

**Prevalence and factors associated with alcohol use disorder in the China-Myanmar border region: A cross-sectional study**L Kum Ja¹, Kyaw Min Htike¹, Roshan Kumar Mahato^{2*}¹MPH, Faculty of Public Health, Khon Kaen University, Khon Kaen, Thailand²Department of Health Management Innovative Technology, Faculty of Public Health, Khon Kaen University, Khon Kaen, Thailand*Corresponding author: Assist. Prof. Dr. Roshan Kumar Mahato, roshan@kku.ac.th**ABSTRACT**

Background: In Myanmar, over half of men aged 18 and above consume alcohol with Kachin State facing unique challenges like political instability and language barriers. Despite the high prevalence, limited data exists on alcohol use disorder (AUD) in this region particularly among men.

Objectives: This study aimed to determine the prevalence of AUD, compare alcohol consumption patterns between urban and rural populations and identify factors associated with AUD in the China-Myanmar border region.

Methods: This cross-sectional analytical study was conducted from April 2024 to March 2025 in Kachin State, Myanmar focusing on three townships along the Myanmar-China border. Data were collected using a structured, interviewer-administered questionnaire. Descriptive statistics and a Generalized Linear Mixed Model with logistic regression were used for data analysis.

Results: Among 428 participants, the study found significant urban-rural differences in demographics, occupation and health behaviours. Rural residents were older, had lower education levels, and were more likely to be manual labourers and smokers. Urban residents had better knowledge of AUD, while rural residents were more likely to view alcohol consumption as inappropriate. The prevalence of AUD was significantly higher in rural areas (45.52%, 95% CI: 39.63–51.55%) compared to urban areas (30.63%, 95% CI: 23.93–38.25%). Factors associated with AUD included lower education (AOR: 1.69, 95% CI: 1.01–2.84 for secondary education; AOR: 1.82, 95% CI: 1.03–3.22 for no formal or primary education), smoking (AOR: 2.56, 95% CI: 1.61–4.06) and neutral or positive attitudes toward alcohol consumption (AOR: 2.18, 95% CI: 1.40–3.41).

Conclusion: AUD was more prevalent in rural areas than in urban areas. Lower education, smoking and permissive attitudes toward alcohol consumption were strongly associated with AUD. These findings underscored the need for targeted interventions particularly in rural areas to enhance awareness, promote healthier behaviours and address socioeconomic determinants of alcohol misuse.

Keywords: AUD, Kachin state, Urban and rural

1. Introduction

Alcohol use disorder (AUD) is a significant public health issue globally affecting an estimated 237 million men and 46 million women and contributing to approximately 3 million deaths annually [1]. In Southeast Asia, alcohol-related deaths and Disability-Adjusted Life Years (DALYs) have increased significantly in recent years highlighting the growing impact of AUD in the region [2]. Chronic alcohol consumption leads to numerous health problems including heart disease, liver cirrhosis, cancers and mental health disorders such as depression and anxiety [3]. The factors contributing to AUD are multifaceted including social norms, peer pressure and economic challenges particularly among men [4]. Excessive drinking can result in anterograde amnesias, temporary cognitive deficits, sleep disturbances, peripheral neuropathy, gastrointestinal issues, reduced bone density, impaired blood cell production and potential foetal alcohol syndrome [5].

Alcohol use is particularly prevalent with Myanmar reporting 54.6% of men aged 15 and above consuming alcohol [6]. Kachin State located in northern Myanmar, shares borders with China and is home to diverse ethnic groups with cultural practices that

include alcohol consumption. Despite the high prevalence of alcohol use in Myanmar, there is limited data on AUD in Kachin State especially among men who are at higher risk. The region faces unique challenges including political instability and language barriers which make conducting health research and interventions particularly difficult [7]. Moreover, comparing alcohol consumption patterns between rural and urban populations is important because these areas have different social, economic and cultural factors that influence drinking behaviours [8]. Understanding these differences helps in designing targeted interventions to address alcohol use disorder effectively in both settings. This study aimed to determine the prevalence of AUD compare alcohol consumption patterns between urban and rural populations and identify factors associated with AUD in the China-Myanmar border, Kachin state.

2. Methods

2.1 Study Area

The study was conducted in Kachin State, Myanmar and is divided into four districts and 13 townships. Among these, Waingmaw, Momauk and Mansi townships located along

the Myanmar-China border were selected for the study.

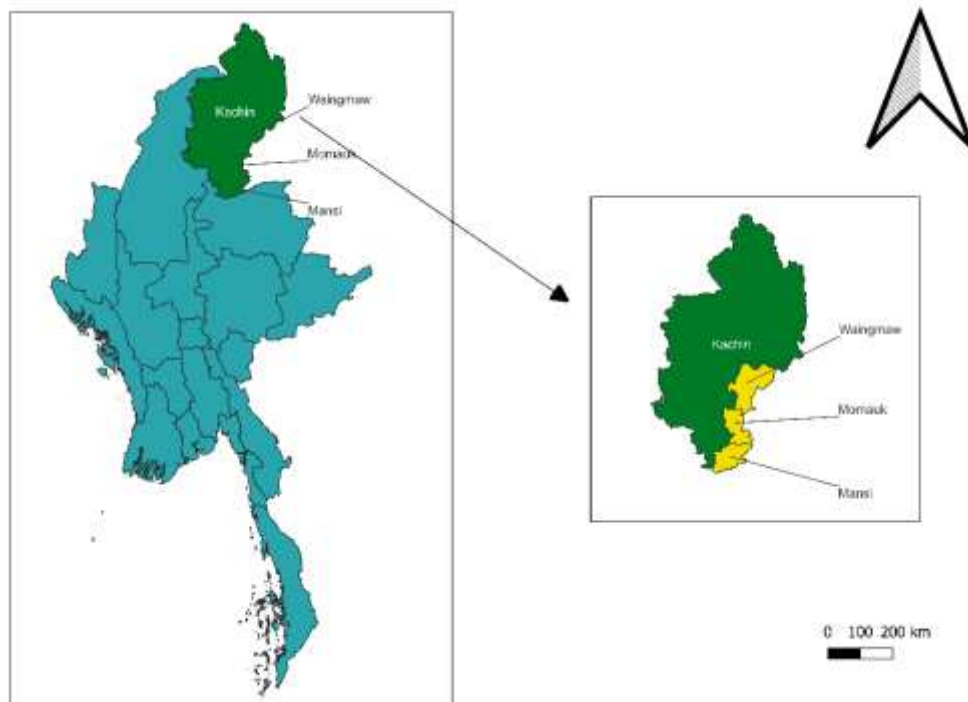


Figure 1: Study area map

2.2 Study Design and population

A cross-sectional analytical study was conducted to examine the prevalence and characteristics of alcohol use disorders among males (18 years and above) in Kachin State. The inclusion criteria for this study were males aged 18 years and above who had resided in the area for at least one year and were able to provide informed consent. Exclusion criteria included individuals with severe bedridden illnesses or mental disabilities that prevented them from giving informed consent as well as individuals who

could not communicate in either Burmese or Kachin.

2.3 Sample Size and Sampling

Sample size estimation was performed using the logistic regression formula by *Hsieh, Bloch and Larsen (1998)* [9] based on a study of alcohol consumption among Myanmar university students [10]. The sample size was calculated by considering the proportion of alcohol consumption among individuals with and without peer alcohol consumption, adjusting for clustering effects and using a

significance level of 0.05 and 80% power. The initial sample size was estimated to be approximately 94 participants using an unadjusted formula. After adjusting for clustering and design effects, the final sample size was calculated to be around 428 participants. This adjustment ensures that the sample size is sufficient to account for potential intra-cluster correlations providing adequate statistical power for the study. A multistage sampling method was employed to select participants from Waingmaw, Momauk, and Mansi townships. In the first stage, two villages were randomly selected from each township. In the second stage, a household listing was conducted in each selected village to create a sampling frame. From this list, households were randomly selected, and within each selected household, one male aged 18 years or above who had resided in the area for at least one year was randomly chosen to participate. This approach ensured that the sample was representative of the male population in each village, with random selection occurring at both the village and household levels.

2.4 Outcome Variables

The Alcohol Use Disorder Identification Test (AUDIT) was used to assess alcohol consumption patterns over the past year and

categorize participants based on their risk level. The AUDIT scores are divided into four categories: Low Risk Drinking (0-7 points) indicating no alcohol-related problems; Hazardous Drinking (8-15 points) suggesting occasional excessive drinking with potential risks; Harmful Drinking (16-19 points) indicating potentially harmful alcohol use and Probable Alcohol Dependence (20+ points) which suggests harmful consumption and the need for medical advice [11]. For the purpose of binary analysis, AUD was defined as an AUDIT score ≥ 8 which includes participants classified as Hazardous Drinking, Harmful Drinking and Probable Alcohol Dependence. Participants with an AUDIT score of 0-7 were considered to have no alcohol use disorder (low risk drinking). This dichotomization allowed for the examination of AUD as a binary outcome in the study.

2.4 Data Collection

Data were collected using structured questionnaires, which were pre-tested with 30 individuals from a neighbouring township to assess the reliability of the tool. The questionnaire including the AUDIT was reviewed by three experts to ensure content validity. The data collection tool was translated into both Myanmar and Kachin

languages, with certification from a language expert. While the Myanmar version of the AUDIT has been validated in previous studies, the Kachin version was not formally validated. To address potential language barriers, the Myanmar version of the AUDIT was administered with the assistance of trained bilingual field staff fluent in both Myanmar and Kachin languages, ensuring accurate understanding and responses from Kachin-speaking participants. The questionnaire covered topics such as alcohol consumption, health, demographics, and peer influences. The AUDIT demonstrated good internal consistency with a Cronbach's alpha of 0.86. Participants provided informed consent before the survey and completed questionnaires were reviewed daily for completeness and accuracy.

2.5 Data Analysis

Data were entered into STATA version 18.0 (College Station, Texas 77845 USA) for analysis. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize demographic data. The relationship between alcohol consumption and various factors was assessed using Generalized Linear Mixed Model (GLMM) with logistic regression. Variables with a bivariate association

($P < 0.25$) were included in the regression model, and Odds Ratios (ORs) with 95% Confidence Intervals (CIs) were calculated. A significance level of $P < 0.05$ was considered for all statistical tests.

3. Results

3.1 Sociodemographic and behavioural characteristics of Participants by residence (Urban vs Rural)

The study revealed significant differences between urban and rural residents across several sociodemographic and behavioural characteristics. Age distribution varied significantly ($P = 0.001$) with a higher proportion of individuals aged ≥ 50 years residing in rural areas (92.06%) compared to urban areas (7.94%). Educational attainment also showed a notable disparity ($P = 0.001$) as individuals with higher education levels (bachelor's degree and above) were more likely to reside in urban areas (67.50%) than in rural areas (37.21%) whereas those with no formal or primary education were predominantly from rural areas. Occupational differences were also evident ($P = 0.001$) with manual workers and day labourers being significantly more common in rural areas (70.90%) while urban residents had a higher proportion of factory workers

(56.18%) and private company employees or vendors (52.11%). Health-related behaviours showed significant rural-urban differences. Smoking was far more prevalent among rural residents ($P = 0.001$) with 80.10% of current smokers residing in rural areas compared to only 19.90% in urban areas. A similar pattern was observed for betel quid chewing ($P = 0.016$) where a higher proportion of former and current users were found in urban areas. Alcohol consumption also varied significantly ($P = 0.001$); while former alcohol users were more common in urban areas (64.10%), a larger proportion of current

alcohol users resided in rural areas. In terms of knowledge and attitudes towards alcohol consumption, urban residents demonstrated better knowledge of alcohol use disorder (AUD) ($P = 0.030$) with 49.44% scoring in the good knowledge category compared to 50.56% in rural areas. However, attitudes towards alcohol consumption differed significantly ($P = 0.001$) with a higher proportion of rural residents (70.59%) perceiving alcohol consumption as inappropriate whereas urban residents were more likely to be neutral or consider alcohol use appropriate (Table 1).

Table 1: Sociodemographic and behavioural characteristics of Participants by residence (Urban vs Rural) (n= 428).

Characteristics	Urban		Rural		P-value*
	n	%	n	%	
Age (years)					0.001
18-29	56	38.89	88	61.11	
30-39	67	47.86	73	52.14	
40-49	32	39.51	49	60.49	
≥50	5	7.94	58	92.06	
Marital Status					0.886
Single	44	37.93	72	62.07	
Married/Separated/Widowed	116	37.18	196	62.82	
Ethnicity					0.288
Kachin	152	36.89	260	63.11	
Burma	8	50.00	8	50.00	
Education Attainment					0.001
No formal education	4	16.00	21	84.00	
Primary school	7	14.89	40	85.11	
Middle school	36	36.00	64	64.00	
High school	86	40.38	127	59.62	
Bachelor's and above	27	67.50	16	37.21	
Occupation					0.001
Currently Unemployed	2	8.33	22	91.67	
Vender/ Private company	37	52.11	34	47.89	
Manual worker/ Day labour	71	29.10	173	70.90	
Factory worker	50	56.18	39	43.82	
Family Income (USD per month)					0.957
< 100	51	37.50	85	62.50	

Characteristics	Urban		Rural		P-value*
	n	%	n	%	
100-250	64	38.10	104	61.90	
251-500	26	34.67	49	65.33	
>500	19	38.78	30	61.22	
Number of Family members (person)					0.860
≤2	0	0	2	100.00	
3-5	87	38.67	138	61.33	
6-7	53	37.06	90	62.94	
≥8	20	34.48	38	65.52	
Family Expenditure (USD per month)					0.571
< 100	57	33.93	111	66.07	
100-250	65	38.01	106	61.99	
251-500	21	43.75	27	56.25	
>500	17	41.46	24	58.54	
Family's financial situation					0.146
Not enough with debts	19	45.24	23	54.76	
Not enough, but no debt	104	40.00	156	60.00	
Enough with no saving	27	30.00	63	70.00	
Enough with saving	10	27.78	26	72.22	
Smoking					0.001
Never	110	53.40	96	46.60	
Former	12	38.71	19	61.29	
Current	38	19.90	153	80.10	
Betel quid chewing					0.016
Never	143	35.66	258	64.34	
Former	7	58.33	5	41.67	
Current	10	66.67	5	33.33	
Alcohol consumption					0.001
Never	130	34.48	247	65.52	
Former	25	64.10	14	35.90	
Current	5	41.67	7	58.33	
Knowledge on AUD					0.030
Poor (<60%)	35	35.00	65	65.00	
Average (60-79%)	81	33.89	158	66.11	
Good (≥80%)	44	49.44	45	50.56	
Attitude on alcohol consumption					0.001
Not Appropriate (<60%)	70	29.41	168	70.59	
Neutral (60-79%)	88	47.06	99	52.94	
Appropriate (≥80%)	2	66.67	1	33.33	

*Chi-square test

3.2 Prevalence of Alcohol use disorder (AUDIT) with urban and rural area of the participants

Table 2 presented the prevalence of AUD among participants from urban and rural areas. The findings indicated a significantly

higher prevalence of AUD in rural areas compared to urban areas. Among rural participants, 45.52% (95% CI: 39.63–51.55%) had an AUDIT score of ≥8 indicating alcohol use disorder whereas only 30.63% (95% CI: 23.93–38.25%) of urban

participants met the same criteria. (69.38%, 95% CI: 61.75–76.07%) compared to rural participants (54.48%, 95% CI: 48.45–60.37%).

Table 2: Prevalence of Alcohol use disorder (AUDIT) with urban and rural area of the participants (n= 428).

AUDIT	Urban			Rural		
	n	%	95% CI	n	%	95% CI
Non-AUD (0-7)	111	69.38	61.75-76.07	146	54.48	48.45-60.37
AUD (≥8)	49	30.63	23.93-38.25	122	45.52	39.63-51.55

3.3 Bivariate analysis of factors associated with AUD along the Myanmar-China border Kachin State

The analysis revealed several significant factors associated with AUD. Age showed that individuals aged 40 years and older had a crude odds ratio (COR) of 1.72 (95% CI: 1.06-2.81) for AUD compared to those aged 18-29 years. Married individuals had a COR of 1.62 (95% CI: 1.01-2.60) for AUD compared to those who were single, separated or widowed. For education, those with no formal education or primary education had a COR of 2.15 (95% CI: 1.24-3.73) and those with secondary education had a COR of 2.00 (95% CI: 1.23-3.25) compared

to those with a high school or bachelor’s degree. Occupation also had an impact with currently unemployed individuals having a COR of 3.49 (95% CI: 1.35-9.06) for AUD, while manual workers or day labourers had a COR of 1.75 (95% CI: 1.01-3.05). Smoking was strongly associated with AUD with current or former smokers having a COR of 2.88 (95% CI: 1.83-4.55) compared to never smokers. Lastly, individuals with a neutral or appropriate attitude toward alcohol consumption had a COR of 2.18 (95% CI: 1.42-3.34) for AUD compared to those who considered alcohol consumption inappropriate (Table 3).

Table 3: Bivariate analysis of factors associated with AUD along the Myanmar-China border Kachin State (n=428).

Factors	Total Samples	% of AUD	Crude Odds Ratio	95%CI	P-value
Age (years)					0.079
18-29	144	34.03	1		
30-39	140	37.14	1.18	0.71-1.94	
≥40	144	48.61	1.72	1.06-2.81	
Marital Status					0.045
Single/Separated/ Widowed	116	31.90	1		
Married	312	42.95	1.62	1.01-2.60	
Ethnicity					0.168

Factors	Total Samples	% of AUD	Crude Odds Ratio	95%CI	P-value
Burma	16	18.75	1		
Kachin	412	40.78	2.49	0.68-9.09	
Education Attainment					0.003
High school/ bachelor's and above	256	32.42	1		
Secondary	100	49.00	2.00	1.23-3.25	
Primary & no formal education	72	54.17	2.15	1.24-3.73	
Occupation					0.038
Factory Worker	89	26.97	1		
Manual worker/ Day labour	244	45.08	1.75	1.01-3.05	
Vender/ Private company/company officer	71	33.80	1.27	0.63-2.55	
Currently Unemployed	24	54.17	3.49	1.35-9.06	
Family Income (USD per month)					0.845
< 100	136	40.44	1		
100-250	168	38.69	1.07	0.66-1.74	
251-500	75	38.67	1.08	0.59-1.96	
>500	49	44.90	1.37	0.69-2.72	
Number of Family members (person)					0.666
≤5	227	37.89	1		
6-7	143	42.66	1.21	0.78-1.89	
≥8	58	41.38	1.00	0.54-1.83	
Family Expenditure (USD per month)					0.518
< 100	168	39.29	1		
100-250	171	39.18	1.05	0.67-1.65	
251-500	48	37.50	1.11	0.56-2.22	
>500	41	48.78	1.72	0.84-3.52	
Family's financial situation					0.093
Enough	126	34.13	1		
Not enough	302	42.38	1.47	0.94-2.31	
Smoking					<0.001
Never	206	25.24	1		
Former / Current	222	53.60	2.88	1.83-4.55	
Betel quid chewing					0.484
Never	401	39.65	1		
Former/Current	27	44.44	1.34	0.59-3.03	
Knowledge on alcohol consumption					0.138
Poor	100	42.00	1		
Average & Good	328	39.33	1.45	0.89-2.36	
Attitude on alcohol consumption					<0.001
Not Appropriate	238	34.87	1		
Neutral & Appropriate	190	46.32	2.18	1.42-3.34	

3.4 Multivariable analysis of factors associated with AUD along the Myanmar-

China border Kachin State using GLMM with logistic regression

In the multivariable model, variables were selected based on the results of bivariable analysis. Variables with a P-value of < 0.25 in the bivariable analysis were considered for inclusion in the multivariable model. The final model was adjusted for potential confounding factors and only those variables that remained statistically significant in the multivariable analysis were retained. The analysis revealed several factors significantly associated with AUD. Education attainment showed that individuals with secondary education had an adjusted odds ratio (AOR) of 1.69 (95% CI: 1.01-2.84) and those with

no formal education or primary education had an AOR of 1.82 (95% CI: 1.03-3.22) compared to those with high school or bachelor’s degrees. Smoking was a strong predictor of AUD with former or current smokers having an AOR of 2.56 (95% CI: 1.61-4.06) compared to never smokers. Additionally, attitude towards alcohol consumption played a significant role as individuals who viewed alcohol consumption as neutral or appropriate had an AOR of 2.18 (95% CI: 1.40-3.41) compared to those who considered it inappropriate (Table 4).

Table 4: Multivariable analysis of factors associated with AUD along the Myanmar-China border Kachin State using GLMM with logistic regression (n=428).

Characteristics	Total Samples	% of AUD	COR	AOR	95% CI	P-value
Education Attainment						0.039
High school/ bachelor’s and above	256	32.42	1	1		
Secondary	100	49.00	2.00	1.69	1.01-2.84	
No formal education/ Primary	72	54.17	2.15	1.82	1.03-3.22	
Smoking						<0.001
Never	206	25.24	1	1		
Former / Current	222	53.60	2.88	2.56	1.61-4.06	
Attitude on alcohol consumption						<0.001
Not Appropriate	238	34.87	1	1		
Neutral & Appropriate	190	46.32	2.18	2.18	1.40-3.41	

4. Discussion

This study revealed a significant urban-rural disparity in the prevalence of AUD, with rural participants exhibiting a notably higher prevalence (45.52%) compared to their urban counterparts (30.63%). These findings

highlight the varying patterns of alcohol consumption between rural and urban areas. A potential explanation for the higher prevalence in rural regions could be limited access to healthcare services, alcohol-related interventions and lower levels of awareness



about alcohol-related risks. Rural regions face challenges such as fewer healthcare facilities and a lack of resources for prevention and treatment, which likely contribute to the elevated rates of alcohol misuse. In Myanmar, where healthcare resources are often concentrated in urban centres, it is crucial to enhance the availability and accessibility of alcohol-related services in rural areas. This could include mobile health units, community outreach programs, and telemedicine services that provide education and support to rural populations. In contrast, urban areas generally have better access to healthcare services and educational programs that may help reduce AUD prevalence. Additionally, alcohol consumption in urban settings may be more regulated and subject to social scrutiny, whereas rural areas may have more permissive attitudes toward alcohol consumption. To bridge the urban-rural gap, public health campaigns tailored to the cultural context of rural Myanmar could help shift attitudes toward alcohol and raise awareness of its risks.

When comparing our findings to international studies, we found that rural-urban disparities in AUD prevalence were more pronounced in our study than in others.

For instance, studies from India reported lower AUD rates in rural areas (30.3%) and urban areas (10.18%) [12, 13]. In contrast, studies from Greece and Ethiopia found even lower AUD prevalences with 3.1% and 13.1%, respectively [14, 15]. These differences could be attributed to cultural, socio-economic and healthcare factors that influence alcohol consumption patterns. In Myanmar, it is important to tailor interventions to account for local cultural norms surrounding alcohol consumption particularly in rural areas where drinking is often normalized in communal settings. Such interventions should focus on educating communities about the harms of excessive drinking while respecting local traditions and practices.

Our study also revealed a strong association between educational attainment and the likelihood of AUD. Individuals with lower educational levels including those with no formal or primary education were more likely to develop AUD compared to those with higher education. This aligned with previous literature that highlighted the protective effect of higher education which is linked to better health literacy and access to resources that promote healthier behaviours [16, 17]. Furthermore, lower educational levels are



often associated with socioeconomic challenges and limited access to health services which can increase vulnerability to AUD [18, 19]. In Myanmar, addressing educational disparities could involve expanding access to education especially in rural areas, and integrating alcohol-related education into school curricula. This could help increase awareness of the risks associated with alcohol consumption from an early age and reduce future alcohol misuse.

Additionally, smoking emerged as a significant predictor of AUD, with former and current smokers having a much higher risk of developing AUD. This finding is consistent with well-established evidence that smoking and alcohol consumption often co-occur due to shared neurobiological mechanisms and common social and environmental factors [20-23]. Given the high rates of smoking in Myanmar, public health interventions that simultaneously target smoking cessation and alcohol use would be particularly effective. Programs that combine smoking cessation with alcohol reduction could provide a more holistic approach to addressing these interrelated behaviours.

Finally, our study found that individuals who held neutral or positive attitudes toward

alcohol consumption were more likely to develop AUD. This finding emphasized the importance of addressing societal attitudes toward alcohol use in public health interventions. People who view alcohol consumption as socially acceptable may underestimate its risks, leading to higher levels of consumption [4, 24]. In Myanmar, public health campaigns should aim to challenge the cultural normalization of alcohol use, particularly in rural areas, and promote healthier attitudes towards drinking. These campaigns could incorporate local influencers such as religious leaders or community elders who can advocate for the harms of excessive drinking and promote healthier alternatives. In conclusion, the findings from this study highlighted significant factors influencing AUD, including rural residence, lower educational attainment, smoking and attitudes toward alcohol. Given the resource constraints and cultural norms in Myanmar, targeted interventions should focus on community-based approaches, mobile health services, and culturally sensitive public health campaigns that address the local context. These interventions should not only increase awareness but also improve access to treatment services particularly in rural areas, where the burden of AUD is most

pronounced. Additionally, integrated programs that address both smoking and alcohol use together as well as educational initiatives can play a critical role in reducing the overall prevalence of AUD in Myanmar.

This study provided valuable, region-specific data on AUD in Kachin State, Myanmar, an area with limited existing research particularly among men. The use of the validated AUDIT ensures reliable measurement of alcohol consumption patterns. A multistage sampling method allows for a representative sample from both urban and rural populations enhancing the generalizability of the findings within the region. The cross-sectional design captures a snapshot of current AUD prevalence while comparing urban and rural populations adds valuable insights into regional disparities. However, the cross-sectional nature of the study limits the ability to draw causal conclusions and the reliance on self-reported data may introduce recall bias. Additionally, the exclusion of female participants restricts the understanding of AUD in the broader population. Although the study's focus on Kachin State provides crucial insights, the findings may not be easily generalized to other regions due to the unique cultural, political and geographic characteristics of the

area. Language and literacy barriers particularly in rural areas could also affect the accuracy of responses. Finally, the ongoing political instability in Myanmar may have impacted data collection in certain areas limiting the overall reach of the study.

5. Conclusion

Nearly half of the rural participants had AUD, compared to one-third of urban participants highlighting a significant disparity. Lower education levels, smoking, and permissive attitudes toward alcohol consumption were key risk factors for AUD, underscoring the need for targeted interventions, particularly in rural communities. Enhancing educational opportunities, raising awareness about the harms of alcohol misuse, and promoting healthier lifestyle choices could help reduce the burden of AUD in these populations.

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Author Contribution

LKJ and KMH contributed to the study conception and design, data collection, data

analysis, and manuscript drafting. RKM contributed to study supervision, critical revision of the manuscript, and final approval of the version to be published. All authors read and approved the final manuscript.

Declaration

Ethical approval and consent to participate

The study was approved by the Centre of Ethics in Human Research, Khon Kaen University, Thailand (HE672255). Informed

consent was obtained from all participants ensuring they were fully aware of the study's objectives and implications. Participants' privacy was maintained and no information that could compromise their autonomy was published.

Competing interests

The authors declare that they have no competing interests.

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References

- [1] WHO. Global status report on alcohol and health and treatment of substance use disorders. 2024.
- [2] Sornpaisarn B, Shield K, Manthey J, Limmade Y, Low WY, Van Thang V, et al. Alcohol consumption and attributable harm in middle-income South-East Asian countries: Epidemiology and policy options. *International Journal of Drug Policy*. 2020;83:102856.
- [3] Obad A, Peeran A, Little JI, Haddad GE, Tarzami ST. Alcohol-mediated organ damages: heart and brain. *Frontiers in pharmacology*. 2018;9:81.
- [4] Sudhinaraset M, Wigglesworth C, Takeuchi DT. Social and Cultural Contexts of Alcohol Use: Influences in a Social-Ecological Framework. *Alcohol Res*. 2016;38(1):35-45.
- [5] Yang W, Singla R, Maheshwari O, Fontaine CJ, Gil-Mohapel J. Alcohol Use Disorder: Neurobiology and Therapeutics. *Biomedicines*. 2022;10(5).
- [6] Knodel J, Pothisiri W. Smoking and drinking behaviors among older adults: a comparative analysis of three Southeast Asian countries. *Journal of Cross-Cultural Gerontology*. 2021;36(4):369-86.
- [7] Debarre A. Delivering healthcare amid crisis: the humanitarian response in Myanmar: *International Peace Institute*.; 2022.
- [8] Dixon MA, Chartier KG. Alcohol Use Patterns Among Urban and Rural Residents: Demographic and Social Influences. *Alcohol Res*. 2016;38(1):69-77.
- [9] Hsieh FY, Bloch DA, Larsen MD. A simple method of sample size calculation for linear and logistic regression. *Statistics in medicine*. 1998;17(14):1623-34.
- [10] Htet H, Saw YM, Saw TN, Htun NMM, Lay Mon K, Cho SM, et al. Prevalence of alcohol consumption and its risk factors among university students: A cross-sectional study across six universities in Myanmar. *PLoS One*. 2020;15(2):e0229329.
- [11] Reinert DF, Allen JP. The alcohol use disorders identification test (AUDIT): a review of recent research. *Alcoholism: Clinical and Experimental Research*. 2002;26(2):272-9.
- [12] Sau A. AUDIT (Alcohol Use Disorders Identification Test) to estimate the pattern and correlates of alcohol consumption among the adult population of west Bengal, India: A community based cross-sectional study. *Journal of clinical and diagnostic research: JCDR*. 2017;11(4):LC01.
- [13] Katyaj R, Bansal R, Goel K, Sharma S. An epidemiological study on association between alcohol and tobacco use in an urban slum of Meerut. *Natl J Community Med*. 2013;4:30-4.

- [14] Bellos S, Petrikis P, Malliori M, Mavreas V, Skapinakis P. Prevalence of alcohol use disorders and their association with sociodemographic determinants and depression/anxiety disorders in a representative sample of the Greek general population. *Psychiatry journal*. 2020;2020(1):4841050.
- [15] Birhanu A, Mekuria M. Prevalence of alcohol use disorders and associated factors among ambo town community, central ethiopia: a community based cross-sectional study. *J Addict Res Ther*. 2019;10(4):1000389.
- [16] Collins SE. Associations Between Socioeconomic Factors and Alcohol Outcomes. *Alcohol Res*. 2016;38(1):83-94.
- [17] Okan O, Rowlands G, Sykes S, Wills J. Shaping Alcohol Health Literacy: A Systematic Concept Analysis and Review. *Health Lit Res Pract*. 2020;4(1):e3-e20.
- [18] Rosoff DB, Clarke T-K, Adams MJ, McIntosh AM, Davey Smith G, Jung J, et al. Educational attainment impacts drinking behaviors and risk for alcohol dependence: results from a two-sample Mendelian randomization study with~ 780,000 participants. *Molecular psychiatry*. 2021;26(4):1119-32.
- [19] Lasserre AM, Imtiaz S, Roerecke M, Heilig M, Probst C, Rehm J. Socioeconomic status, alcohol use disorders, and depression: A population-based study. *Journal of Affective Disorders*. 2022;301:331-6.
- [20] Crews FT, Vetreno RP, Broadwater MA, Robinson DL. Adolescent Alcohol Exposure Persistently Impacts Adult Neurobiology and Behavior. *Pharmacol Rev*. 2016;68(4):1074-109.
- [21] Sontate KV, Rahim Kamaluddin M, Naina Mohamed I, Mohamed RMP, Shaikh MF, Kamal H, et al. Alcohol, Aggression, and Violence: From Public Health to Neuroscience. *Front Psychol*. 2021;12:699726.
- [22] Cohn A, Ehlke S, Cobb CO. Relationship of nicotine deprivation and indices of alcohol use behavior to implicit alcohol and cigarette approach cognitions in smokers. *Addict Behav*. 2017;67:58-65.
- [23] Bold KW, Rosen RL, Steinberg ML, Epstein EE, McCrady BS, Williams JM. Smoking characteristics and alcohol use among women in treatment for alcohol use disorder. *Addictive behaviors*. 2020;101:106137.
- [24] Pramaunururut P, Anuntakulnathee P, Wangroongsarb P, Vongchansathapat T, Romsaithong K, Rangwanich J, et al. Alcohol consumption and its associated factors among adolescents in a rural community in central Thailand: a mixed-methods study. *Sci Rep*. 2022;12(1):19605.

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