Prevalence of tobacco use and its associated factors among adolescent students in Nepal

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ABSTRACT

INTRODUCTION Despite being preventable, tobacco use is the world's predominant cause of disease, disability, morbidity, and mortality. It is an escalating public health concern among adolescent school-level students in Nepal. This study aimed to explore the prevalence of tobacco use and factors associated with it among adolescent secondary school students in Nepalgunj Sub-metropolitan City, Banke, Nepal.
METHODS A school-based cross-sectional design was implemented. At first, two government and two private schools were selected using convenience sampling and a sample of 250 adolescent students were selected employing simple random sampling technique from selected secondary schools of Nepalgunj Sub-Metropolitan City, Banke Nepal from April to May 2023. Primary data were collected through a self-administered structured questionnaire adapted from the Global Youth Tobacco Survey (GYTS). Descriptive and inferential statistical analyses were performed, followed by the binary multiple logistic regression model to assess the

statistically significant factors associated with tobacco use among adolescent students.
RESULTS The study disclosed that the prevalence of tobacco use among school adolescents aged 16–19 years was 41.2%. The fitted model revealed that tobacco use was significantly associated with the gender of adolescent students (AOR=3.61; 95% CI: 1.29–4.25), age group (AOR=2.28; 95% CI: 1.18–4.40), type of school (AOR=0.43; 95% CI: 0.22–0.82), knowledge of adverse effects of tobacco use (AOR=0.67; 95% CI: 0.18–0.71), having smoking family members (AOR=3.69; 95% CI: 1.18–4.75), and peers smoking (AOR=4.09; 95% CI: 2.04–6.19).
CONCLUSIONS The prevalence of tobacco use among adolescent students was significantly elevated. Thus, the findings underscore the urgent necessity of targeted interventions in both family and school environments, as well as awareness campaigns, to mitigate the elevated prevalence of tobacco use among adolescents.

INTRODUCTION

Tobacco use remains a paramount concern in the realm of global public health[1,2], contributing to over 8 million deaths annually worldwide[3]. Of these, more than 7 million are directly attributable to tobacco use, while approximately 1.3 million deaths result from exposure to secondhand smoke[4]. In 2020, 22.3% of the global population consumed tobacco, including 36.7% of males and 7.8% of females[5]. Approximately 80% of the world's 1.3 billion tobacco users reside in low- and middle-income countries[3]. In South-East Asia, around 4.1 million deaths occur annually due to tobacco use[6]. As per the WHO-STEPS Survey (2019) conducted by Nepal Health Research Council (NHRC), 3.8 million adults or currently, 28.9% of adults aged 15–69 years used

smoked or smokeless tobacco products[7]. Tobacco products can be consumed through various forms such as smoking, chewing, snuffing, and ingestion[8,9]. In Nepal, tobacco is used in both smoked and smokeless forms, especially in the Terai region, where bidis, cigarettes, hookahs, and chillums, along with smokeless tobacco products like khaini, gutkha, and zarda are prevalent[10]. It is a leading risk factor for non-communicable diseases (NCDs), such as coronary heart disease, stroke, chronic obstructive pulmonary disease (COPD), lung cancer and cardiovascular disease (CVD)-related fatalities[1,10,11]. Annually, 27100 premature deaths are attributed to tobacco-related diseases in Nepal[12].

As per the World Health Organization (WHO)[13], adolescents are the individuals within the age group of

10–19 years. In Nepal, adolescents constitute 20.15% of the total population, with 9.98% in the age group of 10–14 years and 10.17% in the age group of 15–19 years[14]. The global data set indicates that at least 38 million adolescents (25 million boys and 13 million girls) aged 13–15 years are current users of some form of tobacco[5]. Moreover, globally, at least 1 in 10 adolescents aged 13–15 years uses tobacco[15]. In 2024, 19.0% of US middle and high school students (5.28 million students) in which 1 of every 19 middle school students (5.4%) and 1 of every 10 high school students (10.1%) reported ever having used any tobacco product[16]. The South-East Asia Region leads with 11 million adolescent tobacco users aged 13–15 years, or 30% of the global total[17]. More than 19 million adolescent tobacco users, or 51% of the global total, reside in lower middle-income countries[17]. On average, nearly 10% of adolescents globally, 13% of boys and 7% of girls aged 13–15 years use one or more types of tobacco products[17]. The vast majority of people using tobacco today began doing so when they were adolescents.

Tobacco use remains a significant public health issue among adolescents in Nepal, with prevalence showing a rising trend over the years and across the regions. Early studies reported prevalence of current users of tobacco was 10.2% of adolescents (cigarette smoking: 9.4%, smokeless products: 6.5%, and both forms: 5.7%) in western Nepal[18], 19.7% in Dharan[19], 25.3% in Kalaiya (boys 31% and girls 14.4%)[20]. In Birgunj, it was 15.6%[21]. Subsequent studies highlighted rates of 19.6% in Kaski[22], in Nawalpur, tobacco use prevalence was 11.6%[23], while in Kalimati, Kathmandu 15–20% of higher secondary students used tobacco[9], 22.8% in Syangja district[24], and 31.7% in Budhanilkantha[25]. More recently, the prevalence reached 20.6% in Tokha Municipality, Kathmandu, Nepal[26], and 23.3% in Jumla, with higher rates among males (31.9%) compared to females (7.2%)[27]. Additionally, WHO-STEPS Survey, 2019 by the NHRC reported a national prevalence of 28.9%[7]. These figures underscore the growing burden of tobacco use among adolescents.

Although countries like Bangladesh, Nepal, Bhutan, and Sri Lanka have tobacco control laws and policies, tobacco consumption among youth remains prevalent, and the issue is growing[28]. Moreover, as per the tobacco control Act in 2011, the use of tobacco products is banned in public places, and the purchase is restricted for individuals under 18 years in Nepal[28]. Despite the implementation of tobacco control laws and policies, there has been no notable decrease in tobacco users between 2013 and 2019 in Nepal[7]. There is rising prevalence of tobacco use among adolescents worldwide, including in Nepal[3]. Furthermore, the various studies conducted over the years and across the regions also revealed a rising trend of prevalence of tobacco use among adolescents in Nepal from 10.2% to 31.7%[18,25]. Teenagers make snap decisions and engage in risk-taking behaviors such as using tobacco, abusing drugs, being

violent, having sex beginning from middle adolescence (aged 14–15 years) and onwards[29]. Additionally, late adolescents were more likely to use tobacco than those in early and middle adolescence, as this period is often associated with increased susceptibility to risk-taking behaviors[19,30]. This study therefore focused on the specific age groups of late adolescents (15–19 years). Even though numerous students from various terai and hilly regions are enrolled in grades 11 and 12 of various schools and colleges in Nepalgunj sub-metropolitan city, no specific study on tobacco use has been done in Nepalgunj to date. Thus, this study has attempted to explore the prevalence of tobacco use and the factors associated with adolescent secondary school students in Nepalgunj, Banke District, Nepal.

METHODS

Study design, area, population and sample
A school-based cross-sectional study was conducted in Nepalgunj, Banke District, Nepal, located in Lumbini Province, from April to May 2023. According to the records of the Education Development and Coordination Unit, Banke (2024), Nepalgunj comprises a total of 24 secondary schools (grades 1–12), including 7 government schools and 17 private schools. The target population consisted of all adolescents enrolled in grades 11 and 12 in these secondary schools. Two government schools and two private schools were selected using convenience sampling. Moreover, as indicated by the list of students available from the school administration, the sampling unit comprised students in the late-adolescence age groups (16–17 years) and (18–19 years) enrolled in grades 11 and 12 in these schools. Subsequently, simple random sampling was employed to recruit adolescent students from the selected schools and were approached with a self-administered structured questionnaire adapted from the Global Youth Tobacco Survey (GYTS) for data collection (Supplementary file). The sample size was estimated using the formula[31]:

$$n = \frac{Z^2 p(1-p)}{e^2}$$

where Z = 1.96 at 95% confidence interval (CI). From a similar study in Dharan, Eastern Nepal conducted among adolescents, prevalence of ever use of any tobacco product was 19.7%[18], so we set p=0.197 and the margin of error (e) at 5%. This gave n=243, but assuming a non-respondent rate of 5%, the final sample size was 256.

A total of 256 questionnaires were thus distributed to students in four selected schools and 252 questionnaires were filled in and submitted to the investigator, but four students did not submit a questionnaire. Among 252 responses, two questionnaires were partly filled in; thus, they were excluded. Finally, for a greater representation of the targeted population in our study, we included a total of 250 adolescent students in the analysis, comprising 106 from government schools and 144 from private schools.

Variables

Tobacco ever use was taken as the dependent variable. Ever user was regarded an adolescent who had used any form of tobacco (either smoked or chewed) at least once up to the data collection time. A never user was an adolescent who had never used any form of tobacco. Explanatory variables considered (factors associated with tobacco ever use) were: age, gender, type of school, grade, ethnicity, religion, type of family, living status (living alone, with friends, or family), father's education level, mother's education level, father's occupation, mother's occupation, knowledge regarding the adverse effects of tobacco, personal use of tobacco and by others (father, mother, other family members, friends).

Statistical analysis

Th collected raw data were initially assessed to ensure completeness and consistency. Subsequently, the data were coded, entered, and analyzed using the Statistical Package for Social Science (SPSS version 23.0). Frequencies and percentages were employed for descriptive statistics. Initially, for categorical variables, bivariate analyses using chi-squared (χ^2) test or Fisher's exact test, as appropriate, were conducted to examine the association between the dependent variable (tobacco ever use: 'no'=0 and 'yes'=1) and each explanatory variable. These analyses identified significant variables for potential inclusion in a binary logistic regression model. The results are reported as odds ratios (ORs) with corresponding 95% confidence interval (CI). The goodness of fit for the binary logistic regression model was evaluated using the Hosmer-Lemeshow test[32]. A small discrepancy between the predicted and observed values, for the Pearson's chi-squared value with a high p-value (>0.05) suggests that the model is well-fitted to the data. Similarly, for the test of model adequacy, log likelihood ratio test (LRT), Omnibus test, and the Nagelkerke R^2 test were employed with 5% level of significance[33]. The Omnibus test was applied to assess the overall significance of the model (more details in the Supplementary file). If p<0.05, the overall model coefficients were considered significant at the 5% level. The Nagelkerke R^2 was computed to assess the proportion of variation in the dependent variable explained by the independent variables[33]. The iterated weighted least square method was implemented to solve maximum likelihood equations[32]. Variance inflation factors (VIFs) were used to determine whether acceptable multicollinearity exists between the explanatory variables.

RESULTS

Table 1 presents the sociodemographic characteristics of the respondents. Among the 250 students included in the study, the majority 90 (30.4%) were aged 18 years. Of the total respondents, 144 (57.5%) attended private schools, while 106 (42.4%) were enrolled in government schools. The participants comprised nearly equal numbers of males (50.8%) and females (49.2%). Of the respondents, 131

Table 1. Sociodemographic characteristics of adolescent students in Nepalgunj sub-metropolitan city, Banke, Nepal, April – May 2023 (N=250)

Characteristics	n (%)
Age (years)	
16	44 (17.6)
17	76 (30.4)
18	90 (36.0)
19	40 (16.0)
Gender	
Male	127 (50.8)
Female	123 (49.2)
Type of school	
Government	106 (42.4)
Private	144 (57.6)
Grade	
11	119 (47.6)
12	131 (52.4)
Ethnicity	
Brahman/Chhetri	126 (50.4)
Janajati	46 (18.4)
Madhesi	46 (18.4)
Dalit	25 (10.0)
Other	7 (2.8)
Religion	
Hindu	226 (90.4)
Muslim	7 (2.8)
Buddhist	8 (3.2)
Christian	9 (3.6)
Type of family	
Nuclear	116 (46.4)
Joint	134 (53.6)
Living status	
Alone	35 (14.0)
With friends	39 (15.6)
With family	176 (70.4)
Father's education level	
Illiterate	28 (11.2)
literate	222 (88.8)
Mother's education level	
Illiterate	96 (38.4)
Literate	154 (61.6)

Table 1. Continued

Characteristics	n (%)
Father's occupation	
Business	59 (23.6)
Job	38 (15.2)
Agriculture	81 (32.4)
Daily wages	30 (12.0)
Foreign employment	42 (16.8)
Mother's occupation	
Housemaker	125 (50.0)
Business	25 (10.0)
Job	15 (6.0)
Agriculture	77 (30.8)
Foreign employment	8 (3.2)

(52.4%) were in grade 12 and 119 (47.6) in grade 11. Only 2.8% were Muslims, and 90.4% were Hindus. Brahman/Chhetri accounted for 126 (50.4%) of the total respondents; 34 (53.6%) of the respondents were part of a joint family, and 176 (70.4%) of the respondents lived with family. The fathers of 222 (88.8%) of respondents were literate, while the mothers of 61.6% of respondents were literate. In terms of occupation, half of the respondents' mothers 125 (50.0%) were housemakers, while 81 (32.4%) of the respondents' fathers were employed in agriculture.

Prevalence of ever use of tobacco
The prevalence of ever used tobacco among the adolescents was 103 (41.2%). Among the various tobacco products, 40 adolescents (38.8%) reported using pan masala, gutkha or parag, 37 (35.9%) used cigarettes or bidis, and 9 (8.7%) consumed other tobacco products such as surti or khaini.

Table 2 shows that nearly half of the respondents 48 (46.6%) were former tobacco users, 11 (10.7%) were regular users, and 10 (9.7%) were experimental users. Among the adolescents who used tobacco, 51 (49.5%) got their products from friends. More than three-fourths of respondents, 84 (81.5%), were not denied tobacco sales by the shopkeepers due to their age. Furthermore, the desire for experience led 56 (54.4%) adolescents to use tobacco products. Similarly, 23 (22.3%) were influenced by peer pressure, while only 3.9% used tobacco for enjoyment. The results also indicate that 82 (79.6%) of tobacco users attempted to quit. The vast majority of respondents 244 (97.6%) were aware of the negative consequences of tobacco use, while only 2.4% were unaware of them.

Bivariate analysis
Table 3 demonstrates that gender and age (p<0.01) are statistically significantly related in to ever using tobacco, as

Table 2. Tobacco consumption by adolescent students in Nepalgunj sub-metropolitan city, Banke, Nepal, April – May 2023 (N=250)

Tobacco consumption	n (%)
Frequency	
Regular user	11 (10.7)
Occasional user	34 (33.0)
Past user	48 (46.6)
Experimental user	10 (9.7)
Source	
Shop	45 (43.7)
From friends	51 (49.5)
Other	7 (6.8)
Refused sale because of age	
Yes	19 (18.5)
No	84 (81.5)
Influencing factors for initiating tobacco use	
Peer pressure	23 (22.3)
Imitating others	20 (19.4)
For the experience	56 (54.4
For enjoyment	4 (3.9)
Tried to quit	
Yes	82 (79.6)
No	21 (20.4)
Knowledge of adverse effects of tobacco	
Yes	244 (97.6)
No	6 (2.4)
Forced by friends to use tobacco	
Yes	69 (27.6)
No	181 (72.4)

are the type of school and grade (p<0.05). Education level and occupation of parents show no association with ever use of tobacco among adolescent students (p>0.05). Additionally, the adverse effects of tobacco use are significantly linked to the ever use of tobacco among adolescent students. Furthermore, tobacco use by the father, or other family members (excluding the mother), or by friends, has a significant association with adolescents' tobacco use (p<0.01).

Fitted model for tobacco use
The results in Table 4 show that male adolescent students are 3.61 times more likely to use tobacco products compared to female students (AOR=3.61; 95% CI: 1.29–4.25, p=0.018).

Table 3. Association between sociodemographic characteristics and ever use of tobacco among adolescent students in Nepalgunj sub-metropolitan city, Banke, Nepal, April – May 2023 (N=250)

Variables	Ever use of tobacco		Pearson chi-squared or Fisher's exact test value (p-value)
	Yes n (%)	No n (%)	
Gender			
Male	73 (57.5)	54 (42.5)	28.24 (0.00**)
Female	30 (24.4)	93 (75.6)	
Age (years)			
16–17	35 (29.2)	85 (70.8)	13.79 (0.00**)
18–19	68 (52.3)	62 (47.7)	
Religion			
Hindu	94 (41.6)	132 (58.4)	0.96 (0.811)
Muslim	2 (28.6)	5 (71.4)	
Buddhist	4 (50.0)	4 (50.0)	
Christian	3 (33.3)	6 (66.7)	
Ethnicity			
Brahmin/Chhetri	50 (39.7)	76 (60.3)	1.24 (0.871)
Janajati	19 (41.3)	27 (58.7)	
Madhesi	22 (47.8)	24 (52.2)	
Dalit	9 (36.0)	16 (64.0)	
Other	3 (42.9)	4 (57.1)	
Type of family			
Nuclear	44 (37.9)	72 (62.1)	0.95 (0.329)
Joint	59 (44.0)	75 (56.0)	
Living status			
Alone	18 (51.4)	17 (48.6)	1.80 (0.406)
With friends	16 (41.0)	23 (59.0)	
With family	69 (38.2)	107 (60.8)	
Type of school			
Government	53 (50.0)	53 (50.0)	5.88 (0.015*)
Private	50 (34.7)	94 (65.3)	
Grade			
11	41 (34.5)	78 (65.5)	4.26 (0.039*)
12	62 (47.3)	69 (52.7)	
Father's education level			
Illiterate	8 (28.6)	20 (71.4)	2.07 (0.150)
Literate	95 (42.8)	127 (57.2)	
Mother's education level			
Illiterate	43 (44.8)	53 (55.2)	0.83 (0.362)
Literate	60 (39.0)	94 (61.0)	

Table 3. Continued

Variables	Ever use of tobacco		Pearson chi-squared or Fisher's exact test value (p-value)
	Yes **n (%)**	**No** **n (%)**	
Father's occupation			
Business	32 (54.2)	27 (45.8)	6.63 (0.156)
Job	17 (44.7)	21 (55.3)	
Agriculture	29 (35.8)	52 (64.2)	
Daily wages	11 (36.7)	19 (63.3)	
Foreign employment	14 (33.3)	28 (66.7)	
Mother's occupation			
House maker	50 (40.0)	75 (60.0)	5.80 (0.214)
Business	13 (52.0)	12 (48.0)	
Job	6 (40.0)	9 (60.0)	
Agriculture	28 (36.4)	49 (63.6)	
Foreign employment	6 (75.0)	2 (25.0)	
Knowledge of adverse effects of tobacco			
Yes	102 (41.8)	142 (58.2)	5.27 (0.023*)
No	1 (16.7)	5 (83.3)	
Father uses tobacco			
Yes	72 (48.6)	76 (51.4)	8.30 (0.004**)
No	31 (30.4)	71 (69.6)	
Mother uses tobacco			
Yes	6 (55.2)	13 (44.8)	2.64 (0.104)
No	87 (39.4)	134 (60.6)	
Any other family member uses tobacco			
Yes	39 (58.2)	28 (41.8)	10.93 (0.001**)
No	64 (35.0)	147 (58.8)	
Friends use tobacco			
Yes	78 (73.6)	28 (26.4)	17.67 (0.000**)
No	25 (17.4)	119 (82.6)	

*p<0.05, **p<0.01

Table 4. Binary multiple logistic regression model for ever use of tobacco among adolescent students in Nepalgunj sub-metropolitan city, Banke, Nepal, April – May 2023 (N=250)

Variables	Categories	p*	AOR	95% CI	
				Lower	**Upper**
Gender	Male	0.018	3.61	1.29	4.25
	Female ®		1		
Age (years)	16–17	0.013	2.28	1.18	4.40
	18–19 ®		1		

Table 4. Continued

Variables	Categories	p*	AOR	95% CI	
				Lower	Upper
Type of school	Government	0.012	0.43	0.22	0.82
	Private ®		1		
Knowledge of adverse effects of tobacco	Yes	0.021	0.67	0.18	0.71
	No ®		1		
Smoking by family members	Yes	0.007	3.69	1.18	4.75
	No ®		1		
Smoking by friends	Yes	0.001	4.09	2.04	6.19
	No ®		1		
Constant		0.001	7.40		

AOR: adjusted odds ratio; adjusted for gender, age, type of school, knowledge of adverse effects of tobacco, smoking by family members, smoking by friends. ® Reference categories. *Significant at p<0.05.

Adolescents aged 16–17 years are 2.28 times more likely to have ever used tobacco than those aged 18–19 years (AOR=2.28; 95% CI: 1.18–4.40, p=0.013). In addition, adolescent students from government schools are 57% less likely to use tobacco products compared to those from private schools (AOR=0.43; 95% CI.: 0.22–0.82, p=0.012). Similarly, adolescents with knowledge of the adverse effects of tobacco use are 32.9% less likely to have ever used tobacco than those without such knowledge (AOR=0.67; 95% CI: 0.18–0.71, p=0.021). The odds of using tobacco are 3.69 times higher for adolescents with family members who smoke compared to those whose family members do not smoke (AOR=3.69; 95% CI: 1.18–4.75, p=0.007). Similarly, adolescents with friends who smoke are 4.09 times more likely to use tobacco than those whose friends do not smoke (AOR=4.09; 95% CI: 2.04–6.19, p=0.001).

DISCUSSION

This study provides significant insight into the high prevalence (41.2%) of tobacco use among school adolescents aged 16–19 years, which is significantly influenced by demographic, familial, social and peer-related factors.

This prevalence stands in stark contrast to previous studies conducted across Nepal: 25.3% in Kalaiya[20], 15.6% in Birgunj[21], 19.6% in Kaski[22], 15–20% in Kalimati, Kathmandu[9], 22.8% in Syangja[24], 31.7% in Budhanilkantha[25], 20.6% in Tokha Municipality, Kathmandu[26], and 23.3% in Jumla[27]. Similarly, studies in other countries reported that 19.0% of middle and high school students used tobacco in the US in 2024[16], 30.6% in Bhubaneswar, India[34], and 1.8% in Iraq[30]. This difference may be attributed to variations in the study populations. Furthermore, this study exclusively focused on late adolescents aged 16–19 years, specifically students from grades 11 and 12, as this age group represents a transitional phase from adolescence to early adulthood, a period often associated with increased susceptibility to risk-taking behaviors, such as tobacco use.

This study identified demographic, familial, and social factors significantly associated with the ever use of tobacco, including gender, age, type of school, knowledge of the adverse effects of tobacco use, tobacco use by family members or by friends. These findings are consistent with the results of numerous studies in the literature. Specifically, age and gender have been identified as significant determinants by other studies[18-20,23], as have the type of school attended[19,35], the influence of tobacco use by family members[12,35,36] or by friends[35]. These findings collectively highlight the multifactorial nature of tobacco use behavior among adolescents, influenced by a combination of demographic, familial, and social factors.

The current study revealed that male adolescent students are more likely to use tobacco products compared to female students. This finding aligns with the study conducted in Budhanilkantha municipality of Kathmandu, Nepal[25], and the finding of GYTS 2011, Nepal[28]. This is supported by the studies conducted in the Gaindakot municipality of Nawalpur district, Nepal, in which male adolescents were more likely to use tobacco products than female adolescents[23]. This finding was also in line with the study conducted in Kalaiya, Nepal, in which the male students were likely to ever use tobacco than the female students[20]. This result was supported by the study in Iraq in which male adolescents were twice more likely to be tobacco users than female students[30]. This might be because males have been reported to be more involved in risky behaviors than females[5]. The difference might be caused by alcohol being consumed more by males than by females as a means of stress relief and for recreational purposes.

Our study revealed that adolescents aged 16–17 years were more likely to have ever used tobacco compared to

those aged 18–19 years. In contrast, studies conducted in Dharan, Eastern Nepal[19], Gaindakot municipality of Nawalpur district[23], and Iraq[30], indicated that late adolescents were more likely to use tobacco than their early and middle adolescent counterparts. The observed discrepancy may be attributed to factors such as peer pressure, experimentation, and imitation of others, which were identified as primary reasons for initiating tobacco use in our study.

Additionally, this study found that adolescent students attending government schools were less likely to use tobacco products compared to their counterparts in private schools. This finding aligns with research conducted in Syangja, Nepal, which reported higher tobacco consumption among students in non-government schools compared to those in government schools[24]. However, a study in Dharan, Eastern Nepal, showed that students in government schools were more likely to have ever used tobacco than those in private schools[19]. This variation may be explained by socioeconomic differences and the contrasting school environments in the respective study settings.

In our study, adolescents who were aware of the harmful effects of tobacco use were less likely to have ever used tobacco compared to those who lacked such knowledge. This finding is consistent with research conducted in Western Nepal[18] and Budhanilkantha municipality of Kathmandu, Nepal[25]. It may be advantageous to incorporate education on the health risks of tobacco use into the curricula of schools and colleges.

The present study showed that the students with family members who used tobacco were higher than those with no family history of tobacco. This finding aligns with research conducted in Bhubaneswar, India, which demonstrated the role of tobacco use by family members[34], and in Iraq by parents or siblings[30]; however, a study in Kalaiya, Nepal, indicated that for students whose family members used tobacco[20], the association was significantly higher compared to the findings of our study.

We found that adolescents with friends who smoke are more likely to use tobacco compared to those whose friends do not engage in smoking. This is consistent with findings from the studies in Bhubaneswar, India, where tobacco use among peers[34], and in Ibadan, Nigeria, where close friends who smoked increased the odds of tobacco use[37]. A study in Iraq, also revealed that having friends who smoked was substantially correlated with tobacco use[30]. This may be attributed to the significant association between friends' tobacco consumption and the influence of peer pressure on tobacco use[20].

Limitations
Our study has some limitations, including a focus on a specific age group of adolescent students enrolled in grades 11 and 12, convenience sampling to select schools, and the research was conducted only in Nepalgunj sub-metropolitan city, Banke District, Nepal, which may impact the generalizability of the findings. A cross-sectional study design was adopted, which does not allow for causal attribution. Furthermore, data were acquired using a self-administered questionnaire, which may have introduced reporting bias. Despite these limitations, our findings might be crucial for designing targeted interventions to address tobacco use in Nepal and in similar contexts.

CONCLUSIONS
The study revealed a notably high prevalence of tobacco use among adolescents. The alarming rise in tobacco use among adolescent students in Nepal is significantly influenced by demographic, familial, and social factors such as gender, age, type of school, knowledge of the adverse effects of tobacco use, tobacco use by family members or by friends. These findings underscore the critical need for targeted interventions, including school-based education on the harmful effects of tobacco, family-focused programs, and peer resistance programs to reduce tobacco use among youth. These initiatives should take into account gender differences, age-related susceptibility, the influence of peers, family, and knowledge. It is essential that policymakers, educators, and health authorities work collaboratively to implement evidence-based strategies that protect the health and well-being of adolescent students and foster a tobacco-free future.

REFERENCES
1. WHO global report on trends in prevalence of tobacco smoking 2000–2025, Second edition. World Health Organization; 2018. Accessed February 15, 2025. https://escholarship.org/uc/item/4dc4t5d9
2. GBD 2019 Risk Factors Collaborators. Global burden of 87 risk factors in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet. 2020;396(10258):1223-1249. doi:10.1016/S0140-6736(20)30752-2
3. World Health Organization. Tobacco. World Health Organization; 2023. Accessed February 15, 2025 https://www.who.int/news-room/fact-sheets/detail/tobacco
4. Institute For Health Metrics And Evaluation. Global Burden of Disease. Institute For Health Metrics And Evaluation; 2019. Accessed February 15, 2025. https://www.healthdata.org/gbd
5. World Health Organization. WHO global report on trends in prevalence of tobacco use 2000–2025. Fourth edition. World Health Organization; 2021. Accessed February 15, 2025. https://www.who.int/publications/i/item/9789240039322
6. Kaur J, Rinkoo AV, Richardson S. Update on numbers of tobacco-attributable deaths by country in the South-East Asia region: implications for policy. Tob Control. 2024. doi:10.1136/tc-2024-058599
7. Dhimal M, Bista B, Bhattarai S, et al. Noncommunicable disease risk factors: STEPS Survey Nepal 2019. Nepal Health Research Council; 2019. Accessed February 15, 2025. https://

www.who.int/docs/default-source/nepal-documents/ncds/ncd-steps-survey-2019-compressed.pdf

8. Jacobs M. From the first to the last ash: The History, Economics & Hazards of Tobacco. The Cambridge Tobacco Education Program; 1997.

9. Pradhan M, Pokharel B, Khadgi A. Factors affecting use of tobacco among higher secondary students of Kalimati, Kathmandu. Int J Health Sci Res. 2021;11(6):381-387. doi:10.52403/ijhsr.20210657

10. Thakur JS, Garg R, Narain JP, Menabde N. Tobacco use: A major risk factor for non-communicable diseases in the South-East Asia region. Indian J Public Health. 2011;55(3):155-160. doi:10.4103/0019-557X.89943

11. Eriksen MP, Mackay J, Schluger N, Islami F, Drope J. The Tobacco Atlas, Fifth edition. Atlanta: American Cancer Society; 2015

12. Khanal GN, Khatri RB. Burden, prevention, and control of tobacco consumption in Nepal: A narrative review of existing evidence. Int Health. 2021;13(2):110-121. doi:10.1093/inthealth/ihaa055

13. World Health Organization. Adolescent health in the South-East Asia Region. World Health Organization; 2010. Accessed February 15, 2025. https://www.who.int/southeastasia/health-topics/adolescent-health

14. National Statistics Office (Nepal). National Population and Housing Census 2021, 12th Population Census. National Statistics Office (Nepal); 2021. Accessed February 15, 2025. https://microdata.nsonepal.gov.np/index.php/catalog/124

15. World Health Organization. WHO global report on trends in prevalence of tobacco use 2000–2030. World Health Organization; 2024. Accessed February 15, 2025. https://www.who.int/publications-detail/9789240088283

16. Jamal A, Park-Lee E, Birdsey J, et al. Tobacco Product Use Among Middle and High School Students - National Youth Tobacco Survey, United States, 2024. MMWR Morb Mortal Wkly Rep. 2024;73(41):917-924. doi:10.15585/mmwr.mm7341a2

17. World Health Organization. Adolescent and young adult health. World Health Organization; 2024. Accessed February 15, 2025. https://www.who.int/news-room/fact-sheets/detail/adolescent-and-young-adult-health

18. Sreeramareddy CT, Kishore P, Paudel J, Menezes RG. Prevalence and correlates of tobacco use amongst junior collegiates in twin cities of western Nepal: a cross-sectional, questionnaire-based survey. BMC Public Health. 2008;8:97. doi:10.1186/1471-2458-8-97

19. Pradhan PMS, Niraula SR, Ghimire A, et al. Tobacco use and associated factors among adolescent students in Dharan, Eastern Nepal: a cross-sectional questionnaire survey. BMJ Open. 2013;3:e002123. doi:10.1136/bmjopen-2012-002123

20. Bhaskar R K, Narayan Sah M, Gaurav K, et al. Prevalence and correlates of tobacco use among adolescents in the schools of Kalaiya, Nepal: a cross-sectional questionnaire based study. Tobacco Induced Diseases. 2016;14(March):11. doi:10.1186/s12971-016-0075-x

21. Chaudhary AK, Bhandari TR. Prevalence of tobacco use and its associated factors among school-going adolescents in Birgunj Sub-Metropolitan, Nepal. J Health Allied Sci. 2019;5(1):72-76. doi:10.37107/jhas.40

22. Sharma S, Banstola RS, Pageni S. Tobacco use among adolescents of a public school of Kaski district. J Health Allied Sci. 2020;10(1):59-63. doi:10.37107/jhas.101

23. Sapkota N, Paneru DP. Prevalence and correlates of tobacco and alcohol use among adolescents in Nawalpur district, Nepal. J Chitwan Med Coll. 2021;11(38):14-17. doi:10.54530/jcmc.478

24. Sharma P, Pahari S, Acharya SR, Moon DH, Shin YC. Tobacco consumption and its associated factors among Nepalese students. Open Public Health J. 2021;14:446-454. doi:10.2174/1874944502114010446

25. Kc BB, Khanal P, Oli LK, et al. Prevalence and Factors Associated with Tobacco Use among High School Students. J Nepal Health Res Counc. 2022;20(2):310-315. doi:10.33314/jnhrc.v20i02.3871

26. Bhatt A, Sehgal H, Devkota E, Lamsal A, Karki K. Prevalence of cigarette smoking and its associated factors among adolescent higher secondary students of Tokha Municipality, Kathmandu, Nepal. Soc Sci. 2023;12(4):171-177. doi:10.11648/j.ss.20231204.14

27. Panta PP, Amgain K, Lama N, Neupane P, Panta I. Prevalence and associated factors of tobacco smoking in Jumla, Nepal. J KIST Med Col. 2024;6(11):29-37. doi:10.61122/jkistmc281

28. Public Health Update. Tobacco Products (Control and Regulatory) Act, 2068 (2011). Public Health Update. Accessed February 15, 2025. https://publichealthupdate.com/tobacco-products-control-and-regulatory-act-2068-2011/

29. Sharma R, Grover VL, Chaturvedi S. Tobacco use among adolescent students and the influence of role models. Indian J Community Med. 2010;35(2):272-275. doi:10.4103/0970-0218.66891

30. Hussain HY, Abdul Satar BA. Prevalence and determinants of tobacco use among Iraqi adolescents: Iraq GYTS 2012. Tobacco Induced Diseases. 2013;11(June):14. doi:10.1186/1617-9625-11-14

31. Cochran WG. Sampling Techniques. 3rd ed. John Wiley & Sons; 1977

32. Hosmer DW, Lameshow S. Goodness of fit tests for the multiple logistic regression model. Commun Stat - Theory Methods. 1980;9(10):1043-1069. doi:10.1080/03610928008827941

33. Nagelkerke NJD. A note on a general definition of the coefficient of determination. Biometrika. 1991;78(3):691-692. doi:10.1093/biomet/78.3.691

34. Panigrahi A, Sharma D, Mohapatra I. Tobacco consumption and its socio-demographic correlates among adolescents residing in slum areas of Bhubaneswar, India. Indian J Med Paediatr Oncol. 2020;41(6):718-723. doi:10.4103/ijmpo.ijmpo_151_20

35. Imamuzzaman M, Muhammad F, Haque MI, et al. Prevalence of smoking and its associated factors among adolescent males in Bangladesh: A community survey. Open Public Health

J. 2022;15:e187494452211040. doi:10.2174/18749445-v15-e221115-2022-83

36. Roble AK, Osman MO, Lathwal OP, Aden AA. Prevalence of Cigarette Smoking and Associated Factors Among Adolescents in Eastern Ethiopia, 2020. Subst Abuse Rehabil. 2021;12:73-

80. doi:10.2147/SAR.S331349

37. Onoh I, Dairo MD, Balogun MS, Fawole O. Prevalence and predictors of tobacco use among adolescents in Ibadan, Nigeria. Prev Chronic Dis. 2023;20:E40. doi:10.5888/pcd20.220234