativeness. Each seed from the first wave selected had to represent at least one sub-group: passives, actives, bisexuals, gays, etc. Each participant was then given three coupons with a unique identification code to recruit three other seeds in their network until the required sample size for each group was reached. Inclusion criteria for the three groups were being 18 years or older, living/working/studying in Togo for a minimum of 3 months at the time of the study, and being in possession of a recruitment coupon. In addition to these criteria, criteria specific to MSM were having had anal sex with a man in the previous 12 months, for FSW having had sex in exchange for money as a compensation in the previous 12 months and for DU, consuming heroin, cocaine or hashish at the time of the study.

Sample size estimation

With an estimated prevalence of hazardous alcohol drinking among key populations of 9.1% (17), and with a precision of 3% and an assumption of 10% of missing data, the minimum sample size was estimated at 423 participants. Thus, to allow a comparison between groups, the total sample size estimated for the three groups of key populations was 1,269.

Study procedures

After eligibility screening and informed consent approval, trained study staff administered a structured and standardized questionnaire during a face-to-face interview. The questionnaire was constructed based on validated tools such as the Alcohol Use Disorders Identification Test (AUDIT) (18) and a subset of the Tobacco Questions for Surveys (19) to assess alcohol and tobacco consumption respectively. The Kessler Psychological Distress Scale (K10) (20) was used to measure psychological distress and the Family Health International (FHI) 360 validated guide for bio-behavioral surveys (21) was adapted to collect information on socio-demographic characteristics, risky sexual behaviors, STIs, HIV prevention methods, HIV testing history, access to health care services, and HIV knowledge. The questionnaires were used across the three populations with slight adaptations depending on the population.

Scores and operational definitions

The AUDIT was used to assess alcohol consumption. The AUDIT is a set of 10-item standardized screening instrument measuring self-reported alcohol use in the past 12 months, alcohol dependence symptoms, and alcohol-related problems to screen for excessive drinking. Each question of the AUDIT can obtain a score from zero (0) to four (4). A score ≥8 for men and ≥7 for women indicates hazardous/harmful drinking, while a score of 0 indicates a non-drinker; moderate alcohol use lies in-between (17,21-23). Binge drinking or heavy episodic drinking was defined as the consumption of six or more alcohol drinks on at least one occasion in the past 30 days (third item of the AUDIT) (18).

Tobacco use was assessed using six questions indicating participants' smoking habits, frequency of smoking, history of smoking, type of products smoked and attempts at stopping to smoke.

The Kessler Psychological Distress Scale (K10) was used to measure psychological distress. This scale has been examined and validated among several populations and aims at measuring anxiety and depression with a 10-item questionnaire, each question pertaining to an emotional state and a five-level response scale for each response. The score obtained from the scale allows to categorize participants into four categories of psychological distress: severe (score ≥ 30), moderate (score: 25-29), mild (score: 20-24) and none (score < 20) (24).

Laboratory testing

Blood samples were collected to test for HIV and Syphilis using SD Biolane Duo® (Abbott, Santa Clara, CA, USA). Each HIV positive test was confirmed with another HIV rapid test, the First Response® HIV 1-2-O Card Test (Premier Medical Corporation Pvt. Ltd., Maharashtra, India). In case of discordant results, samples were tested with the INNO-LIA® HIV I/II Score (20T) (Fujirebio, Göteborg, Sweden) line immunoassay. All biological tests analyses were completed in the main HIV laboratory research unit, the Molecular Biology Laboratory (BIOLIM) at the University of Lomé.

Statistical analysis

Descriptive statistics were performed and results were presented with frequency tabulations and percentages. Prevalences were estimated with their 95% confidence interval (95%CI). Univariate and multivariate logistic regression were performed to identify factors associated with: i) hazardous/harmful alcohol consumption, ii) binge drinking and iii) current tobacco consumption. For model building, characteristics that had a p-value <0.20 in univariate analysis were considered for the full multivariate models, which were then finalized using a stepwise, backward elimination approach. The three models did not include the variable "sex" as the four groups were already categorized according to sex. All analyses were performed using R® software.

Ethical consideration

This study was approved by the "Comité de Bioéthique pour la Recherche en Santé (CBRS)" (Bioethics Committee for Health Research) from the Togo Ministry of Health. Participants provided written

consent prior to participation. Potential participants were told about the study purpose and procedures, potential risks and protections, and compensation. Informed consent was documented with signed consent forms.

Patient and Public Involvement

Members of key populations were involved during the study design and data collection phases of the study. They were consulted prior to the study for their input on the best method to reach out to key populations and they were actively involved in the recruitment process.

Results

Socio-demographic characteristics

A total of 641 MSM, 537 DU and 937 FSW, with a median age of 25 years, interquartile range (IQR) [21-32 years] participated in the study. The majority of the sample (n=1,443; 54.0%) had a secondary school education level and 76.7% were Christians (n=1,621). Approximately two-thirds of the sample (n=1,278; 60.4%) were likely to not have any psychological distress and 6.5% (n=136) were identified as having severe psychological distress, the highest among female-DU (n=9; 33.4%). The HIV prevalence was 12.5% across the three populations, with the highest prevalence among MSM (20.4%). Other socio-demographic characteristics are summarized in Table 1.

Alcohol and tobacco consumption

Alcohol and tobacco consumption patterns are presented in Table 2. Overall, the prevalence of alcohol consumption among the three groups was 64.8%. Most participants were identified as having a hazardous/harmful alcohol consumption (n=813; 38.4%), with the highest proportion among DU (74.1% among female-DU and 61.7% among male-DU; 36.7% among FSW; and 20.9% among MSM; p <0.001). More than a quarter of FSW (n=275; 29.4%) were moderate drinkers. The MSM subgroup had the highest proportion of non-drinkers (n=338; 52.7%), followed by FSW (n=318; 33.9%). The overall prevalence of binge drinking was 45.5% (n=962) and was the highest among DU: 80.0 % among female-DU (n=20) and 80.2% among male-DU (n=340) (Table 2).

The prevalence of tobacco consumption was 30.6% among the three groups. DU had the highest proportion of smokers with 85.2% of female-DU (n=23) and 80.6% of male-DU (n=411). The highest proportion of non-smokers were FSW (n=821; 87.6%), followed by MSM (n=544, 84.9%). Of the people who smoked, 63.1% were smoking every day, including 79.1% of DU (female-DU: n=16; 69.6%, male-DU: n=327; 79.6%), 42.2% of FSW and 16.5% of MSM.

Alcohol consumption risk factors

Table 3 summarizes the association between the independent variables and the hazardous/harmful consumption of alcohol and binge drinking. The odds of hazardous/harmful alcohol consumption were

significantly higher among non-believers or other (aOR=0.7; 95% CI= [0.5-0.9]; p= 0.001) than among Muslims (aOR= 0.4; 95% CI [0.3-0.6]; p= 0.001] and Christians (aOR=0.7; 95% CI= [0.5-0.9]; p= 0.001). FSW (aOR=1.6; 95% CI= [1.3-2.1]; p= 0.001), female-DU (aOR=2.9; 95% CI = [1.2-7.9]; p= 0.05) and male-DU (aOR=1.96; 95% CI= [1.40-2.76]; p= 0.001) were more likely to engage in binge drinking compared to MSM. The place of residence, whether in the capital city of Lomé or in other towns, was also associated with hazardous/harmful alcohol consumption and binge drinking so that people living in other towns were almost three times more likely to have hazardous/harmful alcohol consumption (aOR=2.8; 95% CI= [2.2-3.4]; p=0.001) or engage in binge drinking (aOR=2.5; 95% CI= [2.0-3.0]; p=0.001) than those living in the capital city of Lomé. Psychological distress was also a risk factor for hazardous/harmful alcohol consumption and binge drinking. Participants with several psychological distress were three times (aOR= 3.3, 95% CI= [2.2 – 5.1]; p=0.001) and twice (aOR=2.2, 95% CI= [1.5 – 3.4]; p = 0.001) more likely to be engaged in hazardous/harmful alcohol consumption and binge drinking, respectively, than those with no psychological distress. The odds of hazardous/harmful alcohol consumption and binge drinking increased as the severity of psychological distress increased. In addition, being a DU, particularly a female-DU was significantly associated with hazardous/harmful alcohol consumption and binge drinking. Compared to MSM and FSW, female-DU had three times and male-DU had two times the odds of hazardous/harmful alcohol consumption (aOR=3.8; 95%CI=[1.5 -10.5]; p=0.01 and aOR=2.4; 95%CI= [1.7-3.4]; p=0.001, respectively) and two times the odds of binge drinking compared to MSM and FSW (aOR=2.9; 95%CI= [1.2-7.9] and aOR=2.0; 95%CI= [1.4 -2.8]). Finally, being 25 years old and older (aOR=1.3; 95% CI [1.1-1.6]), tobacco use (aOR=2.6; 95% CI: [2.0-3.4]), being HIV positive (aOR=0.7; 95% CI [0.5-0.9]) were significantly associated with both hazardous/harmful alcohol consumption and binge drinking.

Tobacco use risk factors

Living in cities other than Lomé (the capital city) (aOR=0.6; 95%CI 0.5-0.8), hazardous/harmful alcohol consumption (aOR=2.6; 95% CI 2.0-3.4), having mild (aOR=1.5; 95% CI 1.1-2.1) or moderate (aOR=2.0; 95% CI 1.3-2.8) psychological distress, being a FSW (aOR=0.6; 95% 0.4-0.9), a female-DU (aOR=17.2; 95% CI 5.9-62.8) or a male-DU (aOR=18.2; 95%CI: 12.4-26.6) were associated with tobacco use (Table 4) (Table 4).

Discussion

The aim of this study was to assess the prevalence of hazardous/harmful, binge alcohol consumption as well as tobacco consumption, and explore correlates of heavy alcohol consumption and tobacco use in three key populations in Togo. We observed a high prevalence of hazardous/harmful alcohol consumption and binge drinking. Alcohol consumption is frequent among FSW and much more among DU, specifically female-DU. In addition, there was a dose-response effect relationship between alcohol consumption and psychological distress across all three populations. Tobacco use was highly prevalent among DU and among people who had a hazardous/harmful alcohol consumption.

Alcohol consumption is highly prevalent among key populations groups: more than half of the sample were categorized as moderate or hazardous drinkers. This has been corroborated in the literature among key population groups. In a recent study in Kenya, among 1,476 MSM, 44% of the sample had a hazardous alcohol consumption, and, no relationship was found between alcohol and tobacco consumption and HIV infection (25). In another study among 3,588 MSM in China, alcohol prevalence was 56.1% with 16.8% of them being binge drinkers and 14.4% being recent hazardous drinkers, using the WHO AUDIT-C scale (26). Recent alcohol misuse was associated with increased sexual and HIV/syphilis risks as well as sexual risk behaviors including alcohol use before sex, sex without condoms and multiple concurrent partnerships. A prospective cohort study among 1,027 FSW in Uganda found that 78% of the sample reported using alcohol with 71% admitting to using alcohol at least once a week, with a reduced prevalence of 54% after two years of intervention (27). This emphasizes the need for alcohol risk reduction programs and programs specifically focused on the adoption of safer drinking practices integrated into HIV prevention packages and geared towards highly exposed groups (26,27).

Alcohol and tobacco consumption are particularly relevant to people living with HIV (PLHIV). Studies have demonstrated a negative impact of alcohol, tobacco and drug use on life expectancy for HIV-positive patients (28). Alcohol and tobacco use have also been associated with poor adherence to antiretroviral therapy (ART) and the interaction between all those substances leading to a higher susceptibility to co-morbidities, opportunistic infections such as tuberculosis (TB) (29,30). In this study, hazardous/harmful alcohol consumption and binge drinking were both significantly associated with tobacco use. This indicates the need for targeted prevention actions such as smoking cessation treatment and alcohol reducing counseling, among key populations, particularly among key populations living with HIV. A systematic review of interventions to reduce alcohol use among MSM indicated that although interventions such as motivational interviewing (MI) appear to be effective among MSM, they are scarce (31).

Psychological distress was found to have a dose-response relationship with alcohol consumption. Severe psychological distress was at least twice higher among people with a hazardous/harmful alcohol

consumption and people who were binge drinking. This is consistent with other studies that found a relationship between alcohol and drug abuse and psychological symptoms such as depression, anxiety and suicidal ideation among key populations (32,33) . Consistent with our findings, a study conducted in Cambodia among MSM found that 38.8% had severe psychological distress and that severe psychological distress was associated with alcohol and drug use, poor self-reported quality of life and reduced condom use at last sex (32). Another study among PLHIV in Uganda found that psychological distress was significantly associated with non-adherence to ART (34). This has implication for HIV prevention and further demonstrates the need for integrated services of mental health interventions, psychological support as well as substance abuse reduction program into HIV prevention programs. This would also imply that health care workers be sufficiently armed through training to screen and refer KP in need of those interventions.

Very few studies have explored alcohol and tobacco consumption patterns among the three main key populations. This study found quite different patterns of consumption among the three groups, with MSM in this sample being the lowest at-risk group for hazardous/harmful alcohol consumption, binge drinking and tobacco use. DU on the other hand, particularly female-DU appear to be most vulnerable to hazardous/harmful alcohol consumption, binge drinking and tobacco use, as well as the group with the highest prevalence of severe psychological distress. This could potentially indicate that there is a difference in coping strategies for key populations and that, behavioral interventions specifically geared towards MSM have elements that perhaps have successfully enhanced their capacity to cope with the stress among the most marginalized groups. For example, studies have demonstrated the effectiveness of community-based organizations (CBOs), peer-led interventions and community engagement in HIV prevention among MSM (35–37). With the feminization of the HIV epidemic in SSA, it would be essential that female-DU be particularly taken into account as one of the most vulnerable and at risk group for HIV and that, targeted interventions be geared toward generating an interest for community building.

Strengths of this study include the large sample size of the three main types of key populations. In addition, to our knowledge, this is the first study in Togo comparing alcohol and tobacco consumption in these key populations using standardized tools (AUDIT, Tobacco Questions for Surveys, and Kessler psychological distress scale). Finally, this study was completed in eight main cities of Togo, which could indicate that it is nationally representative.

However, there were few limitations including the fact that some variables such as childhood abuse, stigma, or recent trauma which could influence alcohol and tobacco consumption, have not been collected. Furthermore, self-reported data used in this study, are prone to social desirability and recall bias. Despite these limitations, the results presented in this study make a unique contribution to the literature on hazardous/harmful and binge alcohol consumption among key populations in West Africa.

Conclusion

Alcohol and tobacco use and abuse are highly prevalent among key populations. There is a need for mental health and substance abuse screening, referral and treatment fully integrated into HIV prevention services for key populations.

Author contributorship

ABA and FGK contributed equally to this paper. ABA, FGK, PAC and DKE conceived and designed the study with inputs from AJ. PJ, EKS, CAD, MS and TJB facilitated data collection and contributed to analysis of the data. ABA and FGK analyzed, interpreted the data and drafted the manuscript. PAC, AJ and DKE revised the manuscript for important intellectual content. All authors participated in the revision process and have approved the final version of the manuscript.

Competing interests

No competing interests to declare

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Data sharing statement

No additional data are available

Ethics approval and consent to participate

This study was reviewed and approved by the Bioethics Committee for Research in Health in Togo (CBRS No. 18/2017/CBRS of June 22 2017). Consent was obtained from each participant prior to administering the survey questions.

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Table 1: Socio-demographic and health characteristics

	MSM (n=641) n (%)	FSW (n=937) n (%)	Female DU (n=27) n (%)	Male DU (n=510) n (%)	Total (=2115) n (%)	p-value
Age (years)						
18 – 25	442 (68.9)	456 (48.7)	9 (33.3)	174 (34.1)	1081 (51.1)	<0.001
>25	199 (31.1)	481 (51.3)	18 (66.7)	336 (65.9)	1034 (48.9)	
Marital status						
Married	41 (6.4)	130 (13.9)	12 (44.4)	173 (33.9)	356 (16.8)	<0.001
Not married	600 (93.6)	807 (86.1)	15 (55.6)	337 (66.1)	1759 (83.2)	
Education level						
Never went to school	1 (0.2)	158 (16.8)	3 (11.1)	26 (5.1)	188 (8.9)	<0.001
Primary school	51 (7.9)	263 (28.1)	18 (66.7)	145 (28.4)	477 (22.6)	
Secondary school	356 (55.5)	471 (50.3)	6 (22.2)	310 (60.8)	1143 (54.0)	
College/University	233 (36.4)	45 (4.8)	0 (0.00)	29 (5.7)	307 (14.5)	
Religion						
Other/ Non-believers	65 (10.1)	100 (10.7)	6 (22.2)	92 (18.0)	263 (12.4)	<0.001
Christians	522 (81.5)	743 (79.3)	19 (70.4)	337 (66.1)	1621 (76.7)	
Muslims	54 (8.4)	94 (10.0)	2 (7.4)	81 (15.9)	231 (10.9)	
Place of residence						
Lomé	447 (69.7)	526 (5.1)	23 (85.2)	293 (57.4)	1289 (60.9)	<0.001
Other	194 (30.3)	411 (43.9)	4 (14.8)	217 (42.6)	826 (39.1)	
Psychological distress						
Likely not to have psychological distress	497 (77.5)	538 (57.4)	5 (18.5)	238 (46.7)	1278 (60.4)	<0.001
Likely to have mild psychological distress	80 (12.5)	223 (23.8)	5 (18.5)	118 (23.1)	426 (20.1)	
Likely to have moderate psychological distress	55 (8.6)	117 (12.5)	8 (29.6)	95 (18.6)	275 (13.0)	

Likely to have severe psychological distress	9 (1.4)	59 (6.3)	9 (33.4)	59 (13.6)	136 (6.5)	
HIV Infection						
Yes	131 (20.4)	119 (12.7)	5 (18.5)	10 (1.9)	265 (12.5)	<0.001
No	480 (74.9)	787 (84.0)	20 (74.1)	390 (76.6)	1677 (79.3)	
Not tested	30 (4.7)	31 (3.3)	2 (7.4)	110 (21.5)	173 (8.2)	

FSW: Female sex worker; MSM: Men who have sex with men; FDU: Female drug user; MDU: Male drug user; IQR: Interquartile range

Table 2: Alcohol and Tobacco consumption among key populations in Togo in 2017

Addictive behaviour	MSM (n= 641) n (%)	FSW(n=937) n (%)	Female DU (n=27) n (%)	Male DU (n=510) n (%)	Total (N=2115) N (%)	p-value
Alcohol consumption						
Non-drinker	**338** (52.7)	**318** (33.9)	**2** (7.4)	**86** (16.9)	**744** (35.2)	
Moderate drinking[1]	**169** (26.4)	**275** (29.4)	**5** (18.5)	**109** (21.4)	**558** (26.4)	
Hazardous consumption	**134** (20.9)	**344** (36.7)	**20** (74.1)	**315** (61.7)	**813** (38.4)	<0.001
Binge drinking [2]	**196**(30.6)	**406** (43.3)	**20** (74.0)	**340** (66.7)	**962** (45.5)	
Binge drinking among drinkers [2]	**196** (64.7)	**406** (65.6)	**20** (80.0)	**340** (88.2)	**962** (70.2)	
Tobacco Use						
Yes	**97** (15.1)	**116** (12.4)	**23** (85.2)	**411** (80.6)	**647** (30.6)	
Everyday	**16** (16.5)	**49** (42.2)	**16** (69.6)	**327** (79.6)	**408** (63.1)	<0.001
No	**544** (84.9)	**821** (87.6)	**4** (14.8)	**99** (19.4)	**1468** (69.4)	

FSW: female sex worker; MSM: Men who have sex with men; MDU: Male drug user; FDU: Female drug user

[1] Moderate drinking levels depend on sex (differences in metabolism for females and males): AUDIT score: 1-6 for females and AUDIT score: 1-7 for males

[2] Binge drinking is defined as the consumption of six or more alcohol drinks at least once per month in one occasion (Question 3 of the AUDIT)

Table 3: Factors associated with hazardous alcohol consumption and binge drinking among key populations in Togo in 2017

	Hazardous/harmful alcohol consumption					Binge drinking				
		Univariate analysis		Multivariate analysis			Univariate analysis		Multivariate analysis	
	n/N	OR (95% CI)	p-value	aOR (95% CI)	p-value	n/N	OR (95% CI)	p-value	aOR (95% CI)	p-value
Age (years)					**0.05**					**0.05**
18 – 25	351/1081	1		1		433/1081	1		1	
>25	462/1034	1.7 (1.4-2.0)	0.001	1.3 (1.1-1.6)	0.05	529/1034	1.6 (1.3-1.9)	0.001	1.3 (1.1-1.6)	0.01
Marital status					**0.97**					
Not married	641/1759	1		1		777/1759	1			
Married	172/356	1.6 (1.302.1)	0.001	1.0 (0.8-1.3)		185/356	1.4 (1.1-1.7)	0.001		
Education level			0.001		**0.19**			**0.001**		**0.01**
Never been to school	64/188	1		1		69/188	1		1	
Primary school	232/477	1.8 (1.3-2.6)	0.001	1.50 (1.0-2.2)	0.05	256/477	2.0 (1.4-2.8)	0.001	1.6 (1.1-2.4)	0.01
Secondary school	436/1143	1.2 (0.9-1.7)	0.283	1.3 (0.9-1.8)	0.26	517/1143	1.4 (1.0-2.0)	0.05	1.5 (1.0-2.1)	0.05
University	81/307	0.7 (0.5- 1.0)	0.10	1.3 (0.8-2.2)	0.21	120/307	1.1 (0.8-1.6)	0.60	2.1 (1.3-3.3)	0.01
Religion			0.001		**0.001**			**0.001**		**0.001**
Others/ Non-believers	56/112	1		1		151/263	1		1	
Christians	596/1621	0.5 (0.4-0.7)	0.001	0.7 (0.5-0.9)	0.05	718/1621	0.6 (0.5-0.8)	0.001	0.71 (0.5-1.0)	0.05
Muslims	80/231	0.5 (0.3-0.7)	0.001	0.4 (0.3-0.6)	0.001	93/231	0.5 (0.4-0.7)	0.001	0.4 (0.3-0.7)	0.001

Place of residence					**0.001**				**0.001**
Lomé	392/1289	1		1		486/1289	1		1	
Others	421/826	2.4 (2.0-2.9)	0.001	2.8 (2.2-3.4)	0.001	476/826	2.3 (1.9-2.7)	0.001	2.5 (2.0-3.0)	0.001
Tobacco use					**0.001**					**0.001**
No	423/1468	1		1		533/1468	1		1	
Yes	390/647	3.8 (3.1-4.6)	0.001	2.6 (2.0-3.4)	0.001	429/647	3.5 (2.8-4.2)	0.001	2.6 (2.0-3.4)	0.001
Psychological distress			0.001		**0.001**			**0.001**		**0.001**
Likely to not have psychological distress	387/1278	1		1		491/1278	1		1	
Likely to have mild psychological distress	174/426	1.6 (1.3-2.0)	0.001	1.2 (0.9-1.5)	0.20	220/426	1.7 (1.4-2.1)	0.001	1.4 (1.1-1.7)	0.05
Likely to have moderate psychological distress	159/275	3.2 (2.4-4.1)	0.001	2.5 (1.9-3.4)	0.001	160/275	2.2 (1.7-2.9)	0.001	1.8 (1.3-2.4)	0.001
Likely to have severe psychological distress	93/136	5.0 (3.4-7.4)	0.001	3.3 (2.2-5.1)	0.001	91/136	3.2 (2.2-4.8)	0.001	2.2 (1.5-3.4)	0.001
HIV infection			0.001		**0.05**			**0.001**		**0.05**
No	665/1677	1		1		784/1677	1		1	
Yes	67/265	0.5 (0.4-0.7)	0.001	0.7 (0.5-1.0)	0.05	84/265	0.5 (0.4-0.7)	0.001	0.7 (0.5-1.0)	0.05
Not completed	81/173	1.3 (1.0-1.8)	0.10	1.2 (0.8-1.8)	0.30	94/173	1.4 (1.0-1.9)	0.10	1.2 (0.9-1.8)	0.26
Key population			0.001		**0.001**			**0.001**		**0.001**
MSM	134/641	1		1		196/641	1		1	
FSW	344/937	2.2 (1.7-2.8)	0.001	1.8 (1.4-2.4)	0.001	406/937	1.7 (1.4-2.2)	0.001	1.6 (1.3-2.1)	0.001
Female DU	20/27	10.8 (4.7-28.0)	0.001	3.8 (1.5-10.5)	0.01	20/27	6.5 (2.8-16.8	0.001	2.9 (1.2-7.9)	0.05
Male DU	315/510	6.1 (4.7-8.0)	0.001	2.4 (1.7-3.4)	0.001	340/510	4.5 (3.6-5.8)	0.001	2.0 (1.4-2.8)	0.001

aOR: adjusted odds ratio; OR: odds ratio; 95%CI: 95% confidence interval; FDU: female drug user; MDU: male drug user; FSW: female sex worker; MSM: men who have sex with men

Table 4. Factors associated with tobacco use among key populations in Togo in 2017

		Univariate analysis		Multivariate analysis	
	n/N	**OR (95% CI)**	**P**	**aOR (95% CI)**	**P**
Age (years)					**0.14**
18 – 25	280/1081	1		1	
>25	367/1034	1.6 (1.3 -1.9)	0.001	0.81 (0.6-1.1)	0.15
Marital status					**0.22**
Not married	481/1759	1		1	
Married	356	2.3 (1.8-2.9)	0.001	0.8 (0.6-1.1)	0.22
Level of education			0.001		**0.32**
None	42/188	1		1	
Primary school	186/477	2.2 (1.5-3.3)	0.001	1.3 (0.8-2.3)	0.26
Secondary/high school	364/1143	1.6 (1.1-2.4)	0.01	1.2 (0.7-1.9)	0.59
University	55/307	0.8 (0.5-1.2)	0.230	0.9 (0.5-1.7)	0.73
Religion			0.001		**0.05**
Others/ Non-believers	40/112	1		1	
Christians	436/1621	0.5 (0.4-0.6)	0.001	0.7 (0.5-1.0)	0.10
Muslims	96/231	0.9 (0.6-1.3)	0.63	1.1 (0.7-1.9)	0.60
Place of residence					**0.001**
Lomé	400/1289	1		1	
Others	247/826	1.0 (0.8-1.2)	0.59	0.6 (0.5-0.8)	0.001
Alcohol consumption					**0.001**
No risky consumption	257/1302	1		1	
Hazardous/harmful drinking	390/813	3.8 (3.1-4.6)	0.001	2.6 (2.0-3.4)	0.001
Psychological distress			0.001		**0.01**
Likely to not have psychological distress	300/1278	1		1	

Likely to have mild psychological distress	150/426	1.8 (1.4-2.2)	0.001	1.5 (1.1-2.1)	0.01
Likely to have moderate psychological distress	128/275	2.8 (2.2-3.7)	0.001	2.0 (1.3-2.8)	0.001
Likely to have severe psychological distress	69/136	3.4 (2.3-4.8)	0.001	1.3 (0.8-2.2)	0.30
HIV infection			0.001		**0.34**
No	509/1677	1		1	
Yes	44/265	0.5 (0.3-0.6)	0.001	0.9 (0.6-1.3)	0.51
Not completed	94/173	2.7 (2.0-3.8)	0.001	0.7 (0.5-1.2)	0.17
Key populations			0.001		**0.001**
MSM	97/641	1		1	
FSW	116/937	0.8 (0.6-1.1)	0.12	0.6 (0.4-0.9)	0.01
Female DU	23/27	32.3 (12.1-111.8)	0.001	17.2 (5.93-62.8)	0.001
Male DU	411/510	23.3 (17.2-31.9)	0.001	18.0 (12.4-26.6)	0.001

aOR: adjusted odds ratio; OR: odds ratio; 95%CI: 95% confidence interval; FDU: female drug user; MDU: male drug user; FSW: female sex worker; MSM: men who have sex with men

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation		Pages
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	X	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	X	2
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	X	4
Objectives	3	State specific objectives, including any prespecified hypotheses	X	4
Methods				
Study design	4	Present key elements of study design early in the paper	X	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	X	6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	X	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	X	6-7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	X	6-7
Bias	9	Describe any efforts to address potential sources of bias	X	6
Study size	10	Explain how the study size was arrived at	X	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	X	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	X	7
		(*b*) Describe any methods used to examine subgroups and interactions	X	7
		(*c*) Explain how missing data were addressed	N/A	
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/A	
		(*e*) Describe any sensitivity analyses	N/A	
Results				
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	X	8
		(b) Give reasons for non-participation at each stage	N/A	
		(c) Consider use of a flow diagram	N/A	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	X	8; 18-19
		(b) Indicate number of participants with missing data for each variable of interest	N/A	
Outcome data	15*	Report numbers of outcome events or summary measures	X	8
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	X	8-9

		(*b*) Report category boundaries when continuous variables were categorized	X	8-9
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A	
Discussion				
Key results	18	Summarise key results with reference to study objectives	X	10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	X	11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	X	10
Generalisability	21	Discuss the generalisability (external validity) of the study results	X	10-11
Other information				
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	X	13

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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PREVALENCE AND CORRELATES OF ALCOHOL AND TOBACCO USE AMONG KEY POPULATIONS IN TOGO IN 2017: A CROSS-SECTIONAL STUDY

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PREVALENCE AND CORRELATES OF ALCOHOL AND TOBACCO USE AMONG KEY POPULATIONS IN TOGO IN 2017: A CROSS-SECTIONAL STUDY

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Abstract

Objectives

The aim of this study was to estimate alcohol and tobacco use prevalence and their correlates among female sex workers (FSW), males who have sex with males (MSM) and drug users (DU) in Togo.

Design, setting and participants

A cross-sectional bio-behavioral study was conducted among 2,115 MSM, FSW and DU in 2017 using a respondent-driven sampling (RDS) method, in the eight biggest towns of Togo. Selection criteria for the MSM were being male and having had oral or anal intercourse with a man in the previous 12 months; for FSW, being a female and having exchanged sex for money in the previous 12 months; and for DU, consuming heroin, cocaine or hashish for MSM, FSW and DU, respectively. All participants had be to at least 18 years old and residing in the territory for the past three months.

Results

The prevalence of alcohol consumption, hazardous/harmful consumption and binge drinking was 64.8 %, 38.4%, and 45.5%, respectively. Current tobacco use was reported by 30.6% of participants and HIV prevalence was estimated at 12.5%. DU were more likely to engage in binge drinking compared to other key populations (aOR=2.0; 95% CI = [1.4-2.8]; p= 0.001). Participants who were identified as having hazardous/harmful alcohol consumption had almost three times the odds of tobacco consumption than those with no risky consumption (aOR=2.6; 95% CI= [2.0-3.4]; p=0.001). Hazardous/harmful alcohol consumption was three times more likely among participants with severe psychological distress compared to those with no psychological distress (aOR= 3.3, 95% CI= [2.2 – 5.1]; p=0.001).

Conclusion

Findings from this study demonstrate the need for the integration of mental health and substance abuse reduction interventions into HIV prevention programs, particularly those geared toward key populations.

Key words: Alcohol, tobacco, HIV, key populations, Sub-Saharan Africa.

Strengths and limitations of this study

- This study is among the first in sub-Saharan Africa exploring the patterns of alcohol and tobacco consumption among the three main groups of key populations
- This study had a consistent sample size
- The use of internationally validated instruments to assess alcohol and tobacco consumption, as well as psychological distress minimized bias
- The main limitation of our study is that it was based on self-reported data which could be a potential source of recall bias or social desirability bias

Introduction

Sub-Saharan Africa (SSA) is the region of the World the most affected by the HIV/AIDS epidemic: with only 12% of the global population, SSA accounts for an estimated 71% of the world's burden of HIV infection and 74% of world's AIDS-related deaths (1). In West and Central Africa, the HIV epidemic is described as generalized and driven by heterosexual sex with an estimated prevalence of 2.2% (1). However, in key populations, populations at higher risk of HIV such as sex workers, men who have sex with men (MSM) and injection drug users, the reported prevalence rates are disproportionally high compared to those of the general population (2,3). In Togo, HIV prevalence among key populations ranges from 11% to 13% compared to 2.1% in the general population (4). Several biological, behavioral and structural risk factors are associated with this high HIV rate among key populations: unprotected sex, presence of other Sexually Transmitted Infections (STIs), lack of access to condoms, multiple concurrent sex partners (males and females for MSM), lack of access to health care and prevention services, physical and sexual violence, challenging legal and sociopolitical environment, poverty, sociopolitical stigma and discrimination (2,3).

Other risk factors associated with sexual risk behaviors and thus contributing to HIV transmission include alcohol and tobacco consumption. Alcohol, a psychoactive substance with dependence-producing properties, has been an integral part of many cultures for several centuries (5). The harmful use of alcohol and its consequences make its consumption a public health problem. More than 200 disease and injury conditions including alcohol dependence, liver cirrhosis, cancers and injuries are the consequences of the harmful use of alcohol (5). In 2012, it was reported that 5.9% of all global deaths and 5.1% of the global burden of disease and injury were the consequences of harmful alcohol consumption (5). Recent research studies have also uncovered a causal relationship between the harmful use of alcohol and infectious diseases, including HIV (5–7). This relation could be attributed to the fact that alcohol influences cognitive abilities and decision making, and affects condom negotiation and correct condom use (8). Among key populations, particularly sex workers, alcohol consumption is seen as a sexual enhancer and work requirement which in many cases leads to an increased likelihood of unprotected sex, economic loss, interference with family responsibilities and sexual violence (7,9,10).

Tobacco consumption is also one of the biggest public health challenges of the 21st century, with a clear, causal link between tobacco use and health. It is estimated that tobacco use kills half of its users and is responsible for the death of more than 7 million people a year. Approximately 80% of tobacco users live in low and middle income countries (11). Tobacco use is one the main risk factors for lung cancer, disability and death from non-communicable chronic diseases, and also an increased risk of death from communicable diseases (12,13). For people living with HIV, tobacco use is a risk factor for HIV-related comorbidities and premature death (14). Estimates in Togo put the prevalence of alcohol and tobacco consumption at 53.7% and 8.5% respectively, in the general population (15).

Both alcohol and tobacco consumption play an important role in the HIV epidemic in SSA. With key populations being an important catalyst of the HIV epidemic in SSA and particularly in West Africa, it is important that patterns of alcohol and tobacco consumption be explored among these populations. However, there is a dearth of data on the consumption of addictive substances such as tobacco and alcohol among the three main key populations in SSA. Of the few studies on key populations completed in Togo, none has explored alcohol and tobacco consumption and very few studies in West Africa have explored alcohol and tobacco consumption across the three key populations. The aim of this study was to estimate the prevalence of alcohol and tobacco consumption and to assess their correlates among female sex workers (FSW), MSM and drug users (DU) in Togo.

Methods

Study design, sampling and recruitment

This study was a bio-behavioral cross-sectional study conducted from August to September 2017 in Togo. Togo is a country of West Africa, with a population of 7.6 million inhabitants in 2018, covering 57,000 square kilometres with an average density of 133 inhabitants per square kilometres, an infant mortality of 45.2/ 1,000 and an estimated life expectancy of 64.5 years old. The HIV prevalence in Togo is estimated at 2.1%, with a high prevalence among key population groups (4). Togo is divided into five regions and in each region, based on the mapping and size estimation studies previously carried out in Togo (16), towns with the highest number of key populations were selected: Dapaong in the Savanes region; Kara in Kara region; Sokodé in the Centrale region; Atakpamé and Kpalimé in the Plateaux region and Tsévié, Aného and Lomé, the capital city in the Maritime region. Prior to the study, locations (associations and hot spots) specific to each group of key population were identified during preliminary visits with the help of leaders from these communities. DU and FSW were recruited in drug-dealing/consumption locations and brothels (licensed or not), respectively. MSM were recruited using a Respondent Driven Sampling (RDS) method (17,18). MSM community leaders were the first "seeds". A total of 28 seeds were identified at first based on their roles in their community and on their representativeness. Each seed from the first wave selected had to represent at least one MSM sub-group, based on how MSM self-identify as bisexuals or gays (19,20). Each participant was then given three coupons with a unique identification code to recruit three other seeds in their network until the required sample size for each group was reached. Inclusion criteria for the three groups were being 18 years or older, living/working/studying in Togo for a minimum of 3 months at the time of the study, and being in possession of a recruitment coupon. In addition to these criteria, criteria specific to MSM were having had anal and/or oral sex with a man in the previous 12 months, for FSW having had sex in exchange for money as a compensation in the previous 12 months and for DU, consuming heroin, cocaine or hashish at the time of the study.

Sample size estimation

The sample size estimation was based on the estimated prevalence of hazardous alcohol drinking among key populations of 9.1% (21). We also took into account the prevalence of tobacco use, with the assumption that tobacco use prevalence in the key populations would be twice that of the general population. Hence, with a tobacco use prevalence of 6.8% in the general population, the expected prevalence of tobacco use among key populations was 13.6% (15). With a precision of 3% and an assumption of 10% of missing data, the minimum sample size was estimated at 552 participants per group at a minimum. Thus, to allow a comparison between groups, the total sample size estimated for the three groups of key populations was 1,656.

Study procedures

After eligibility screening and written informed consent approval, trained study staff administered a structured and standardized questionnaire during a face-to-face interview. The questionnaire was constructed based on validated tools such as the Alcohol Use Disorders Identification Test (AUDIT) (22) and a subset of the Tobacco Questions for Surveys (23) to assess alcohol and tobacco consumption respectively. The Kessler Psychological Distress Scale (K10) (24) was used to measure psychological distress and the Family Health International (FHI) 360 validated guide for bio-behavioral surveys (25) was adapted to collect information on socio-demographic characteristics, risky sexual behaviors, STIs, HIV prevention methods, HIV testing history, access to health care services, and HIV knowledge. The questionnaires were used across the three populations with slight adaptations depending on the population.

Scores and operational definitions

The AUDIT was used to assess alcohol consumption. The AUDIT is a set of 10-item standardized screening instrument measuring self-reported alcohol use in the past 12 months, alcohol dependence symptoms, and alcohol-related problems to screen for excessive drinking. Each question of the AUDIT can obtain a score from zero (0) to four (4). A score ≥8 for men and ≥7 for women indicates hazardous/harmful drinking, while a score of 0 indicates a non-drinker; moderate alcohol use lies in-between (22,26,27). Binge drinking or heavy episodic drinking was defined as the consumption of six or more alcohol drinks on at least one occasion in the past 30 days (third item of the AUDIT) (22).

Tobacco use was assessed using six questions indicating participants' smoking habits, frequency of smoking, history of smoking, type of products smoked and attempts at stopping to smoke (23).

The Kessler Psychological Distress Scale (K10) was used to measure psychological distress. This scale has been examined and validated among several populations and aims at measuring anxiety and depression with a 10-item questionnaire, each question pertaining to an emotional state and a five-level response scale for each response. The score obtained from the scale allows to categorize participants into four categories of psychological distress: severe (score ≥ 30), moderate (score: 25-29), mild (score: 20-24) and none (score < 20) (28).

Laboratory testing

Written informed consent was obtained prior to blood sample collection. Among the 2,115 key populations recruited for the study, 91.8% gave their written informed consent for blood sample collection. Blood samples were collected to test for HIV and Syphilis using SD Biolane Duo® (Abbott, Santa Clara, CA, USA). Each HIV positive test was confirmed with another HIV rapid test, the First Response® HIV 1-2-O Card Test (Premier Medical Corporation Pvt. Ltd., Maharashtra, India). In case

of discordant results, samples were tested with the INNO-LIA® HIV I/II Score (20T) (Fujirebio, Göteborg, Sweden) line immunoassay. All biological tests analyses were completed in the main HIV laboratory research unit, the Molecular Biology Laboratory (BIOLIM) at the University of Lomé.

Statistical analysis

Descriptive statistics were performed and results were presented with frequency tabulations and percentages. Prevalences were estimated with their 95% confidence interval (95%CI). Univariate and multivariate logistic regression were performed to identify factors associated with: i) hazardous/harmful alcohol consumption, ii) binge drinking and iii) current tobacco consumption. For model building, characteristics that had a p-value <0.20 in univariate analysis were considered for the full multivariable models, which were then finalized using a stepwise, backward elimination approach. The three models did not include the variable "sex" as the four groups were already categorized according to sex. All analyses were performed using R® software.

Ethical consideration

This study was approved by the "Comité de Bioéthique pour la Recherche en Santé (CBRS)" (Bioethics Committee for Health Research) from the Togo Ministry of Health. Participants provided written consent prior to participation. Potential participants were told about the study purpose and procedures, potential risks and protections, and compensation. Informed consent was documented with signed consent forms.

Patient and Public Involvement

Members of key populations were involved during the study design and data collection phases of the study. They were consulted prior to the study for their input on the best method to reach out to key populations and they were actively involved in the recruitment process.

Results

Socio-demographic characteristics

A total of 641 MSM, 537 DU and 937 FSW, with a median age of 25 years, interquartile range (IQR) [21-32 years] participated in the study. The majority of the sample (n=1,443; 54.0%) had a secondary school education level and 76.7% were Christians (n=1,621). Approximately two-thirds of the sample (n=1,278; 60.4%) were likely to not have any psychological distress and 6.4% (n=136) were identified as having severe psychological distress, the highest among DU (n=68; 12.7 %). The HIV prevalence was 12.5% across the three populations, with the highest prevalence among MSM (20.4%). Study participants were informed of their blood test results by trained health professionals from HIV clinics. Newly diagnosed HIV positive patients were referred to an HIV clinic for HIV treatment and care. Socio-demographic and health characteristics are summarized in Table 1.

Alcohol and tobacco consumption

Alcohol and tobacco consumption patterns are presented in Table 2. Overall, the prevalence of alcohol consumption among the three groups was 64.8%. Most participants were identified as having a hazardous/harmful alcohol consumption (n=813; 38.4%), with the highest proportion among DU (62.4% among DU; 36.7% among FSW; and 20.9% among MSM; p <0.001). More than a quarter of FSW (n=275; 29.4%) were moderate drinkers. The MSM subgroup had the highest proportion of non-drinkers (n=338; 52.7%), followed by FSW (n=318; 33.9%). The overall prevalence of binge drinking was 45.5% and was the highest among DU (67.0%) (Table 2).

The prevalence of tobacco consumption was 30.6% among the three groups. DU had the highest proportion of smokers (80.8%). The highest proportion of non-smokers were FSW (n=821; 87.6%), followed by MSM (n=544, 84.9%). Of the people who smoked, 63.1% were smoking every day, including 79.0% of DU, 42.2% of FSW and 16.5% of MSM.

Factors associated with alcohol consumption

Table 3 reports the results of the multivariable logistic regression model which describes the association between the independent variables and the hazardous/harmful consumption of alcohol and binge drinking.. The odds of hazardous/harmful alcohol consumption were significantly higher among non-believers or other (aOR=0.7; 95% CI= [0.5-0.9]; p= 0.001) than among Muslims (aOR= 0.4; 95% CI [0.3-0.6]; p= 0.001] and Christians (aOR=0.7; 95% CI= [0.5-0.9]; p= 0.001). FSW (aOR=1.6; 95% CI= [1.3-2.1]; p= 0.001), and DU (aOR=2.0; 95% CI = [1.4-2.8]; p= 0.001) were more likely to engage in binge drinking compared to MSM. The place of residence, whether in the capital city of Lomé or in other towns, was also associated with hazardous/harmful alcohol consumption and binge drinking so that people living in other towns were almost three times more likely to have hazardous/harmful alcohol consumption (aOR=2.8; 95% CI= [2.2-3.4]; p=0.001) or engage in binge drinking (aOR=2.5; 95% CI= [2.0-3.0]; p=0.001) than those living in the capital city of Lomé. Psychological distress was also a risk factor for hazardous/harmful alcohol consumption and binge drinking. Participants with severe psychological distress were three times (aOR= 3.3, 95% CI= [2.2 – 5.1]; p=0.001) and twice (aOR=2.2, 95% CI= [1.5 – 3.4]; p = 0.001) more likely to be engaged in hazardous/harmful alcohol consumption and binge drinking, respectively, than those with no psychological distress. The odds of hazardous/harmful alcohol consumption and binge drinking increased as the severity of psychological distress increased. In addition, being a DU was significantly associated with hazardous/harmful alcohol consumption and binge drinking. Compared to MSM and FSW, DU had two times the odds of hazardous/harmful alcohol consumption (aOR=2.4; 95%CI= [1.7-3.4]; p=0.001) and two times the odds of binge drinking compared to MSM and FSW (aOR=2.0; 95%CI= [1.4 -2.8]). Finally, being 25 years old and older (aOR=1.3; 95% CI [1.1-1.6]), tobacco use (aOR=2.6; 95% CI: [2.0-3.4]), being HIV

positive (aOR=0.7; 95% CI [0.5-0.9]) were significantly associated with both hazardous/harmful alcohol consumption and binge drinking.

Factors associated with tobacco use

In multivariable analysis, living in cities other than Lomé (the capital city) (aOR=0.6; 95%CI 0.5-0.8), hazardous/harmful alcohol consumption (aOR=2.6; 95% CI 2.0-3.4), having mild (aOR=1.5; 95% CI 1.1-2.1) or moderate (aOR=2.0; 95% CI 1.3-2.8) psychological distress, being a FSW (aOR=0.6; 95% 0.4-0.9), and being a DU (aOR=17.9; 95% CI 12.4-26.4) were factors associated with tobacco use (Table 4) .

Discussion

The aim of this study was to assess the prevalence of hazardous/harmful, binge alcohol consumption as well as tobacco consumption, and explore correlates of heavy alcohol consumption and tobacco use in three key populations in Togo. We observed a high prevalence of hazardous/harmful alcohol consumption and binge drinking. Alcohol consumption was frequent among FSW and much more among DU. In addition, there was a dose-response effect relationship between alcohol consumption and psychological distress across all three populations. Tobacco use was highly prevalent among DU and among people who had a hazardous/harmful alcohol consumption.

Alcohol consumption is highly prevalent among key populations groups: more than half of the sample were categorized as moderate or hazardous drinkers. This has been corroborated in the literature among key population groups. In a recent study in Kenya, among 1,476 MSM, 44% of the sample had a hazardous alcohol consumption, and, no relationship was found between alcohol and tobacco consumption and HIV infection (29). In another study among 3,588 MSM in China, alcohol prevalence was 56.1% with 16.8% of them being binge drinkers and 14.4% being recent hazardous drinkers, using the WHO AUDIT-C scale (30). Recent alcohol misuse was associated with increased sexual and HIV/syphilis risks as well as sexual risk behaviors including alcohol use before sex, sex without condoms and multiple concurrent partnerships. A prospective cohort study among 1,027 FSW in Uganda found that 78% of the sample reported using alcohol with 71% admitting to using alcohol at least once a week, with a reduced prevalence of 54% after two years of intervention (31). This emphasizes the need for alcohol risk reduction programs and programs specifically focused on the adoption of safer drinking practices integrated into HIV prevention packages and geared towards highly exposed groups (30,31).

Alcohol and tobacco consumption are particularly relevant to people living with HIV (PLHIV). Studies have demonstrated a negative impact of alcohol, tobacco and drug use on life expectancy for HIV-positive patients (32). Alcohol and tobacco use have also been associated with poor adherence to antiretroviral therapy (ART) and the interaction between all those substances leading to a higher susceptibility to co-morbidities, opportunistic infections such as tuberculosis (TB) (33,34). In this study, hazardous/harmful alcohol consumption and binge drinking were both significantly associated with tobacco use (33). This indicates the need for targeted prevention actions such as smoking cessation treatment and alcohol reducing counseling, among key populations, particularly among key populations living with HIV. A systematic review of interventions to reduce alcohol use among MSM indicated that although interventions such as motivational interviewing appear to be effective among MSM, they are scarce (35).

Psychological distress was found to have a dose-response relationship with alcohol consumption. Severe psychological distress was at least twice higher among people with a hazardous/harmful alcohol

consumption and people who were binge drinking. This is consistent with other studies that found a relationship between alcohol and drug abuse and psychological symptoms such as depression, anxiety and suicidal ideation among key populations (29,36,37). Consistent with our findings, a study conducted in Cambodia among MSM found that 38.8% had severe psychological distress and that severe psychological distress was associated with alcohol and drug use, poor self-reported quality of life and reduced condom use at last sex (36). In southern India, a study among FSW found a significant relationship between major depression and alcohol use (38). Another study among PLHIV in Uganda found that psychological distress was significantly associated with non-adherence to ART (39). This has implication for HIV prevention and further demonstrates the need for integrated services of mental health interventions, psychological support as well as substance abuse reduction program into HIV prevention programs. In fact, in Togo, the current policy on HIV prevention and care ensures access to HIV prevention and treatment services with the integration of Sexual and Reproductive Services and HIV care services for all citizens including key populations, but mental health interventions are not yet a component of the basic health services package. This would also imply that health care workers be sufficiently armed through sufficient and adequate training to screen and refer key populations in need of those interventions.

Very few studies have explored alcohol and tobacco consumption patterns among the three main key populations. This study found quite different patterns of consumption among the three groups, with MSM in this sample being the lowest at-risk group for hazardous/harmful alcohol consumption, binge drinking and tobacco use. DU on the other hand, appear to be most vulnerable to hazardous/harmful alcohol consumption, binge drinking and tobacco use, as well as the group with the highest prevalence of severe psychological distress. This could potentially indicate that there is a difference in coping strategies for key populations and that, behavioral interventions specifically geared towards MSM have elements that perhaps have successfully enhanced their capacity to cope with the stress among the most marginalized groups. For example, studies have demonstrated the effectiveness of community-based organizations (CBOs), peer-led interventions and community engagement in HIV prevention among MSM (40–42). It is important that targeted interventions be geared toward generating an interest for community building among DU.

Strengths of this study include the large sample size of the three main types of key populations. In addition, to our knowledge, this is the first study in Togo comparing alcohol and tobacco consumption in these key populations using standardized tools (AUDIT, Tobacco Questions for Surveys, and Kessler psychological distress scale). Finally, this study was completed in the eight main cities of Togo and used geographical mapping as well as RDS sampling, which could indicate that the findings of this study to reflect the national prevalence of alcohol and tobacco consumption among key populations.

However, there were few limitations including the fact that some variables such as childhood abuse, stigma, or recent trauma which could influence alcohol and tobacco consumption, have not been collected. Interactions between the different groups of key populations (i.e., DUs engaging in sex work, MSM who engage in sex work, sex workers who are also MSM) were also not collected. Furthermore, self-reported data used in this study, are prone to social desirability and recall bias. Despite these limitations, the results presented in this study make a unique contribution to the literature on alcohol and tobacco use among key populations in West Africa, especially since Togo shares similar characteristics with other countries of West Africa regarding the HIV epidemic (concentrated HIV epidemics with elevated HIV prevalences among key populations), access to treatment and prevention for key populations (3,43). The results could be generalized to other countries in West Africa.

Further research could further explore the relationship between alcohol, tobacco, depression and sexual risk behaviors and HIV infection among key populations. Qualitative studies could also explore the reasons for high alcohol and tobacco consumption among key populations.

Conclusion

Alcohol and tobacco use and abuse are highly prevalent among key populations. Psychological distress and being a DU were both significantly associated with alcohol and tobacco consumption. There is a need for mental health and substance abuse screening, referral and treatment to be addressed and fully integrated into HIV prevention services for key populations. Further research is also needed to explore, through qualitative and quantitative designs, the consequences and impact of alcohol and tobacco consumption, as well as mental health issues such as psychological distress on individuals and its burden in the HIV epidemic.

Author contributorship

ABA and FGK contributed equally to this paper. ABA, FGK, PAC and DKE conceived and designed the study with inputs from AJ. PJ, EKS, CAD, MS and TJB facilitated data collection and contributed to analysis of the data. ABA and FGK analyzed, interpreted the data and drafted the manuscript. PAC, AJ and DKE revised the manuscript for important intellectual content. All authors participated in the revision process and have approved the final version of the manuscript.

Competing interests

No competing interests to declare

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Data sharing statement

No additional data are available

Ethics approval and consent to participate

This study was reviewed and approved by the Bioethics Committee for Research in Health in Togo (CBRS No. 18/2017/CBRS of June 22 2017). Consent was obtained from each participant prior to administering the survey questions.

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Table 1: Socio-demographic and health characteristics

	MSM (n=641) n (%)	FSW (n=937) n (%)	DU (n=537) n (%)	Total (=2115) n (%)	p-value
Age (years)					<0.001
18 – 25	442 (68.9)	456 (48.7)	183 (34.1)	1081 (51.1)	
> 25	199 (31.1)	481 (51.3)	354 (65.9)	1034 (48.9)	
Sex					<0.001
Male	641 (100.0)	0 (0.0)	510 (95.0)	1151 (54.4)	
Female	0 (0.0)	937 (100.0)	27 (5.0)	964 (45.6)	
Marital status					<0.001
Married	41 (6.4)	130 (13.9)	185 (34.5)	356 (16.8)	
Not married	600 (93.6)	807 (86.1)	352 (65.5)	1759 (83.2)	
Education level					<0.001
Never went to school	1 (0.2)	158 (16.8)	29 (5.4)	188 (8.9)	
Primary school	51 (7.9)	263 (28.1)	163 (30.4)	477 (22.6)	
Secondary school	356 (55.5)	471 (50.3)	316 (58.8)	1143 (54.0)	
College/University	233 (36.4)	45 (4.8)	29 (5.4)	307 (14.5)	
Religion					<0.001
Other/ Non-believers	65 (10.1)	100 (10.7)	98 (18.2)	263 (12.4)	
Christians	522 (81.5)	743 (79.3)	356 (66.3)	1621 (76.7)	
Muslims	54 (8.4)	94 (10.0)	83 (15.5)	231 (10.9)	
Place of residence					<0.001
Lomé	447 (69.7)	526 (5.1)	316 (58.8)	1289 (60.9)	
Other	194 (30.3)	411 (43.9)	221 (41.2)	826 (39.1)	
Psychological distress					<0.001
Likely not to have psychological distress	497 (77.5)	538 (57.4)	243 (45.2)	1278 (60.4)	

Likely to have mild psychological distress	80 (12.5)	223 (23.8)	123 (22.9)	426 (20.1)	
Likely to have moderate psychological distress	55 (8.6)	117 (12.5)	103 (19.2)	275 (13.0)	
Likely to have severe psychological distress	9 (1.4)	59 (6.3)	68 (12.7)	136 (6.5)	
HIV Infection					<0.001
Yes	131 (20.4)	119 (12.7)	15 (2.8)	265 (12.5)	
No	480 (74.9)	787 (84.0)	410 (76.3)	1677 (79.3)	
Not tested	30 (4.7)	31 (3.3)	112 (20.9)	173 (8.2)	

Addictive behaviour	MSM (n= 641)	FSW(n=937)	DU (n=537)	Total (N=2115)	p-value

	n (%)	n (%)	n (%)	N (%)	
Alcohol consumption					<0.001
Non-drinker	**338** (52.7)	**318** (33.9)	**88** (16.4)	**744** (32.2)	
Moderate drinking[1]	**169** (26.4)	**275** (29.4)	**114** (21.2)	**558** (24.4)	
Hazardous consumption	**134** (20.9)	**344** (36.7)	**335** (62.4)	**813** (35.4)	
Binge drinking[2] (overall)	**196** (30.6)	**406** (43.3)	**360** (67.0)	**962** (41.5)	
Binge drinking[2] (among drinkers)	**196** (64.7)	**406** (65.6)	**360** (80.2)	**962** (70.2)	
Tobacco Use					<0.001
Yes	**97** (15.1)	**116** (12.4)	**434** (80.8)	**647** (28.1)	
Everyday	**16** (16.5)	**49** (42.2)	**343** (79.0)	**408** (63.1)	
No	**544** (84.9)	**821** (87.6)	**103** (19.2)	**1468** (69.4)	

FSW: female sex worker; MSM: Men who have sex with men; DU: Drug user

[1]: Moderate drinking levels depend on sex (differences in metabolism for females and males): AUDIT score: 1-6 for females and AUDIT score: 1- 7 for males

[2]: Binge drinking is defined as the consumption of six or more alcohol drinks at least once per month in one occasion (Question 3 of the AUDIT)

Table 2: Alcohol and Tobacco consumption patterns among key populations in Togo in 2017

Table 3: Factors associated with hazardous alcohol consumption and binge drinking among key populations in Togo, 2017

	Hazardous/harmful alcohol consumption					Binge drinking				
		Univariate analysis		Multivariate analysis			Univariate analysis		Multivariate analysis	
	n/N	OR (95% CI)	p-value	aOR (95% CI)	p-value	n/N	OR (95% CI)	p-value	aOR (95% CI)	p-value
Age (years)					**0.05**					**0.05**
18 – 25	351/1081	1		1		433/1081	1		1	
>25	462/1034	1.7 (1.4-2.0)	0.001	1.3 (1.1-1.6)	0.05	529/1034	1.6 (1.3-1.9)	0.001	1.3 (1.1-1.6)	0.01
Marital status					0.97					
Not married	641/1759	1		1		777/1759	1			
Married	172/356	1.6 (1.302.1)	0.001	1.0 (0.8-1.3)		185/356	1.4 (1.1-1.7)	0.001		
Education level			0.001		0.19			**0.001**		**0.01**

Never been to school	64/188	1		1		69/188	1		1	
Primary school	232/477	1.8 (1.3-2.6)	0.001	1.50 (1.0-2.2)	0.05	256/477	2.0 (1.4-2.8)	0.001	1.6 (1.1-2.4)	0.01
Secondary school	436/1143	1.2 (0.9-1.7)	0.283	1.3 (0.9-1.8)	0.26	517/1143	1.4 (1.0-2.0)	0.05	1.5 (1.0-2.1)	0.05
University	81/307	0.7 (0.5- 1.0)	0.10	1.3 (0.8-2.2)	0.21	120/307	1.1 (0.8-1.6)	0.60	2.1 (1.3-3.3)	0.01
Religion			0.001		**0.001**			**0.001**		**0.001**
Others/ Non-believers	56/112	1		1		151/263	1		1	
Christians	596/1621	0.5 (0.4-0.7)	0.001	0.7 (0.5-0.9)	0.05	718/1621	0.6 (0.5-0.8)	0.001	0.71 (0.5-1.0)	0.05
Muslims	80/231	0.5 (0.3-0.7)	0.001	0.4 (0.3-0.6)	0.001	93/231	0.5 (0.4-0.7)	0.001	0.4 (0.3-0.7)	0.001
Place of residence					**0.001**					**0.001**
Lomé	392/1289	1		1		486/1289	1		1	
Others	421/826	2.4 (2.0-2.9)	0.001	2.8 (2.2-3.4)	0.001	476/826	2.3 (1.9-2.7)	0.001	2.5 (2.0-3.0)	0.001
Tobacco use					**0.001**					**0.001**
No	423/1468	1		1		533/1468	1		1	
Yes	390/647	3.8 (3.1-4.6)	0.001	2.6 (2.0-3.4)	0.001	429/647	3.5 (2.8-4.2)	0.001	2.6 (2.0-3.4)	0.001
Psychological distress			0.001		**0.001**			**0.001**		**0.001**
Likely to not have psychological distress	387/1278	1		1		491/1278	1		1	
Likely to have mild psychological distress	174/426	1.6 (1.3-2.0)	0.001	1.2 (0.9-1.5)	0.20	220/426	1.7 (1.4-2.1)	0.001	1.4 (1.1-1.7)	0.05
Likely to have moderate psychological distress	159/275	3.2 (2.4-4.1)	0.001	2.5 (1.9-3.4)	0.001	160/275	2.2 (1.7-2.9)	0.001	1.8 (1.3-2.4)	0.001
Likely to have severe psychological distress	93/136	5.0 (3.4-7.4)	0.001	3.3 (2.2-5.1)	0.001	91/136	3.2 (2.2-4.8)	0.001	2.2 (1.5-3.4)	0.001
HIV infection			0.001		**0.05**			**0.001**		**0.05**
No	665/1677	1		1		784/1677	1		1	
Yes	67/265	0.5 (0.4-0.7)	0.001	0.7 (0.5-1.0)	0.05	84/265	0.5 (0.4-0.7)	0.001	0.7 (0.5-1.0)	0.05

Not completed	81/173	1.3 (1.0-1.8)	0.10	1.2 (0.8-1.8)	0.30	94/173	1.4 (1.0-1.9)	0.10	1.2 (0.9-1.8)	0.26
Key population			0.001		**0.001**			**0.001**		**0.001**
MSM	134/641	1		1		196/641	1		1	
FSW	344/937	2.2 (1.7-2.8)	0.001	1.8 (1.4-2.4)	0.001	406/937	1.7 (1.4-2.2)	0.001	1.6 (1.3-2.1)	0.001
DU	335/537	6.3 (4.9-8.2)	0.001	2.4 (1.7-3.4)	0.01	20/27	4.6 (3.6-5.9)	0.001	2.0 (1.4-2.8)	0.001

aOR: adjusted odds ratio; OR: odds ratio; 95%CI: 95% confidence interval; FDU: female drug user; MDU: male drug user; FSW: female sex worker; MSM: men who have sex with men

Table 4. Factors associated with tobacco use among key populations in Togo in 2017

		Univariate analysis		Multivariate analysis	
	n/N	**OR (95% CI)**	**p-value**	**aOR (95% CI)**	**p-value**
Age (years)					0.14
18 – 25	280/1081	1		1	
>25	367/1034	1.6 (1.3 -1.9)	0.001	0.81 (0.6-1.1)	0.15
Marital status					0.22
Not married	481/1759	1		1	
Married	356	2.3 (1.8-2.9)	0.001	0.8 (0.6-1.1)	0.22
Level of education			0.001		0.32
None	42/188	1		1	
Primary school	186/477	2.2 (1.5-3.3)	0.001	1.3 (0.8-2.3)	0.26
Secondary/high school	364/1143	1.6 (1.1-2.4)	0.01	1.2 (0.7-1.9)	0.59
University	55/307	0.8 (0.5-1.2)	0.230	0.9 (0.5-1.7)	0.73
Religion			0.001		**0.05**
Others/ Non-believers	40/112	1		1	
Christians	436/1621	0.5 (0.4-0.6)	0.001	0.7 (0.5-1.0)	0.10
Muslims	96/231	0.9 (0.6-1.3)	0.63	1.1 (0.7-1.9)	0.60
Place of residence					**0.001**
Lomé	400/1289	1		1	
Others	247/826	1.0 (0.8-1.2)	0.59	0.6 (0.5-0.8)	0.001
Alcohol consumption					**0.001**
No risky consumption	257/1302	1		1	
Hazardous/harmful drinking	390/813	3.8 (3.1-4.6)	0.001	2.6 (2.0-3.4)	0.001
Psychological distress			0.001		**0.01**
Likely to not have psychological distress	300/1278	1		1	

Likely to have mild psychological distress	150/426	1.8 (1.4-2.2)	0.001	1.5 (1.1-2.1)	0.01
Likely to have moderate psychological distress	128/275	2.8 (2.2-3.7)	0.001	2.0 (1.3-2.8)	0.001
Likely to have severe psychological distress	69/136	3.4 (2.3-4.8)	0.001	1.3 (0.8-2.2)	0.30
HIV infection			0.001		0.34
No	509/1677	1		1	
Yes	44/265	0.5 (0.3-0.6)	0.001	0.9 (0.6-1.3)	0.51
Not completed	94/173	2.7 (2.0-3.8)	0.001	0.7 (0.5-1.2)	0.17
Key populations			0.001		**0.001**
MSM	97/641	1		1	
FSW	116/937	0.8 (0.6-1.1)	0.12	0.6 (0.4-0.9)	0.01
DU	434/537	23.6 (17.5-32.2)	0.001	17.9 (12.4-26.4)	0.001

aOR: adjusted odds ratio; OR: odds ratio; 95%CI: 95% confidence interval; FDU: female drug user; MDU: male drug user; FSW: female sex worker; MSM: men who have sex with men

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation		Pages
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	X	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	X	2
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	X	4
Objectives	3	State specific objectives, including any prespecified hypotheses	X	4
Methods				
Study design	4	Present key elements of study design early in the paper	X	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	X	6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	X	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	X	6-7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	X	6-7
Bias	9	Describe any efforts to address potential sources of bias	X	6
Study size	10	Explain how the study size was arrived at	X	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	X	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	X	7
		(*b*) Describe any methods used to examine subgroups and interactions	X	7
		(*c*) Explain how missing data were addressed	N/A	
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/A	
		(*e*) Describe any sensitivity analyses	N/A	
Results				
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	X	8
		(b) Give reasons for non-participation at each stage	N/A	
		(c) Consider use of a flow diagram	N/A	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	X	8; 18-19
		(b) Indicate number of participants with missing data for each variable of interest	N/A	
Outcome data	15*	Report numbers of outcome events or summary measures	X	8
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	X	8-9

		(*b*) Report category boundaries when continuous variables were categorized	X	8-9
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A	
Discussion				
Key results	18	Summarise key results with reference to study objectives	X	10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	X	11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	X	10
Generalisability	21	Discuss the generalisability (external validity) of the study results	X	10-11
Other information				
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	X	13

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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PREVALENCE AND CORRELATES OF ALCOHOL AND TOBACCO USE AMONG KEY POPULATIONS IN TOGO IN 2017: A CROSS-SECTIONAL STUDY

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PREVALENCE AND CORRELATES OF ALCOHOL AND TOBACCO USE AMONG KEY POPULATIONS IN TOGO IN 2017: A CROSS-SECTIONAL STUDY

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Abstract

Objectives

The aim of this study was to estimate alcohol and tobacco use prevalence and their correlates among female sex workers (FSW), men who have sex with men (MSM) and drug users (DU) in Togo.

Design, setting and participants

A cross-sectional bio-behavioral study was conducted among 2,115 MSM, FSW and DU in 2017 using a respondent-driven sampling (RDS) method, in the eight biggest towns of Togo. Selection criteria for the MSM were being male and having had oral or anal intercourse with a man in the previous 12 months; for FSW, being a female and having exchanged sex for money in the previous 12 months; and for DU, consuming heroin, cocaine or hashish for MSM, FSW and DU, respectively. All participants had be to at least 18 years old and residing in the territory for the past three months.

Results

The prevalence of alcohol consumption, hazardous/harmful consumption and binge drinking was 64.8 %, 38.4%, and 45.5%, respectively. Current tobacco use was reported by 30.6% of participants and HIV prevalence was estimated at 12.5%. DU were more likely to engage in binge drinking compared to other key populations (aOR=2.0; 95% CI = [1.4-2.8]; p= 0.001). Participants who were identified as having hazardous/harmful alcohol consumption had almost three times the odds of tobacco consumption than those with no risky consumption (aOR=2.6; 95% CI= [2.0-3.4]; p=0.001). Hazardous/harmful alcohol consumption was three times more likely among participants with severe psychological distress compared to those with no psychological distress (aOR= 3.3, 95% CI= [2.2 – 5.1]; p=0.001).

Conclusion

Findings from this study demonstrate the need for the integration of mental health and substance abuse reduction interventions into HIV prevention programs, particularly those geared toward key populations.

Key words: Alcohol, tobacco, HIV, key populations, Sub-Saharan Africa.

Strengths and limitations of this study

- This study is among the first in sub-Saharan Africa exploring the patterns of alcohol and tobacco consumption among the three main groups of key populations
- This study had a consistent sample size
- The use of internationally validated instruments to assess alcohol and tobacco consumption, as well as psychological distress minimized bias
- The main limitation of our study is that it was based on self-reported data which could be a potential source of recall bias or social desirability bias

Introduction

Sub-Saharan Africa (SSA) is the region of the World the most affected by the HIV/AIDS epidemic: with only 12% of the global population, SSA accounts for an estimated 71% of the world's burden of HIV infection and 74% of world's AIDS-related deaths (1). In West and Central Africa, the HIV epidemic is described as generalized and driven by heterosexual sex with an estimated prevalence of 2.2% (1). However, in key populations, populations at higher risk of HIV such as sex workers, men who have sex with men (MSM) and injection drug users, the reported prevalence rates are disproportionally high compared to those of the general population (2,3). In Togo, HIV prevalence among key populations ranges from 11% to 13% compared to 2.1% in the general population (4). Several biological, behavioral and structural risk factors are associated with this high HIV rate among key populations: unprotected sex, presence of other Sexually Transmitted Infections (STIs), lack of access to condoms, multiple concurrent sex partners (males and females for MSM), lack of access to health care and prevention services, physical and sexual violence, challenging legal and sociopolitical environment, poverty, sociopolitical stigma and discrimination (2,3).

Other risk factors associated with sexual risk behaviors and thus contributing to HIV transmission include alcohol and tobacco consumption. Alcohol, a psychoactive substance with dependence-producing properties, has been an integral part of many cultures for several centuries (5). The harmful use of alcohol and its consequences make its consumption a public health problem. More than 200 disease and injury conditions including alcohol dependence, liver cirrhosis, cancers and injuries are the consequences of the harmful use of alcohol (5). In 2012, it was reported that 5.9% of all global deaths and 5.1% of the global burden of disease and injury were the consequences of harmful alcohol consumption (5). Recent research studies have also uncovered a causal relationship between the harmful use of alcohol and infectious diseases, including HIV (5–7). This relation could be attributed to the fact that alcohol influences cognitive abilities and decision making, and affects condom negotiation and correct condom use (8). Among key populations, particularly sex workers, alcohol consumption is seen as a sexual enhancer and work requirement which in many cases leads to an increased likelihood of unprotected sex, economic loss, interference with family responsibilities and sexual violence (7,9,10).

Tobacco consumption is also one of the biggest public health challenges of the 21st century, with a clear, causal link between tobacco use and health. It is estimated that tobacco use kills half of its users and is responsible for the death of more than 7 million people a year. Approximately 80% of tobacco users live in low and middle income countries (11). Tobacco use is one the main risk factors for lung cancer, disability and death from non-communicable chronic diseases, and also an increased risk of death from communicable diseases (12,13). For people living with HIV, tobacco use is a risk factor for HIV-related comorbidities and premature death (14). Estimates in Togo put the prevalence of alcohol and tobacco consumption at 53.7% and 8.5% respectively, in the general population (15).

Both alcohol and tobacco consumption play an important role in the HIV epidemic in SSA. With key populations being an important catalyst of the HIV epidemic in SSA and particularly in West Africa, it is important that patterns of alcohol and tobacco consumption be explored among these populations. However, there is a dearth of data on the consumption of addictive substances such as tobacco and alcohol among the three main key populations in SSA. Of the few studies on key populations completed in Togo, none has explored alcohol and tobacco consumption and very few studies in West Africa have explored alcohol and tobacco consumption across the three key populations. The aim of this study was to estimate the prevalence of alcohol and tobacco consumption and to assess their correlates among female sex workers (FSW), MSM and drug users (DU) in Togo.

Methods

Study design, sampling and recruitment

This study was a bio-behavioral cross-sectional study conducted from August to September 2017 in Togo. Togo is a country of West Africa, with a population of 7.6 million inhabitants in 2018, covering 57,000 square kilometres with an average density of 133 inhabitants per square kilometres, an infant mortality of 45.2/ 1,000 and an estimated life expectancy of 64.5 years old. The HIV prevalence in Togo is estimated at 2.1%, with a high prevalence among key population groups (4). Togo is divided into five regions and in each region, based on the mapping and size estimation studies previously carried out in Togo (16), towns with the highest number of key populations were selected: Dapaong in the Savanes region; Kara in Kara region; Sokodé in the Centrale region; Atakpamé and Kpalimé in the Plateaux region and Tsévié, Aného and Lomé, the capital city in the Maritime region. Prior to the study, locations (associations and hot spots) specific to each group of key population were identified during preliminary visits with the help of leaders from these communities. DU and FSW were recruited in drug-dealing/consumption locations and brothels (licensed or not), respectively. MSM were recruited using a Respondent Driven Sampling (RDS) method (17,18). MSM community leaders were the first "seeds". A total of 28 seeds were identified at first based on their roles in their community and on their representativeness. Each seed from the first wave selected had to represent at least one MSM sub-group, based on how MSM self-identify as bisexuals or gays (19,20). Each participant was then given three coupons with a unique identification code to recruit three other seeds in their network until the required sample size for each group was reached. Inclusion criteria for the three groups were being 18 years or older, living/working/studying in Togo for a minimum of 3 months at the time of the study, and being in possession of a recruitment coupon. In addition to these criteria, criteria specific to MSM were having had anal and/or oral sex with a man in the previous 12 months, for FSW having had sex in exchange for money as a compensation in the previous 12 months and for DU, consuming heroin, cocaine or hashish at the time of the study.

Sample size estimation

The sample size estimation was based on the estimated prevalence of hazardous alcohol drinking among key populations of 9.1% (21). We also took into account the prevalence of tobacco use, with the assumption that tobacco use prevalence in the key populations would be twice that of the general population. Hence, with a tobacco use prevalence of 6.8% in the general population, the expected prevalence of tobacco use among key populations was 13.6% (15). With a precision of 3% and an assumption of 10% of missing data, the minimum sample size was estimated at 552 participants per group at a minimum. Thus, to allow a comparison between groups, the total sample size estimated for the three groups of key populations was 1,656.

Study procedures

After eligibility screening and written informed consent approval, trained study staff (medical students) administered a structured and standardized questionnaire during a face-to-face interview. The interviews took place in the MSM community-based organizations for the MSM, for the FSW, in selected bars around the main "hot spots" from which they were recruited and for the DU, recruitment occurred in the smoking spots in the "ghettos". The questionnaire was constructed based on validated tools such as the Alcohol Use Disorders Identification Test (AUDIT) (22) and a subset of the Tobacco Questions for Surveys (23) to assess alcohol and tobacco consumption respectively. The Kessler Psychological Distress Scale (K10) (24) was used to measure psychological distress and the Family Health International (FHI) 360 validated guide for bio-behavioral surveys (25) was adapted to collect information on socio-demographic characteristics, risky sexual behaviors, STIs, HIV prevention methods, HIV testing history, access to health care services, and HIV knowledge. The questionnaires were used across the three populations with slight adaptations depending on the population.

Scores and operational definitions

The AUDIT was used to assess alcohol consumption. The AUDIT is a set of 10-item standardized screening instrument measuring self-reported alcohol use in the past 12 months, alcohol dependence symptoms, and alcohol-related problems to screen for excessive drinking. Each question of the AUDIT can obtain a score from zero (0) to four (4). A score ≥8 for men and ≥7 for women indicates hazardous/harmful drinking, while a score of 0 indicates a non-drinker; moderate alcohol use lies in-between (22,26,27). Binge drinking or heavy episodic drinking was defined as the consumption of six or more alcohol drinks on at least one occasion in the past 30 days (third item of the AUDIT) (22).

Tobacco use was assessed using six questions indicating participants' smoking habits, frequency of smoking, history of smoking, type of products smoked and attempts at stopping to smoke (23).

The Kessler Psychological Distress Scale (K10) was used to measure psychological distress. This scale has been examined and validated among several populations and aims at measuring anxiety and depression with a 10-item questionnaire, each question pertaining to an emotional state and a five-level response scale for each response. The score obtained from the scale allows to categorize participants into four categories of psychological distress: severe (score ≥ 30), moderate (score: 25-29), mild (score: 20-24) and none (score < 20) (28).

Laboratory testing

Written informed consent was obtained prior to blood sample collection. Among the 2,115 key populations recruited for the study, 91.8% gave their written informed consent for blood sample collection. Blood samples were collected to test for HIV and Syphilis using SD Biolane Duo® (Abbott, Santa Clara, CA, USA). Each HIV positive test was confirmed with another HIV rapid test, the First

Response® HIV 1-2-O Card Test (Premier Medical Corporation Pvt. Ltd., Maharashtra, India). In case of discordant results, samples were tested with the INNO-LIA® HIV I/II Score (20T) (Fujirebio, Göteborg, Sweden) line immunoassay. All biological tests analyses were completed in the main HIV laboratory research unit, the Molecular Biology Laboratory (BIOLIM) at the University of Lomé.

Statistical analysis

Descriptive statistics were performed and results were presented with frequency tabulations and percentages. Prevalences were estimated with their 95% confidence interval (95%CI). Univariate and multivariate logistic regression were performed to identify factors associated with: i) hazardous/harmful alcohol consumption, ii) binge drinking and iii) current tobacco consumption. For model building, characteristics that had a p-value <0.20 in univariate analysis were considered for the full multivariable models, which were then finalized using a stepwise, backward elimination approach. The three models did not include the variable "sex" as the four groups were already categorized according to sex. All analyses were performed using R® software.

Ethical consideration

This study was approved by the "Comité de Bioéthique pour la Recherche en Santé (CBRS)" (Bioethics Committee for Health Research) from the Togo Ministry of Health. Participants provided written consent prior to participation. Potential participants were told about the study purpose and procedures, potential risks and protections, and compensation. Informed consent was documented with signed consent forms.

Patient and Public Involvement

Members of key populations were involved during the study design and data collection phases of the study. They were consulted prior to the study for their input on the best method to reach out to key populations and they were actively involved in the recruitment process.

Results

Socio-demographic characteristics

A total of 641 MSM, 537 DU and 937 FSW, with a median age of 25 years, interquartile range (IQR) [21-32 years] participated in the study. The majority of the sample (n=1,443; 54.0%) had a secondary school education level and 76.7% were Christians (n=1,621). Approximately two-thirds of the sample (n=1,278; 60.4%) were likely to not have any psychological distress and 6.4% (n=136) were identified as having severe psychological distress, the highest among DU (n=68; 12.7 %). The HIV prevalence was 12.5% across the three populations, with the highest prevalence among MSM (20.4%). Study participants were informed of their blood test results by trained health professionals from HIV clinics.

Newly diagnosed HIV positive patients were referred to an HIV clinic for HIV treatment and care. Socio-demographic and health characteristics are summarized in Table 1.

Alcohol and tobacco consumption

Alcohol and tobacco consumption patterns are presented in Table 2. Overall, the prevalence of alcohol consumption among the three groups was 64.8%. Most participants were identified as having a hazardous/harmful alcohol consumption (n=813; 38.4%), with the highest proportion among DU (62.4% among DU; 36.7% among FSW; and 20.9% among MSM; p <0.001). More than a quarter of FSW (n=275; 29.4%) were moderate drinkers. The MSM subgroup had the highest proportion of non-drinkers (n=338; 52.7%), followed by FSW (n=318; 33.9%). The overall prevalence of binge drinking was 45.5% and was the highest among DU (67.0%) (Table 2).

The prevalence of tobacco consumption was 30.6% among the three groups. DU had the highest proportion of smokers (80.8%). The highest proportion of non-smokers were FSW (n=821; 87.6%), followed by MSM (n=544, 84.9%). Of the people who smoked, 63.1% were smoking every day, including 79.0% of DU, 42.2% of FSW and 16.5% of MSM.

Factors associated with alcohol consumption

Table 3 reports the results of the multivariable logistic regression model which describes the association between the independent variables and the hazardous/harmful consumption of alcohol and binge drinking.. The odds of hazardous/harmful alcohol consumption were significantly higher among non-believers or other (aOR=0.7; 95% CI= [0.5-0.9]; p= 0.001) than among Muslims (aOR= 0.4; 95% CI [0.3-0.6]; p= 0.001] and Christians (aOR=0.7; 95% CI= [0.5-0.9]; p= 0.001). FSW (aOR=1.6; 95% CI= [1.3-2.1]; p= 0.001), and DU (aOR=2.0; 95% CI = [1.4-2.8]; p= 0.001) were more likely to engage in binge drinking compared to MSM. The place of residence, whether in the capital city of Lomé or in other towns, was also associated with hazardous/harmful alcohol consumption and binge drinking so that people living in other towns were almost three times more likely to have hazardous/harmful alcohol consumption (aOR=2.8; 95% CI= [2.2-3.4]; p=0.001) or engage in binge drinking (aOR=2.5; 95% CI= [2.0-3.0]; p=0.001) than those living in the capital city of Lomé. Psychological distress was also a risk factor for hazardous/harmful alcohol consumption and binge drinking. Participants with severe psychological distress were three times (aOR= 3.3, 95% CI= [2.2 – 5.1]; p=0.001) and twice (aOR=2.2, 95% CI= [1.5 – 3.4]; p = 0.001) more likely to be engaged in hazardous/harmful alcohol consumption and binge drinking, respectively, than those with no psychological distress. The odds of hazardous/harmful alcohol consumption and binge drinking increased as the severity of psychological distress increased. In addition, being a DU was significantly associated with hazardous/harmful alcohol consumption and binge drinking. Compared to MSM and FSW, DU had two times the odds of hazardous/harmful alcohol consumption (aOR=2.4; 95%CI= [1.7-3.4]; p=0.001) and two times the odds of binge drinking compared to MSM and FSW (aOR=2.0; 95%CI= [1.4 -2.8]). Finally, being 25 years

old and older (aOR=1.3; 95% CI [1.1-1.6]), tobacco use (aOR=2.6; 95% CI: [2.0-3.4]), being HIV positive (aOR=0.7; 95% CI [0.5-0.9]) were significantly associated with both hazardous/harmful alcohol consumption and binge drinking.

Factors associated with tobacco use

In multivariable analysis, living in cities other than Lomé (the capital city) (aOR=0.6; 95%CI 0.5-0.8), hazardous/harmful alcohol consumption (aOR=2.6; 95% CI 2.0-3.4), having mild (aOR=1.5; 95% CI 1.1-2.1) or moderate (aOR=2.0; 95% CI 1.3-2.8) psychological distress, being a FSW (aOR=0.6; 95% 0.4-0.9), and being a DU (aOR=17.9; 95% CI 12.4-26.4) were factors associated with tobacco use (Table 4) .

Discussion

The aim of this study was to assess the prevalence of hazardous/harmful, binge alcohol consumption as well as tobacco consumption, and explore correlates of heavy alcohol consumption and tobacco use in three key populations in Togo. We observed a high prevalence of hazardous/harmful alcohol consumption and binge drinking. Alcohol consumption was frequent among FSW and much more among DU. In addition, there was a dose-response effect relationship between alcohol consumption and psychological distress across all three populations. Tobacco use was highly prevalent among DU and among people who had a hazardous/harmful alcohol consumption.

Alcohol consumption is highly prevalent among key populations groups: more than half of the sample were categorized as moderate or hazardous drinkers. This has been corroborated in the literature among key population groups. In a recent study in Kenya, among 1,476 MSM, 44% of the sample had a hazardous alcohol consumption, and, no relationship was found between alcohol and tobacco consumption and HIV infection (29). In another study among 3,588 MSM in China, alcohol prevalence was 56.1% with 16.8% of them being binge drinkers and 14.4% being recent hazardous drinkers, using the WHO AUDIT-C scale (30). Recent alcohol misuse was associated with increased sexual and HIV/syphilis risks as well as sexual risk behaviors including alcohol use before sex, sex without condoms and multiple concurrent partnerships. A prospective cohort study among 1,027 FSW in Uganda found that 78% of the sample reported using alcohol with 71% admitting to using alcohol at least once a week, with a reduced prevalence of 54% after two years of intervention (31). This emphasizes the need for alcohol risk reduction programs and programs specifically focused on the adoption of safer drinking practices integrated into HIV prevention packages and geared towards highly exposed groups (30,31).

Alcohol and tobacco consumption are particularly relevant to people living with HIV (PLHIV). Studies have demonstrated a negative impact of alcohol, tobacco and drug use on life expectancy for HIV-positive patients (32). Alcohol and tobacco use have also been associated with poor adherence to antiretroviral therapy (ART) and the interaction between all those substances leading to a higher susceptibility to co-morbidities, opportunistic infections such as tuberculosis (TB) (33,34). In this study, hazardous/harmful alcohol consumption and binge drinking were both significantly associated with tobacco use (33). This indicates the need for targeted prevention actions such as smoking cessation treatment and alcohol reducing counseling, among key populations, particularly among key populations living with HIV. A systematic review of interventions to reduce alcohol use among MSM indicated that although interventions such as motivational interviewing appear to be effective among MSM, they are scarce (35).

Psychological distress was found to have a dose-response relationship with alcohol consumption. Severe psychological distress was at least twice higher among people with a hazardous/harmful alcohol

consumption and people who were binge drinking. This is consistent with other studies that found a relationship between alcohol and drug abuse and psychological symptoms such as depression, anxiety and suicidal ideation among key populations (29,36,37). Consistent with our findings, a study conducted in Cambodia among MSM found that 38.8% had severe psychological distress and that severe psychological distress was associated with alcohol and drug use, poor self-reported quality of life and reduced condom use at last sex (36). In southern India, a study among FSW found a significant relationship between major depression and alcohol use (38). Another study among PLHIV in Uganda found that psychological distress was significantly associated with non-adherence to ART (39). This has implication for HIV prevention and further demonstrates the need for integrated services of mental health interventions, psychological support as well as substance abuse reduction program into HIV prevention programs. In fact, in Togo, the current policy on HIV prevention and care ensures access to HIV prevention and treatment services with the integration of Sexual and Reproductive Services and HIV care services for all citizens including key populations, but mental health interventions are not yet a component of the basic health services package. This would also imply that health care workers be sufficiently armed through sufficient and adequate training to screen and refer key populations in need of those interventions.

Very few studies have explored alcohol and tobacco consumption patterns among the three main key populations. This study found quite different patterns of consumption among the three groups, with MSM in this sample being the lowest at-risk group for hazardous/harmful alcohol consumption, binge drinking and tobacco use. DU on the other hand, appear to be most vulnerable to hazardous/harmful alcohol consumption, binge drinking and tobacco use, as well as the group with the highest prevalence of severe psychological distress. This could potentially indicate that there is a difference in coping strategies for key populations and that, behavioral interventions specifically geared towards MSM have elements that perhaps have successfully enhanced their capacity to cope with the stress among the most marginalized groups. For example, studies have demonstrated the effectiveness of community-based organizations (CBOs), peer-led interventions and community engagement in HIV prevention among MSM (40–42). It is important that targeted interventions be geared toward generating an interest for community building among DU.

Strengths of this study include the large sample size of the three main types of key populations. In addition, to our knowledge, this is the first study in Togo comparing alcohol and tobacco consumption in these key populations using standardized tools (AUDIT, Tobacco Questions for Surveys, and Kessler psychological distress scale). Finally, this study was completed in the eight main cities of Togo and used geographical mapping as well as RDS sampling, which could indicate that the findings of this study to reflect the national prevalence of alcohol and tobacco consumption among key populations.

However, there were few limitations including the fact that some variables such as childhood abuse, stigma, or recent trauma which could influence alcohol and tobacco consumption, have not been collected. Interactions between the different groups of key populations (i.e., DUs engaging in sex work, MSM who engage in sex work, sex workers who are also MSM) were also not collected. Furthermore, self-reported data used in this study, are prone to social desirability and recall bias. Despite these limitations, the results presented in this study make a unique contribution to the literature on alcohol and tobacco use among key populations in West Africa, especially since Togo shares similar characteristics with other countries of West Africa regarding the HIV epidemic (concentrated HIV epidemics with elevated HIV prevalences among key populations), access to treatment and prevention for key populations (3,43). The results could be generalized to other countries in West Africa.

Further research could further explore the relationship between alcohol, tobacco, depression and sexual risk behaviors and HIV infection among key populations. Qualitative studies could also explore the reasons for high alcohol and tobacco consumption among key populations.

Conclusion

Alcohol and tobacco use and abuse are highly prevalent among key populations. Psychological distress and being a DU were both significantly associated with alcohol and tobacco consumption. There is a need for mental health and substance abuse screening, referral and treatment to be addressed and fully integrated into HIV prevention services for key populations. Further research is also needed to explore, through qualitative and quantitative designs, the consequences and impact of alcohol and tobacco consumption, as well as mental health issues such as psychological distress on individuals and its contribution to the HIV epidemic.

Author contributorship

ABA and FGK contributed equally to this paper. ABA, FGK, PAC and DKE conceived and designed the study with inputs from AJ. PJ, EKS, CAD, MS and TJB facilitated data collection and contributed to analysis of the data. ABA and FGK analyzed, interpreted the data and drafted the manuscript. PAC, AJ and DKE revised the manuscript for important intellectual content. All authors participated in the revision process and have approved the final version of the manuscript.

Competing interests

No competing interests to declare

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Data sharing statement

No additional data are available

Ethics approval and consent to participate

This study was reviewed and approved by the Bioethics Committee for Research in Health in Togo (CBRS No. 18/2017/CBRS of June 22 2017). Consent was obtained from each participant prior to administering the survey questions.

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Table 1: Socio-demographic and health characteristics

	MSM (n=641) n (%)	FSW (n=937) n (%)	DU (n=537) n (%)	Total (=2115) n (%)	p-value
Age (years)					<0.001
18 – 25	442 (68.9)	456 (48.7)	183 (34.1)	1081 (51.1)	
> 25	199 (31.1)	481 (51.3)	354 (65.9)	1034 (48.9)	
Sex					<0.001
Male	641 (100.0)	0 (0.0)	510 (95.0)	1151 (54.4)	
Female	0 (0.0)	937 (100.0)	27 (5.0)	964 (45.6)	
Marital status					<0.001
Married	41 (6.4)	130 (13.9)	185 (34.5)	356 (16.8)	
Not married	600 (93.6)	807 (86.1)	352 (65.5)	1759 (83.2)	
Education level					<0.001
Never went to school	1 (0.2)	158 (16.8)	29 (5.4)	188 (8.9)	
Primary school	51 (7.9)	263 (28.1)	163 (30.4)	477 (22.6)	
Secondary school	356 (55.5)	471 (50.3)	316 (58.8)	1143 (54.0)	
College/University	233 (36.4)	45 (4.8)	29 (5.4)	307 (14.5)	
Religion					<0.001
Other/ Non-believers	65 (10.1)	100 (10.7)	98 (18.2)	263 (12.4)	
Christians	522 (81.5)	743 (79.3)	356 (66.3)	1621 (76.7)	
Muslims	54 (8.4)	94 (10.0)	83 (15.5)	231 (10.9)	
Place of residence					<0.001
Lomé	447 (69.7)	526 (5.1)	316 (58.8)	1289 (60.9)	
Other	194 (30.3)	411 (43.9)	221 (41.2)	826 (39.1)	
Psychological distress					<0.001
Likely not to have psychological distress	497 (77.5)	538 (57.4)	243 (45.2)	1278 (60.4)	

Likely to have mild psychological distress	80 (12.5)	223 (23.8)	123 (22.9)	426 (20.1)	
Likely to have moderate psychological distress	55 (8.6)	117 (12.5)	103 (19.2)	275 (13.0)	
Likely to have severe psychological distress	9 (1.4)	59 (6.3)	68 (12.7)	136 (6.5)	
HIV Infection					<0.001
Yes	131 (20.4)	119 (12.7)	15 (2.8)	265 (12.5)	
No	480 (74.9)	787 (84.0)	410 (76.3)	1677 (79.3)	
Not tested	30 (4.7)	31 (3.3)	112 (20.9)	173 (8.2)	

Addictive behaviour	MSM (n= 641)	FSW(n=937)	DU (n=537)	Total (N=2115)	p-value

	n (%)	n (%)	n (%)	N (%)	
Alcohol consumption					<0.001
Non-drinker	**338** (52.7)	**318** (33.9)	**88** (16.4)	**744** (32.2)	
Moderate drinking[1]	**169** (26.4)	**275** (29.4)	**114** (21.2)	**558** (24.4)	
Hazardous consumption	**134** (20.9)	**344** (36.7)	**335** (62.4)	**813** (35.4)	
Binge drinking[2] (overall)	**196** (30.6)	**406** (43.3)	**360** (67.0)	**962** (41.5)	
Binge drinking[2] (among drinkers)	**196** (64.7)	**406** (65.6)	**360** (80.2)	**962** (70.2)	
Tobacco Use					<0.001
Yes	**97** (15.1)	**116** (12.4)	**434** (80.8)	**647** (28.1)	
Everyday	**16** (16.5)	**49** (42.2)	**343** (79.0)	**408** (63.1)	
No	**544** (84.9)	**821** (87.6)	**103** (19.2)	**1468** (69.4)	

FSW: female sex worker; MSM: Men who have sex with men; DU: Drug user

[1]: Moderate drinking levels depend on sex (differences in metabolism for females and males): AUDIT score: 1-6 for females and AUDIT score: 1- 7 for males

[2]: Binge drinking is defined as the consumption of six or more alcohol drinks at least once per month in one occasion (Question 3 of the AUDIT)

Table 2: Alcohol and Tobacco consumption patterns among key populations in Togo in 2017

Table 3: Factors associated with hazardous alcohol consumption and binge drinking among key populations in Togo, 2017

	Hazardous/harmful alcohol consumption					Binge drinking				
		Univariate analysis		Multivariate analysis			Univariate analysis		Multivariate analysis	
	n/N	OR (95% CI)	p-value	aOR (95% CI)	p-value	n/N	OR (95% CI)	p-value	aOR (95% CI)	p-value
Age (years)					**0.05**					**0.05**
18 – 25	351/1081	1		1		433/1081	1		1	
>25	462/1034	1.7 (1.4-2.0)	0.001	1.3 (1.1-1.6)	0.05	529/1034	1.6 (1.3-1.9)	0.001	1.3 (1.1-1.6)	0.01
Marital status					0.97					
Not married	641/1759	1		1		777/1759	1			
Married	172/356	1.6 (1.302.1)	0.001	1.0 (0.8-1.3)		185/356	1.4 (1.1-1.7)	0.001		
Education level			0.001		0.19			**0.001**		**0.01**

Never been to school	64/188	1		1		69/188	1		1	
Primary school	232/477	1.8 (1.3-2.6)	0.001	1.50 (1.0-2.2)	0.05	256/477	2.0 (1.4-2.8)	0.001	1.6 (1.1-2.4)	0.01
Secondary school	436/1143	1.2 (0.9-1.7)	0.283	1.3 (0.9-1.8)	0.26	517/1143	1.4 (1.0-2.0)	0.05	1.5 (1.0-2.1)	0.05
University	81/307	0.7 (0.5- 1.0)	0.10	1.3 (0.8-2.2)	0.21	120/307	1.1 (0.8-1.6)	0.60	2.1 (1.3-3.3)	0.01
Religion			0.001		**0.001**			**0.001**		**0.001**
Others/ Non-believers	56/112	1		1		151/263	1		1	
Christians	596/1621	0.5 (0.4-0.7)	0.001	0.7 (0.5-0.9)	0.05	718/1621	0.6 (0.5-0.8)	0.001	0.71 (0.5-1.0)	0.05
Muslims	80/231	0.5 (0.3-0.7)	0.001	0.4 (0.3-0.6)	0.001	93/231	0.5 (0.4-0.7)	0.001	0.4 (0.3-0.7)	0.001
Place of residence					**0.001**					**0.001**
Lomé	392/1289	1		1		486/1289	1		1	
Others	421/826	2.4 (2.0-2.9)	0.001	2.8 (2.2-3.4)	0.001	476/826	2.3 (1.9-2.7)	0.001	2.5 (2.0-3.0)	0.001
Tobacco use					**0.001**					**0.001**
No	423/1468	1		1		533/1468	1		1	
Yes	390/647	3.8 (3.1-4.6)	0.001	2.6 (2.0-3.4)	0.001	429/647	3.5 (2.8-4.2)	0.001	2.6 (2.0-3.4)	0.001
Psychological distress			0.001		**0.001**			**0.001**		**0.001**
Likely to not have psychological distress	387/1278	1		1		491/1278	1		1	
Likely to have mild psychological distress	174/426	1.6 (1.3-2.0)	0.001	1.2 (0.9-1.5)	0.20	220/426	1.7 (1.4-2.1)	0.001	1.4 (1.1-1.7)	0.05
Likely to have moderate psychological distress	159/275	3.2 (2.4-4.1)	0.001	2.5 (1.9-3.4)	0.001	160/275	2.2 (1.7-2.9)	0.001	1.8 (1.3-2.4)	0.001
Likely to have severe psychological distress	93/136	5.0 (3.4-7.4)	0.001	3.3 (2.2-5.1)	0.001	91/136	3.2 (2.2-4.8)	0.001	2.2 (1.5-3.4)	0.001
HIV infection			0.001		**0.05**			**0.001**		**0.05**
No	665/1677	1		1		784/1677	1		1	
Yes	67/265	0.5 (0.4-0.7)	0.001	0.7 (0.5-1.0)	0.05	84/265	0.5 (0.4-0.7)	0.001	0.7 (0.5-1.0)	0.05

Not completed	81/173	1.3 (1.0-1.8)	0.10	1.2 (0.8-1.8)	0.30	94/173	1.4 (1.0-1.9)	0.10	1.2 (0.9-1.8)	0.26
Key population			0.001		**0.001**			**0.001**		**0.001**
MSM	134/641	1		1		196/641	1		1	
FSW	344/937	2.2 (1.7-2.8)	0.001	1.8 (1.4-2.4)	0.001	406/937	1.7 (1.4-2.2)	0.001	1.6 (1.3-2.1)	0.001
DU	335/537	6.3 (4.9-8.2)	0.001	2.4 (1.7-3.4)	0.01	20/27	4.6 (3.6-5.9)	0.001	2.0 (1.4-2.8)	0.001

aOR: adjusted odds ratio; OR: odds ratio; 95%CI: 95% confidence interval; FDU: female drug user; MDU: male drug user; FSW: female sex worker; MSM: men who have sex with men

Table 4. Factors associated with tobacco use among key populations in Togo in 2017

		Univariate analysis		Multivariate analysis	
	n/N	**OR (95% CI)**	**p-value**	**aOR (95% CI)**	**p-value**
Age (years)					0.14
18 – 25	280/1081	1		1	
>25	367/1034	1.6 (1.3 -1.9)	0.001	0.81 (0.6-1.1)	0.15
Marital status					0.22
Not married	481/1759	1		1	
Married	356	2.3 (1.8-2.9)	0.001	0.8 (0.6-1.1)	0.22
Level of education			0.001		0.32
None	42/188	1		1	
Primary school	186/477	2.2 (1.5-3.3)	0.001	1.3 (0.8-2.3)	0.26
Secondary/high school	364/1143	1.6 (1.1-2.4)	0.01	1.2 (0.7-1.9)	0.59
University	55/307	0.8 (0.5-1.2)	0.230	0.9 (0.5-1.7)	0.73
Religion			0.001		**0.05**
Others/ Non-believers	40/112	1		1	
Christians	436/1621	0.5 (0.4-0.6)	0.001	0.7 (0.5-1.0)	0.10
Muslims	96/231	0.9 (0.6-1.3)	0.63	1.1 (0.7-1.9)	0.60
Place of residence					**0.001**
Lomé	400/1289	1		1	
Others	247/826	1.0 (0.8-1.2)	0.59	0.6 (0.5-0.8)	0.001
Alcohol consumption					**0.001**
No risky consumption	257/1302	1		1	
Hazardous/harmful drinking	390/813	3.8 (3.1-4.6)	0.001	2.6 (2.0-3.4)	0.001
Psychological distress			0.001		**0.01**
Likely to not have psychological distress	300/1278	1		1	

Likely to have mild psychological distress	150/426	1.8 (1.4-2.2)	0.001	1.5 (1.1-2.1)	0.01
Likely to have moderate psychological distress	128/275	2.8 (2.2-3.7)	0.001	2.0 (1.3-2.8)	0.001
Likely to have severe psychological distress	69/136	3.4 (2.3-4.8)	0.001	1.3 (0.8-2.2)	0.30
HIV infection			0.001		0.34
No	509/1677	1		1	
Yes	44/265	0.5 (0.3-0.6)	0.001	0.9 (0.6-1.3)	0.51
Not completed	94/173	2.7 (2.0-3.8)	0.001	0.7 (0.5-1.2)	0.17
Key populations			0.001		**0.001**
MSM	97/641	1		1	
FSW	116/937	0.8 (0.6-1.1)	0.12	0.6 (0.4-0.9)	0.01
DU	434/537	23.6 (17.5-32.2)	0.001	17.9 (12.4-26.4)	0.001

aOR: adjusted odds ratio; OR: odds ratio; 95%CI: 95% confidence interval; FDU: female drug user; MDU: male drug user; FSW: female sex worker; MSM: men who have sex with men

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation		Pages
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	X	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	X	2
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	X	4
Objectives	3	State specific objectives, including any prespecified hypotheses	X	4
Methods				
Study design	4	Present key elements of study design early in the paper	X	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	X	6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	X	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	X	6-7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	X	6-7
Bias	9	Describe any efforts to address potential sources of bias	X	6
Study size	10	Explain how the study size was arrived at	X	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	X	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	X	7
		(*b*) Describe any methods used to examine subgroups and interactions	X	7
		(*c*) Explain how missing data were addressed	N/A	
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/A	
		(*e*) Describe any sensitivity analyses	N/A	
Results				
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	X	8
		(b) Give reasons for non-participation at each stage	N/A	
		(c) Consider use of a flow diagram	N/A	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	X	8; 18-19
		(b) Indicate number of participants with missing data for each variable of interest	N/A	
Outcome data	15*	Report numbers of outcome events or summary measures	X	8
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	X	8-9

		(*b*) Report category boundaries when continuous variables were categorized	X	8-9
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A	
Discussion				
Key results	18	Summarise key results with reference to study objectives	X	10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	X	11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	X	10
Generalisability	21	Discuss the generalisability (external validity) of the study results	X	10-11
Other information				
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	X	13

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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PREVALENCE AND CORRELATES OF ALCOHOL AND TOBACCO USE AMONG KEY POPULATIONS IN TOGO IN 2017: A CROSS-SECTIONAL STUDY

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PREVALENCE AND CORRELATES OF ALCOHOL AND TOBACCO USE AMONG KEY POPULATIONS IN TOGO IN 2017: A CROSS-SECTIONAL STUDY

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Abstract

Objectives

The aim of this study was to estimate alcohol and tobacco use prevalence and their correlates among female sex workers (FSW), men who have sex with men (MSM) and drug users (DU) in Togo.

Design, setting and participants

A cross-sectional bio-behavioral study was conducted among 2,115 MSM, FSW and DU in 2017 using a respondent-driven sampling (RDS) method, in the eight biggest towns of Togo. Selection criteria for the MSM were being male and having had oral or anal intercourse with a man in the previous 12 months; for FSW, being a female and having exchanged sex for money in the previous 12 months; and for DU, consuming heroin, cocaine or hashish for MSM, FSW and DU, respectively. All participants had be to at least 18 years old and residing in the territory for the past three months.

Results

The prevalence of alcohol consumption, hazardous/harmful consumption and binge drinking was 64.8 %, 38.4%, and 45.5%, respectively. Current tobacco use was reported by 30.6% of participants and HIV prevalence was estimated at 12.5%. DU were more likely to engage in binge drinking compared to other key populations (aOR=2.0; 95% CI = [1.4-2.8]; p= 0.001). Participants who were identified as having hazardous/harmful alcohol consumption had almost three times the odds of tobacco consumption than those with no risky consumption (aOR=2.6; 95% CI= [2.0-3.4]; p=0.001). Hazardous/harmful alcohol consumption was three times more likely among participants with severe psychological distress compared to those with no psychological distress (aOR= 3.3, 95% CI= [2.2 – 5.1]; p=0.001).

Conclusion

Findings from this study demonstrate the need for the integration of mental health and substance abuse reduction interventions into HIV prevention programs, particularly those geared toward key populations.

Key words: Alcohol, tobacco, HIV, key populations, Sub-Saharan Africa.

Strengths and limitations of this study

- This study is among the first in sub-Saharan Africa exploring the patterns of alcohol and tobacco consumption among the three main groups of key populations
- This study had a consistent sample size
- The use of internationally validated instruments to assess alcohol and tobacco consumption, as well as psychological distress minimized bias
- The main limitation of our study is that it was based on self-reported data which could be a potential source of recall bias or social desirability bias

Introduction

Sub-Saharan Africa (SSA) is the region of the World the most affected by the HIV/AIDS epidemic: with only 12% of the global population, SSA accounts for an estimated 71% of the world's burden of HIV infection and 74% of world's AIDS-related deaths (1). In West and Central Africa, the HIV epidemic is described as generalized and driven by heterosexual sex with an estimated prevalence of 2.2% (1). However, in key populations, populations at higher risk of HIV such as sex workers, men who have sex with men (MSM) and injection drug users, the reported prevalence rates are disproportionally high compared to those of the general population (2,3). In Togo, HIV prevalence among key populations ranges from 11% to 13% compared to 2.1% in the general population (4). Several biological, behavioral and structural risk factors are associated with this high HIV rate among key populations: unprotected sex, presence of other Sexually Transmitted Infections (STIs), lack of access to condoms, multiple concurrent sex partners (males and females for MSM), lack of access to health care and prevention services, physical and sexual violence, challenging legal and sociopolitical environment, poverty, sociopolitical stigma and discrimination (2,3).

Other risk factors associated with sexual risk behaviors and thus contributing to HIV transmission include alcohol and tobacco consumption. Alcohol, a psychoactive substance with dependence-producing properties, has been an integral part of many cultures for several centuries (5). The harmful use of alcohol and its consequences make its consumption a public health problem. More than 200 disease and injury conditions including alcohol dependence, liver cirrhosis, cancers and injuries are the consequences of the harmful use of alcohol (5). In 2012, it was reported that 5.9% of all global deaths and 5.1% of the global burden of disease and injury were the consequences of harmful alcohol consumption (5). Recent research studies have also uncovered a causal relationship between the harmful use of alcohol and infectious diseases, including HIV (5–7). This relation could be attributed to the fact that alcohol influences cognitive abilities and decision making, and affects condom negotiation and correct condom use (8). Among key populations, particularly sex workers, alcohol consumption is seen as a sexual enhancer and work requirement which in many cases leads to an increased likelihood of unprotected sex, economic loss, interference with family responsibilities and sexual violence (7,9,10).

Tobacco consumption is also one of the biggest public health challenges of the 21st century, with a clear, causal link between tobacco use and health. It is estimated that tobacco use kills half of its users and is responsible for the death of more than 7 million people a year. Approximately 80% of tobacco users live in low and middle income countries (11). Tobacco use is one the main risk factors for lung cancer, disability and death from non-communicable chronic diseases, and also an increased risk of death from communicable diseases (12,13). For people living with HIV, tobacco use is a risk factor for HIV-related comorbidities and premature death (14). Estimates in Togo put the prevalence of alcohol and tobacco consumption at 53.7% and 8.5% respectively, in the general population (15).

Both alcohol and tobacco consumption play an important role in the HIV epidemic in SSA. With key populations being an important catalyst of the HIV epidemic in SSA and particularly in West Africa, it is important that patterns of alcohol and tobacco consumption be explored among these populations. However, there is a dearth of data on the consumption of addictive substances such as tobacco and alcohol among the three main key populations in SSA. Of the few studies on key populations completed in Togo, none has explored alcohol and tobacco consumption and very few studies in West Africa have explored alcohol and tobacco consumption across the three key populations. The aim of this study was to estimate the prevalence of alcohol and tobacco consumption and to assess their correlates among female sex workers (FSW), MSM and drug users (DU) in Togo.

Methods

Study design, sampling and recruitment

This study was a bio-behavioral cross-sectional study conducted from August to September 2017 in Togo. Togo is a country of West Africa, with a population of 7.6 million inhabitants in 2018, covering 57,000 square kilometres with an average density of 133 inhabitants per square kilometres, an infant mortality of 45.2/ 1,000 and an estimated life expectancy of 64.5 years old. The HIV prevalence in Togo is estimated at 2.1%, with a high prevalence among key population groups (4). Togo is divided into five regions and in each region, based on the mapping and size estimation studies previously carried out in Togo (16), towns with the highest number of key populations were selected: Dapaong in the Savanes region; Kara in Kara region; Sokodé in the Centrale region; Atakpamé and Kpalimé in the Plateaux region and Tsévié, Aného and Lomé, the capital city in the Maritime region. Prior to the study, locations (associations and hot spots) specific to each group of key population were identified during preliminary visits with the help of leaders from these communities. DU and FSW were recruited in drug-dealing/consumption locations and brothels (licensed or not), respectively. MSM were recruited using a Respondent Driven Sampling (RDS) method (17,18). MSM community leaders were the first "seeds". A total of 28 seeds were identified at first based on their roles in their community and on their representativeness. Each seed from the first wave selected had to represent at least one MSM sub-group, based on how MSM self-identify as bisexuals or gays (19,20). Each participant was then given three coupons with a unique identification code to recruit three other seeds in their network until the required sample size for each group was reached. Inclusion criteria for the three groups were being 18 years or older, living/working/studying in Togo for a minimum of 3 months at the time of the study, and being in possession of a recruitment coupon. In addition to these criteria, criteria specific to MSM were having had anal and/or oral sex with a man in the previous 12 months, for FSW having had sex in exchange for money as a compensation in the previous 12 months and for DU, consuming heroin, cocaine or hashish at the time of the study.

Sample size estimation

The sample size estimation was based on the estimated prevalence of hazardous alcohol drinking among key populations of 9.1% (21). We also took into account the prevalence of tobacco use, with the assumption that tobacco use prevalence in the key populations would be twice that of the general population. Hence, with a tobacco use prevalence of 6.8% in the general population, the expected prevalence of tobacco use among key populations was 13.6% (15). With a precision of 3% and an assumption of 10% of missing data, the minimum sample size was estimated at 552 participants per group at a minimum. Thus, to allow a comparison between groups, the total sample size estimated for the three groups of key populations was 1,656.

Study procedures

After eligibility screening and written informed consent approval, trained study staff (medical students) administered a structured and standardized questionnaire during a face-to-face interview. The interviews took place in the MSM community-based organizations for the MSM, for the FSW, in selected bars around the main "hot spots" from which they were recruited and for the DU, recruitment occurred in the smoking spots in the "ghettos". The questionnaire was constructed based on validated tools such as the Alcohol Use Disorders Identification Test (AUDIT) (22) and a subset of the Tobacco Questions for Surveys (23) to assess alcohol and tobacco consumption respectively. The Kessler Psychological Distress Scale (K10) (24) was used to measure psychological distress and the Family Health International (FHI) 360 validated guide for bio-behavioral surveys (25) was adapted to collect information on socio-demographic characteristics, risky sexual behaviors, STIs, HIV prevention methods, HIV testing history, access to health care services, and HIV knowledge. The questionnaires were used across the three populations with slight adaptations depending on the population.

Scores and operational definitions

The AUDIT was used to assess alcohol consumption. The AUDIT is a set of 10-item standardized screening instrument measuring self-reported alcohol use in the past 12 months, alcohol dependence symptoms, and alcohol-related problems to screen for excessive drinking. Each question of the AUDIT can obtain a score from zero (0) to four (4). A score ≥8 for men and ≥7 for women indicates hazardous/harmful drinking, while a score of 0 indicates a non-drinker; moderate alcohol use lies in-between (22,26,27). Binge drinking or heavy episodic drinking was defined as the consumption of six or more alcohol drinks on at least one occasion in the past 30 days (third item of the AUDIT) (22).

Tobacco use was assessed using six questions indicating participants' smoking habits, frequency of smoking, history of smoking, type of products smoked and attempts at stopping to smoke (23).

The Kessler Psychological Distress Scale (K10) was used to measure psychological distress. This scale has been examined and validated among several populations and aims at measuring anxiety and depression with a 10-item questionnaire, each question pertaining to an emotional state and a five-level response scale for each response. The score obtained from the scale allows to categorize participants into four categories of psychological distress: severe (score ≥ 30), moderate (score: 25-29), mild (score: 20-24) and none (score < 20) (28).

Laboratory testing

Written informed consent was obtained prior to blood sample collection. Among the 2,115 key populations recruited for the study, 91.8% gave their written informed consent for blood sample collection. Blood samples were collected to test for HIV and Syphilis using SD Biolane Duo® (Abbott, Santa Clara, CA, USA). Each HIV positive test was confirmed with another HIV rapid test, the First

Response® HIV 1-2-O Card Test (Premier Medical Corporation Pvt. Ltd., Maharashtra, India). In case of discordant results, samples were tested with the INNO-LIA® HIV I/II Score (20T) (Fujirebio, Göteborg, Sweden) line immunoassay. All biological tests analyses were completed in the main HIV laboratory research unit, the Molecular Biology Laboratory (BIOLIM) at the University of Lomé.

Statistical analysis

Descriptive statistics were performed and results were presented with frequency tabulations and percentages. Prevalences were estimated with their 95% confidence interval (95%CI). Univariate and multivariate logistic regression were performed to identify factors associated with: i) hazardous/harmful alcohol consumption, ii) binge drinking and iii) current tobacco consumption. For model building, characteristics that had a p-value <0.20 in univariate analysis were considered for the full multivariable models, which were then finalized using a stepwise, backward elimination approach. The three models did not include the variable "sex" as the four groups were already categorized according to sex. All analyses were performed using R® software.

Ethical consideration

This study was approved by the "Comité de Bioéthique pour la Recherche en Santé (CBRS)" (Bioethics Committee for Health Research) from the Togo Ministry of Health. Participants provided written consent prior to participation. Potential participants were told about the study purpose and procedures, potential risks and protections, and compensation. Informed consent was documented with signed consent forms.

Patient and Public Involvement

Members of key populations were involved during the study design and data collection phases of the study. They were consulted prior to the study for their input on the best method to reach out to key populations and they were actively involved in the recruitment process.

Results

Socio-demographic characteristics

A total of 641 MSM, 537 DU and 937 FSW, with a median age of 25 years, interquartile range (IQR) [21-32 years] participated in the study. The majority of the sample (n=1,443; 54.0%) had a secondary school education level and 76.7% were Christians (n=1,621). Approximately two-thirds of the sample (n=1,278; 60.4%) were likely to not have any psychological distress and 6.4% (n=136) were identified as having severe psychological distress, the highest among DU (n=68; 12.7 %). The HIV prevalence was 12.5% across the three populations, with the highest prevalence among MSM (20.4%). Study participants were informed of their blood test results by trained health professionals from HIV clinics.

Newly diagnosed HIV positive patients were referred to an HIV clinic for HIV treatment and care. Socio-demographic and health characteristics are summarized in Table 1.

Alcohol and tobacco consumption

Alcohol and tobacco consumption patterns are presented in Table 2. Overall, the prevalence of alcohol consumption among the three groups was 64.8%. Most participants were identified as having a hazardous/harmful alcohol consumption (n=813; 38.4%), with the highest proportion among DU (62.4% among DU; 36.7% among FSW; and 20.9% among MSM; p <0.001). More than a quarter of FSW (n=275; 29.4%) were moderate drinkers. The MSM subgroup had the highest proportion of non-drinkers (n=338; 52.7%), followed by FSW (n=318; 33.9%). The overall prevalence of binge drinking was 45.5% and was the highest among DU (67.0%) (Table 2).

The prevalence of tobacco consumption was 30.6% among the three groups. DU had the highest proportion of smokers (80.8%). The highest proportion of non-smokers were FSW (n=821; 87.6%), followed by MSM (n=544, 84.9%). Of the people who smoked, 63.1% were smoking every day, including 79.0% of DU, 42.2% of FSW and 16.5% of MSM.

Factors associated with alcohol consumption

Table 3 reports the results of the multivariable logistic regression model which describes the association between the independent variables and the hazardous/harmful consumption of alcohol and binge drinking.. The odds of hazardous/harmful alcohol consumption were significantly higher among non-believers or other (aOR=0.7; 95% CI= [0.5-0.9]; p= 0.001) than among Muslims (aOR= 0.4; 95% CI [0.3-0.6]; p= 0.001] and Christians (aOR=0.7; 95% CI= [0.5-0.9]; p= 0.001). FSW (aOR=1.6; 95% CI= [1.3-2.1]; p= 0.001), and DU (aOR=2.0; 95% CI = [1.4-2.8]; p= 0.001) were more likely to engage in binge drinking compared to MSM. The place of residence, whether in the capital city of Lomé or in other towns, was also associated with hazardous/harmful alcohol consumption and binge drinking so that people living in other towns were almost three times more likely to have hazardous/harmful alcohol consumption (aOR=2.8; 95% CI= [2.2-3.4]; p=0.001) or engage in binge drinking (aOR=2.5; 95% CI= [2.0-3.0]; p=0.001) than those living in the capital city of Lomé. Psychological distress was also a risk factor for hazardous/harmful alcohol consumption and binge drinking. Participants with severe psychological distress were three times (aOR= 3.3, 95% CI= [2.2 – 5.1]; p=0.001) and twice (aOR=2.2, 95% CI= [1.5 – 3.4]; p = 0.001) more likely to be engaged in hazardous/harmful alcohol consumption and binge drinking, respectively, than those with no psychological distress. The odds of hazardous/harmful alcohol consumption and binge drinking increased as the severity of psychological distress increased. In addition, being a DU was significantly associated with hazardous/harmful alcohol consumption and binge drinking. Compared to MSM and FSW, DU had two times the odds of hazardous/harmful alcohol consumption (aOR=2.4; 95%CI= [1.7-3.4]; p=0.001) and two times the odds of binge drinking compared to MSM and FSW (aOR=2.0; 95%CI= [1.4 -2.8]). Finally, being 25 years

old and older (aOR=1.3; 95% CI [1.1-1.6]), tobacco use (aOR=2.6; 95% CI: [2.0-3.4]), being HIV positive (aOR=0.7; 95% CI [0.5-0.9]) were significantly associated with both hazardous/harmful alcohol consumption and binge drinking.

Factors associated with tobacco use

In multivariable analysis, living in cities other than Lomé (the capital city) (aOR=0.6; 95%CI 0.5-0.8), hazardous/harmful alcohol consumption (aOR=2.6; 95% CI 2.0-3.4), having mild (aOR=1.5; 95% CI 1.1-2.1) or moderate (aOR=2.0; 95% CI 1.3-2.8) psychological distress, being a FSW (aOR=0.6; 95% 0.4-0.9), and being a DU (aOR=17.9; 95% CI 12.4-26.4) were factors associated with tobacco use (Table 4) .

Discussion

The aim of this study was to assess the prevalence of hazardous/harmful, binge alcohol consumption as well as tobacco consumption, and explore correlates of heavy alcohol consumption and tobacco use in three key populations in Togo. We observed a high prevalence of hazardous/harmful alcohol consumption and binge drinking. Alcohol consumption was frequent among FSW and much more among DU. In addition, there was a dose-response effect relationship between alcohol consumption and psychological distress across all three populations. Tobacco use was highly prevalent among DU and among people who had a hazardous/harmful alcohol consumption.

Alcohol consumption is highly prevalent among key populations groups: more than half of the sample were categorized as moderate or hazardous drinkers. This has been corroborated in the literature among key population groups. In a recent study in Kenya, among 1,476 MSM, 44% of the sample had a hazardous alcohol consumption, and, no relationship was found between alcohol and tobacco consumption and HIV infection (29). In another study among 3,588 MSM in China, alcohol prevalence was 56.1% with 16.8% of them being binge drinkers and 14.4% being recent hazardous drinkers, using the WHO AUDIT-C scale (30). Recent alcohol misuse was associated with increased sexual and HIV/syphilis risks as well as sexual risk behaviors including alcohol use before sex, sex without condoms and multiple concurrent partnerships. A prospective cohort study among 1,027 FSW in Uganda found that 78% of the sample reported using alcohol with 71% admitting to using alcohol at least once a week, with a reduced prevalence of 54% after two years of intervention (31). This emphasizes the need for alcohol risk reduction programs and programs specifically focused on the adoption of safer drinking practices integrated into HIV prevention packages and geared towards highly exposed groups (30,31).

Alcohol and tobacco consumption are particularly relevant to people living with HIV (PLHIV). Studies have demonstrated a negative impact of alcohol, tobacco and drug use on life expectancy for HIV-positive patients (32). Alcohol and tobacco use have also been associated with poor adherence to antiretroviral therapy (ART) and the interaction between all those substances leading to a higher susceptibility to co-morbidities, opportunistic infections such as tuberculosis (TB) (33,34). In this study, hazardous/harmful alcohol consumption and binge drinking were both significantly associated with tobacco use (33). This indicates the need for targeted prevention actions such as smoking cessation treatment and alcohol reducing counseling, among key populations, particularly among key populations living with HIV. A systematic review of interventions to reduce alcohol use among MSM indicated that although interventions such as motivational interviewing appear to be effective among MSM, they are scarce (35).

Psychological distress was found to have a dose-response relationship with alcohol consumption. Severe psychological distress was at least twice higher among people with a hazardous/harmful alcohol

consumption and people who were binge drinking. This is consistent with other studies that found a relationship between alcohol and drug abuse and psychological symptoms such as depression, anxiety and suicidal ideation among key populations (29,36,37). Consistent with our findings, a study conducted in Cambodia among MSM found that 38.8% had severe psychological distress and that severe psychological distress was associated with alcohol and drug use, poor self-reported quality of life and reduced condom use at last sex (36). In southern India, a study among FSW found a significant relationship between major depression and alcohol use (38). Another study among PLHIV in Uganda found that psychological distress was significantly associated with non-adherence to ART (39). This has implication for HIV prevention and further demonstrates the need for integrated services of mental health interventions, psychological support as well as substance abuse reduction program into HIV prevention programs. In fact, in Togo, the current policy on HIV prevention and care ensures access to HIV prevention and treatment services with the integration of Sexual and Reproductive Services and HIV care services for all citizens including key populations, but mental health interventions are not yet a component of the basic health services package. This would also imply that health care workers be sufficiently armed through sufficient and adequate training to screen and refer key populations in need of those interventions.

Very few studies have explored alcohol and tobacco consumption patterns among the three main key populations. This study found quite different patterns of consumption among the three groups, with MSM in this sample being the lowest at-risk group for hazardous/harmful alcohol consumption, binge drinking and tobacco use. DU on the other hand, appear to be most vulnerable to hazardous/harmful alcohol consumption, binge drinking and tobacco use, as well as the group with the highest prevalence of severe psychological distress. This could potentially indicate that there is a difference in coping strategies for key populations and that, behavioral interventions specifically geared towards MSM have elements that perhaps have successfully enhanced their capacity to cope with the stress among the most marginalized groups. For example, studies have demonstrated the effectiveness of community-based organizations (CBOs), peer-led interventions and community engagement in HIV prevention among MSM (40–42). It is important that targeted interventions be geared toward generating an interest for community building among DU.

Strengths of this study include the large sample size of the three main types of key populations. In addition, to our knowledge, this is the first study in Togo comparing alcohol and tobacco consumption in these key populations using standardized tools (AUDIT, Tobacco Questions for Surveys, and Kessler psychological distress scale). Finally, this study was completed in the eight main cities of Togo and used geographical mapping as well as RDS sampling, which could indicate that the findings of this study to reflect the national prevalence of alcohol and tobacco consumption among key populations.

However, there were few limitations including the fact that some variables such as childhood abuse, stigma, or recent trauma which could influence alcohol and tobacco consumption, have not been collected. Interactions between the different groups of key populations (i.e., DUs engaging in sex work, MSM who engage in sex work, sex workers who are also MSM) were also not collected. Furthermore, self-reported data used in this study, are prone to social desirability and recall bias. Despite these limitations, the results presented in this study make a unique contribution to the literature on alcohol and tobacco use among key populations in West Africa, especially since Togo shares similar characteristics with other countries of West Africa regarding the HIV epidemic (concentrated HIV epidemics with elevated HIV prevalences among key populations), access to treatment and prevention for key populations (3,43). The results could be generalized to other countries in West Africa.

Further research could further explore the relationship between alcohol, tobacco, depression and sexual risk behaviors and HIV infection among key populations. Qualitative studies could also explore the reasons for high alcohol and tobacco consumption among key populations.

Conclusion

Alcohol and tobacco use and abuse are highly prevalent among key populations. Psychological distress and being a DU were both significantly associated with alcohol and tobacco consumption. There is a need for mental health and substance abuse screening, referral and treatment to be addressed and fully integrated into HIV prevention services for key populations. Further research is also needed to explore, through qualitative and quantitative designs, the consequences and impact of alcohol and tobacco consumption, as well as mental health issues such as psychological distress on individuals and its contribution to the HIV epidemic.

Author contributorship

ABA and FGK contributed equally to this paper. ABA, FGK, PAC and DKE conceived and designed the study with inputs from AJ. PJ, EKS, CAD, MS and TJB facilitated data collection and contributed to analysis of the data. ABA and FGK analyzed, interpreted the data and drafted the manuscript. PAC, AJ and DKE revised the manuscript for important intellectual content. All authors participated in the revision process and have approved the final version of the manuscript.

Competing interests

No competing interests to declare

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Data sharing statement

No additional data are available

Ethics approval and consent to participate

This study was reviewed and approved by the Bioethics Committee for Research in Health in Togo (CBRS No. 18/2017/CBRS of June 22 2017). Consent was obtained from each participant prior to administering the survey questions.

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Table 1: Socio-demographic and health characteristics

	MSM (n=641) n (%)	FSW (n=937) n (%)	DU (n=537) n (%)	Total (=2115) n (%)	p-value
Age (years)					<0.001
18 – 25	442 (68.9)	456 (48.7)	183 (34.1)	1081 (51.1)	
> 25	199 (31.1)	481 (51.3)	354 (65.9)	1034 (48.9)	
Sex					<0.001
Male	641 (100.0)	0 (0.0)	510 (95.0)	1151 (54.4)	
Female	0 (0.0)	937 (100.0)	27 (5.0)	964 (45.6)	
Marital status					<0.001
Married	41 (6.4)	130 (13.9)	185 (34.5)	356 (16.8)	
Not married	600 (93.6)	807 (86.1)	352 (65.5)	1759 (83.2)	
Education level					<0.001
Never went to school	1 (0.2)	158 (16.8)	29 (5.4)	188 (8.9)	
Primary school	51 (7.9)	263 (28.1)	163 (30.4)	477 (22.6)	
Secondary school	356 (55.5)	471 (50.3)	316 (58.8)	1143 (54.0)	
College/University	233 (36.4)	45 (4.8)	29 (5.4)	307 (14.5)	
Religion					<0.001
Other/ Non-believers	65 (10.1)	100 (10.7)	98 (18.2)	263 (12.4)	
Christians	522 (81.5)	743 (79.3)	356 (66.3)	1621 (76.7)	
Muslims	54 (8.4)	94 (10.0)	83 (15.5)	231 (10.9)	
Place of residence					<0.001
Lomé	447 (69.7)	526 (5.1)	316 (58.8)	1289 (60.9)	
Other	194 (30.3)	411 (43.9)	221 (41.2)	826 (39.1)	
Psychological distress					<0.001
Likely not to have psychological distress	497 (77.5)	538 (57.4)	243 (45.2)	1278 (60.4)	

Likely to have mild psychological distress	80 (12.5)	223 (23.8)	123 (22.9)	426 (20.1)	
Likely to have moderate psychological distress	55 (8.6)	117 (12.5)	103 (19.2)	275 (13.0)	
Likely to have severe psychological distress	9 (1.4)	59 (6.3)	68 (12.7)	136 (6.5)	
HIV Infection					<0.001
Yes	131 (20.4)	119 (12.7)	15 (2.8)	265 (12.5)	
No	480 (74.9)	787 (84.0)	410 (76.3)	1677 (79.3)	
Not tested	30 (4.7)	31 (3.3)	112 (20.9)	173 (8.2)	

Table 2: Alcohol and Tobacco consumption patterns among key populations in Togo in 2017

Addictive behaviour	MSM (n= 641) n (%)	FSW(n=937) n (%)	DU (n=537) n (%)	Total (N=2115) N (%)	p-value
Alcohol consumption					<0.001
Non-drinker	**338** (52.7)	**318** (33.9)	**88** (16.4)	**744** (35.2)	
Moderate drinking[1]	**169** (26.4)	**275** (29.4)	**114** (21.2)	**558** (26.4)	
Hazardous consumption	**134** (20.9)	**344** (36.7)	**335** (62.4)	**813** (38.4)	
Binge drinking[2] (overall)	**196** (30.6)	**406** (43.3)	**360** (67.0)	**962** (45.5)	
Binge drinking[2] (among drinkers)	**196** (64.7)	**406** (65.6)	**360** (80.2)	**962** (71.2)	
Tobacco Use					<0.001
Yes	**97** (15.1)	**116** (12.4)	**434** (80.8)	**647** (30.6)	
Everyday	**16** (16.5)	**49** (42.2)	**343** (79.0)	**408** (63.1)	
No	**544** (84.9)	**821** (87.6)	**103** (19.2)	**1468** (69.4)	

FSW: female sex worker; MSM: Men who have sex with men; DU: Drug user

[1]: Moderate drinking levels depend on sex (differences in metabolism for females and males): AUDIT score: 1-6 for females and AUDIT score: 1- 7 for males

[2]: Binge drinking is defined as the consumption of six or more alcohol drinks at least once per month in one occasion (Question 3 of the AUDIT)

Table 3: Factors associated with hazardous alcohol consumption and binge drinking among key populations in Togo, 2017

	Hazardous/harmful alcohol consumption					Binge drinking				
		Univariate analysis		Multivariate analysis			Univariate analysis		Multivariate analysis	
	n/N	OR (95% CI)	p-value	aOR (95% CI)	p-value	n/N	OR (95% CI)	p-value	aOR (95% CI)	p-value
Age (years)					**0.05**					**0.05**
18 – 25	351/1081	1		1		433/1081	1		1	
>25	462/1034	1.7 (1.4-2.0)	0.001	1.3 (1.1-1.6)	0.05	529/1034	1.6 (1.3-1.9)	0.001	1.3 (1.1-1.6)	0.01
Marital status					0.97					
Not married	641/1759	1		1		777/1759	1			
Married	172/356	1.6 (1.302.1)	0.001	1.0 (0.8-1.3)		185/356	1.4 (1.1-1.7)	0.001		
Education level			0.001		0.19			**0.001**		**0.01**
Never been to school	64/188	1		1		69/188	1		1	
Primary school	232/477	1.8 (1.3-2.6)	0.001	1.50 (1.0-2.2)	0.05	256/477	2.0 (1.4-2.8)	0.001	1.6 (1.1-2.4)	0.01
Secondary school	436/1143	1.2 (0.9-1.7)	0.283	1.3 (0.9-1.8)	0.26	517/1143	1.4 (1.0-2.0)	0.05	1.5 (1.0-2.1)	0.05
University	81/307	0.7 (0.5- 1.0)	0.10	1.3 (0.8-2.2)	0.21	120/307	1.1 (0.8-1.6)	0.60	2.1 (1.3-3.3)	0.01
Religion			0.001		**0.001**			**0.001**		**0.001**
Others/ Non-believers	56/112	1		1		151/263	1		1	

Christians	596/1621	0.5 (0.4-0.7)	0.001	0.7 (0.5-0.9)	0.05	718/1621	0.6 (0.5-0.8)	0.001	0.71 (0.5-1.0)	0.05
Muslims	80/231	0.5 (0.3-0.7)	0.001	0.4 (0.3-0.6)	0.001	93/231	0.5 (0.4-0.7)	0.001	0.4 (0.3-0.7)	0.001
Place of residence					**0.001**					**0.001**
Lomé	392/1289	1		1		486/1289	1		1	
Others	421/826	2.4 (2.0-2.9)	0.001	2.8 (2.2-3.4)	0.001	476/826	2.3 (1.9-2.8)	0.001	2.5 (2.0-3.0)	0.001
Tobacco use					**0.001**					**0.001**
No	423/1468	1		1		533/1468	1		1	
Yes	390/647	3.8 (3.1-4.6)	0.001	2.6 (2.0-3.4)	0.001	429/647	3.5 (2.8-4.2)	0.001	2.6 (2.0-3.4)	0.001
Psychological distress			0.001		**0.001**			**0.001**		**0.001**
Likely to not have psychological distress	387/1278	1		1		491/1278	1		1	
Likely to have mild psychological distress	174/426	1.6 (1.3-2.0)	0.001	1.2 (0.9-1.5)	0.20	220/426	1.7 (1.4-2.1)	0.001	1.4 (1.1-1.7)	0.05
Likely to have moderate psychological distress	159/275	3.2 (2.4-4.1)	0.001	2.5 (1.9-3.4)	0.001	160/275	2.2 (1.7-2.9)	0.001	1.8 (1.3-2.4)	0.001
Likely to have severe psychological distress	93/136	5.0 (3.4-7.4)	0.001	3.3 (2.2-5.1)	0.001	91/136	3.2 (2.2-4.8)	0.001	2.2 (1.5-3.4)	0.001
HIV infection			0.001		**0.05**			**0.001**		**0.05**
No	665/1677	1		1		784/1677	1		1	
Yes	67/265	0.5 (0.4-0.7)	0.001	0.7 (0.5-1.0)	0.05	84/265	0.5 (0.4-0.7)	0.001	0.7 (0.5-1.0)	0.05
Not completed	81/173	1.3 (1.0-1.8)	0.10	1.2 (0.8-1.8)	0.30	94/173	1.4 (1.0-1.9)	0.10	1.2 (0.9-1.8)	0.26
Key population			0.001		**0.001**			**0.001**		**0.001**
MSM	134/641	1		1		196/641	1		1	
FSW	344/937	2.2 (1.7-2.8)	0.001	1.8 (1.4-2.4)	0.001	406/937	1.7 (1.4-2.2)	0.001	1.6 (1.3-2.1)	0.001
DU	335/537	6.3 (4.9-8.2)	0.001	2.4 (1.7-3.4)	0.01	20/27	4.6 (3.6-5.9)	0.001	2.0 (1.4-2.8)	0.001

aOR: adjusted odds ratio; OR: odds ratio; 95%CI: 95% confidence interval; DU: drug user; FSW: female sex worker; MSM: men who have sex with men

Table 4. Factors associated with tobacco use among key populations in Togo in 2017

		Univariate analysis		Multivariate analysis	
	n/N	**OR (95% CI)**	**p-value**	**aOR (95% CI)**	**p-value**
Age (years)					0.14
18 – 25	280/1081	1		1	
>25	367/1034	1.6 (1.3 -1.9)	0.001	0.81 (0.6-1.1)	0.15
Marital status					0.22
Not married	481/1759	1		1	
Married	356	2.3 (1.8-2.9)	0.001	0.8 (0.6-1.1)	0.22
Level of education			0.001		0.32
None	42/188	1		1	
Primary school	186/477	2.2 (1.5-3.3)	0.001	1.3 (0.8-2.3)	0.26
Secondary/high school	364/1143	1.6 (1.1-2.4)	0.01	1.2 (0.7-1.9)	0.59
University	55/307	0.8 (0.5-1.2)	0.230	0.9 (0.5-1.7)	0.73
Religion			0.001		**0.05**
Others/ Non-believers	40/112	1		1	
Christians	436/1621	0.5 (0.4-0.6)	0.001	0.7 (0.5-1.0)	0.10
Muslims	96/231	0.9 (0.6-1.3)	0.63	1.1 (0.7-1.9)	0.60
Place of residence					**0.001**
Lomé	400/1289	1		1	
Others	247/826	1.0 (0.8-1.2)	0.59	0.6 (0.5-0.8)	0.001
Alcohol consumption					**0.001**
No risky consumption	257/1302	1		1	
Hazardous/harmful drinking	390/813	3.8 (3.1-4.6)	0.001	2.6 (2.0-3.4)	0.001
Psychological distress			0.001		**0.01**
Likely to not have psychological distress	300/1278	1		1	

Likely to have mild psychological distress	150/426	1.8 (1.4-2.2)	0.001	1.5 (1.1-2.1)	0.01
Likely to have moderate psychological distress	128/275	2.8 (2.2-3.7)	0.001	2.0 (1.3-2.8)	0.001
Likely to have severe psychological distress	69/136	3.4 (2.3-4.8)	0.001	1.3 (0.8-2.2)	0.30
HIV infection			0.001		0.34
No	509/1677	1		1	
Yes	44/265	0.5 (0.3-0.6)	0.001	0.9 (0.6-1.3)	0.51
Not completed	94/173	2.7 (2.0-3.8)	0.001	0.7 (0.5-1.2)	0.17
Key populations			0.001		**0.001**
MSM	97/641	1		1	
FSW	116/937	0.8 (0.6-1.1)	0.12	0.6 (0.4-0.9)	0.01
DU	434/537	23.6 (17.5-32.2)	0.001	17.9 (12.4-26.4)	0.001

aOR: adjusted odds ratio; OR: odds ratio; 95%CI: 95% confidence interval; DU: drug user;
FSW: female sex worker; MSM: men who have sex with men

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation		Pages
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	X	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	X	2
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	X	4
Objectives	3	State specific objectives, including any prespecified hypotheses	X	4
Methods				
Study design	4	Present key elements of study design early in the paper	X	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	X	6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	X	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	X	6-7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	X	6-7
Bias	9	Describe any efforts to address potential sources of bias	X	6
Study size	10	Explain how the study size was arrived at	X	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	X	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	X	7
		(*b*) Describe any methods used to examine subgroups and interactions	X	7
		(*c*) Explain how missing data were addressed	N/A	
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/A	
		(*e*) Describe any sensitivity analyses	N/A	
Results				
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	X	8
		(b) Give reasons for non-participation at each stage	N/A	
		(c) Consider use of a flow diagram	N/A	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	X	8; 18-19
		(b) Indicate number of participants with missing data for each variable of interest	N/A	
Outcome data	15*	Report numbers of outcome events or summary measures	X	8
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	X	8-9

		(*b*) Report category boundaries when continuous variables were categorized	X	8-9
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A	
Discussion				
Key results	18	Summarise key results with reference to study objectives	X	10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	X	11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	X	10
Generalisability	21	Discuss the generalisability (external validity) of the study results	X	10-11
Other information				
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	X	13

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.