

Original Research Article

Knowledge, attitude, practice, cardiovascular risk and current tobacco use among adults in Pyin Oo Lwin Township, Mandalay Region, Myanmar

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ABSTRACT

Background: Tobacco consumption is a major health risk behavior in Myanmar, a low-income country in Southeast Asia. The lack of effective policy and public health measures causes many chronic diseases leading to premature mortality. This study was conducted to determine the prevalence of smoking and smokeless tobacco use, the association between socio-demographic characteristics, knowledge, and attitudes about tobacco use, and current tobacco use, and the relationship between Framingham cardiovascular disease risk and different types of tobacco use among adults in Pyin Oo Lwin, Myanmar.

Methods: A cross-sectional study was conducted among 430 adults aged 18 years and older, both genders, in Pyin Oo Lwin, Myanmar.

Results: The mean age was 40.2 years and 70.5% were male. Tobacco consumption is common in the form of smoking (39.5%) and smokeless tobacco use (32.6%). Among the current smokers and current smokeless tobacco users, the majority were male (97.1% and 85.0% respectively). Men had 13 times the odds of being current tobacco users compared to women. Gender, education, occupation, and attitude toward tobacco use were identified as significant factors of current tobacco use ($p < 0.050$). Current exclusive smokers are 6.15 times more likely to have cardiovascular diseases compared to non-current users ($OR = 6.149$, $p < 0.001$).

Conclusions: Health education campaigns should be conducted to change the attitude toward tobacco use among adults in Myanmar. Smoking cessation, regular physical activity, and reduced alcohol and salt intake should be encouraged to prevent cardiovascular disease.

Keywords: Tobacco use, Adults, Cardiovascular risk, Pyin Oo Lwin, Myanmar

INTRODUCTION

Tobacco use can cause many chronic diseases which lead to premature mortality. In Asia, tobacco use is still a major public health problem.¹

According to the results of the pooled meta-analysis which was based on studies in the Asia cohort consortium between September 2017 and March 2018, increased lung cancer mortality among Asian men was associated with tobacco smoking.¹

In the Myanmar demographic and health survey (2015-2016), 47% of men aged 15-49 years who live in urban areas used tobacco while 48.6% of men who live in rural areas used tobacco.² Moreover, 1.3% of women aged 15-49 living in urban areas used tobacco while 5% of women living in rural areas used tobacco products.² Most women in Myanmar aged between 15-49 (96%) do not use tobacco products. Myanmar had the second highest smoking rate in the world, according to data from the world health organization (WHO) in 2020.³

The tobacco-free initiative project was begun in 2000 in Myanmar.⁴ The national tobacco control committee was founded in Myanmar in 2002.⁵ Tobacco advertising was banned.⁶ The law for control of smoking and consumption of tobacco products was legislated in May 2006.⁷ Myanmar is one of the parties to the WHO framework convention on tobacco control.⁸

Smoking is a significant cause of cardiovascular diseases.⁹ In the surgeon general's report on smoking and health, it accounted for nearly a quarter of deaths from cardiovascular disease.¹⁰ According to the WHO data in 2019, coronary heart disease was one of the leading causes of death in Myanmar.¹¹ The Framingham Heart Study was conducted in the United States to assess the general cardiovascular disease risk of participants and estimated the 10-year general cardiovascular disease risk using two risk scores.¹² These were body mass index-based 10-year cardiovascular disease risk score and cholesterol-based 10-year general cardiovascular disease risk score.¹²

According to the Myanmar population and housing census (2014), the total population in Myanmar was 51,486,253 people.¹³ Pyin Oo Lwin Township has a population of 255, 508 and is situated in the Mandalay region, Myanmar.¹³ There was no previous community-based study of smoking and smokeless tobacco use among adults in Pyin Oo Lwin Township. Therefore, necessary preventive measures for smoking and smokeless tobacco use in Myanmar could be implemented depending on the result of this study. This community-based study aimed to determine the prevalence of smoking and smokeless tobacco use, the association between socio-demographic characteristics, knowledge, and attitudes about tobacco use, and current tobacco use, and the relationship between Framingham cardiovascular disease risk and different types of tobacco use among adults in Pyin Oo Lwin, Myanmar.

METHODS

This community-based, cross-sectional study was conducted in two randomly selected wards of Pyin Oo Lwin Township in January and February 2024. Two wards (out of twenty-one) were selected by simple random sampling. Adults aged 18 years and older residing in these two wards were listed with the help of the ward administrators, and 215 adults from each ward were randomly selected from the list. This study involved total 430 participants. The minimum sample size was calculated using the formula of Daniel (2005), based on Myanmar's tobacco use prevalence in 2020.^{3,14} Data were collected through face-to-face interviews using a structured questionnaire, weight and height measurement, and blood pressure measurement. A mobile stadiometer SECA (Hamburg, Germany) and a digital weighing scale Tanita (Japan) (BC-705N) were used to measure body weight and height, and an automatic blood pressure monitor (Omron, Japan) (HEM-7156) was used to

measure the blood pressure of each respondent. If the respondent uses tobacco products currently or has used it in the last 30 days, he or she was regarded as a current tobacco user. The inclusion criteria for this study are adults aged 18 years and older of both genders who are willing to participate.

The BMI-based ten-year risk of cardiovascular disease for respondents aged 30-74 years was calculated using the body mass index-based formula available on the Framingham heart study website.¹² The predictors of 10-year CVD risk were age, sex, current smoking, diabetes, systolic blood pressure, treatment for hypertension, and body mass index (BMI).¹² The BMI-based Framingham cardiovascular disease risk was categorized into three groups: low risk (<10%), moderate risk (10% to 20%) and high risk (>20%).¹⁵

Regarding the knowledge of tobacco use, the total score was categorized into high, moderate, and low as specified by Bloom's classification.¹⁶ High knowledge means >80% of total scores, moderate knowledge indicates 60-80% of total scores and low knowledge means <60% of total scores. It included 6 questions. The score for the correct answer was 1 and for the incorrect answer and don't know was 0. The highest score for knowledge on tobacco was 6 and the lowest score was 0. Attitude towards tobacco use included 8 questions. The cut-off point for the attitude on tobacco use was mean±standard deviation. The score ≤mean-standard deviation indicated a low attitude towards tobacco use. The score within mean+standard deviation and mean-standard deviation meant a moderate attitude towards tobacco use and the score ≥mean+standard deviation concerned a high attitude towards tobacco use.

A pre-test was carried out with 30 adults in Myanmar to determine the reliability of the questionnaire and the public health experts assessed the validity of this study. Questions for knowledge and attitude towards tobacco use were derived from previous studies.^{17,18} The reliability of the knowledge and attitude toward tobacco use was measured using Cronbach's alpha coefficient which was 0.7. Smoking and smokeless tobacco use was categorized into current user, ever-user, and never-user. Then, it was regrouped as current users and non-current users.¹⁹ Non-current users included ever-user and never-user. Ethical approval was obtained from the ethics committee of Juntendo university in January 2024.

Data analysis

IBM SPSS statistics 29 (IBM Corp., Armonk, New York, USA) was used for data entry and analysis. Chi-square test, ordinal logistic regression and binary logistic regression, multivariable analysis with backward elimination method were used for statistical analysis to determine factors associated with current tobacco use. Statistical significance was defined as a p value less than 0.05 with 95% confidence intervals. The association

between exposure and outcome variables was calculated using odds ratio (OR) and adjusted odds ratio (aOR). The logistic regression model treated current tobacco use as outcome, knowledge, and attitudes towards tobacco use as exposure, and age, gender, occupation, and education as covariates. Independent variables with a $p < 0.2$ in the univariate analysis and theoretically important variables were included in the final multivariate model.

Ordinal logistic regression was used because Framingham cardiovascular disease risk was an ordinal dependent variable. It was applied by treating BMI-based Framingham cardiovascular disease risk as the dependent variable and different types of current tobacco use as the independent variable because current smoking status was one of the predictors of BMI-based Framingham cardiovascular disease risk.

RESULTS

The mean age was 40.2 years (Table 2). The prevalences of smoking and smokeless tobacco use were 39.5% (95% CI, 0.349 to 0.443) and 32.6% (95% CI, 0.281 to 0.372), respectively (Table 1). The result shows that there was a significant difference between age groups and current tobacco use ($p=0.047$). Current tobacco use was the highest in the age group 21-30 years (25%). The result reveals that there was a significant relationship between gender, occupation of the participants, and current tobacco use with $p < 0.001$ and 0.002, respectively. Most of the current tobacco users were male (90.3%) (Table 2).

Religion, education, marital status, monthly household income, and respondents' living conditions were not significantly associated with current tobacco use. The majority of current tobacco users (77.7%) lived with family members and relatives. Most current tobacco users were Bamar (89.0%) and Buddhist (95.7%) and were married (69.1%). Only a few (4.3%) belonged to other religions such as Islam, Hindu and Christian. More than a third of current tobacco users (35.2%) had completed secondary education. Most of them (77.7%) lived with their family and relatives. In addition, 44.9% of current tobacco users had a monthly household income of

150,001-300,000 Myanmar Kyat (Table 2). There was no significant difference between knowledge and current tobacco use ($p=0.751$). However, there was a highly significant difference between attitudes toward tobacco use and current tobacco use ($p=0.002$). Current tobacco use was lowest among adults with high attitudes toward tobacco use, at 13.7% (Table 3).

Table 1: Behavior of smoking and smokeless tobacco use among the respondents (n=430).

Variables	N	%	95% CI
Smoking			
Current smoker	170	39.5	0.349, 0.443
Non-current smoker	260	60.5	0.557, 0.651
Smokeless tobacco			
Current smokeless tobacco user	140	32.6	0.281, 0.372
Non-current user	290	67.4	0.628, 0.719

Regarding the association between different types of tobacco use and the BMI-based Framingham cardiovascular disease risk, current exclusive smokers are 6.15 times more likely to have cardiovascular disease compared to non-current users (OR=6.149, 95% CI=3.352, 11.277, $p < 0.001$). Current exclusive smokeless tobacco users were 2.67 times more likely to have cardiovascular disease compared with non-current users (OR=2.677, 95% CI=1.486, 4.821, $p=0.001$) (Table 4).

Logistic regression was used to determine the association between current tobacco use and socio-demographic characteristics, knowledge of tobacco use, and attitude toward tobacco use. Gender, education, occupation, and attitude toward tobacco use were identified as significant factors for current tobacco use ($p < 0.05$). Men were 13 times more likely to be current tobacco users than women. Although occupation and attitude toward tobacco use were significant factors in multivariable analysis, negative associations with current tobacco use were observed (i.e. protective factors). Age and knowledge of tobacco use were not significantly associated with current tobacco use (Table 5).

Table 2: Relationship between socio-demographic characteristics and current tobacco use among adults in Pyin Oo Lwin, Myanmar (n=430).

Variables	Current user, N (%)	Non-user, N (%)	X ²	P value
Age (in years)				
18-20	22 (8.6)	6 (3.5)	11.238	0.047
21-30	64 (25.0)	28 (16.1)		
31-40	60 (23.4)	51 (29.3)		
41-50	54 (21.1)	43 (24.7)		
51-60	40 (15.7)	35 (20.1)		
61-85	16 (6.3)	11 (6.3)		
Total	256 (100.0)	174 (100.0)		
Mean=40.18, median=39, SD=13.309				
Range=18-84				

Continued.

Variables	Current user, N (%)	Non-user, N (%)	X ²	P value
Gender				
Male	231 (90.3)	72 (41.4)	118.804	<0.001
Female	25 (9.7)	102 (58.6)		
Total	256 (100.0)	174 (100.0)		
Race				
Bamar	228 (89.1)	155 (89.1)	0.000	0.995
Kachin+Kayah+Kayin+Chin+Mon Rakhine+Shan	28 (10.9)	19 (10.9)		
Total	256 (100.0)	174 (100.0)		
Marital status				
Single	64 (25.0)	44 (25.3)	0.006	0.997
Married	177 (69.1)	120 (68.9)		
Divorced+widowed+separated	15 (5.9)	10 (5.8)		
Total	256 (100.0)	174 (100.0)		
Religion				
Buddhist	245 (95.7)	168 (96.6)	0.196	0.658
Christian+Islam+Hindu	11 (4.3)	6 (3.4)		
Total	256 (100.0)	174 (100.0)		
Education				
No formal schooling+ less than primary school	17 (6.7)	15 (8.6)	5.577	0.233
Primary school level completed	72 (28.1)	38 (21.8)		
Secondary school level completed	90 (35.2)	54 (31.0)		
High school level completed	50 (19.5)	39 (22.5)		
College/university completed+postgraduate degree	27 (10.5)	28 (16.1)		
Total	256 (100.0)	174 (100.0)		
Occupation				
Government employee	87 (33.9)	43 (24.7)	17.473	0.002
Self-employed+daily wager	100 (39.1)	58 (33.4)		
Agriculture or livestock worker+company worker +professional	20 (7.8)	14 (8.0)		
Skilled worker+student+retired	21 (8.3)	14 (8.0)		
Household work+unemployed	28 (10.9)	45 (25.9)		
Total	256 (100.0)	174 (100.0)		
Monthly household income (Kyat)				
50,000-150,000	23 (8.9)	20 (11.5)	1.564	0.815
150,001-300,000	115 (44.9)	78 (44.8)		
300,001-500,000	75 (29.3)	53 (30.5)		
500,001-1,000,000	30 (11.7)	16 (9.2)		
>1,000,000	13 (5.2)	7 (4.0)		
Total	256 (100.0)	174 (100.0)		
Range=50,000-6,000,000				
Mean=442,803.49, SD=530,889.177				
Living condition				
Living alone	57 (22.3)	33 (18.9)	0.682	0.409
Living with family members+living with relatives	199 (77.7)	141 (81.1)		
Total	256 (100.0)	174 (100.0)		

Table 3: Relationship between level of knowledge, attitude level of respondents with current tobacco use (n=430).

Characteristics	Current user, N (%)	Non user, N (%)	X ²	P value
Level of knowledge				
Low knowledge (<3.6)	7 (2.7)	7 (4.1)	0.572	0.751
Moderate knowledge (3.6-4.8)	22 (8.6)	14 (8.1)		
High knowledge (>4.8)	227 (88.7)	153 (87.9)		
Total	256 (100.0)	174 (100.0)		
Mean=5.41, SD=0.856, range=1-6				

Continued.

Characteristics	Current user, N (%)	Non user, N (%)	X ²	P value
Attitude level				
High attitude (≥ 36.462)	35 (13.7)	43 (24.7)	12.595	0.002
Moderate attitude (24.638-36.462)	177 (69.1)	116 (66.7)		
Low attitude (≤ 24.638)	44 (17.2)	15 (8.6)		
Total	256 (100.0)	174 (100.0)		
Mean=30.55 , SD=5.912, Range=8-40				

Table 4: Results of ordinal logistic regression assessing the association between different types of current tobacco use and BMI-based Framingham cardiovascular disease risk among adults aged 30-74 years in Pyin Oo Lwin, Myanmar (n=340).

Different types of current tobacco use	Ordinal regression analyses			
	OR	95% CI		P value
		Lower	Upper	
Current exclusive smoking	6.149	3.352	11.277	<0.001
Current smokeless tobacco uses only	2.677	1.486	4.821	0.001
Current smoking+ smokeless tobacco use	3.397	1.642	7.029	0.001
Non-current users	Reference			

Table 5: Results of univariable and multivariable logistic regression assessing the association between socio-demographic characteristics, knowledge, attitudes and current tobacco use (n=430).

Variables	Univariable regression analyses				Multivariable regression analyses			
	OR	95% CI		P value	aOR	95% CI		P value
		Lower	Upper			Lower	Upper	
Age (in years)								
18-20	Reference				Reference			
21-30	0.623	0.228	1.705	0.357	0.174	0.035	0.859	0.032
31-40	0.321	0.121	0.852	0.023	0.094	0.019	0.474	0.004
41-50	0.342	0.128	0.920	0.033	0.114	0.022	0.583	0.009
51-60	0.312	0.113	0.856	0.024	0.108	0.020	0.567	0.009
61-85	0.397	0.121	1.297	0.126	0.144	0.025	0.825	0.030
Gender								
Male	13.090	7.851	21.824	<0.001	28.032	12.855	61.131	<0.001
Female	Reference				Reference			
Occupation								
Government employee	3.252	1.79	5.905	<0.001	0.329	0.122	0.887	0.028
Self-employed + daily wagger	2.771	1.564	4.910	<0.001	0.465	0.189	1.142	0.095
Agriculture or livestock worker+ Company worker+ professional	2.296	1.001	5.266	0.050	0.806	0.244	2.661	0.724
Skilled worker+ student+ retired	2.411	1.057	5.498	0.036	0.108	0.030	0.386	0.001
Household work+ unemployed	Reference				Reference			
Education								
No formal schooling+ less than Primary school	Reference				Reference			
Primary school level completed	1.672	0.753	3.713	0.207	2.824	0.988	8.072	0.053
Secondary school level completed	1.471	0.680	3.182	0.327	1.535	0.551	4.277	0.413
High school level completed	1.131	0.503	2.545	0.766	0.918	0.310	2.722	0.877
College/university completed + postgraduate degree	0.851	0.356	2.036	0.717	0.897	0.285	2.819	0.852
Knowledge level								
Low knowledge (<3.6)	Reference							
Moderate knowledge (3.6-4.8)	1.571	0.453	5.450	0.476				
High knowledge (>4.8)	1.484	0.510	4.315	0.469				
Attitude level								
Low attitude (≤24.638)	Reference				Reference			
Moderate attitude (24.638-36.462)	0.520	0.277	0.978	0.042	0.932	0.442	1.964	0.853
High attitude (≥36.462)	0.277	0.133	0.58	0.001	0.437	0.181	1.053	0.065

Note: aOR: adjusted odds ratio, OR: odds ratio, 95% CI: 95% confidential interval.

DISCUSSION

The prevalences of smoking and smokeless tobacco use were 39.5% (95% CI, 0.349 to 0.443) and 32.6% (95% CI, 0.281 to 0.372), respectively (Table 1). It was reported that the prevalence of current smoking and smokeless tobacco use for both men and women increased as compared with the WHO STEPS survey in 2009 in which the prevalences of smoking and smokeless tobacco use were 22% (95% CI, 21.1 to 23.0) and 29.7% (95% CI, 28.7 to 30.7), respectively.²⁰ This study was conducted in the urban area of Myanmar so the results of this study could not represent the whole population in Myanmar.

There were significant associations between the socio-demographic characteristics of the participants such as age ($p=0.047$), gender ($p<0.001$), occupation ($p=0.002$), and current tobacco use (Table 2). These findings were consistent with the tobacco use study carried out among adults in Yangon, Myanmar.¹⁹ Moreover, a previous study done among Myanmar migrants in Samut Sakhon Province, Thailand also found that gender was significantly related to cigarette smoking.¹⁸ Furthermore, these findings were compatible with the study conducted in Myanmar in which age and gender were significantly associated with smoking.²¹

Regarding the knowledge of tobacco use, there was no significant difference between the level of knowledge and current tobacco use ($p=0.751$) (Table 3). However, this finding was controversial with the study done among Myanmar migrants in Thailand in which there was a significant association between cigarette smoking and the level of knowledge.²² There was a highly significant difference between the attitude toward tobacco use and current tobacco use ($p=0.002$) (Table 3). This was consistent with another study conducted among Myanmar migrants in Thailand (18). In addition, there were no significant relationships between marital status, monthly household income of the respondents, and current tobacco use. This finding was compatible with the study done in Yangon.¹⁹

Current exclusive smokers are 6.15 times more likely to have cardiovascular disease compared to non-current users (OR=6.149, 95% CI=3.352, 11.277, $p<0.001$) (Table 4). This finding was consistent with another study in which current or ever users of cigarettes only were 1.6 times more likely to have any cardiovascular disease compared with never users of cigarettes and smokeless tobacco products (OR=1.6, 95% CI=1.1-2.3).²³ This result was also compatible with the study done in Finland in which smoking behavior was significantly related to a higher Framingham cardiovascular disease risk score.²⁴ Current exclusive smokeless tobacco users were 2.67 times more likely to have cardiovascular disease compared with non-current users (OR=2.677, 95% CI=1.486, 4.821, $p=0.001$) (Table 4). This finding is consistent with the PATH study conducted in the United

States, in which current or ever users of smokeless tobacco products only were 1.7 times more likely to have any cardiovascular disease compared with never users of cigarettes and smokeless tobacco products (OR=1.7, 95% CI=0.8-3.7).²³ Furthermore, gender, education, occupation, and attitude toward tobacco use were found as significant factors of current tobacco use ($p<0.05$) (Table 5). This result was supported by the findings of other studies done in Myanmar.^{19,21}

This study could provide the Myanmar authorities with baseline data on current tobacco use. Tobacco control legislation should be strengthened to reduce the use of tobacco products in Myanmar. More community-based studies on smoking and smokeless tobacco use should be conducted in Myanmar for further prevention and control measures. The strength of this study was that it could estimate cardiovascular disease risk in ten years and the assessment of the knowledge and attitude toward tobacco use among Myanmar adults. It was conducted only in Pyin Oo Lwin Township. Therefore, the findings of this study could not represent the whole adult population in Myanmar.

CONCLUSION

Gender, education, occupation, and attitude toward tobacco use were identified as significant determinants of current tobacco use ($p<0.050$). Health education campaigns should be conducted to change the attitude toward tobacco use among adults in Myanmar. Smoke-free workplaces and campuses should be implemented to further tobacco control in Myanmar. Smoking cessation, regular physical activity, and reduced alcohol and salt intake should be encouraged to prevent cardiovascular disease.

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