

## Knowledge, attitude, and usage pattern of tobacco among high school students in Nay Pyi Taw, Myanmar

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### ABSTRACT

In Myanmar, although the law prohibits the sale of tobacco products to and by those aged less than 18 years, the use of smoking and smokeless tobacco among high school students is a social problem. There has been no previous study on tobacco use or knowledge of tobacco law among students in Nay Pyi Taw. A survey was conducted to assess the knowledge, attitude, and usage pattern of tobacco among high school students in Nay Pyi Taw, Myanmar. The data were collected in three high schools, from 300 students of Grade 10 and 11, in September 2015, using anonymous self-administered questionnaires which included characteristics of students, knowledge, attitude, and usage pattern of tobacco. Of the 300 students, 104 (34.7%) were smokers and 85 (28.3%) were users of smokeless tobacco. The average age of first use of tobacco was 14 years. Although most students knew about the ill effects of tobacco, only 25% knew about the Tobacco Product Law. The most common source of tobacco was friends and male family members were main smokers in families. Most students had seen male teachers and headmasters smoking in schools. The usage of tobacco and smokeless tobacco was associated with sex and the students' attitude towards tobacco. This study indicated that the high school students knew about the ill effects of tobacco, but not about the Tobacco Product Law. Schools need to educate students and teachers about tobacco and the Tobacco Product Law and the enforcement of the law is also needed.

Keywords: high school students, Myanmar, smokeless tobacco, smoking, Tobacco Product Law

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### INTRODUCTION

Around 6 million people die due to tobacco use every year globally, and the annual number of deaths is expected to increase up to 8 million by 2030.<sup>1</sup> Approximately 80% of these preventable deaths by tobacco occur in low and middle-income countries. According to WHO, tobacco use is the most important underlying risk factor for premature deaths from non-communicable diseases

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(NCD) in the Western Pacific Region.<sup>2</sup> Not only cigarettes but also other tobacco products contribute to the mortality burden. Out of all cancers, 22% are due to tobacco use, and 70% of lung cancer is attributed to smoking. Further, more than 600,000 deaths, including nearly 130,000 child deaths, occur due to second-hand smoke exposure.<sup>2</sup>

Tobacco use is the most common cause of preventable deaths and a global epidemic among young people.<sup>2,3</sup> According to the Global Youth Tobacco Survey (GYTS) project conducted in 2000, the proportion of 13- to 15-year-old high school students who had ever smoked was the highest in Ukraine, Poland, and Moscow (70%), moderate in Sri Lanka (24.2%), and the lowest (15%) in China.<sup>4</sup> In the United States, it was reported that one in four high school seniors are current cigarette smokers and one in ten male high school seniors are current smokeless tobacco users.<sup>3</sup> Nearly 4,000 people under 18 years of age try their first cigarettes every day, and 90% of smokers start smoking before 18 years of age.<sup>5</sup> Nowadays, 600,000 middle school students and 3 million high school students smoke cigarettes in the USA.<sup>5</sup>

In Southeast Asia, about 1.3 million people die due to tobacco every year.<sup>6</sup> Over 250 million people, which is approximately 17% of the total population, use tobacco products and nearly the same number of people use smokeless tobacco.<sup>1,6</sup> In Myanmar, 53.5% of the population were smokers and 46.5% were users of smokeless tobacco in 2007.<sup>7</sup> Among smoking, cigarettes were used by 9.2%, cigars by 4.8%, hand rolled cheroots by 4.8%, and cheroots were used by 81.2%.<sup>7</sup> The Myanmar GYTS was conducted in 2001, 2007, and 2011, as a school-based tobacco survey of students of 8th, 9th, 10th and 11th grades, aged 13 to 15 years. According to the GYTS 2001 and 2007, the proportion of students who had ever smoked a cigarette was 18.0% and 14.7%, respectively. Boys had more experience of smoking as compared to girls; smokers in boys and girls were 30.0% and 8.9% in 2001, and 23.4% and 6.3% in 2007, respectively.<sup>7</sup> The 2011 GYTS reported that 7.0% (13.0% of boys and 0.5% of girls) were current smokers of cigarettes, while approximately 17.0% (28.0% of boys and 7.0% of girls) were users of other tobacco products.<sup>6</sup>

“The Control of Smoking and Consumption of Tobacco Product Law” was enacted on May 4th, 2006, and came into effect on May 4th, 2007. The law prohibits all forms of tobacco advertisements, sale of tobacco products to and by people under 18 years of age, sale of tobacco products within the school grounds and within 100 feet from schools, sale by vending machines, and sale of cigarettes in loose forms. The law designates non-smoking areas and requires health warning labels on tobacco products. Health facilities, basic education schools, sports fields, and sports grounds are designated as tobacco-free areas. Myanmar signed the WHO Framework Convention on Tobacco Control on October 23rd, 2003 and ratified it on April 20th, 2004.<sup>7</sup>

Many data show that the prevalence of tobacco use among high school students is high in Myanmar. Smoking and smokeless tobacco use among high school students is an important issue. GYTS is a national survey and each city may have different prevalence. Although Nay Pyi Taw, which consists of 8 townships, is the capital of Myanmar since 2006, most parts of Nay Pyi Taw are rural and peri-urban areas. People living in the capital are more likely to influence the other people in the country. There has been no previous study on tobacco use among students in Nay Pyi Taw or study on students' knowledge of the policy related to tobacco use. The purpose of this study was to assess the knowledge, attitude, and usage pattern of tobacco among high school students in Nay Pyi Taw. The results of this study will help to improve education related to the health hazards of tobacco and to provide better knowledge of the law on tobacco to students. The study will also lead us to the development of effective strategies for fostering a healthy lifestyle in high school students, who are the future of the nation.

## MATERIALS AND METHODS

### *Study design*

This cross-sectional study was conducted in three high schools in Nay Pyi Taw, Myanmar. The data were collected in September 2015. This study included 300 high school students in Grade 10 and 11. We used a multi-stage sampling method and the response rate was 100%. Firstly, three townships were selected by simple random sampling from all eight townships in Nay Pyi Taw. In the selected townships, one high school was selected from each township by simple random sampling. One hundred students were selected from each school, including 25 males and 25 females each from Grade 10 and 11 of each school.

### *Questionnaires*

Pre-tested, semi-structured and self-administered anonymous questionnaires were used for data collection after acquiring informed consent from each student. Questionnaires included four parts: (1) characteristics of students, (2) knowledge of tobacco, (3) attitude to tobacco, and (4) use of tobacco. The questionnaires regarding to knowledge of tobacco, attitude to tobacco, and use of tobacco had 20, 18, and 24 questions, respectively. Scoring for knowledge was 1 for correct answers and 0 for incorrect answers. Scoring for attitude was 3 for “agree”, 2 for “don’t know,” and 1 for “disagree” for questions on positive attitudes, and 1 for “agree”, 2 for “don’t know,” and 3 for “disagree” for questions on negative attitudes. The level of knowledge and attitude was divided into two categories. The level was defined as “high” when the total score was above the median and “low” when it was below the median.

### *Statistical analysis*

The collected data were entered into and analyzed using the Statistical Package for the Social Sciences (SPSS) version 16. Odds Ratios (OR) and 95% confidence intervals (CI) were estimated with a logistics regression analysis. A P-value < 0.05 was considered as significant.

### *Ethical consideration*

This study was conducted according to the ethical guidelines. The ethical clearance was provided by the Ethical Board of Committee, Department of Medical Services, Ministry of Health and Sports, Myanmar. The data collection was conducted after acquiring informed consent from the participants, after explaining the purpose and benefits of the study. The questionnaires were anonymous and self-administered, to ensure the privacy and confidentiality.

## RESULTS

Table 1 shows the characteristics of all 300 students. Their age ranged from 13 to 19 years, and the average ( $\pm$  SD) was 15.1 ( $\pm$  1.0) years. Among the 300 students, 104 (34.7%) were smokers and 85 (28.3%) were smokeless tobacco users. Students who have ever smoked and students who have ever used smokeless tobacco were called “smokers” and “smokeless tobacco users” in this study, respectively. There were 71 students (23.7%) who were smokers as well as users of smokeless tobacco. The major educational level of the students’ fathers and mothers was middle school (36.7% and 33.0%, respectively). Although illiterate fathers and mothers were 0.3% and 4.7%, 85.4% of the fathers and 79.6% of the mothers were educated up to the elementary school level or higher. Family income was less than 77 USD per month for more than half (56.0%) of the students (Table 1).

**Table 1 Characteristics of high school students in Nay Pyi Taw, Myanmar**

Characteristics	Male		Female		Total	
	n	(%)	n	(%)	n	(%)
<b>Total</b>	150	(100)	150	(100)	300	(100)
<b>Grade</b>						
Grade 10	75	(50.0)	75	(50.0)	150	(50.0)
Grade 11	75	(50.0)	75	(50.0)	150	(50.0)
<b>Age</b>						
Average $\pm$ SD (range)	15.1 $\pm$ 1.0 (13–19)					
<b>Smoking</b>						
Smoker	98	(65.3)	6	(4.0)	104	(34.7)
Non-smoker	52	(34.7)	144	(96.0)	196	(65.3)
<b>Smokeless</b>						
User	75	(50.0)	10	(6.7)	85	(28.3)
Non-user	75	(50.0)	140	(93.3)	215	(71.7)
<b>Father's education</b>						
Illiterate	0	(0.0)	1	(0.7)	1	(0.3)
Read & write	27	(18.0)	16	(10.7)	43	(14.3)
Primary school	27	(18.0)	24	(16.0)	51	(17.0)
Middle school	46	(30.7)	64	(42.7)	110	(36.7)
High school	38	(25.3)	34	(22.7)	72	(24.0)
Graduate	12	(8.0)	11	(7.3)	23	(7.7)
<b>Mother's education</b>						
Illiterate	10	(6.7)	4	(2.7)	14	(4.7)
Read & write	22	(14.7)	25	(16.7)	47	(15.7)
Primary school	31	(20.7)	30	(20.0)	61	(20.3)
Middle school	48	(32.0)	51	(34.0)	99	(33.0)
High school	32	(21.3)	31	(20.7)	63	(21.0)
Graduate	7	(4.7)	9	(6.0)	16	(5.3)
<b>Family income per month</b>						
<77 USD	78	(52.0)	90	(60.0)	168	(56.0)
77–280 USD	49	(32.7)	42	(28.0)	91	(30.3)
>280 USD	23	(15.3)	18	(12.0)	41	(13.7)

Table 2 indicates students' knowledge regarding the ill effects of tobacco and the Tobacco Product Law. Majority of the students answered that tobacco and tobacco smoke were harmful to health, regardless of whether they were smokers/users or not. Approximately one-third of the students had received education on the danger of tobacco in their classes. The leading sources of anti-tobacco messages were television, newspaper, and movies, and non-smokers and non-users of smokeless tobacco noticed the messages from each source more than the smokers and users did, except from the internet. 129 students (43.0%) and 148 students (49.3%) had not heard or seen any anti-tobacco messages for smoking and smokeless tobacco use during the past 30 days. These results suggested that more anti-smoking message was sent to the people than anti-smokeless tobacco message. Generally, smokers and smokeless tobacco users knew about the law

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**Table 2 Knowledge regarding the ill effects of tobacco and the Tobacco Product Law**

Questions	Smoking				Smokeless			
	Smoker		Non-smoker		User		Non-user	
	n	(%)	n	(%)	n	(%)	n	(%)
Total	104	(100)	196	(100)	85	(100)	215	(100)
<b>Knowledge regarding the ill effects of tobacco</b>								
Knowledge of harm to health	103	(99.0)	194	(99.0)	74	(87.1)	193	(89.8)
Smoke from other people's cigarette is harmful	103	(99.0)	194	(99.0)	–	–	–	–
Taught about the danger of tobacco in classes	38	(36.5)	83	(42.3)	31	(36.5)	70	(32.6)
Hazardous effects of tobacco	92	(88.5)	169	(86.2)	71	(83.5)	180	(83.7)
Source of anti-tobacco message								
Television	83	(79.8)	180	(91.8)	51	(60.0)	153	(71.2)
Radio	56	(53.8)	125	(63.8)	36	(42.4)	104	(48.4)
Billboard	60	(57.7)	115	(58.7)	34	(40.0)	87	(40.5)
Poster	51	(49.0)	113	(57.7)	31	(36.5)	79	(36.7)
Newspaper	59	(56.7)	153	(78.1)	44	(51.8)	121	(56.3)
Journal	50	(48.1)	118	(60.2)	34	(40.0)	97	(45.1)
Magazine	39	(37.5)	89	(45.4)	26	(30.6)	69	(32.1)
Movie	67	(64.4)	131	(66.8)	42	(49.4)	119	(55.3)
Internet	40	(38.5)	67	(34.2)	30	(35.3)	69	(32.1)
Heard or seen anti-tobacco message by media in the past 30 days								
No	42	(40.4)	87	(44.4)	47	(55.3)	101	(47.0)
1–4 times	46	(44.2)	85	(43.4)	27	(31.8)	94	(43.7)
5 times and above	16	(15.3)	24	(12.2)	11	(12.9)	20	(9.3)
Knowledge regarding the Tobacco Product Law								
Presence of Tobacco Product Law in Myanmar	36	(34.6)	39	(19.9)	29	(34.1)	46	(21.4)
Ban of tobacco use in public places								
Hospital	99	(95.2)	188	(95.9)	80	(94.1)	207	(96.3)
Restaurant	31	(29.8)	54	(27.6)	30	(35.3)	55	(25.6)
Bus	80	(76.9)	143	(73.0)	67	(78.8)	156	(72.6)
School	97	(93.3)	190	(96.9)	80	(94.1)	207	(96.3)
Gym	85	(81.7)	130	(66.3)	65	(76.5)	150	(69.8)
Sport arena	68	(65.4)	106	(54.1)	54	(63.5)	120	(55.8)
Age of prohibition to sell tobacco products								
<16 years	10	(9.6)	35	(17.9)	9	(10.6)	36	(16.7)
<17 years	3	(2.9)	0	(0.0)	3	(3.5)	0	(0.0)
<18 years	84	(80.8)	140	(71.4)	67	(78.8)	157	(73.0)
Don't know	7	(6.7)	21	(10.7)	6	(7.1)	22	(10.2)
Prohibition sale of tobacco products in school	81	(77.9)	159	(81.8)	67	(78.8)	173	(80.5)
Prohibited area from school to sell tobacco products								
50 feet	17	(16.3)	23	(11.7)	14	(16.5)	26	(12.1)
100 feet	19	(18.3)	19	(9.7)	18	(21.2)	20	(9.3)
200 feet	11	(10.6)	21	(10.7)	9	(10.6)	23	(10.7)
Don't know	57	(54.8)	133	(67.9)	44	(51.8)	146	(67.9)
Presence of the law to prohibit all forms of tobacco advertisement in Myanmar	35	(33.7)	60	(30.6)	29	(34.1)	66	(30.7)
Have seen tobacco advertisement in television or billboard	70	(67.3)	103	(52.6)	57	(67.1)	116	(54.0)

better than did the non-smokers and non-users. Only 25% of all the students knew about the presence of the Tobacco Product Law in Myanmar, and more smokers and smokeless tobacco users (34.6% and 34.1%) knew about it than did the non-smokers and non-users (19.9% and 21.4%). Regarding public places, most students knew that hospitals, schools, gyms, and buses were public places where tobacco use was banned. Smokers and users noticed about the bans on tobacco use in each place more than the others did. Surprisingly, we found that more smokers (80.8%) and smokeless tobacco users (78.8%) had better knowledge on the age of prohibition for selling tobacco products than did the non-smokers (71.4%) and non-users (73.0%). Although the knowledge level of prohibition to sell tobacco products in schools was high, more than half of the students did not know about the distance of the prohibition from schools, and only 12.7% chose the correct answer (100 feet). Smokers (33.7%) and smokeless tobacco users (34.1%) had better knowledge of the presence of the law that prohibits all forms of tobacco advertisement in Myanmar, and had seen the tobacco advertisement on television or billboards more than the non-smokers and non-users had (Table 2).

Tables 3 and 4 show the knowledge level of the students on the diseases caused by smoking and smokeless tobacco use. Table 3 reveals that the non-smokers had better knowledge than the smokers did in terms of the diseases caused by smoking, such as chronic lung disease, cancer, discoloration of skin, nail discoloration, arthritis, and risk of congenital abnormalities in newborns. A small number of smokers and non-smokers had incorrect knowledge that AIDS was caused by smoking. In terms of diseases caused by smokeless tobacco use, the users had better knowledge than did the non-users, in terms of diseases such as oral cancer, stones, goiter, and damage to the buccal mucosa. However, smokeless tobacco users also had the incorrect knowledge that smokeless tobacco led to oral cleansing and stronger teeth than did the non-users (Table 4).

Table 5 shows the attitudes of all the students toward tobacco. Majority of the students agreed with questions related to the harmful effects of tobacco, such as “smoking is harmful to health” (95.0%), “smoke from others’ cigarette is harmful” (94.3%), and “smoking should be prevented in public transport” (84.0%). Most students disagreed that smoking is a good habit (87.7%) and agreed that quitting smoking is good for health (74.7%). Regarding tobacco and the Tobacco Product Law, 74.3% of the students disagreed about no prohibition of selling tobacco products to people aged below 18 years, and 85.0% agreed that public areas should be smoke free. Regarding smokeless tobacco, 90.3% of the students agreed that spitting betel quid can cause a nuisance to the environment and 90.0% disagreed that spitting betel quid everywhere is good for health. More than half (62.7%) agreed that quitting smokeless tobacco use is good for health (Table 5).

Table 6 shows the usage data of the 104 students who were smokers. The age of first smoking ranged from 5 to 18 years and the average was 13.7 years. The major type of smoking was cigarette. More than half of the students did not smoke and about one-fifth smoked only one or two days in the past 30 days. Forty-one students (39.4%) smoked only 1 or 2 puff, but around 60% of the students continued smoking, even though not every day. The major sources of first smoke were a friend (62.5%) and family member (23.1%), and friend’s houses were common smoking places. Out of the 300 students, 54.4% had a close friend who smoked, and male family members were the main smokers in their family: fathers, brothers, and grandfathers were smokers in 43.0%, 34.0%, and 21.7% of the students’ families, respectively. Most students had seen someone smoking in the school, including the headmaster (3.0%) and male teachers (19.0%) (Table 6).

Table 7 shows the usage data of the 85 smokeless tobacco users. The age of first use of smokeless tobacco ranged from 9 to 18 years and the average was 14.2 years. The major type of smokeless tobacco was betel chewing (69.4%). Compared with smokers, smokeless tobacco users tended to use more often and longer. The rates of non-using within the past 30 days,

**Table 3 Knowledge on the diseases caused by smoking**

Diseases	Smoker (n=104)		Non-smoker (n=196)	
	n	(%)	n	(%)
Chronic lung disease	82	(78.8)	171	(87.2)
Cardiovascular disease	60	(57.7)	92	(46.9)
Infertility	25	(24.0)	47	(24.0)
Cancer in general	72	(69.2)	145	(74.0)
Discoloration of skin	60	(57.7)	123	(62.8)
Nail discoloration	39	(37.5)	86	(43.9)
Oral disease	75	(72.1)	136	(69.4)
AIDS <sup>a)</sup>	12	(11.5)	25	(12.8)
Arthritis	26	(25.0)	61	(31.1)
Risk of congenital abnormalities of newborn	49	(47.1)	101	(51.5)

<sup>a)</sup>Disease not caused by smoking.

**Table 4 Knowledge on the diseases caused by smokeless tobacco**

Diseases	User (n=85)		Non-user (n=215)	
	n	(%)	n	(%)
Oral cancer	76	(89.4)	183	(85.1)
Stones	63	(74.1)	152	(70.7)
Goiter	50	(58.8)	96	(44.7)
Damage to buccal mucosa	69	(81.2)	171	(79.5)
Oral cleaning <sup>a)</sup>	20	(23.5)	19	(8.8)
Teeth stronger <sup>a)</sup>	20	(23.5)	32	(14.9)

<sup>a)</sup>The condition is not caused by smokeless tobacco.

chewing only one or two quid and not chewing every day were lower than the results of the smokers. In terms of the common places for chewing, family members who chewed tobacco, and seeing persons chewing tobacco in the school, the findings were the same as those observed in smokers (Table 7).

To identify factors associated with tobacco users, we performed a multiple logistic regression using sex, level of knowledge and level of attitude. A “high” score on attitude and knowledge was determined as a score higher than the median ( $\geq 47$  and  $\geq 13$ ). Because the association between smoker and smokeless tobacco user was strong, tobacco user, who are smokers as well as smokeless tobacco users, was used as a dependent variable. A multiple logistic regression analysis found that sex and the attitude level were associated with tobacco user ( $P < 0.001$ ) (Table 8).

**Table 5 Attitude of students towards tobacco (n=300)**

Questions	Agree		Don't know		Disagree	
	n	(%)	n	(%)	n	(%)
<b>Smoking is effective to solve problems</b>	42	(14.0)	59	(19.7)	199	(66.3)
You will smoke if your best friend offers a cigarette	46	(15.3)	32	(10.7)	222	(74.0)
Smoking is harmful to your health	285	(95.0)	7	(2.3)	8	(2.7)
Smoke from other people's cigarette is harmful to you	283	(94.3)	9	(3.0)	8	(2.7)
Smoking should be prevented in means of transportation	252	(84.0)	43	(14.3)	5	(1.7)
If you were smoker, you want to stop smoking now	192	(64.0)	92	(30.7)	16	(5.3)
Smoking reduces stress and anxiety	42	(14.0)	110	(36.7)	148	(49.3)
Smoking is stylish	87	(28.7)	81	(27.0)	182	(60.7)
Smoking is a good habit	10	(3.3)	27	(9.0)	268	(87.7)
Quitting of smoking is good for health	224	(74.7)	10	(3.3)	66	(22.0)
Selling tobacco products to people under 18 years should not be prohibited	63	(21.0)	14	(4.7)	223	(74.3)
Public places like school, hospital and park should be smoke free areas	255	(85.0)	21	(7.0)	24	(8.0)
Banning of cigarette advertisements can reduce tobacco use	189	(63.0)	82	(27.3)	29	(9.7)
Raising taxes on cigarettes and other tobacco products can reduce tobacco use	144	(48.0)	125	(41.7)	31	(10.3)
Betel chewing is safer than smoking for health	60	(20.0)	118	(39.3)	122	(40.7)
Spitting from betel quid can cause nuisance to environment	271	(90.3)	11	(3.7)	18	(6.0)
Spitting betel quid at everywhere is a good habit	4	(1.3)	26	(8.7)	270	(90.0)
Quitting of smokeless tobacco is good for health	188	(62.7)	68	(22.7)	44	(14.7)



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**Table 6 Usage pattern of smokers (n=104)**

Questions		Male		Female		Total	
		n	(%)	n	(%)	n	(%)
Smoking age	5 years	4	(4.1)	1	(16.7)	5	(4.8)
	6 years	1	(1.0)	0	(0.0)	1	(1.0)
	8 years	2	(2.0)	0	(0.0)	2	(1.9)
	10 years	4	(4.1)	0	(0.0)	4	(3.8)
	11 years	3	(3.1)	2	(33.3)	5	(4.8)
	12 years	6	(6.1)	0	(0.0)	6	(5.8)
	13 years	12	(12.2)	2	(33.3)	14	(13.5)
	14 years	23	(23.5)	0	(0.0)	23	(22.1)
	15 years	13	(13.3)	0	(0.0)	13	(12.5)
	16 years	22	(22.4)	1	(16.7)	23	(22.1)
	17 years	3	(3.1)	0	(0.0)	3	(2.9)
	18 years	5	(5.1)	0	(0.0)	5	(4.8)
Types of Smoking	Cigarette	73	(74.5)	4	(66.7)	77	(73.9)
	Cheroots	24	(24.5)	1	(16.7)	25	(23.9)
	Hand-rolled cheroot	36	(36.7)	5	(83.3)	41	(39.4)
	Cigar	4	(4.1)	0	(0.0)	4	(3.8)
	Pipes	2	(2.0)	0	(0.0)	2	(1.9)
Smoking days in the past 30 days	0 day	54	(55.1)	0	(0.0)	54	(51.9)
	1–2 days	22	(22.4)	0	(0.0)	22	(21.1)
	3–5 days	8	(8.1)	0	(0.0)	8	(7.7)
	6–9 days	8	(8.1)	0	(0.0)	8	(7.7)
	10–19 days	3	(3.1)	0	(0.0)	3	(2.9)
	20–29 days	3	(3.1)	0	(0.0)	3	(2.9)
	1 month	6	(6.1)	0	(0.0)	6	(5.8)
Source of the first smoke	Friend	63	(64.3)	2	(33.3)	65	(62.5)
	Family	21	(21.4)	3	(50.0)	24	(23.1)
	Coffee shop	8	(8.1)	1	(16.7)	9	(8.6)
	Neighbor	5	(5.1)	1	(16.7)	6	(5.8)
Duration of smoking	1 or 2 puff	36	(36.7)	5	(83.3)	41	(39.4)
	<2 years	55	(56.1)	0	(0.0)	55	(52.9)
	2–4 years	3	(3.1)	1	(16.7)	4	(3.8)
	>4 years	4	(4.1)	0	(0.0)	4	(3.8)
Smoking of cigarettes per day	Not everyday	35	(35.7)	4	(66.7)	39	(37.5)
	<3	54	(55.1)	0	(0.0)	54	(51.9)
	3–5	3	(3.1)	2	(33.3)	5	(4.8)
	>5	6	(6.1)	0	(0.0)	6	(5.8)

**Table 6 Usage pattern of smokers (n= 104) (cont.)**

Questions		Male		Female		Total	
		n	(%)	n	(%)	n	(%)
Smoking place	Home	16	(16.3)	3	(50.0)	19	(18.2)
	School	13	(13.3)	1	(16.7)	14	(13.4)
	Friend's house	18	(18.4)	2	(33.3)	20	(19.2)
	Park	12	(12.2)	0	(0.0)	12	(11.5)
	Shopping center	6	(6.1)	0	(0.0)	6	(5.8)
	Hospital	2	(2.0)	0	(0.0)	2	(1.9)
	Street corner	19	(19.4)	2	(33.3)	21	(20.2)
	Others <sup>a)</sup>	19	(19.4)	1	(16.7)	20	(19.2)
<b>All (n=300)</b>							
Smoking of closest friend	Yes	110	(73.3)	53	(35.3)	163	(54.4)
	No	40	(26.7)	97	(64.7)	137	(45.6)
Smoking of parents	None	81	(54.0)	86	(57.3)	167	(55.7)
	Only Father	62	(41.3)	57	(38.0)	119	(39.7)
	Only Mother	1	(0.7)	3	(2.0)	4	(1.3)
	Both	6	(4.0)	4	(2.7)	10	(3.3)
Smoker in family except parents	Brother	53	(35.3)	49	(32.7)	102	(34.0)
	Grandfather	36	(24.0)	29	(19.3)	65	(21.7)
	Others <sup>b)</sup>	59	(39.0)	69	(46.0)	128	(42.7)
School persons smoking seen in schools	Headmaster	6	(4.0)	3	(2.0)	9	(3.0)
	Male teacher	37	(24.7)	20	(13.3)	57	(19.0)
	Others <sup>c)</sup>	96	(64.0)	107	(71.3)	203	(67.7)

<sup>a)</sup>Tea shop and street vendor.

<sup>b)</sup>Uncle, aunt, and grandmother.

<sup>c)</sup>Student's parents, school workers, and food sellers in school.

**Table 7 Usage pattern of smokeless tobacco users (n=85)**

Questions		Male		Female		Total	
		n	(%)	n	(%)	n	(%)
Age of first use of smokeless tobacco	9 years	1	(1.3)	0	(0.0)	1	(1.2)
	10 years	2	(2.7)	1	(10.0)	3	(3.5)
	11 years	4	(5.3)	0	(0.0)	4	(4.7)
	12 years	8	(10.7)	1	(10.0)	9	(10.6)
	13 years	7	(9.3)	1	(10.0)	8	(9.4)
	14 years	20	(26.7)	3	(30.0)	23	(27.0)
	15 years	12	(16.0)	2	(20.0)	14	(16.5)
	16 years	14	(18.7)	2	(20.0)	16	(18.9)
	17 years	3	(4.0)	0	(0.0)	3	(3.5)
	18 years	4	(5.3)	0	(0.0)	4	(4.7)
Types of smokeless tobacco	Raw Tobacco	9	(12.0)	2	(20.0)	11	(13.0)
	Betel Chewing	55	(73.3)	4	(40.0)	59	(69.4)
	Ready tobacco	14	(18.7)	1	(10.0)	15	(17.7)

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Table 7 Usage pattern of smokeless tobacco users (n=85) (cont.)

Questions	Male		Female		Total	
	n	(%)	n	(%)	n	(%)
Use in the past 30 days	0 day	30 (40.0)	0 (0.0)		30 (35.3)	
	1–2 days	21 (28.0)	5 (50.0)		26 (30.6)	
	3–5 days	11 (14.7)	1 (10.0)		12 (14.1)	
	6–9 days	5 (6.7)	0 (0.0)		5 (5.9)	
	10–19 days	6 (8.0)	9 (90.0)		6 (7.1)	
	20–29 days	5 (6.7)	0 (0.0)		5 (5.9)	
	1 month	1 (1.3)	0 (0.0)		1 (1.2)	
Source of the first use	Friend	51 (68.0)	4 (40.0)		55 (64.7)	
	Family	15 (20.0)	1 (10.0)		16 (18.8)	
	Tea & coffee shop	6 (8.0)	1 (10.0)		7 (8.2)	
	Neighbor	6 (8.0)	1 (10.0)		7 (8.3)	
Duration of use	1 or 2 quid	8 (10.7)	7 (70.0)		15 (17.6)	
	<2 years	51 (68.0)	2 (20.0)		53 (62.4)	
	2–4 years	11 (14.7)	0 (0.0)		11 (12.9)	
	>4 years	5 (6.7)	1 (10.0)		6 (7.1)	
Use per day (pack/quid)	Not everyday	11 (14.7)	7 (70.0)		18 (21.2)	
	<3	46 (61.3)	2 (20.0)		48 (56.5)	
	3–5	8 (10.7)	0 (0.0)		8 (9.4)	
	>5	10 (13.3)	1 (10.0)		11 (12.9)	
Tobacco chewing place	Home	22 (29.3)	5 (50.0)		27 (31.8)	
	School	16 (21.3)	0 (0.0)		16 (18.8)	
	Friend's house	11 (14.7)	1 (10.0)		12 (14.1)	
	Park	9 (12.0)	0 (0.0)		9 (10.6)	
	Shopping center	4 (5.3)	0 (0.0)		4 (4.7)	
	Hospital	3 (4.0)	0 (0.0)		3 (3.5)	
	Street corner	16 (21.3)	0 (0.0)		16 (18.8)	
	Others <sup>a)</sup>	13 (17.3)	2 (20.0)		15 (17.6)	
<b>All (n=300)</b>						
Use of closest friend	Yes	105 (70.0)	60 (40.0)		165 (55.0)	
	No	45 (30.0)	90 (60.0)		135 (45.0)	
Use of parents	None	50 (33.3)	49 (32.7)		99 (33.0)	
	Only Father	49 (32.7)	46 (30.7)		95 (31.6)	
	Only Mother	22 (14.7)	23 (15.3)		45 (15.0)	
	Both	29 (19.3)	32 (21.3)		61 (20.4)	
Use in family members except parents	Brother	56 (37.3)	48 (32.0)		104 (34.7)	
	Grandfather	31 (20.7)	32 (21.3)		63 (21.0)	
	Others <sup>b)</sup>	57 (38.0)	66 (44.0)		123 (41.0)	
School persons using seen in schools	Headmaster	28 (18.7)	17 (11.3)		45 (15.0)	
	Teacher (male)	64 (42.7)	39 (26.0)		103 (34.3)	
	Others <sup>c)</sup>	64 (42.7)	91 (60.7)		155 (51.6)	

<sup>a)</sup>Tea shop and street vendor.<sup>b)</sup>Uncle, aunt, and grandmother.<sup>c)</sup>Student's parents, school workers, food sellers in school, and female teachers.

**Table 8 Odds ratio and 95% confidence interval of tobacco user in high school students in Nay Pyi Taw**

Variables		Tobacco user	Crude OR (95% CI)	Adjusted <sup>o</sup> OR (95% CI)
Sex	Male	69 (97.18%)	63.04 (15.06–263.86)*	56.68 (13.42–239.30)*
	Female	2 (2.82%)	1	1
Knowledge level	Low <sup>a</sup>	39 (54.93%)	1.13 (0.66–1.92)	1.00 (0.52–21.95)
	High <sup>b</sup>	32 (45.07%)	1	1
Attitude level	Low <sup>c</sup>	61 (85.92%)	5.63 (2.75–11.55)*	4.55 (2.05–10.08)*
	High <sup>d</sup>	10 (14.08%)	1	1

OR, odds ratio; CI, confidence interval.

\*,  $P < 0.001$ .

<sup>a</sup>score < 13.

<sup>b</sup>score  $\geq$  13.

<sup>c</sup>score < 47.

<sup>d</sup>score  $\geq$  47.

<sup>o</sup>Adjusted by sex, knowledge level and attitude level.

## DISCUSSION

In this study, the prevalence of tobacco use was 34.7% for smoking and 28.3% for smokeless tobacco in high school students of Nay Pyi Taw, and it was higher than in GYTS 2001, 2007 and 2011 in Myanmar.<sup>7-9</sup> GYTSs were conducted in more than 3,000 high schools and the data depicts the average for the whole country. In Myanmar, students can easily buy a cigarette in the loose form from street vendors and the price of cigarettes is cheap. Smokeless tobacco use is an increasing trend in Myanmar, not only in students but also in adults, owing to the socio-cultural context of smokeless tobacco use, especially betel chewing.

Our results showed that only 25% of students knew about the presence of the Tobacco Product Law in Myanmar. Smokers and smokeless tobacco users had better knowledge on the age of prohibition of tobacco selling and use, public areas where tobacco use is banned, the prohibition area around schools, and the regulation of tobacco advertisement. Smokers and smokeless tobacco users may pay attention to the law compared to non-smokers and smokeless tobacco non-users, because smokers and users do not want to have a penalty. In the Tobacco Product Law, whoever commits smoking or holding lighted cigar in any non-smoking area will be punished with a fine from a minimum of 1,000 Myanmar kyats to a maximum of 5,000 Myanmar kyats.<sup>10</sup> Tobacco use is banned in public places in Myanmar, including hospitals, restaurants, buses, schools, gym, and sport arena.<sup>10</sup> Indonesia, Myanmar, and Nepal have banned the sale of smokeless tobacco within 100 yards or 100 meters from schools.<sup>11</sup> In Myanmar, according to the Tobacco and Tobacco Product Law, a person who sells or gives a cigar to someone aged below 18 years or sells a cigar within schools and within 100 feet from schools is punished with a fine or imprisonment.<sup>10</sup>

The most common source of tobacco use was friends and this may reflect the influence of

curiosity of students and peer pressure. The second common source was family, especially male members; fathers in 39.7%, brothers in 34.0%, and grandfathers in 21.7% of students who smoked (Table 6). In the previous studies with a higher prevalence of smoking (43.3% and 45.4%, respectively), students who smoked had more friends who smoked in Saudi Arabia than this study (85.5% vs. 54.4%) and 71.0% of students who smoked had a smoker in at least one of their family members in India.<sup>12,13</sup> These results suggest that having smokers as close friends or family members may strongly influence students to use tobacco products.

Our results suggest that schools are very important places to reduce the prevalence of smoking among students. First, students often observed school personnel, including teachers and headmasters engaging in tobacco use in the school. The Global School Personnel Survey (GPS) 2007, Myanmar, reported that 57.2% of male school personnel used tobacco in one form or the other.<sup>14</sup> Previous studies showed that 7.8% and 17.0% of secondary school teachers were smoking in Malaysia and Bangladesh.<sup>15,16</sup> The prevalence of smoking in school personnel was reported to be 24.0% in Iran, possibly due to the lack of policies to prohibit smoking in schools.<sup>17</sup> According to the Tobacco Product Law, teaching building, classrooms, offices, and other buildings in school are deemed as non-smoking areas, except for staff apartments.<sup>10</sup> Secondly, only 40.3% of the students had been taught about the dangers of tobacco in their classes. It is necessary to evaluate a school-based program on tobacco prevention and to educate students about tobacco and the Tobacco Product Law. The previous two studies in China and Moscow suggested that lower prevalence of smoking was related to being taught about the dangers of smoking.<sup>4</sup> The students' knowledge about tobacco was higher in the studies conducted in Ethiopia and India, and the prevalence of smoking was lower than the present study.<sup>18,19</sup> These results may indicate that teaching about the dangers of smoking was highly effective and influenced the smoking habits of students. Therefore, the Tobacco Product Law and the economic and health hazards should be taught as a part of the school curriculum.

Although the students knew about the hazardous effects of tobacco, approximately half of the students had not heard or seen any anti-tobacco message during the past 30 days. The previous study reported that students received more anti-tobacco messages and the smoking prevalence of among students was lower in Bangladesh than in our study.<sup>20</sup> In the present study, televisions, journals and newspapers were major sources of anti-tobacco messages for all students and internet was the only one source that smokers and users had received messages more than the others. To decrease smokers among students in Nay Pyi Taw, anti-tobacco messages should be communicated through different media like televisions, journals, newspapers and internet.

This study showed that tobacco user was significantly associated with the low level of attitude toward tobacco but not the level of knowledge. It is natural that the attitude toward tobacco highly influenced the usage pattern of tobacco. When we divided the students into two groups according to the score of attitude, higher attitude was significantly associated with the knowledge level (Supplementary Table 1). However, a previous study in Myanmar reported that knowledge on the Tobacco Product Law was higher among the current smokeless tobacco users.<sup>21</sup> In order to stop the usage of tobacco in high school students, not only providing education on tobacco but also the enforcement of the law will be needed.

There were several limitations in this study. This cross-sectional study indicated associations between the variables during data collection. However, there is a need of an interventional study to examine the usage patterns in students before and after providing education on health and tobacco use. Even though the questionnaire used in the present study was anonymous and self-administered, some students might have responded to the items more effectively. The sample size was small and the results of this study cannot represent high school students across Myanmar.

In conclusion, this study showed the knowledge, attitude, and usage pattern of tobacco among

**Supplementary Table 1 Odds ratio and 95% confidence interval of high attitude towards tobacco in high school students in Nay Pyi Taw**

Variables		High attitude <sup>a)</sup>	Crude OR (95% CI)	Adjusted <sup>d)</sup> OR (95% CI)
Sex	Male	44 (29.3%)	1	1
	Female	76 (50.7%)	2.47 (1.53–3.98)*	1.29 (0.69–2.42)
Knowledge level	Low knowledge <sup>b)</sup>	49 (31.0%)	1	1
	High knowledge <sup>c)</sup>	71 (50.0%)	2.22 (1.38–3.56)**	2.42 (1.47–3.99)***
Smoking	Smoker	24 (23.3%)	1	1
	Non-smoker	96 (48.7%)	3.20 (1.87–5.46)***	1.70 (0.79–3.65)
Smokeless tobacco	User	16 (18.8%)	1	1
	Non-user	104 (48.4%)	3.67 (2.02–6.67)**	2.57 (1.20–5.51)*

OR, odds ratio; CI, confidence interval.

\*,  $P < 0.05$ ; \*\*,  $P < 0.01$ ; \*\*\*,  $P < 0.001$ .

<sup>a)</sup>score  $\geq 47$ .

<sup>b)</sup>score  $< 13$ .

<sup>c)</sup>score  $\geq 13$ .

<sup>d)</sup>Adjusted by sex, knowledge level, smoking and smokeless tobacco.

high school students in Nay Pyi Taw. The findings indicated that the high school students knew about the ill effects of tobacco, but not the Tobacco Product Law. Schools should provide education on tobacco and the Tobacco Product Law to students as well as teachers. Furthermore, the enforcement of the law will be needed. The evidence from this study can be an initial step towards the control of tobacco use in all high school students.

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#### CONFLICT OF INTEREST

The authors declare no conflict of interest.

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