International Journal of Public Health Asia Pacific

Open Access: e-Journal
ISSN: 2822-0587(Online)

Factors associated with tobacco use among working-age population in Mon state, Myanmar

Houng Sar Mon[1], Chutikan Sakphisutthikul[2]*, Roshan Kumar Mahato[2], Kittipong Sornlorm[2], Wor Mi Thi[1]

[1]Master of Public Health, Faculty of Public Health, Khon Kaen University, Thailand
[2]Faculty of Public Health, Khon Kaen University, Thailand

*Corresponding author: Chutikan Sakphisuttthikul, chusak@kku.ac.th

ABSTRACT

Background: The tobacco epidemic is the leading cause of preventable death globally. Despite numerous studies on factors influencing tobacco use among working youths and adults, research remains limited on tobacco use and associated factors among the working-age population in urban and rural areas of Mon State.

Objectives: To identify the factors associated with the tobacco use among the working-age population in Mon State, Myanmar.

Methods: A cross-sectional study was conducted among 509 participants aged 18 to 60 years in Mon State, Myanmar, utilizing structured interviews. The associations between tobacco use and various factors were evaluated using multiple logistic regression analyses, with results reported as adjusted odds ratios (AORs) and corresponding 95% confidence intervals (CIs). Statistical significance was determined at a threshold of $P < 0.05$.

Results: The prevalence of tobacco use among the working-age population in Mon State was 45.58% (95% CI: 41.19-50.02). Factors significantly associated with tobacco use included male gender (AOR=10.04, 95% CI: 5.34-18.86), lower educational attainment; specifically uneducated or primary education (AOR=9.38, 95% CI: 4.43-19.81), secondary education (AOR=4.39, 95% CI: 1.97-9.76), and tertiary education (AOR=2.29, 95% CI: 1.17-4.49). Additional correlates included family influence (AOR=7.79, 95% CI: 4.33-14.02), peer pressure (AOR=2.92, 95% CI: 1.66-5.13), community influence (AOR=4.90, 95% CI: 2.85-8.59), moderately severe depression (AOR=5.27, 95% CI: 2.56-10.84), severe depression (AOR=3.67, 95% CI: 1.50-8.94), and neutral or positive perceptions of tobacco marketing (AOR=2.02, 95% CI: 1.16-3.49).

Conclusion: About half of the study participants used tobacco. Being male, having lower educational status, having family influences, peer pressure, depression, and neutral and positive perception on tobacco marketing were associated with the higher risks of using tobacco. Therefore, it is important to make efforts in promoting of education, health education programs, effective tobacco control policies and mental health supports in addressing tobacco problems in Myanmar.

Keywords: Mon State, Myanmar, Tobacco use, Working-age

1. Introduction

The tobacco epidemic is the leading cause of preventable death worldwide, surpassing vehicle injuries, HIV, alcohol, and illegal drugs, accounting for 90% of lung cancer deaths [1]. Despite global tobacco use declining since 2000, particularly in South-East Asia, with projections of 0.96 billion users by 2025 [2], the burden remains significant in low- and lower middle-income countries where smokeless tobacco use is highest [2].

Myanmar, a major tobacco exporter/importer in 2020 [3], shows alarming prevalence rates with 40.9% tobacco use and 50.89% betel quid chewing [4]. Tobacco causes various cancers [5], heart disease, stroke [6] and other diseases [7]. WHO reports 8.7 million annual tobacco-related deaths, plus 1.2 million from second-hand smoke. Smoking reduces male fertility and causes adverse pregnancy outcomes [9, 10]. All tobacco forms: smoked, smokeless, and e-cigarettes are toxic [11] with smoked tobacco more prevalent among males and other forms among females [12].

Provided that, it is imperative to understand the determinants of tobacco usage to set the effective tobacco control interventions. Existing literature provided crucial association of sociodemographic factors [13-15], tobacco marketings [16], peer factors [17, 18] and influence from the family [19] as the determinants of tobacco use. In addition, attitude [20], knowledge [21] and health literacy [22] were explored as remarkable protective factors while having psychological distress [13], consumption of alcohol [12, 23] were identified as augmenters for tobacco use.

Although some studies have explored tobacco use in Myanmar [4, 24], there was limited research on the meticulous consideration on the association of sociodemographic, environmental and psychosocial factors and tobacco consumption especially in Mon State which leads this study to examine the association between those factors and tobacco use among the working-age population in Mon State, Myanmar to provide the evidence for the appropriate tobacco control actions.

2. Methods

2.1 Study Area

This study was conducted in Mon State, Myanmar with a total of 509 participants between the age of completed 18 years to 60 years.

2.2 Study Design

A cross-sectional analytical study design was conducted to describe the proportion and identify the factors influencing tobacco use among working-age people in Mon State, Myanmar.

2.3 Sample size and sampling

As our study outcome was binary outcome, we estimated sample size by multiple logistic regression using logistic regression formula of Hsieh, Bloch and Larsen [25] with $Z_{1-\alpha}$. was set at 1.96 and $Z_{1-\beta}$ was set at 0.84. The previous study conducted in Magway, Myanmar was used as the reference [26] to estimate the proportion of smokers among those with unexposed (P0) and exposed (P1). Mon state, border with Kayin state, is one of the highest consumptions of tobacco among 15 states and regions of Myanmar [27]. Due to the high prevalence, it is distinctive to explore the determining factors on tobacco in this state for the further implementations. The multistage sampling method was used to select sample in this study. There are two districts in Mon State which are Thaton district and Mawlamying district, with a total of 10 townships in two districts together. By using the simple random sampling method, one township of Thaton district and two townships of Mawlamying district were chosen respectively and continued selecting one ward and one village tract from each township. Finally, the households from the 3 wards and 3 village tracts were selected. Population proportional to size of working-aged group from 18 years to 60 years was employed to get the required samples.

2.4 Data Collection

A structured questionnaire was used to collect quantitative data, including socio-demographic, social, environmental, psychosocial factors, tobacco marketing, and health literacy. Prior to the interview, the questionnaires were translated into Myanmar. Pretests were conducted at one neighbouring township to check on the ease of comprehension of questions and revised accordingly. The dependent variable in our study was tobacco used including both smoke and smokeless tobacco used in the past 12 months. Perceived stress was measured by Perceived Stress Scales (PSS) [28]. Depression was measured by 9 items Patient Health Questionnaire (PHQ 9) [29]. Health literacy was measured by 47 items of European Health Literacy Scale (HLS-EU 47) which was validated in six Asian countries [30].

2.5 Data Analysis

The collected data of 509 participants who consumed tobacco was inserted into Microsoft excel and transferred into the 18.0 version of STATA program 18.0. The categorical data were described as frequency, percentage while continuous variables were presented with mean, standard deviation (SD), median, minimum and maximum. Total 14 variables that contain P-value < 0.25 from bivariate analysis were considered to include in the multivariable model [31]. Multicollinearity between independent variables was checked before adding the variables into multivariable analysis and resulted mean Variance Inflation Factor (VIF) value of 1.34. The association between tobacco use status and each factor were presented as adjusted odds ratio (AOR) and their 95% confidence interval (CI), with the level of statistical significance assigned as 0.05 in the multiple logistic regression [32]. The final model exhibited a Receiver Operating Characteristic (ROC) curve value of 0.95, indicating that our model had a high predictive accuracy, correctly distinguishing the outcome 95% of the time.

3 Results

3.1 Sociodemographic characteristics of working-age population

The sociodemographic characteristics of the respondents are shown in the Table 1. It could be observed that 40.47% of the respondents were in the age group of 18-30 years with the mean age of 36.98 years (SD ±12.51). Majority (63.85%) of them were male participants. The highest proportion of education was seen in bachelor and higher than bachelor (31.04%) followed by tertiary level education (29.27%). However, there were still uneducated populations in Mon state representing 9.63% of our total respondents (Table 1).

Table 1: Sociodemographic characteristics of working-age population in Mon state, Myanmar (n=509)

Characteristics	Number (n)	Percentage (%)
Age (years)		
18 - 30	206	40.47
31 - 40	127	24.95
41 - 50	79	15.52
51-60	97	19.06
Mean (±SD)	36.98(±12.51)	
Median (min: max)	35(18: 60)	
Gender		
Male	325	63.85

Characteristics	Number (n)	Percentage (%)
Female	184	36.15
Educational Level		
Uneducated	49	9.63
Primary level	65	12.77
Secondary level	88	17.29
Tertiary level	149	29.27
Bachelor and higher than bachelor level	158	31.04
Marital Status		
Single	129	25.34
Married	374	73.48
Widow/Divorced	6	1.18
Occupation		
Dependent	35	6.87
Student	17	3.34
Daily Wage Worker	43	8.45
Farmer	32	6.29
Self-Employee	229	44.99
Other	153	30.06
Income of Respondents (MMK per month)		
< 250,000	167	32.81
250,000 - 400,000	204	40.08
> 400,000	138	27.11
Mean (±SD)	360,098.2 (±227,453)	
Median (min: max)	300,000 (20,000:1500,000)	
Residence		
Urban	214	42.04
Rural	295	57.96

3.2 Prevalence and distribution of smoking and smokeless tobacco consumption

There were (232 persons) 45.58% who were former or current smoking and smokeless tobacco use (95% CI: 41.19 – 50.02) and (277 persons) 54.42% who were never smoke and smokeless. Based on the 209 respondents of smoking and smokeless tobacco use, 82.30% were cigarettes/homemade cigarettes users, 6.22% used vapers, 6.70% used cheroots, and 4.78% used pipe smokes. All 232 (100%) of tobacco users chewed betel quid (Table 2).

Table 2: Prevalence and distribution of smoking and smokeless tobacco consumption among working-age population in Mon state, Myanmar (n=509)

Characteristics	Number (n)	Percentage (%)	95% CI
Tobacco Use (Smoking & Smokeless in past 12 months)			
No	277	54.42	48.98 – 58.81

Characteristics	Number (n)	Percentage (%)	95% CI
Yes	232	45.58	41.19 – 50.02
Type of tobacco use (Smoking) (n=209)			
Cigarette/Homemade Cigarette	172	82.30	76.43 – 87.22
Vaper	13	6.22	3.35 – 10.40
Cheroots	14	6.70	3.71 – 10.98
Pipe	10	4.78	2.32 – 8.62
Type of smokeless tobacco use (n=232)			
Betel chewing	232	100	N/A
Tobacco chewing	0	0	N/A
Snuff	0	0	N/A
Snus	0	0	N/A

Note: N/A= Not applicable

3.3. Distribution of family influence, peer pressure, and community influence on tobacco use

Among the respondents, 67.39% had family influence and 343 persons (67.39%) did not have the family influence which means anyone in their family did not use the smoking and smokeless tobacco. However, 66.80% of the respondents did not have pressure to smoke or use smokeless tobacco from their peers and friends while 169 respondents (33.20%) have it. Moreover, community influence was seen among 61.1% of the participants (Table 3).

Table 3: Distribution of family influence, peer pressure, and community influence on tobacco use among working-age population in Mon state, Myanmar (n=509)

Characteristics	Number (n)	Percentage (%)
Family Influence		
No	343	67.39
Yes	166	32.61
Peer Pressure		
No	340	66.80
Yes	169	33.20
Community Influence		
No	311	61.10
Yes	198	38.90

3.4. The psychosocial factors, perception on the marketing, and health literacy among working-age population in Mon state, Myanmar

There were four parts to the psychosocial factors such as stress, depression, knowledge and attitude. Among 509 respondents, 63.85% had moderate stress, and 9.04% had high stress. Apart from 9.04% of the respondents, the remaining had mild to severe depression with 29.27% of moderately severe to severe depression. One third

(35.95%) of the respondents had poor level of knowledge and 19.65% of them had poor attitude.

Majority (63.85%) of the participants had negative perception while only 11.20% had positive perception on the tobacco marketing.

The median of the knowledge level was 52. The general health literacy was divided into 4 groups which were inadequate (24.56%), problematic (51.67%), sufficient (16.90%), and excellent (6.88%) (Table 4).

Table 4: Distribution of Marketing and General Health Literacy Factors on tobacco use among working-age population in Mon state, Myanmar (n=509)

Characteristics	Number (n)	Percentage (%)
Perceived stress		
Low (0-13)	138	27.11
Moderate (14-26)	325	63.85
High (27-40)	46	9.04
Mean (±SD)	17.59 (±6.943)	
Median (min: max)	18 (2: 37)	
Depression		
None (0-4)	46	9.04
Mild (5-9)	151	29.67
Moderate (10-14)	163	32.02
Moderately severe (15-19)	102	20.04
Severe (20-27)	47	9.23
Mean (±SD)	11.44 (±5.508)	
Median (min: max)	12 (3:24)	
Knowledge		
Poor level (<60%)	183	35.95
Moderate level (60% - 79%)	231	45.38
High level of knowledge (80% - 100%)	95	18.66
Mean (±SD)	61.43 (±18.889)	
Median (min: max)	70 (10:100)	
Attitude		
Poor attitude (<60%)	100	19.65
Moderate attitude (60% - 79%)	332	65.23
Good attitude (80% - 100%)	77	15.13
Mean (±SD)	69.13 (±10.446)	
Median (min: max)	70 (42:98)	
Marketing		
Negative perception (<60%)	325	63.85
Neutral perception (60% - 79%)	127	24.95
Positive perception (80% - 100%)	57	11.20
Mean (±SD)	52.77 (±17.88)	
Median (mini: max)	52 (20:90)	
Health Literacy		
Inadequate (0-25)	125	24.56
Problematic (>25-33)	263	51.67

Characteristics	Number (n)	Percentage (%)
Sufficient (>33 – 42)	86	16.90
Excellent (>42 -50)	35	6.88
Mean (±SD)	29.91 (±7.055)	
Median (mini: max)	31(13:50)	

3.5 Factors associated with tobacco use among working-age population in Mon state, Myanmar

Table 5 presented the factors associated with tobacco use among working-age population in Mon state resulted from multiple logistic regression. Being male was more likely to use tobacco 10 times than being female (AOR=10.0, 95% CI: 5.34–18.86). The uneducated & primary level was more likely to use tobacco 9.3 times (AOR=9.37, 95% CI: 4.43–19.81), secondary educational level had 4.3 times higher odds (AOR=4.39, 95% CI: 1.97–9.76), and tertiary level had 2.29 times higher odds of using tobacco (AOR= 2.29, 1.17–4.49) than bachelor and higher than bachelor's degree. The family influence was 7.7 times more likely to use tobacco use than those who did not have family members who used tobacco (AOR=7.7, 95%CI: 4.33–14.02). Likewise, having peer pressure also had 2.9 times more likely to use tobacco than those who did not have peer pressure (AOR=2.9, 95%CI: 1.66–5.13). In addition, the respondents who had community influence were 4.9 times more likely to use tobacco than those who did not have it (AOR=4.95, 95% CI: 2.85–8.59). Moreover, participants with neutral and positive perception were 2 folds more likely to use smoke and smokeless tobacco than those with negative perception on the tobacco marketing (AOR=2.0, 95% CI: 1.16–3.49) (Table 5).

Table 5: Factors associated with tobacco use among working-age population in Mon state, Myanmar (n=509)

Factors	Number	Tobacco use (Yes)	Percentage (%)	Crude odds ratio	Adjusted odds ratio	95% Confidence interval (CI)	P-value
Gender							<0.001
Female	184	29	15.76	1	1		
Male	325	203	62.46	8.89	10.04	5.34–18.86	
Educational Level							<0.001
Bachelor and higher than bachelor level	158	34	21.52	1	1		
Tertiary level	149	67	44.97	2.97	2.29	1.17–4.49	
Secondary level	88	54	61.36	5.79	4.39	1.97–9.76	
Primary level & uneducated	114	77	67.54	7.58	9.38	4.43–19.81	
Family Influence							<0.001

Factors	Number	Tobacco use (Yes)	Percentage (%)	Crude odds ratio	Adjusted odds ratio	95% Confidence interval (CI)	P-value
No	343	111	32.36	1	1		
Yes	166	121	72.89	5.62	7.79	4.33–14.02	
Peer Pressure							<0.001
No	340	125	36.76	1	1		
Yes	169	107	63.31	2.96	2.92	1.66–5.13	
Community Influence							<0.001
No	311	112	36.01	1	1		
Yes	198	120	60.61	2.73	4.95	2.85–8.59	
Depression							<0.001
None to Moderate	360	121	33.61	1	1		
Moderately Severe	102	78	76.47	6.41	5.27	2.56–10.84	
Severe	47	33	70.21	4.65	3.67	1.50–8.94	
Marketing							0.012
Negative perception	325	126	38.77	1	1		
Neutral & Positive perception	184	106	57.61	2.14	2.02	1.16–3.49	

4. Discussion

The prevalence of tobacco consumption observed in our study was substantially higher than the national prevalence of 20% reported by WHO in 2016 [24]. Notably, all tobacco users chewed betel quid regardless of whether they used smoked or smokeless tobacco. Betel nut chewing, known as "kwun-ya," has a long-standing tradition in Myanmar, consisting of betel vine leaf, areca nut, slaked lime, and various spices [33]. Importantly, tobacco is commonly added to this traditional betel quid mixture, creating a dual-use pattern that significantly increases health risks. Given its historical significance, betel quid chewing is deeply embedded in Myanmar's traditional culture [34], and the integration of tobacco into this practice has made tobacco consumption socially normalized and culturally reinforced.

This combined tobacco and betel consumption pattern persists even among Myanmar populations living abroad. A cross-sectional study conducted in Thailand found high tobacco usage rates among Myanmar migrant workers, with 44.58% being current tobacco users and 11.58% former tobacco users [35]. This demonstrates how the cultural integration of tobacco with traditional betel chewing practices creates persistent habits that transcend geographical boundaries.

The factors that were associated with the prevalence of tobacco used included gender, education, family influence, peer pressure, community influence, depression and

marketing factors. In our study, the level of education significantly influenced tobacco consumption. The lower the education, the higher the odds of having tobacco consumption were noted. Since, the ability to read, listen and understand could determine individuals ability to apply health knowledges [36], lower education might be unaware of the complications of tobacco consumption. Our finding was supported by another study where the participants who had no educational level was 2.7 times more likely to use tobacco than those with higher education level [37].

Moreover, having peer pressure was also found to be associated with 2.9 folds higher odds of tobacco consumption in our study. Research conducted in Great Britain found a strong correlation between peer influence and smoking initiation. The study indicated that people whose friends smoked had a 2.6-fold higher likelihood of starting to smoke than those with non-smoking social circles [39]. Furthermore, a systematic review and meta-analysis showed that cigarette smoking was significantly associated with peer pressure with 2.68 times higher odds than those without peer pressure [40]. As peer pressure is the strong influence of a group and it cause the members of that group to behave as everyone else does [38], this could affect a person's behaviour to be good or bad.

Similarly, we also found that the respondents with having tobacco user in family member were 5.6 times more likely to use tobacco than the respondents who had no family member influence. Likewise, our study also found 4.95 times higher odds of tobacco consumption among participants with community influence which was consistent with finding from a longitudinal study where adolescent smoking was determined by neighbourhood socio-economic, permissive family smoking environment and having deviant peers [19]. These findings underscore the powerful role of social environment in perpetuating tobacco use in Myanmar, highlighting the need for comprehensive, community-wide interventions that address both family and peer influences to effectively reduce tobacco consumption.

In addition, our study also remarked the strong association between marketing and tobacco consumption. Participants with neutral or positive perception towards tobacco marketing including product, price, place and promotion indicated 2.02 times higher odds of tobacco usage. Evidence showed that those exposure to tobacco content on social media expressed 2.18 times

higher odds of reporting lifetime tobacco use, 2.19 times higher odds of past 30 days tobacco use, and 2.08 folds higher risk of tobacco use among non-users. The similar association was also found in tobacco promotion, active and passive engagement in tobacco marketing platforms [41]. These findings emphasize the urgent need for stricter tobacco marketing regulations and comprehensive media literacy programs in Mon State, Myanmar, to counter the significant influence of tobacco advertising on consumption behaviours.

Our study also demonstrated depression as a strong determinant of tobacco consumption where individuals with moderately severe depression had 5.27 times while those with severe depression had 3.67 folds higher odds of tobacco used. A study conducted in Texas found out that having depressive symptoms were associated with single or dual/poly tobacco product usage in compared to those without depressive symptoms [42]. The higher odds of using tobacco among depressive individuals in our study could be due to the effects of nicotine which stimulates the release of neurotransmitter, dopamine which increases the brain reward function that is lacking in depression [43]. These findings highlight the critical need for integrated mental health and tobacco cessation programs in Mon State, Myanmar, recognizing that addressing depression may be essential for successful tobacco control interventions in this population.

Though we tried our best to minimize the possible bias in conducting this research, there were some limitations that we needed to address. Due to the study design, we could only explore the health risks due to tobacco consumption. Moreover, due to the different geographic and culture of Myanmar, our study could not represent the whole Myanmar working-age adult. Therefore, it was suggested for the fellow researcher to conduct further research to conduct more cross-sectional studies with different geographic to provide baseline tobacco consumption data in Myanmar. Moreover, further study should identify the health risks of tobacco in Mon state.

5. Conclusion

About half of the study participants used tobacco which is higher than national prevalence of Myanmar. Being male, having lower educational status, having family influences, peer pressure, depression, and neutral and positive perception on tobacco marketing were associated with the risks of

tobacco use. Our study highlighted the underlying factors which contributed to this high prevalence of tobacco consumption in Mon state. Therefore, it is important to make efforts in promoting of education, health education programs, effective tobacco control policies and mental health supports in addressing tobacco problems in Myanmar in order to reduce tobacco related health risks and health expenditures.

Acknowledgement

We are grateful to every participant who contributed willingly for this study. We would like to express our gratitude to Faculty of Public Health, Khon Kaen University for their technical assistance.

Author contributions

HSM: Conceptualization, data curation, formal analysis, methodology, writing original draft, writing review and editing. CS: Methodology, supervision, writing original draft, writing review and editing. RKM: Conceptualization, supervision, writing original draft, writing review and editing. KS: Conceptualization, methodology, supervision, writing review and editing. WMT: Conceptualization, methodology, supervision, writing original draft, writing review and editing.

Declaration

Ethics approval and consent to participate

This research was implemented after getting approval from the Ethics Committee of KKU under the references number “HE662191”. For the research ethics, we considered the consent form, confidentiality, respect for participants, benefits, and no maleficent for participants.

Competing interests

None

Funding

None

References

[1] Sein T, Swe T, Toe MM, Zaw KK, Sein TO. Challenges of smokeless tobacco use in Myanmar. Indian journal of cancer. 2014;51 Suppl 1:S3-7.
[2] WHO. WHO global report on trends in prevalence of tobacco smoking 2000-2025, fourth edition. Geneva; 2021.
[3] OEC. Rolled Tobacco in Myanmar: The Observatory of Economic Complexity; 2020 [cited 2024 Oct 2]. Available from: https://oec.world/en/profile/bilateral-product/rolled-tobacco/reporter/mmr.
[4] Sreeramareddy CT, Aye SN, Venkateswaran SP. Tobacco use and betel quid chewing among adults in Myanmar- estimates and social determinants from demographic and health survey, 2015–16. BMC Public Health. 2021;21(1):277.

[5] Chuang H-C, Tsai M-H, Lin Y-T, Chou M-H, Yang K-L, Chien C-Y. Systemic and Local Effects Among Patients With Betel Quid-Related Oral Cancer. Technology in Cancer Research & Treatment. 2022;21:15330338221146870.
[6] WHO. Myanmar Tobacco factsheet 2018 R4: World Health Organization; 2018 [cited 2024 Oct 2]. Available from: https://iris.who.int/bitstream/handle/10665/272686/wntd_2018_myanmar_fs.pdf?sequence=2
[7] McKenna C. UK has highest reduction in deaths from lung and breast cancer. Bmj. 2002;325(7355):63a.
[8] WHO. Tobacco Use Factsheets 2022 [cited 2024 Oct 2]. Available from: https://www.who.int/news-room/fact-sheets/detail/ tobacco.
[9] Clark JM, Maclaine K. The effects of smoking in pregnancy: a review of approaches to behavioural change. Midwifery. 1992;8(1):19-30.
[10] Durairajanayagam D. Lifestyle causes of male infertility. Arab journal of urology. 2018;16(1):10-20.
[11] Münzel T, Hahad O, Kuntic M, Keaney JF, Jr, Deanfield JE, Daiber A. Effects of tobacco cigarettes, e-cigarettes, and waterpipe smoking on endothelial function and clinical outcomes. European Heart Journal. 2020;41(41):4057-70.
[12] Bonnechere B, Cisse K, Millogo T, Ouedraogo GH, Garanet F, Ouedraogo MA, et al. Tobacco use and associated risk factors in Burkina Faso: results from a population-based cross-sectional survey. BMC Public Health. 2019;19(1):1466.
[13] Islam FMA, Walton A. Tobacco Smoking and Use of Smokeless Tobacco and Their Association with Psychological Distress and Other Factors in a Rural District in Bangladesh: A Cross-Sectional Study. J Environ Public Health. 2019;2019:1424592.
[14] Gangadi M, Kalpourtzi N, Gavana M, Vantarakis A, Chlouverakis G, Hadjichristodoulou C, et al. Prevalence of tobacco smoking and association with other unhealthy lifestyle risk factors in the general population of Greece: Results from the EMENO study. Tob Prev Cessat. 2021;7:61.
[15] Silva PAD, Meucci RD, Luzini R, Paiva LA. Tobacco smoking prevalence and associated factors among the elderly in the rural area of Rio Grande/RS, Brazil. Rural Remote Health. 2019;19(4):4982.
[16] Cho SM, Saw YM, Latt NN, Saw TN, Htet H, Khaing M, et al. Cross-sectional study on tobacco advertising, promotion and sponsorship (TAPS) and violations of tobacco sale regulations in Myanmar: do these factors affect current tobacco use among Myanmar high school students? BMJ Open. 2020;10(2):e031933.
[17] Hasan MZ, Cohen JE, Bishai D, Kennedy CE, Rao KD, Ahuja A, et al. Social capital and peer influence of tobacco consumption: a cross-sectional study among household heads in rural Uttar Pradesh, India. BMJ Open. 2020;10(6):e037202.
[18] Nakaseko E, Kotera S, Nakazawa M. Factors Associated with Smoking and Drinking among Early Adolescents in Vanuatu: A Cross-Sectional Study of Adolescents and Their Parents. Int J Environ Res Public Health. 2020;17(22).
[19] Cambron C, Kosterman R, Catalano RF, Guttmannova K, Hawkins JD. Neighborhood, Family, and Peer Factors Associated with Early Adolescent Smoking and Alcohol Use. Journal of Youth and Adolescence. 2018;47(2):369-82.
[20] Htin Aung Myint MN, Yamamoto E, Ko MH, Khaing M, Reyer JA, Hamajima N. Knowledge, attitude, and usage pattern of tobacco among high school students in Nay Pyi Taw, Myanmar. Nagoya J Med Sci. 2019;81(1):65-79.
[21] Dai H, Chaney L, Ellerbeck E, Friggeri R, White N, Catley D. Youth Knowledge of Tobacco 21 and its Association With Intention to Use Tobacco. Nicotine & Tobacco Research. 2020;23(2):341-8.
[22] Vila-Candel R, Navarro-Illana E, Mena-Tudela D, Perez-Ros P, Castro-Sanchez E, Soriano-Vidal FJ, et al. Influence of Puerperal Health Literacy on Tobacco Use during Pregnancy among Spanish Women: A Transversal Study. Int J Environ Res Public Health. 2020;17(8).
[23] Gutema BT, Chuka A, Ayele G, Estifaons W, Melketsedik ZA, Tariku EZ, et al. Tobacco use and associated factors among adults reside in Arba Minch health and demographic surveillance site, southern Ethiopia: a cross-sectional study. BMC Public Health. 2021;21(1):441.
[24] WHO. Noncommunicable diseases country profiles 2018. Geneva; 2018.

[25] Hsieh FY, Bloch DA, Larsen MD. A simple method of sample size calculation for linear and logistic regression. 1998;17(14):1623-34.
[26] Linn H, Chompikul J, Sillabutra J, Wongsawass S. Factors associated with tobacco use among male adolescents in Magway Township, Myanmar. Journal of Public Health and Development. 2013;11:19-32.
[27] Ministry of H, Sports - Mo HSM, Icf. Myanmar Demographic and Health Survey 2015-16. Nay Pyi Taw, Myanmar: MoHS and ICF; 2017.
[28] Cohen S, Kamarck T, Mermelstein R. Perceived stress scale. 1994;10(2):1-2.
[29] Kroenke K, Spitzer RL. The PHQ-9: a new depression diagnostic and severity measure. SLACK Incorporated Thorofare, NJ; 2002. p. 509-15.
[30] Duong TV, Aringazina A, Baisunova G, Nurjanah, Pham TV, Pham KM, et al. Measuring health literacy in Asia: Validation of the HLS-EU-Q47 survey tool in six Asian countries. Journal of epidemiology. 2017;27(2):80-6.
[31] Hosmer DW, Lemeshow S. Applied Logistic Regression 2nd Edition Wiley. New York. 2000.
[32] Hosmer Jr DW, Lemeshow S, Sturdivant RX. Applied logistic regression: John Wiley & Sons; 2013.
[33] Smith-Forbes CJF. British Burma and its people: being sketches of native manners, customs, and religion. London: John Murray; 1878.
[34] Seekins DM. Historical Dictionary of Burma (Myanmar): Rowman & Littlefield; 2017.
[35] Sornlorm K, Thi WM. Health literacy and high blood pressure among Myanmar migrant workers in Northeastern Thailand. PLoS One. 2024;19(4):e0302057.
[36] Nutbeam D, Kickbusch I. Health promotion glossary. 1998;13(4):349-64.
[37] Shariful Islam M, AlWajeah H, Rabbani MG, Ferdous M, Mahfuza NS, Konka D, et al. Prevalence of and factors associated with tobacco smoking in the Gambia: a national cross-sectional study. BMJ Open. 2022;12(6):e057607.
[38] Cambridge dictionary. 2024. Peer pressure.
[39] East K, Hitchman SC, Bakolis I, Williams S, Cheeseman H, Arnott D, et al. The Association Between Smoking and Electronic Cigarette Use in a Cohort of Young People. J Adolesc Health. 2018;62(5):539-47.
[40] Leshargie CT, Alebel A, Kibret GD, Birhanu MY, Mulugeta H, Malloy P, et al. The impact of peer pressure on cigarette smoking among high school and university students in Ethiopia: A systemic review and meta-analysis. PLOS ONE. 2019;14(10):e0222572.
[41] Donaldson SI, Dormanesh A, Perez C, Majmundar A, Allem J-P. Association Between Exposure to Tobacco Content on Social Media and Tobacco Use: A Systematic Review and Meta-analysis. JAMA Pediatrics. 2022;176(9):878-85.
[42] Chido-Amajuoyi OG, Mantey DS, Omega-Njemnobi O, Yu RK, Shete S. Association of dual and poly tobacco use with depressive symptoms and use of antidepressants. Addictive Behaviors. 2021;115:106790.
[43] Benowitz NL. Pharmacology of nicotine: addiction, smoking-induced disease, and therapeutics. Annual review of pharmacology and toxicology. 2009;49:57-71.

Received 04/10/2024
Received in revised form 19/10/2024
Accepted 20/10/2024