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RESEARCH ARTICLE

REVISED Alcohol consumption patterns among men who have sex with men in major cities of Myanmar: A cross-sectional study [version 2; peer review: 2 approved]

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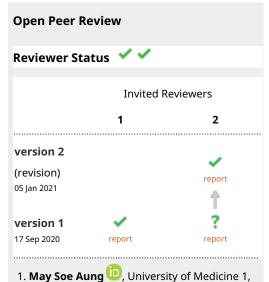
Abstract

Background: Alcohol consumption patterns vary widely across the regions of the world. Although previous studies have focused on the sexual risk behaviours among men who have sex with men (MSM), studies regarding binge alcohol drinking among MSM in Myanmar are scarce.

Methods: A cross-sectional study was conducted to identify the alcohol consumption patterns among MSM aged over 18 years in two major cities of Myanmar where the MSM population is higher than other regions. Purposive sampling was applied and sampling was made through Myanmar MSM network. Face-to-face interviews were conducted using a structured questionnaire. Patterns of alcohol consumption were described as frequency/percentage and mean/median as appropriate. Bivariate analysis was also done to find out the association between types of MSM and binge drinking.

Results: A total of 256 MSM included in the study (mean age, 27.33±7.7 years). Of 256 participants, 225 MSM had the experience of alcohol consumption in their lifetime (225/256, 87.9%). Among ever drinkers, 152 MSM consumed alcohol within three months (152/225, 67.6%). Regarding beer consumption, the highest proportions of MSM from both groups (42.8%, 36.8%) consumed 1-3 times per week. Overall, 57.2% of young MSM and 41.2% of adult MSM consumed beer together with their friends. Nearly 34% of young MSM and nearly 38% of adult MMS consumed beer at gatherings of friends. At different time periods, higher proportions of Thange (partners of MSM) had experienced of binge drinking than apwint (open) and apone (hidden) (p<0.05).

Conclusions: The current study identified the alcohol consumption patterns in terms of type, amount, frequency at different time periods among MSM in major cities of Myanmar. It is suggested to develop

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Reviewer Status ✔✔

	Invited Reviewers	
	1	**2**
version 2 (revision) 05 Jan 2021		✔ report
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Any reports and responses or comments on the article can be found at the end of the article.

and implement alcohol control policy for MSM since the proportion of current drinkers as well as binge drinking higher among these groups.

Keywords
Men who have sex with men, alcohol, binge drinking, Myanmar

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REVISED **Amendments from Version 1**

We have revised this version according to the expert opinions of the reviewers:

- The prevalence of alcohol drinking among men in Myanmar has been described in the *Introduction*.

- We have listed other places where recruitment was carried out in the *Data collection* section.

- We have updated the spelling of "Tha Nge" to "Thange" to be consistent with the terms recognised by the National AIDS Program.

- "Whisky" was added as an alcohol beverage to the *Operational definitions* section.

- Statistical analysis statement was added to the *Data management and analysis* section.

- "15–24 yrs" has been updated to "18–24 yrs" throughout the article.

- We have updated our conclusion in the *Discussion and recommendation* section.

Any further responses from the reviewers can be found at the end of the article

Introduction

Globally, alcohol is widely consumed as a beverage and for recreation and socialization. Alcohol consumption patterns vary widely across the regions, ranging from daily heavy drinking to occasional hazardous drinking (Ennett *et al.*, 2016; World_Health_Organization, 2018). Excessive alcohol use and chronic alcohol binging are associated with high morbidity and mortality (Stockings *et al.*, 2016). About 40% of global population aged over 15 years had consumed alcohol while 2.3 billion of them are current drinkers. Worldwide, 44.8% of total recorded alcohol is consumed in the form of spirits. The second most consumed type of beverage is beer (34.3%) followed by wine (11.7%) (World_Health_Organization, 2018).

Types of alcoholic beverage varied among countries in South-East Asia region. Spirit was most common in Democratic People's Republic of Korea (97%), India (92%), Sri Lanka (85%), Philippines (72%), Thailand (69%) and Myanmar (68%). Similarly, wine was the commonest type in Indonesia (76%), Nepal (49%), and Maldives (37%) while beer was common in Brunei Darussalam (100%), Vietnam (91%), Cambodia (88%), Singapore (70%), Timor-Leste (68%), and Malaysia (61%) (World_Health_Organization, 2018). The most common type of alcoholic beverage in Myanmar was spirits, which was consumed by 68% of drinkers (World_Health_Organization, 2018).

Previous studies have highlighted that hazardous alcohol drinking was common among men who have sex with men (MSM), ranging from incidences of 14% to 52%, and it was also associated with unsafe sexual behaviours (Davis *et al.*, 2016; Herrera *et al.*, 2016; Liu *et al.*, 2016; Santos *et al.*, 2018).

Furthermore, a significant association was noted between hazardous alcohol drinking and sexually transmitted infections, including HIV. According to a study conducted in China, 14.4% of MSM reported hazardous drinking and 16.8% reported binge drinking. Hazardous or binge drinkers were associated with various risky sexual behaviours such as have multiple partnerships, pay for sex, and have condomless insertive anal intercourse (Liu *et al.*, 2016). In a study in Peru, 45% of MSM and transgender women had an alcohol use disorder. Higher incidence of condomless anal intercourse was seen among participants with alcohol use disorder (AUD). However, AUD positivity was not associated with either condomless anal intercourse or recent STI/HIV infection (Herrera *et al.*, 2016). Another study in US has documented the heavy alcohol use patterns and correlates in a diverse sample of MSM using respondent-driven sampling. It was found that prevalence of RDS adjusted weekly drinking was 24.9% and weekly binge drinking was 19.3%. Independent correlates of hazardous alcohol consumption were identified as being moderately or extremely interested in reducing alcohol use; ever receiving alcohol treatment; using ecstasy; reporting syphilis diagnosis; and having more than five male partners (Santos *et al.*, 2018).

In Myanmar, HIV is concentrated among key affected populations like MSM, whereas HIV prevalence was over 10% among them (UNAIDS, 2015). Alcohol drinking was common among MSM, as it was with other men. Although previous studies have focused on risky sexual behaviours among MSM, few studies assessed hazardous alcohol drinking among MSM. According to a previous study in Myanmar, there was 50% of lifetime drinkers and 20% of current drinker among general men (Oo *et al.*, 2015). Similarly, in Myanmar, we know of no studies to have reported on alcohol consumption among MSM. Therefore, current study was conducted to identify the alcohol consumption patterns and binge drinking at different time periods among men who have sex with men in Myanmar.

Methods
Study design, population and area

A cross-sectional study was conducted among MSM those aged more than 18 years in Yangon and Mandalay, major cities of Myanmar where MSM population is higher than other regions during June and July 2020.

Inclusion criteria

- Self-identifying MSM;

- MSM who had engaged in insertive or receptive anal sex or both;

- MSM who have at least six months stay in Yangon and Mandalay

Exclusion criteria

- MSM who are not mentally sound according to the records from the centre

- MSM who do not understand and communicate in the Myanmar language

Sampling and sample size

Purposive sampling was applied and sampling of the MSMs was made through the Myanmar MSM network. Identification of the places for recruitment of the possible participants was made after discussion with the focal persons from the networks of MSM. There might be bias resulting from applying purposive sampling; however, attempts to reduce the bias were made by providing thorough explanations to the focal person to recruit different type of MSM from different sources, such as drop-in-centre and beauty parlours.

By considering the estimated proportion of MSM who are current drinkers as 20% (Oo *et al.*, 2015), to achieve a 95% confidence level and an error of 5%, the minimum required sample size becomes 246 (Wayne, 1995).

Data collection

Firstly, a structured questionnaire was developed in English by reviewing the literature (see *Extended data*; Htut *et al.*, 2020b). Then, translation was done into Myanmar language and back translation was carried out into English by a translator who was expert in both languages and had experience of translation regarding questionnaire used in MSM related research. Training of the interviewers was done at Department of Medical Research and pre-test was done at a non-study township in Yangon Region. After receiving ethical approval, at the venues where MSMs usually gather like drop-in-centers of International Non-governmental Organizations, beauty parlors, famous beautician, moat and office of community based organization eligible participants were contacted and invited to participate in the study. After getting the informed consent, data collection was done by face-to-face interview. Strict adherence to ethical principles were ensured throughout the data collection period in order to maintain the confidentiality of the information of the study participants.

Operational definitions

According to the local terminology in Myanmar, three groups of MSM were included in the study: Apwint or open type, Apone or hidden type and Thange (National_AIDS_Program, 2019). Apwint or open MSM are defined as individuals born biological male but who openly express themselves femininely by dress and/or social interactions. Apone or hidden MSM are defined as individuals born biological males who may also want to express themselves femininely but may not disclose this behaviour to all segments of their social networks. Tha Nge are defined as having a masculine outward appearance but have sex with men".

Types of alcohol beverages consumed by MSM included Beer, Wine, Whisky and Rum.

Data management and analysis

Data entry was carried out with EpiData version 3.1 and data analysis was done with SPSS version 21. Exploratory data analysis was done to check the errors, consistencies and missing values. The number of standard drinks was calculated by volume of container in liters multiplied by the percentage of alcohol volume multiplied by 0.789 (the specific gravity volume of ethyl alcohol). Binge drinking was defined as five or more standard drinks for men in a sitting or within two hours. Descriptive statistics were shown according to the data obtained from the assessment. Patterns of alcohol consumption were described as frequency/percentage and mean/median as appropriate. Bivariate analysis using chi-squared was also done to find out the association between types of MSM and binge drinking. Level of statistical significance was set as p value of <0.05.

Ethical considerations

The proposal was submitted to Institutional Review Board, Department of Medical Research, Myanmar (Ethics/DMR/2020/036). Written informed consent was taken from the participants after thorough explanation about the objectives of the study. Confidentiality and anonymity of the information were strictly ensured. All answer sheets and data reports were kept in locked cabinet.

Results

A total of 256 MSM were included in the study, of whom 151 participants were residents of Yangon and 105 participants were residents of Mandalay. Mean age of MSM was 27.33±7.7 years and ranged from 18 to 57 years. Tables were presented according to the age group that was categorized as 18–24 years as young MSM and ≥25 years as adult (older) MSM. As shown in Table 1, 39.1% of 18–24 years age group and 58.9% of ≥25 years age group were "apwint" (open). Regarding their education status, 52.7% of the younger age group and 39% of the older age group had attended education up to high school level. Over 46% of young MSM and over 66% of adult MSM have regular income earning job. Median monthly income was 200,000 MMK in both groups. Over 33% of young MSM were private/government staff while over 35% of adult MSM were running their own business. Individual-level responses from each participant are available as Underlying data (Htut *et al*., 2020a)

Of the 256 participants, 225 had experience of alcohol consumption in their lifetime (225/256, 87.9%). Among ever drinkers, 152 had consumed alcohol within the past three months (152/225, 67.6%). The amount and frequency of different types of alcohol consumption within three months in terms of amount, frequency, with whom they drink together, time of consumption and reasons are shown in Table 2. Regarding beer consumption, the mean amount consumed was 4.1±2.5 standard drinks by young MSM and 4.5 ± 3.0 standard drinks by adult MSM (ethanol concentration of 41 and 45 grams, respectively), highest proportions of MSM from both groups (42.8%, 36.8%) consumed 1–3 times per week.

Table 3 shows the types of person that MSM drink with, the reasons and timings of different types of alcohol consumption by age group of MSM within three months. Over 57.2% of young MSM and 41.2% of adult MSM consumed beer together with their friends. A majority of younger and older MSM consumed beer in the evening or at night (96% and 94.2%, respectively). Nearly 34% of young MSM and nearly 38% of adult MMS consumed beer for the reason of a friends' gathering.

Table 1. Socio-demographic characteristics of MSM from Yangon and Mandalay (n=256).

Characteristics	Age group (n=256)	
	18–24 years n (%)	≥25 years n (%)
Type of MSM		
Apwint (open)	43 (39.1)	86 (58.9)
Apone (hidden)	27 (24.5)	41 (28.1)
Thange (partner of apwint/apone)	40 (36.4)	19 (13.0)
Education		
Read & write	3 (2.7)	4 (2.7)
Primary school	14 (12.7)	14 (9.6)
Middle school	28 (25.5)	39 (26.7)
High school	58 (52.7)	57 (39.0)
Graduate/University	7 (6.4)	32 (31.9)
Have income earning job		
No/not regular	59 (53.6)	6 (4.1)
Yes, always	51 (46.4)	97 (66.4)
Monthly income (Kyats)		
Median (IQR)	200,000 (166,000)	200,000 (187,500)
Range	15,000 – 900,000	15,000 – 2,000,000
Occupation		
Manual labour	31 (32.3)	18 (12.9)
Private/government staff	32 (33.3)	27 (19.3)
NGO/INGO staff	8 (8.3)	31 (22.1)
Own business	16 (16.7)	50 (35.7)
Sex work	6 (6.3)	10 (7.1)
Others	3 (3.1)	4 (2.9)

Table 4 shows that binge drinking was associated with type of MSM. At different time periods, higher proportions of Thange (partner of MSM) had experienced of binge drinking than apwint (open) and apone (hidden), and the association was statistically significant (p<0.05).

Discussion and recommendation

Worldwide, the prevalence of alcohol consumption was 43% in general population while about half has never consumed alcohol. Of all participants in present study, nearly 90% have ever consumed alcohol in their life time and over 50% were current drinkers within one month. Previous studies have documented the alcohol consumption among general population in Myanmar. They reported the prevalence of 50% lifetime drinkers and 20% current drinkers. The proportion of ever drinkers in current study was much higher than those from previous studies done in two different townships in Myanmar (Oo et al., 2015; Win & Areesantichai, 2014). These studies focused on the general adult population, which might differ

from the MSM population. These differences in study population and time periods might contribute to the discrepancy. Regarding the types of alcoholic beverages, as reported in the report of World Health Organization, common types of alcoholic beverages consumed in Myanmar included spirits, beer and wine. Likewise, beer, whisky and wine were the common alcoholic beverages stated by MSM in current study.

Studies in China and other countries also highlighted alcohol consumption among MSM and general population but using different screening tools. Additionally, previous studies have documented the prevalence of alcohol consumption at different time periods (Liu et al., 2016; Lu et al., 2019). In present study, nearly 70% of MSM had consumed alcohol within the past 3 months and 36.2% of Apwint (open type), 35.3% of Apone (hidden type) and 62.8% of Thange (sexual partners of MSM) had experience of binge drinking. In a large-scale study in China, over 56% of 3,588 MSM had consumed alcohol in the past 3 months and 17% were binge drinkers (Liu et al., 2016).

Table 2. Amount and frequency of different types of alcohol consumption by age group of MSM within three months.

	Age group	
	18–24 years	≥25 years
Amount of alcohol use		
Beer	(n=49)	(n=68)
Mean ± SD	4.1 ± 2.5	4.5 ± 3.0
Min – Max	1.3 – 13.0	0.5 – 15.6
Wine	(n=6)	(n=5)
Mean ± SD	6.6 ± 5.2	4.1 ± 3.4
Min – Max	1.3 – 15.4	0.5 – 7.7
Whisky	(n=14)	(n=19)
Mean ± SD	6.5 ± 2.9	6.8 ± 4.1
Min – Max	2.5 – 10.0	1.9 – 15.6
Frequency of alcohol use, n (%)		
Beer	(n=49)	(n=68)
1/month	14 (28.6)	24 (35.3)
2–4/month	12 (24.5)	19 (27.9)
1–3/week	21 (42.8)	25 (36.8)
>3/week	2 (4.1)	0 (0.0)
Wine	(n=6)	(n=5)
1/month	2 (33.4)	2 (40.0)
2–4/month	3 (50.0)	0 (0.0)
1–3/week	1 (16.7)	3 (60.0)
Whisky	(n=14)	(n=19)
1/month	1 (7.1)	4 (21.1)
2–4/month	2 (14.3)	6 (31.6)
1–3/week	9 (64.3)	9 (47.3)
>3/week	2 (14.3)	0 (0.0)

Table 3. People who drink together, reason and timing of different types of alcohol consumption by age group of MSM within three months.

	Age group	
	18–24 years n (%)	≥25 years n (%)
With whom consume alcohol together		
Beer	(n=49)	(n=68)
Friends	28 (57.2)	28 (41.2)
MSM friends	17 (34.7)	27 (39.7)
Sexual partner	1 (2.0)	7 (10.3)
Alone	3 (6.1)	6 (8.8)
Wine	(n=6)	(n=5)
Friends	2 (33.4)	2 (40.0)
MSM friends	4 (66.7)	2 (40.0)
Alone	0 (0.0)	1 (20.0)
Whisky	(n=14)	(n=19)
Friends	7 (50)	7 (36.9)
MSM friends	6 (42.9)	8 (42.1)
Sexual partners	0 (0.0)	3 (15.8)
Alone	1 (7.1)	1 (5.3)
Timing of alcohol consumption		
Beer	(n=49)	(n=68)
Morning/afternoon	1 (2.0)	3 (4.4)
Evening/night	47 (96.0)	64 (94.2)
Whole day	1 (2.0)	1 (1.4)
Wine	(n=6)	(n=5)
Evening/night	6 (100.0)	5 (100.0)
Whisky	(n=14)	(n=19)
Morning/afternoon	1 (7.1)	0 (0.0)
Evening/night	13 (92.9)	17 (89.5)
Whole day	0 (0.0)	2 (10.5)
Rum	(n=6)	(n=3)
Evening/night	6 (100.0)	3 (100.0)
Reason of alcohol consumption		
Beer	(n=49)	(n=68)
Gathering	17 (34.1)	26 (38.2)
Special occasion	1 (2.0)	1 (1.5)
Feel unhappy	7 (14.3)	6 (8.8)
Feel happy	9 (18.4)	15 (22.1)
Want to use	12 (24.4)	17 (25.0)
Attract sexual partner	3 (6.1)	3 (4.4)
Wine	(n=6)	(n=5)
Gathering	1 (16.7)	1 (20.0)
Social occasion	0 (0.0)	1 (20.0)
Feel unhappy	1 (16.7)	0 (0.0)
Feel happy	3 (50.0)	1 (20.0)
Want to use	1 (16.7)	1 (20.0)
Attract sexual partner	0 (0.0)	1 (20.0)
Whisky	(n=14)	(n=19)
Gathering	6 (42.9)	8 (42.1)
Special occasion	0 (0.0)	1 (5.3)
Feel unhappy	1 (7.1)	0 (0.0)
Feel happy	1 (7.1)	1 (5.3)
Want to use	4 (28.5)	9 (47.4)
Attract sexual partner	2 (14.3)	0 (0.0)

Table 4. Binge drinking according to the category of MSM at different time periods among MSM from Yangon and Mandalay.

	Type of MSM			p-value
	Apwint (Open) n (%)	Apone (Hidden) n (%)	Thange (Partner) n (%)	
Within one month	(n=53)	(n=46)	(n=41)	0.0001
Non-binge drinking	35 (66.0)	27 (58.7)	10 (24.4)	
Binge drinking	18 (34.0)	19 (41.3)	31 (75.6)	
Within three months	(n=58)	(n=51)	(n=43)	0.01
Non-binge drinking	37 (63.8)	33 (64.7)	16 (37.2)	
Binge drinking	21 (36.2)	18 (35.3)	27 (62.8)	
Within six months	(n=70)	(n=50)	(n=44)	0.04
Non-binge drinking	45 (64.3)	33 (66.0)	19 (43.2)	
Binge drinking	25 (35.7)	17 (34.0)	25 (56.8)	
Within one year	(n=82)	(n=53)	(n=48)	0.01
Non-binge drinking	55 (67.1)	33 (62.3)	20 (41.7)	
Binge drinking	27 (32.9)	20 (37.7)	28 (58.3)	
Lifetime	(n=107)	(n=63)	(n=55)	0.003
Non-binge drinking	77 (72.0)	42 (66.7)	25 (45.5)	
Binge drinking	30 (28.0)	21 (33.3)	30 (54.5)	

Though recent alcohol consumption within 3 months among MSM was similar between the studies, the proportion of binge drinkers was higher in present study.

In Peru, 45% of MSM had an alcohol use disorder and over 90% were hazardous drinkers (Herrera *et al.*, 2016). Another study in China among a general adult population aged 18 to 34 years also identified the prevalence of alcohol consumption as about 45% (Lu *et al.*, 2019). Similarly, another study in US among MSM documented that nearly 14% and 25% were monthly and weekly binge drinkers (Santos *et al.*, 2018). Unlike other studies in China, Fan *et al.* (2016) documented that 23% of MSM had consumed a drink containing alcohol in the previous year while 7% were heavy alcohol drinkers.

The current study also identified the proportion of drinkers and binge drinkers in different time periods (one month, three months, six months, one year and lifetime). and over one third to nearly two third among different types of MSM reported binge drinking within three months. A higher proportion of participants drinking alcohol was noted in current study than in previous studies among MSM population. Differences in background sociocultural conditions may contribute to this discrepancy. (Liu *et al.*, 2016; Lu *et al.*, 2019). It was detected that binge drinking was more common among Thange than other two types of MSM at different time periods showing higher risk among that particular group of MSM.

There was a limitation in the present study that should be acknowledged. Alcohol consumption patterns were self-reported and their behaviours could not be validated with other methods, such as observation. However, we tried to overcome this limitation by carefully explaining the objectives of the study to allow participants to answer with accurate responses.

The development and implementation of an alcohol control policy for MSM should be considered, since over half of them were current drinkers (within one month). Between one-third and three-quarters of them had binge drinking at different time periods, which could lead to adverse health and social consequences. Emphasis should be done more on the partners of MSM as higher proportion of them had practice of binge drinking.

Data availability
Underlying data
Figshare: msm_data_alcohol.sav. https://doi.org/10.6084/m9. figshare.12911510.v1 (Htut *et al.*, 2020a).

This project contains the de-identified underlying data from each participant for the present study.

Extended data
Figshare: Questionnaire_Alcohol consumption patterns among men who have sex with men in major cities of Myanmar: A cross-sectional study. https://doi.org/10.6084/m9.figshare.12926636.v1 (Htut *et al.*, 2020b).

This project contains the questionnaire used in the present study.

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).

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Open Peer Review

Current Peer Review Status: ✔ ✔

✔   **Inn Kynn Khaing**
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     Myat Thuthu Win (iD)
     Unit of Pharmacology, Faculty of Medicine, AIMST International University, Bedong, Malaysia

1. The spelling of "Tha Nge" to "Thange" to be consistent. Still some place not updated. (Operational definitions).
2. "15-24 yrs" has been updated to "18-24 yrs".
3. Bivariate analysis using chi-squared & p- value were added.
4. Slight modification in discussion.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Diabetes, Aging.

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

? **Inn Kynn Khaing**

AIMST University, Bedong, Malaysia

Myat Thuthu Win (iD)

Unit of Pharmacology, Faculty of Medicine, AIMST International University, Bedong, Malaysia

1. It is good idea to study alcohol consumption which is very popular among men who have sex with men (MSM) but it is not clearly described why the authors want to choose target population of this group as well as aim of this study. We suggest that the prevalence of alcohol drinking among men in Myanmar should be stated in general so the prevalence in this group will be higher or not can be determined.

2. The study design is suitable and sample size is adequate. We recommend that age range should be included in abstract. (18-57 yrs) We aware that the authors used 15-24 yrs in (Table -1) but young MSM should be 18-24yrs (Table -1) because the study was done over 18 yrs of age in this study.

3. The authors tried to explore the data as much as possible but it is difficult to get exact data of alcohol consumption among MSM. Out of 256 participants, 225 participants consumed alcohol in their lifetime, 89.7%, but the authors did not specify about others who were more than 18 yrs of age or not. (Never drinking alcohol in their lifetime?) These data only indicates alcohol drinking but no impact. We recommend that if the authors can correlate the data with some points like the prevalence of sexually transmitted disease among them, it will be more scientific and reproducible. We also doubtful about the lowest salary among MSM is only 1,5000 MMK per month. If the salary is too low, it will affect the alcohol consumption.

4. Justify for using bivariate analysis of Binge drinking according to the category of MSM at different time periods.
It is not relevant with Table -4 results in discussion: "over one third to nearly two third among different types of MSM reported binge drinking within three months".

5. As we mentioned above, it is difficult to guarantee for full reproducibility. It will need to be more scientific study and outcome for reliable data. But, we understood that there would be some constraints because of COVID-19 pandemic.

6. We suggest that there should be some outcome for conclusion for alcohol consumption among MSM. After describing the results, the authors could not discuss properly about binge drinking among different category of MSM in different time periods and it does not highlight how different time periods of binge drinking have an influence on different category of MSM. So it was difficult to get conclusion from the results. It is not a good conclusion.

Is the work clearly and accurately presented and does it cite the current literature?
Partly

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Partly

Are all the source data underlying the results available to ensure full reproducibility?
Partly

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Diabetes, Aging.

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however we have significant reservations, as outlined above.

Author Response 09 Jan 2021

Kyaw-Min Htut, Ministry of Health and Sports, Myanmar, Yangon, Myanmar

According to comment 1, the prevalence of alcohol drinking among men in Myanmar had described as "According to a previous study in Myanmar, there was 50% of lifetime drinkers and 20% of current drinker among general men."

According to the comment 2, I have edited 18-24 yrs instead of 15-24 yrs in every sentence and tables.

Comment number 3: "These data only indicates alcohol drinking but no impact"
Response: It does not include any impact of alcohol consumption as the study does not focus and include in our study objectives.

C**omment number 3**: "We recommend that if the authors can correlate the data with some points like the prevalence of sexually transmitted disease among them, it will be more scientific and reproducible."
Response: Thanks so much for your suggestion and we agree that these points are very important to discuss. But we don't have such kind of data because it is out of our study scope.

C**omment number 3 of reviewer 2**: "We also doubtful about the lowest salary among MSM is only 1,5000 MMK per month. If the salary is too low, it will affect the alcohol consumption."
Response: It is not the salary. We just ask about their income in terms of money they received in anyway because some of them did not have regular job.

According to comment 4, we did bivariate analysis between binge drinking and type of MSM since there would be difference in behaviors according to the types of MSM

"It was detected that binge drinking was more common among Thange than other two types of MSM at different time periods showing higher risk among that particular group of MSM" and "Emphasis should be done more on the partners of MSM as higher proportion of them had practice of binge drinking" were added according to your 5th and 6th comments.

Competing Interests: No competing interests were disclosed.

Reviewer Report 23 September 2020

https://doi.org/10.5256/f1000research.28371.r71570

✔️ **May Soe Aung** 🆔

Department of Preventive and Social Medicine, University of Medicine 1, Yangon, Myanmar

It is an interesting article which highlighted the alcohol consumption patterns among men who have sex with men. It was accurately worked by current literature to fulfill the study objectives. Suitable statistical methods are applied and interpretations are appropriate.
For more clarification, reviewer's comments are provided as follows:
Abstract
1. Regarding beer consumption, type of grouping should be mentioned precisely instead of "both groups".

2. Clear description of the variables: "Together with their friends" and "at gathering of friends" is required at the start of article because repeated use of same word may cause a bit confusing.

3. In this study, only amount of alcohol consumption was found out by different time periods according to Table 4. However, it was mentioned that type and frequency were also identified by different time periods. Therefore, conclusion is necessary to be coincided with the finding.

4. There was no comparison of MSM with other specific groups in this article. Therefore, the proportion of current drinkers as well as binge drinking should not be concluded by the term, "higher".

Introduction
1. Description of RDS in the second last paragraph is more appropriate.

Methods

1. As the pretesting was done in non-selected township, number of townships for purposive sampling from Yangon and Mandalay Cities should be mentioned.

2. Are there any other places of recruiting participants? Because "etc." was added after drop-in-centers of International Non-governmental Organizations and beauty parlors in data collection.

3. Regarding three groups of MSM, similar word formatting should be used according to the literature because there is no consistency between abstract and operational definitions.

4. Types of alcoholic beverages mentioned in operational definitions section included "RUM" but following tables in results section were shown by "Whisky". Therefore, it is better to explained about the discrepancy of usage if possible.

5. References should be cited for calculation of the number of standard drinks. Is it similar to amount of alcohol use?

6. In data management and analysis, statistical test for association and level of statistical significance are needed to be mentioned.

Results

1. In second paragraph, there was mentioning about the types of person that MSM drink with, the reasons and timings of consumption although Table 2 was shown amount and frequency of alcohol use.

2. The calculation of ethanol concentration by mean of grams in relation to mean amount of standard drinks should be explained.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Public Health, Epidemiology, Maternal and Reproductive Health, Infection Control, NCDs, Biostatistics, Environmental Health.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 25 Sep 2020

Kyaw-Min Htut, Ministry of Health and Sports, Myanmar, Yangon, Myanmar

Thank you for your expert opinions and approval on our manuscript.

Comments from reviewer
Abstract
1. Regarding beer consumption, type of grouping should be mentioned precisely instead of "both groups".
Response: Thanks for your comments and "both groups" means young age group (15-24 yrs) and adult age group (>24 yrs)
2. Clear description of the variables: "Together with their friends" and "at gathering of friends" is required at the start of article because repeated use of same word may cause a bit confusing.
Response: Sorry for making you confusing. "Together with their friends" is one of the responses for the question "With whom they consumed alcohol". Similarly, "at gathering of friends" is the response for the reason of alcohol consumption.
3. There was no comparison of MSM with other specific groups in this article. Therefore, the proportion of current drinkers as well as binge drinking should not be concluded by the term, "higher".
Response: Proportion of current drinkers among MSM from current study was higher than the previous studies conducted among general population in Myanmar

Methods
1. As the pretesting was done in non-selected township, number of townships for purposive sampling from Yangon and Mandalay Cities should be mentioned.
Response: The participants were recruited through Myanmar MSM network and it is not possible to mention the number of townships.

2. Are there any other places of recruiting participants? Because "etc." was added after drop-in-centers of International Non-governmental Organizations and beauty parlors in data collection.
Response: Others included the hotspot places of MSM were they usually gather such as home of famous beautician, moat and office of community based organization.

3. Regarding three groups of MSM, similar word formatting should be used according to the literature because there is no consistency between abstract and operational definitions.
Response: I think three groups of MSM (Apwint, Apone and Thange) were used.

4. Types of alcoholic beverages mentioned in operational definitions section included "RUM" but following tables in results section were shown by "Whisky". Therefore, it is better to

explained about the discrepancy of usage if possible.
Response: Thank you for your comment. Whisky was missed to mention in the operational definition.

Competing Interests: No competing interests were disclosed.

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