

Original Research Article

Social influence and 10-year cardiovascular risk impact of tobacco use among adults in Pyin Oo Lwin, Myanmar

Khin Thu Zar*, Motoyuki Yuasa

Department of Global Health Research, Graduate School of Medicine, Juntendo University, Tokyo, Japan

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*Correspondence:

Dr. Khin Thu Zar,
E-mail: dr.ktz86@gmail.com

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ABSTRACT

Background: Tobacco use is more common in developing countries than in developed countries. This study aimed to identify the patterns of tobacco use and determine the relationships between social factors, the level of social influence, Framingham 10-year cardiovascular disease risk, and current tobacco use among adults in Pyin Oo Lwin, Myanmar.

Methods: This was a community-based, cross-sectional study, and it included 430 adults, 18 years of age and above, who resided in Pyin Oo Lwin township and were willing to participate.

Results: This study revealed that the prevalence of tobacco use among adults in Pyin Oo Lwin was 59.5%. Most respondents were men (70.5 %), and almost a third of current tobacco users (28.9 %) used only smokeless tobacco. The Framingham 10-year cardiovascular disease risk was highly associated with current tobacco use ($p < 0.001$). The participants with a high level of social influence were 9.5 times more likely to be tobacco users compared to the participants with a low level of social influence. The results showed social influence levels and peer influence, such as friends using tobacco products and friends offering tobacco products, were significant factors in current tobacco use ($p < 0.050$).

Conclusions: Tobacco taxes should be increased to minimize tobacco use among Myanmar adults. Early prevention programs for cardiovascular disease risk and healthy lifestyle behavior change promotion programs should be established for Myanmar's adults.

Keywords: Social influence, Tobacco use, Cardiovascular risk, Adults, Myanmar

INTRODUCTION

Tobacco use is one of the most serious threats to public health in the world and it is more common in developing than developed countries.^{1,2} In Myanmar, cigarette smoking is more common in civic areas.³ Cheroot is the most typical type of tobacco product used in Myanmar.³ The prevalence of current tobacco use among adults in Myanmar was 44.1% in 2020, as reported on the World Bank website.⁴ According to the WHO STEPS survey in Myanmar (2014), the prevalence of current tobacco use among adults aged 25-64 was 54.4%.⁵ Moreover, the prevalence of current tobacco use was 37.7% in the Myanmar sentinel tobacco use prevalence study, which

was conducted in 2001.⁶ The prevalence of current tobacco use for males and females was 57% and 20%, respectively.⁶

Smoking can cause coronary heart disease, including heart attack and stroke.⁷ The prevalence of cardiovascular diseases is high in Myanmar.⁸ There are many scores for the prediction of cardiovascular diseases. However, the Framingham cardiovascular disease risk score is one of the most widely used scores for predicting 10-year cardiovascular disease risk in the world.⁹

In 2024, Myanmar's total population was 51.3 million, and Pyin Oo Lwin's was 361,096 according to the 2024

Myanmar population and housing census.¹⁰ A community-based tobacco use study is needed in Pyin Oo Lwin, Myanmar, to provide baseline information on adult tobacco use to local authorities for further action on tobacco control. This study aimed to identify tobacco use patterns and determine the relationships between social factors, the level of social influence, Framingham 10-year cardiovascular disease risk, and current tobacco use among adults in Pyin Oo Lwin, Myanmar. Health education related to tobacco use and smoking cessation programs can be implemented, based on this study, for further prevention and control measures of tobacco use among adults in Myanmar. Moreover, early prevention programs for cardiovascular disease risk and healthy lifestyle behavior change promotion can also be implemented according to the results of this study.

METHODS

This was a cross-sectional study. Data was collected in Pyin Oo Lwin, Myanmar, in January and February 2024. The participants were adults aged 18 years and older who lived in Pyin Oo Lwin, Myanmar. There are a total of twenty-one wards in Pyin Oo Lwin township. Two wards were selected from the twenty-one wards using simple random sampling. With the support of the ward authorities, 430 adults were also randomly chosen from the list of adults aged 18 and over living in these two wards. Inclusion criteria were: adults 18 years of age or older, residing in Pyin Oo Lwin, and willing to participate. The sample size for this study was computed using Daniel's formula (2005), based on adult tobacco use prevalence in Myanmar.^{4,11} Data collection was carried out by face-to-face interviews using structured questionnaires, anthropometric measurements, and arterial pressure measurements of the respondents. Anthropometric measurements: body weight was measured using a body weight scale (Tanita, made in Japan), height was measured using a portable stadiometer (SECA, made in Germany), and the participants' arterial pressure was measured using an Omron digital blood pressure monitor. The structured questionnaire contained five major areas: (1) socio-demographic characteristics, (2) tobacco use pattern, (3) family and social influences on tobacco use, (4) knowledge and attitude towards tobacco use, and (5) 10-year cardiovascular risk prediction.

Questions for the behavior of tobacco use are obtained from the global adult tobacco survey questions and the WHO stepwise approach to NCD risk factor surveillance (STEPS) survey questions.^{12,13} Moreover, questions about family influence, peer influence, and employer influence are derived from the previous tobacco use studies in Thailand, and the level of social influence in the questionnaire is obtained from a standardized survey instrument from the IARC tobacco policy evaluation handbook.¹⁴⁻¹⁶ In this study, the 10-year cardiovascular disease risk of the participants was computed using the calculator available on the website of the Framingham

heart study, based on the body mass index associated formula.¹⁷ The ten-year cardiovascular disease risk of the participants was classified as low risk (<10%), moderate risk (10% to 20%), and high risk (>20%).¹⁸

The reliability of the study questionnaire was pretested with thirty participants in Myanmar before the actual data collection, and the validity was assessed by the public health experts. Cronbach's alpha coefficient was used to measure the reliability of the level of social influence, and the alpha value was 0.9. It was assessed using the social goals subscale of the Wisconsin inventory of smoking dependence motives (68 items), which included four statements.¹⁹ A total of seven levels of agreement were included in each statement, from not true at all to extremely true.¹⁹ The cutting point for the level of social influence on tobacco use was the mean±SD. The behavior of tobacco use was classified into current tobacco users, ex-tobacco users, and never tobacco users. It was rearranged into two groups: current tobacco users and non-current tobacco users. Thus, ex-tobacco users and never tobacco users were combined as non-current tobacco users.

All analyses were performed utilizing IBM SPSS statistics 29 in this study. For statistical analysis, descriptive statistics such as frequency, percentage, mean, and standard deviation were utilized. The association between independent variables and dependent variables was determined by the Chi-square test. Binary logistic regression analysis and multivariable logistic regression analyses with a backward elimination method were utilized for predicting the factors associated with current tobacco use. The multivariable logistic regression model included the variables with a p value of less than 0.2 in the univariate analysis and the theoretically important variables. Relationships between independent variables and binary outcome variables were assessed using the odds ratio and adjusted odds ratio.

RESULTS

The total of 430 Myanmar adults living in Pyin Oo Lwin, Myanmar, were included in this study. All participants were between 18 to 84 years old. Nearly half of them (47.2%) were in the age group from 21 to 40 years. Most of them were male (70.5%) and Buddhist (96%). A third of them were government employees (30.2%). According to the educational level of the participants, 33.5% of them finished secondary school. Majority of the respondents lived with family members and relatives (79.1%).

The prevalence of tobacco use in this study was measured by the percentage of adults who are 18 years and older using tobacco products currently. The study revealed that the prevalence of tobacco use among adults in Pyin Oo Lwin was 59.5%. In addition, 2.6% of the participants had ever used tobacco products in the past, and 37.9% of them had never used tobacco products throughout their lifetime (Table 1).

According to the types of tobacco products used among current tobacco users, nearly one-third of current tobacco users (28.9%) used only smokeless tobacco (i.e., betel quid with tobacco). Betel chewing with tobacco is common among Myanmar adults. In addition, nearly half of the current tobacco users (45.7%) started using tobacco products more than thirty minutes after getting up but before noon (Table 2).

Social factors included the questions concerning the tobacco use status of parents and family members, such as sisters, brothers, and other relatives, close friends' tobacco use status, persuading to use tobacco products, and the employer's tobacco use status. There was an association between father's tobacco use and current tobacco use ($p=0.024$). There were relationships between peer influence, such as friends using tobacco products ($p<0.001$), friends offering tobacco products ($p<0.001$), friends urging to use tobacco products ($p=0.025$), and current tobacco use. In addition, there was an association between employer influence and current tobacco use, with a $p<0.001$. There was a highly significant association between the level of social influence and

current tobacco use ($p<0.001$). Current tobacco use was the lowest among the participants who had a low social influence level (7.1%) (Table 3).

Framingham 10-year CVD risk for participants aged 30-74 was calculated using the Framingham heart study website calculator.¹⁷ There were 340 participants aged 30-74 years in this study. Framingham's 10-year cardiovascular disease risk was highly associated with current tobacco use ($p<0.001$) (Table 4).

Univariable and multivariable logistic regression analysis results were revealed in Table 5. Logistic regression was utilized to determine the associations of current tobacco use with social factors and the level of social influence. Participants with a high level of social influence were 9.5 times more likely to be tobacco users compared to participants with a low level of social influence. Social influence level and peer influence, such as friends using tobacco products and friends offering tobacco products, were significant factors in current tobacco use ($p<0.050$). Employers' use of tobacco products did not have significant relationship with current tobacco use.

Table 1: Behavior of tobacco use among respondents (n=430).

Tobacco use	N	Percentage (%)	95% CI
Current user	256	59.5	0.547, 0.642
Ex-user	11	2.6	0.013, 0.045
Never user	163	37.9	0.333, 0.427
Total	430	100.0	

Table 2: Types of tobacco product use and behavior among current tobacco users (n=256).

Variables	N	Percentage (%)
Types of tobacco products used among current users		
(I) Smoking tobacco		
Cigarettes	29	11.3
Cheroots	47	18.5
Cigarettes+ cheroots	31	12.1
(II) Smokeless tobacco		
Betel quid with tobacco	74	28.9
(III) Smoking tobacco+ smokeless tobacco		
Cigarettes+ betel quid with tobacco	27	10.5
Cheroots + betel quid with tobacco	37	14.4
Cigarettes+ cheroots+ betel quid with tobacco	11	4.3
Time-consuming tobacco products		
Within 5 minutes of getting up	73	28.5
More than thirty minutes after getting up but before noon	117	45.7
After midday	53	20.7
Evening	13	5.1

Table 3: Association between social factors, the level of social influence and current tobacco use among adults in Pyin Oo Lwin, Myanmar (n=430).

Variables	Current user, N (%)	Non user, N (%)	X ²	P value
Father using tobacco products				
Yes	159 (62.1)	89 (51.2)	5.097	0.024
No	97 (37.9)	85 (48.8)		
Total	256 (100.0)	174 (100.0)		

Continued.

Variables	Current user, N (%)	Non user, N (%)	X ²	P value
Mother using tobacco products				
Yes	64 (25.0)	33 (18.9)	2.159	0.142
No	192 (75.0)	141 (81.1)		
Total	256 (100.0)	174 (100.0)		
Other family members using tobacco products				
Yes	122 (47.7)	75 (43.1)	0.865	0.352
No	134 (52.3)	99 (56.9)		
Total	256 (100.0)	174 (100.0)		
Friends using tobacco products				
Yes	242 (94.5)	124 (71.3)	44.266	<0.001
No	14 (5.5)	50 (28.7)		
Total	256 (100.0)	174 (100.0)		
Friends offering tobacco products				
Yes	154 (60.2)	28 (16.1)	82.396	<0.001
No	102 (39.8)	146 (83.9)		
Total	256 (100.0)	174 (100.0)		
Friends urging to use tobacco products				
Yes	41 (16.1)	15 (8.6)	5.001	0.025
No	215 (83.9)	159 (91.4)		
Total	256 (100.0)	174 (100.0)		
Employer using tobacco products				
Yes	90 (35.2)	29 (16.7)	22.616	<0.001
No	71 (27.7)	80 (45.9)		
Don't know	95 (37.1)	65 (37.4)		
Total	256 (100.0)	174 (100.0)		
Level of social influence				
High social influence (≥18.733)	60 (23.4)	16 (9.2)	38.508	<0.001
Moderate social influence (6.827-18.733)	178 (69.5)	112 (64.4)		
Low social influence (≤6.827)	18 (7.1)	46 (26.4)		
Total	256 (100.0)	174 (100.0)		
Mean=12.78, SD=5.953, range=4-28				

Table 4: Relationship between BMI based 10-year cardiovascular disease Framingham risk and current tobacco use (n=340).

Characteristics	Framingham cardiovascular disease risk score			X ²	P value
	Low risk (<10%)	Moderate risk (10% to 20%)	High risk (>20%)		
	N (%)	N (%)	N (%)		
Non user	133 (59.6)	24 (32.0)	9 (21.4)	31.555	<0.001
Current tobacco user	90 (40.4)	51 (68.0)	33 (78.6)		
Total	223 (100.0)	75 (100.0)	42 (100.0)		

Table 5: Results of univariable and multivariable logistic regression analyses in assessing the relationship between social factors, social influence level and current tobacco use (n=430).

Variables	Univariable logistic regression analyses				Multivariable logistic regression analyses			
	OR	95% CI		P value	aOR	95% CI		P value
		Lower	Upper			Lower	Upper	
Level of social influence								
Low social influence (≤6.827)	Reference				Reference			
Moderate social influence (6.827-18.733)	4.062	2.242	7.356	<0.001	2.147	1.109	4.157	0.023
High social influence (>18.733)	9.583	4.414	20.807	<0.001	3.122	1.296	7.518	0.011

Continued.

Variables	Univariable logistic regression analyses				Multivariable logistic regression analyses			
	OR	95% CI		P value	aOR	95% CI		P value
		Lower	Upper			Lower	Upper	
Father using tobacco products								
Yes	1.566	1.060	2.312	0.024				
No	Reference							
Mother using tobacco products								
Yes	1.424	0.888	2.286	0.143				
No	Reference							
Friends using tobacco products								
Yes	6.970	3.709	13.099	<0.001	3.195	1.606	6.355	0.001
No	Reference				Reference			
Friends urging to use tobacco products								
Yes	2.021	1.081	3.780	0.028				
No	Reference							
Friends offering tobacco products								
Yes	7.873	4.893	12.666	<0.001	5.223	3.161	8.630	<0.001
No	Reference				Reference			
Employers using tobacco products								
Yes	3.497	2.065	5.921	<0.001	1.979	1.078	3.633	0.028
Don't know	1.647	1.051	2.580	0.029	1.277	0.760	2.146	0.356
No	Reference				Reference			

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

DISCUSSIONS

The study reported that the prevalence of tobacco use among adults in Pyin Oo Lwin was 59.5%. It was higher than the WHO STEPS survey in Myanmar, where the prevalence of tobacco use among adults 25-64 years of age was 54.4%, and the Myanmar demographic and health survey (2015-2016), where the prevalence of tobacco use among men and women was 40.9% and 3.7%, respectively.^{5,20} It might be due to differences in the study area, as the present study was done in Pyin Oo Lwin Township, which is included in the urban area of Myanmar. Therefore, this study's results could not represent the whole Myanmar population. It has increased compared to previous studies conducted in Asian countries (Bhutan, Laos, Bangladesh, India, and Thailand).²¹⁻²³ This might be due to different study populations and study areas.

According to the types of tobacco products used among current tobacco users, nearly one-third of current tobacco users (28.9%) used only smokeless tobacco (i.e., betel quid with tobacco). This finding was consistent with the WHO STEPS survey conducted in Myanmar in 2009, in which the prevalence of smokeless tobacco use for all genders was 29.7%.²⁴ Moreover, nearly half of the current tobacco users (45.7%) started using tobacco products more than thirty minutes after getting up but before noon. It was also compatible with previous study done among Myanmar migrants in Thailand, in which half of tobacco users (51.5%) utilized tobacco products at that time.¹⁵

There was a significant association between father using tobacco products and current tobacco use ($p=0.024$) and

also peer influence such as friends using tobacco products ($p<0.001$), friends offering tobacco products ($p<0.001$), friends urging to use tobacco products ($p=0.025$), and current tobacco use. There was a significant relationship between employer influence and current tobacco use, with a $p<0.001$. These results were compatible with the study conducted among Myanmar migrants in Samut Sakhon Province, Thailand, in which fathers' smoking, close friends' smoking, and employers' smoking were significant risk factors.¹⁴

Regarding the BMI-based Framingham cardiovascular disease risk, the Framingham 10-year cardiovascular disease risk was highly associated with current tobacco use ($p<0.001$). This finding was consistent with the previous cohort study, which was carried out in Finland. In this study, 10-year Framingham cardiovascular disease risk was statistically related to smoking behavior in both males and females ($p<0.001$).²⁵ There was a highly significant association between social influence levels and current tobacco use ($p<0.001$), which was compatible with the previous study done in the United States.¹⁹

Tobacco prevention control measures should be undertaken because the prevalence of tobacco use is high compared to the previous survey (WHO STEPS, 2014) in Myanmar.⁵ Health education related to tobacco use and smoking cessation programs should be implemented to reduce tobacco use among Myanmar adults. The study's strength is the first community-based cross-sectional study of tobacco use in Pyin Oo Lwin township and the measurement of the social influence and 10-year cardiovascular risk of tobacco use. However, the results could not represent the tobacco use of the total adult

people in Myanmar because the data collection was not carried out in all states and regions of Myanmar.

CONCLUSION

Tobacco taxes should be increased to minimize tobacco use among Myanmar adults. Early prevention programs for cardiovascular disease risk and healthy lifestyle behavior change promotion programs should be established for Myanmar's adults. Further community-based tobacco use studies should also be conducted to monitor the prevalence of tobacco use among Myanmar adults.

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