

## Patterns of tobacco and alcohol misuse among presumptive TB Patients in Myanmar: prevalence and sociodemographic associations

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### ABSTRACT

This study aimed to assess the prevalence and patterns of tobacco and alcohol use and the associations with socio-demographic variables among presumptive TB patients.

A cross-sectional study was conducted among 397 presumptive TB patients in a tertiary hospital in Myanmar. Global Adult Tobacco Survey (GATS) questionnaire and AUDIT-C were used to measure daily tobacco use (single, any or dual use of smoked and smokeless tobacco) and harmful alcohol use, respectively. Multiple and multinomial logistic regression were used to examine the associations with socio-demographic factors.

The prevalence of daily use of dual tobacco and any tobacco was 28.2% and 65.7%, respectively. Harmful alcohol use was also high (44.8%). While single use of daily tobacco and harmful alcohol was 28.2% and 7.3%, respectively, concurrent tobacco and alcohol use was 37.5%. While being male and having low education were associated with tobacco use, concurrent tobacco and harmful alcohol use were associated with male gender, low education, and occupation with the government or a company.

Due to the high prevalence of tobacco and alcohol misuse, identifying those at risk of tobacco and alcohol misuse and providing integrated care services in a health facility should be considered as a joint activity in national TB and tobacco control programmes.

Keywords: tobacco, alcohol, presumptive TB patients

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### INTRODUCTION

The burden of tuberculosis (TB) is now decreasing globally with dramatic falls in the number of people dying from TB, but it remains very high in the Southeast Asia Region.<sup>1</sup> Myanmar is one of the world's 22 high TB burden countries and also one of the 5 highest TB incidence countries in the Southeast Asia Region.<sup>2</sup> TB incidence and mortality in 2016 were 361 and 47, respectively, per 100,000 people in the region.<sup>3</sup>

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Misuse of substances, such as alcohol<sup>4,5</sup> and tobacco,<sup>6</sup> which is the dominant risk factor for TB among tuberculin-positive individuals or those at high risk of infection,<sup>7-9</sup> is also very high in Myanmar. For example, the prevalence of smoking is rather on the rise from 29.7 % in 2009 to 43.2 % in 2014.<sup>10</sup> A recent study in Myanmar showed that former or current smokers were 30% of TB index cases and 18.4% of household contacts and passive smokers were also relatively high 12.5% and 33.9%, respectively. Current or passive smokers among household contacts were associated with positive TB.<sup>8</sup> Another type of tobacco, namely smokeless tobacco (SLT), which contains nicotine and is highly addictive, is produced locally and is frequently used at social customs and religious events in Myanmar.<sup>11</sup> The percentage of SLT among adults aged 15 or higher in Myanmar in 2014 is the highest in the Southeast Asia Region (24.1% female, 62.2% male, and 43.2% total).<sup>12</sup> Furthermore, SLT can be substituted for cigarettes where smoking is prohibited. An Indian study noted that TB patients who were advised to quit smoking shifted to SLT after completion of TB treatment as a form of harm reduction, and the relapse rate of tobacco use at 6 months after the completion of treatment was higher for SLT (52%) than for smoking (36%).<sup>13</sup> Despite a less clear association of SLT with TB,<sup>7</sup> SLT and smoking should be considered in tobacco cessation programmes to control TB in a country like Myanmar where SLT is easily available and perceived to be less harmful to health. Moreover, dual users, that is, people who both smoke and use SLT, have emerged as a high-risk group for tobacco dependence<sup>14,15</sup> and tobacco related-harm due to a more prolonged increase in total tobacco consumption.<sup>15</sup> They are thus considered as heterogeneous groups of tobacco users who are at a greater risk of continued tobacco use.<sup>16</sup>

In light of alcohol use, unrecorded forms of alcohol like home-brewed wine and spirits are regularly consumed and the consumption rate in Myanmar is increasing.<sup>17</sup> People who drink alcohol have increased risk of active TB infection, probably because of their increased risk of exposure to people with infectious TB disease in specific settings, such as bars, restaurants, and social institutions.<sup>18,19</sup> About 10% of people living with HIV (PLHIV) drink alcohol daily,<sup>20</sup> and alcohol consumption is an independent risk factor for prevalent TB among PLHIV<sup>20</sup> and among household contacts.<sup>8</sup>

The combined use of tobacco (smoking and/or SLT) and alcohol has become a widespread phenomenon and a major public health concern the world over, including Myanmar. Such tobacco and alcohol misuse further weakens the immune system and increases the risk of TB treatment failure, relapse and death.<sup>21,22</sup> In addition, there are concerns that the use of one substance, for example, alcohol, can serve as a gateway toward the use of tobacco or other substances.<sup>23</sup> Frequent risky drinkers smoked more cigarettes per day and had greater temptations to smoke in positive affective/social situations.<sup>24</sup> It is too difficult to quit both alcohol and tobacco, and an attempt to quit tobacco might adversely affect the patient's recovery from alcoholism. A recent prospective cohort study in Singapore among 63,257 adults aged 45–74 years showed that, compared with those who neither smoked nor drank, the risk of active TB increased from 1.82 (95% CI 1.57 to 2.10) among current smokers who were non-drinkers to 3.16 (95% CI 2.35 to 4.24) among current smokers who also had two or more drinks daily (p for interaction=0.08).<sup>25</sup>

Although prompt identification of tobacco and alcohol use and its cessation services are critical for improving the clinical outcomes of TB patients, its role in reducing the burden of TB seems minimal as intervention is directed only for TB patients. Since community-based tobacco control strategies are resource intensive, efforts in tobacco and alcohol control in presumptive TB patients in a health facility may be a good alternative option to reduce the number of TB incident cases.<sup>26</sup> Nonetheless, there are limited studies on prevalence and patterns of tobacco (smoking and also SLT) and alcohol use among either presumptive or confirmed TB patients in Southeast Asia Region. The objectives of the present study are thus to assess the prevalence

of types of tobacco (smoking and/or SLT) and alcohol use and also exclusive and concurrent use of tobacco and alcohol among presumptive TB patients and to examine the association with socio-demographic variables. This could be important in making a new policy to prevent and control TB and may, therefore, help reduce the global TB burden.<sup>21,27</sup>

## MATERIALS AND METHODS

### *Study Design and Participants*

A hospital-based cross-sectional study was conducted at a tertiary care hospital in Taungoo Township, Myanmar, in April 2017. Taungoo, the study area, is located in the Bago Region, which is situated in the southern central part of Myanmar. It covers an area of 1,717.6 square kilometers with a total population of 262,056 people (47.8 % male and 52.2 % female), the majority (58.6 %) of which reside in rural areas.<sup>28</sup> Among 8 hospitals (4 not-for-profit public hospitals and 4 private and for-profit hospitals) in Taungoo, Taungoo General Hospital, the biggest not-for-profit public tertiary hospital in Taungoo, takes part in a huge TB campaign and performs TB screening and treatment in Taungoo, all organized by the Department of Public Health under the Ministry of Health and Sports. Regular screening cases per day was 15–25 patients.

The sample size (n=368) was calculated using a confidence interval (CI) of 95%, an acceptance error of 5% and a proportion of current tobacco smoking of 40% according to outpatient department (OPD) data of Taungoo General Hospital, in September 2016. The sample size was increased by 10% to allow for any incomplete data occurring during the data collection; the required sample size was 400 presumptive TB patients aged 18 years and above who attended the TB department. A total of 400 presumptive patients, previously called TB suspects, who were defined by having either cough, fever or chest pain for more than 2 weeks, were invited by convenience sampling. Written informed consent was obtained from all the participants after the study objectives were explained to them and they were assured of the confidentiality of their identity and that choosing not to participate would not disadvantage them in any way. Face-to-face interviews were conducted by researchers and trained research assistants to complete the structured questionnaire. Researchers wore effective devices like N-95 masks to protect against disease transmission while interviewing participants in separate, well-ventilated rooms with good lighting at the TB department at the Taungoo General Hospital. The study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects were approved by the Human Research Ethics Committee of Mahidol University, Thailand (Approval No.: 2017/056.1403). All data were treated anonymously with study identification numbers. Those with no information on tobacco or alcohol (n=3) were excluded from the analyses (total n=397).

### *Measure of tobacco use*

The prevalence of tobacco use was obtained based on Global Adult Tobacco Survey (GATS).<sup>29</sup> The primary outcomes for this analysis were self-reported daily smoking and SLT use. Smoking included cigarettes, hand roll cheroots, cigars, pipes, kreteks and other smoked tobacco products. SLT included chewing tobacco with betel nuts, snuff, dipping tobacco and other SLT products. Three questions for each smoking and SLT were asked, “Do you currently smoke tobacco on a daily basis, less than daily, or not at all?” They were asked, “Have you smoked tobacco daily in the past?” with Yes or No responses, and, “In the past, have you smoked tobacco on a daily basis, less than daily, or not at all?” According to the GATS guidelines,<sup>29</sup> current daily users of smoked tobacco and SLT were categorized. Dual tobacco use and any tobacco use were defined

as daily users of both smoked tobacco and SLT and as daily users of either smoked tobacco or SLT. In consideration of the number of intensive substances (tobacco and harmful alcohol use) used, no tobacco and alcohol use, exclusive tobacco use, exclusive harmful alcohol use and concurrent use were classified. Concurrent alcohol and tobacco use was defined as any tobacco use on a daily basis and harmful alcohol use.

#### *Measure of harmful alcohol use*

Alcohol consumption over the last year was measured with the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C),<sup>30,31</sup> which consists of the first 3 questions of the full 10-item AUDIT measuring only i) frequency of drinking, ii) quantity consumed on a typical occasion, and iii) frequency of heavy episodic drinking. Each AUDIT-C questions have 5 response options and total scores range from 0–12. In men, a score of 5 or more is considered indicative of harmful alcohol drinking and at higher values also of alcohol use disorder; the corresponding score in women is 4 or more. Cronbach's alpha internal consistency indicator was used to estimate the reliability of the 3-item scale of AUDIT-C ( $\alpha = 0.77$ ) in this study.

#### *Sociodemographic variables*

The following sociodemographic characteristics were selected as possible correlating factors on tobacco and alcohol use among presumptive TB patients: gender, age groups (18–34, 35–59, and 60 years and above), monthly household income by tertiles (<160,000 Myanmar Kyat [MMK], 160,000–239,999 MMK, and 240,000 MMK and above), education level (primary, middle, and high school level education), occupation (government/company staff, self-employed, and farmers/laborers/others).

#### *Data analysis*

Descriptive statistics were used to present the number and proportion of general subject characteristics and outcome variables. Chi-square tests were used to identify differences in proportions of the categories of socio-demographic factors by types of tobacco and alcohol use. Associations between socio-demographic factors and types of tobacco and alcohol use were examined by multiple logistic regression. A multinomial logistic regression model was fitted to explore socio-demographic factors associated with different numbers of tobacco and alcohol use. Dependent variables were single substance use (either any daily tobacco use or harmful alcohol use) and concurrent tobacco and alcohol use, and the comparison group were those with no substance use. Adjusted odds ratios (AOR) and 95 % confidence intervals (CIs) after adjustment for covariates were estimated and presented. All statistical analyses were done in SAS 9.4 (SAS Institute, Cary, NC).

## RESULTS

More than half of the presumptive TB patients were male, aged 35–60 years, farmers, self-employed and of low education (no formal education or only primary school) (Table 1). Nearly half of the respondents reported daily use of smoked tobacco (45.8%) and SLT (48.1%). Those with any daily tobacco use were 65.7% (80.6% for men and 34.9% for women), and those with dual tobacco daily use were 28.2% (39.9% and 3.9% for men and women, respectively). In the associations with socio-demographic factors, daily use of smoked tobacco, SLT and any tobacco were associated with being male and of a low education level, while daily dual tobacco use and harmful alcohol drinking were only associated with the male gender.

## Prevalence and patterns of substance misuse

**Table 1** Association with socio-demographic determinants of substance use patterns among presumptive TB patients

	Total n (%)	Types of tobacco use						Harmful alcohol use <sup>1)</sup> % aOR (95% CI)			
		Daily smoking		Daily SLT use		Dual tobacco use			Any tobacco use		
		%	aOR (95% CI)	%	aOR (95% CI)	%	aOR (95% CI)		%	aOR (95% CI)	
Prevalence	397 (100)	45.8	48.1	28.2	65.7	44.8					
Sex											
Male	268 (67.5)	62.3	<b>13.9 (7.47-26.0)</b>	58.2	<b>4.22 (2.59-6.86)</b>	39.9	<b>18.6 (7.26-47.8)</b>	80.6	<b>9.15 (5.43-15.4)</b>	60.8	<b>11.5 (6.28-21.2)</b>
Female	129 (32.5)	11.6	1.00	27.1	1.00	3.9	1.00	34.9	1.00	11.6	1.00
Age groups											
18-34	134 (33.8)	39.6	0.92 (0.39-2.18)	46.3	1.32 (0.62-2.81)	26.9	1.95 (0.76-4.99)	59.0	0.76 (0.33-1.74)	44.0	2.04 (0.85-4.90)
35-59	214 (53.9)	50.9	1.00 (0.44-2.25)	50.0	1.16 (0.57-2.34)	30.8	1.63 (0.67-3.95)	70.1	0.83 (0.38-1.82)	50.0	1.95 (0.86-4.45)
≥ 60	49 (12.3)	40.8	1.00	44.9	1.00	20.4	1.00	65.3	1.00	24.5	1.00
Income (1,000 Kyat)											
<160	130 (32.8)	38.5	1.83 (0.99-3.40)	51.5	0.92 (0.53-1.60)	26.2	1.33 (0.69-2.56)	63.9	1.36 (0.73-2.56)	39.2	0.63 (0.34-1.16)
160-239	132 (33.3)	53.0	<b>2.13 (1.11-4.08)</b>	44.7	0.81 (0.45-1.47)	31.1	1.65 (0.84-3.25)	66.7	1.06 (0.53-2.09)	45.5	<b>0.51 (0.26-0.99)</b>
≥240	135 (34.0)	45.9	1.00	48.2	1.00	27.4	1.00	66.7	1.00	49.6	1.00
Education											
Primary school -	183 (46.1)	49.7	<b>2.33 (1.14-4.78)</b>	55.2	<b>3.04 (1.55-5.96)</b>	33.9	2.09 (0.98-4.47)	71.0	<b>5.00 (2.31-10.8)</b>	38.8	1.20 (0.60-2.43)
Middle school	111 (28.0)	48.7	1.62 (0.85-3.10)	1.4	<b>2.06 (1.12-3.78)</b>	27.0	1.26 (0.62-2.57)	73.0	<b>3.46 (1.72-6.96)</b>	55.0	1.53 (0.80-2.91)
High school +	103 (25.9)	35.9	1.00	32.0	1.00	19.4	1.00	48.5	1.00	44.7	1.00
Occupation											
Government/company	75 (18.9)	46.7	1.00	37.3	1.00	21.3	1.00	62.7	1.00	54.7	1.00
Self-employed	113 (28.5)	41.6	0.92 (0.39-2.16)	49.6	1.30 (0.59-2.89)	25.7	1.51 (0.60-3.80)	65.5	0.82 (0.33-2.07)	47.8	0.59 (0.25-1.38)
Farmers/Labor/others	209 (52.6)	47.9	1.29 (0.55-3.03)	51.2	1.09 (0.49-2.44)	32.1	2.22 (0.89-5.50)	67.0	0.61 (0.24-1.56)	39.7	0.56 (0.24-1.31)

1) Alcohol use over the last year was measured with the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C). In men, a score of 5 or more is considered indicative of harmful alcohol drinking and at higher values also of alcohol use disorder; the corresponding score in women is 4 or more. The aORs presented adjusted ORs after adjustment of all the variables listed in the tables.

**Table 2** Prevalence of substance use by the exclusive and concurrent use of tobacco and alcohol among presumptive TB patients (n=397)

Number of substance use	Harmful alcohol	Daily use of tobacco		n	%	(95% CI)
		SLT	Smoking			
No substance use	-	-	-	107	27.0	(22.6-31.4)
Daily tobacco use (28.2%)	-	+	-	52	13.1	(9.8-16.4)
	-	-	+	23	5.8	(3.5-8.1)
Harmful alcohol use <sup>1)</sup> (7.3%)	-	+	+	37	9.3	(6.4-12.2)
	+	-	-	29	7.3	(4.7-9.9)
Concurrent substance use (37.5 %)	+	+	-	27	6.8	(4.3-9.3)
	+	-	+	47	11.8	(8.6-15.0)
	+	+	+	75	18.9	(15.0-22.8)

1) Alcohol use over the last year was measured with the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C). In men, a score of 5 or more is considered indicative of harmful alcohol drinking and at higher values also of alcohol use disorder; the corresponding score in women is 4 or more.

In Table 2, the prevalence of exclusive use of tobacco and alcohol and its concurrent use among presumptive TB patients was 35.5% (7.3% harmful alcohol use only and 28.2% daily tobacco use only) and 37.5%, respectively.

Table 3 shows the AOR and 95% CI for exclusive use of tobacco and alcohol and its concurrent use relative to neither tobacco nor alcohol use for the socio-demographic covariates considered in the multinomial logistic regression analysis. Compared with female respondents, male respondents were 6.78 times and 8.91 times more likely to be daily tobacco users and harmful alcohol users, respectively, and 26.7 times more likely to be concurrent alcohol and tobacco users. Those with lower education, compared to high school or higher education, were more likely to be daily users of tobacco (AOR=5.21, 95% CI=1.95-13.9 for middle school and AOR=10.0, 95% CI=3.48-28.6 for primary school or less) and concurrent users of tobacco and alcohol (AOR=3.97, 95% CI=1.49-10.6 for middle school and AOR=3.98, 95% CI=1.32-12.0 for primary school or less). Compared with farmers, laborers, or others, those working for the government or companies were 3.83 times more likely to be concurrent tobacco and harmful alcohol users.

**Table 3** Multinomial logistic regression models of the exclusive and concurrent use of tobacco and alcohol among presumptive TB patients

	No substance use			Tobacco use			Harmful alcohol use			Concurrent tobacco and alcohol use		
	%	%	aOR (95% CI)	%	aOR (95% CI)	%	aOR (95% CI)	%	aOR (95% CI)	%	aOR (95% CI)	
<b>Sex</b>												
Male	15.5	38.7	<b>6.78 (3.52–13.1)</b>	11.3	<b>8.91 (3.31–24.0)</b>	34.5	<b>26.7 (10.5–68.0)</b>					
Female	60.2	28.9	1.00	5.5	1.00	5.5	1.00					
<b>Age groups</b>												
18–35	41.9	29.5	0.74 (0.28–1.92)	10.5	1.35 (0.28–6.49)	18.1	0.73 (0.21–2.63)					
35–59	28.8	34.1	0.63 (0.26–1.51)	8.8	0.96 (0.22–4.27)	28.2	0.93 (0.29–3.02)					
≥ 60	29.8	48.9	1.00	6.4	1.00	14.9	1.00					
<b>Income (1,000 Kyat)</b>												
<160	35.5	38.3	0.79 (0.36–1.74)	8.4	0.75 (0.23–2.47)	17.8	0.46 (0.18–1.17)					
160–239	29.4	36.7	1.05 (0.42–2.61)	11.0	0.93 (0.24–3.62)	22.9	0.39 (0.13–1.15)					
≥240	34.9	29.3	1.00	7.6	1.00	28.3	1.00					
<b>Education</b>												
Primary school –	27.5	47.7	<b>10.0 (3.48–28.6)</b>	8.1	2.82 (0.71–11.2)	16.8	<b>3.98 (1.32–12.0)</b>					
Middle school	27.1	31.8	<b>5.21 (1.95–13.9)</b>	8.2	2.10 (0.60–7.43)	32.9	<b>3.97 (1.49–10.6)</b>					
High school +	48.9	15.9	1.00	11.4	1.00	23.9	1.00					
<b>Occupation</b>												
Government/company	31.8	22.2	1.69 (0.47–5.99)	12.7	1.81 (0.35–9.45)	33.3	<b>3.83 (1.01–14.6)</b>					
Self-employed	37.5	29.6	1.21 (0.52–2.80)	6.8	0.85 (0.24–3.00)	26.1	1.39 (0.53–3.62)					
Farmers/Labor/others	31.6	42.1	1.00	8.8	1.00	17.5	1.00					

1) Reference: neither tobacco nor alcohol use

The aORs presented adjusted ORs after adjustment of all the variables listed in the tables.

## DISCUSSION

This study is, to our knowledge, the first study to identify types of tobacco, such as smoking and/or SLT, and the combined use with alcohol among presumptive TB patients. Nearly half reported daily use of smoking (45.8%) and SLT (48.1%), which is higher in comparison with 2014 national estimates (20.7% and 30%, respectively) among adults aged 25–64 years.<sup>32</sup> While exclusive smokers and SLT users were 17.6% and 19.9%, respectively, the percentage of daily dual tobacco users was high (28.2% in total, 39.9% in men, and 3.9% in women) in line with a review study showing that Myanmar had the highest prevalence of current dual tobacco use in both men (31%) and women (13%), compared to other countries in South-east Asia.<sup>33</sup> Furthermore, this study reported a high prevalence of harmful alcohol use (about 45%) and concurrent use of alcohol with tobacco (37.5% for alcohol with any tobacco and 18.9% for alcohol with dual tobacco use). This study noted a higher prevalence of concurrent tobacco and alcohol use than the exclusive use of either any tobacco or harmful alcohol. It may imply the need to address poly-substance use, which may hinder successful TB treatment.

With regard to associations with sociodemographic factors, this study revealed strong associations of male gender and low education with tobacco use, regardless of type of tobacco, which agrees with other studies,<sup>34,35</sup> and an association of male gender with harmful alcohol use. The differences in gender and education were larger in poly-substance use, as it was shown that the proportions of dual tobacco use and concurrent tobacco and alcohol use were much higher in men of low education. Interestingly, low income was found to have a positive association with daily smoking but an inverse association with harmful alcohol use in this study. Furthermore, concurrent tobacco and harmful alcohol users were higher among those working for the government or a company, compared to those in other occupations, such as self-employment, farming or manual labor. This may be partly explained by the fact that men, particularly those working for the government or companies, drink after work to relieve stress with their colleagues and smoke more when drinking alcoholic beverages. This study did not present an association with age, which is consistent with results from Myanmar DHS 2015–16 showing that there was no difference in either smoking or SLT use by age groups among men, while smoking increased with age among women.<sup>35</sup> Effective campaigns to discourage use of alcohol and tobacco to prevent TB infection and treat TB disease are needed, particularly for men and those with low education in the community and those at worksites.

A few things should be considered in interpreting the present study results. Firstly, as the data were collected using convenience sampling at a tertiary hospital in Taungoo Township, Myanmar, the sample may not be representative of presumptive TB patients. Furthermore, the information on tobacco and alcohol use, which relied on self-report, may be subject to recall bias. Next, this study did not consider the time frame in which the alcohol is consumed. While a few drinks a day may not have a huge effect, consuming too much alcohol for too long can be damaging to health. Thus, the results of this study may help us to understand the tobacco and alcohol use profile of presumptive TB patients. Also, as this study did not cover other illicit substances, further research is warranted.

Despite the limitations, these findings have implications for TB control strategies, particularly in countries where a high proportion of TB can be attributed to tobacco and alcohol use. A Taiwan cohort study showed that smoking cessation reduces the risk of TB as well as TB mortality by a third.<sup>36</sup> In Myanmar, TB control efforts still rely heavily on treatment-based control minimally integrated with tobacco cessation.<sup>37</sup> Tobacco cessation services are not integrated into primary health care, and no provision is made for tobacco cessation counselling for TB patients even when they are found to be tobacco users.<sup>38</sup> Thus, proactive tobacco control, such as universal



access to counselling and tobacco cessation services for all people including those with active and presumptive TB,<sup>38</sup> and heavier taxation<sup>39</sup> should be done in Myanmar. In addition, screening for alcohol misuse is rarely done in a health facility and much far less for TB control. A study has noted that, as occasional and daily smokers were at a greater risk of being diagnosed as harmful drinkers, smoking status can be an indicator for alcohol screening.<sup>40</sup> Thus, screening for alcohol use should be recommended after diagnosis of tobacco use in a health facility. Identifying users of tobacco smoking, SLT and alcohol in a health facility and providing an integrated tobacco and alcohol cessation service in national TB programme (NTP) modules, as well as TB diagnosis and management in tobacco control modules,<sup>38</sup> can be a short-term alternate option.

## CONCLUSION

This study has provided important information regarding the prevalence and patterns of tobacco and alcohol use among presumptive TB patients in Myanmar, which is one of the world's high TB burden countries. The study has demonstrated a high prevalence of daily use of dual tobacco and harmful alcohol use among presumptive TB patients. Furthermore, the prevalence of concurrent alcohol and tobacco use was greater than single tobacco use without harmful alcohol drinking and harmful alcohol use without tobacco use. While tobacco use was associated with male gender and low education, concurrent tobacco and harmful alcohol use were associated with male gender, low education and occupation with the government or a company. These findings have implications for TB control strategies and implementation of TB programmes, pressing the need to address harmful alcohol as well as tobacco, particularly in countries where a high proportion of TB is attributed to tobacco and alcohol misuse.

## DISCLOSURE STATEMENT

None of the authors has any conflicts of interest to declare in relation to this work.

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