Original article

Factors associated with tobacco use among Nepalese men aged 15–49 years: Data from Nepal demographic and Health Survey 2016

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ABSTRACT

Background: Tobacco is one of the leading causes of premature death around the world. In Nepal, tobacco kills 15,000 people every year. Men are also the primary users of tobacco. This study aimed to discern the prevalence and associated factors of tobacco use among Nepalese men aged 15–49 years.

Methods: This was a cross-sectional study. This study used data from the Nepal Demographic and Health Survey 2016. A total of 4059 study participants aged 15–49 years were included in the final analysis. The primary outcome of interest in this study was ‘tobacco use’, which was further categorized into smoked and smokeless tobacco use. Multivariable logistic regression was performed to identify determinants of tobacco use, smoking, and smokeless tobacco use.

Results: The prevalence of overall tobacco, smoked tobacco, and smokeless tobacco use were 52.3% (95% CI: 50.0–54.6), 27.3% (95% CI: 24.5–30.3), and 40.2% (95% CI: 38.0–42.4), respectively. The prevalence of tobacco use was significantly higher among the elderly, manual workers, those of lower educational status, those of lower economic status, and residents of Province No. 2. In multivariable logistic regression analysis, older age, poor education, poor economic status, and residence in the Terai region were each found to be significantly associated with tobacco use.

Conclusion: As one out of every two Nepalese men is a tobacco consumer, pertinent public health programs need to increase advocacy against tobacco use among the mass population. Tobacco control programs should also target high-risk groups when designing interventions.

1. Background

In 2016, around 72% of all deaths globally were attributable to non-communicable diseases (NCDs).¹ At the same time, around 61% of Disability-Adjusted Life Years (DALYs) lost were caused by NCDs.² Tobacco use including both smoked and smokeless tobacco (SLT) is a well-known NCD risk factor.³ Several studies have shown that the risk of coronary heart disease (CHD), stroke, chronic obstructive pulmonary disease (COPD), and lung cancer increases several fold due to tobacco

use.³ Smoking is the second largest contributor to global DALYs.⁴ Smoking accounts for 5 million deaths annually, since the 1990s, and this burden is increasing day by day, particularly in low- and middle-income countries.⁴ Similarly, SLT use results in 1.7 million DALYs lost annually and is a leading preventable cause of oral, esophageal, and pharyngeal cancers worldwide.⁵

The rate of tobacco usage is high in the South and Southeast Asian region, causing 1.3 million deaths per year.⁶ The prevalence of smoking ranges from 31% to 72% in this region.⁷ Countries like Bangladesh,

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India, Nepal, and Pakistan have a high prevalence of SLT use, ranging from 16 to 37%.⁷ Almost half of all deaths in the region are attributable to NCDs, including CHD, stroke, COPD, and cancer.⁸ Furthermore, tobacco is a major risk factor for each of those NCDs.⁴ It has been estimated that around 10% of all deaths in the South and Southeast Asian region are attributable to tobacco use.⁹

Nepal is experiencing an epidemiological transition due to the increasing burden of NCDs.¹⁰ Tobacco use is responsible for the death of around 15,000 people per year in Nepal.¹¹ According to the Nepal Demographic and Health Survey (NDHS) 2006, the estimated prevalence of tobacco use was 30.3% among the population. The survey reported that the proportion of tobacco consumption was higher among men than women (56.5% versus 19.6%).¹² However, according to the NDHS 2011, the estimated prevalence of tobacco use was 51.9% among Nepalese men, which was almost four times higher than women (13%).^{11,13} Therefore, men are the primary tobacco consumers in Nepal and are more at risk of developing NCDs.

In the 'Global NCD Action Plan 2013–2020', the World Health Organization (WHO) has recommended the reduction of tobacco usage by at least 30% among the population (aged 15 years or above) in order to reduce the global burden of NCDs.¹⁴ Updated epidemiological data is necessary to monitor the country's progress towards achieving that goal. In addition, up-to-date information on social determinants is warranted to plan and design the tobacco control program for effective prevention and control of tobacco-related NCDs. This study aimed to ascertain the prevalence and associated social factors of tobacco use (both smoked and SLT products) among Nepalese men aged 15–49 years using NDHS 2016 data.

2. Methods

2.1. Study design

A secondary data analysis was carried out using data from the Nepal Demographic and Health Survey (NDHS) 2016; collected using the men's questionnaire.¹⁵ The NDHS 2016 adopted a cross-sectional survey design and was conducted by NEW ERA under the direct supervision of the Ministry of Health (MOH), Government of Nepal. The objective of the survey was to collect up-to-date information on selected health and demographic indicators of Nepalese population.¹⁵

Multistage stratified cluster sampling design was used by the NDHS 2016. Stratification was done based on place of residence (urban or rural). In the rural areas two-stage stratified clustered sampling was followed. At first, primary sampling units (PSUs) were selected based on probability proportional to size (PPS). Then, households were selected from the PSUs. In the urban areas, household selection followed three-stage stratified clustered sampling. At first, PSUs were selected according to PPS method. Next, enumeration areas (EAs; which is a ward/part of a ward) were selected. At the third stage, households were systematically selected. In total, 383 PSUs (urban: 184 and rural: 199) and 11,490 households (urban: 5520 and rural: 5970) were selected for the survey. The sampling strategy is detailed in the NDHS 2016 report.¹⁵

2.2. Study participants

The participants of this study were 4059 Nepalese men aged between 15 and 49 years. The selection process of the participants is shown in Fig. 1.

2.3. Outcome of interest

The outcome of interest in this study was 'tobacco use', which was further categorized into 'smoked' and 'smokeless tobacco use'. Participants fell under the 'smoked' category when they reported smoking manufactured cigarettes, hand-rolled cigarettes, tobacco pipes,

cigars, cheroots, cigarillos, or water pipes during the survey. Similarly, if any participant reported the use of snuff (by mouth or by nose), chewing tobacco products, or consumption of betel quid with tobacco during the survey, they were categorized under the 'smokeless tobacco use' category.

2.4. Associated factors

In this study, four types of associated factors were considered, as identified through literature review: demographic, sociocultural, spatial, and access to information.^{12,13,16–18} Demographic variables were the age and marital status of the respondents. Sociocultural factors were their educational status, occupation, ethnicity, religion, and wealth index. Place of residence (urban vs. rural), province of residence, and ecological region were considered spatial factors. Lastly, access to information included frequency of reading newspapers/magazines, watching television, and listening to the radio.

2.5. Statistical analysis

At first, univariate analysis was performed in order to examine the distribution of the variables. Then, bivariate analysis was done between dependent variables (tobacco use, smoking, and smokeless tobacco) and selected independent variables. Multivariable logistic regression was performed to identify associated factors of tobacco use, smoking, and smokeless tobacco use. Both crude odds ratio (COR) and adjusted odds ratio (AOR) were reported along with a 95% confidence interval (CI). A *p*-value of less than 0.05 was considered statistically significant. The variance inflation factor (VIF) was derived to find out whether any multicollinearity existed among the covariates; however, no significant multicollinearity was found. The sample weight calculated for the NDHS 2016 was used and the cluster effect was adjusted in the final analysis. All the statistical analyses were performed using Stata 13.0.

2.6. Ethical consideration

The ethical review boards of the Nepal Research Council and ICF International reviewed and approved the protocol of the NDHS 2016. Informed consent was taken from the respondents before data collection.

3. Findings

3.1. Prevalence of different forms of tobacco use

The overall prevalence of tobacco use was 52.3% (95% CI: 50.0–54.6). The prevalence of smoking was 27.3% (95% CI: 24.5–30.3) and SLT use was 40.2% (95% CI: 38.0–42.4). The weighted prevalence of different forms of tobacco use among Nepalese men is presented in Table 1.

Among the respondents, 22.9% belonged to the 15–19 years age group followed by 15.9% in the 20–24 years age group. Around two-thirds (65.9%) of the respondents were married. Almost half of them (49.0%) were educated up to the secondary level and roughly one-fifth (22.0%) received higher education. Professional/clerical/service was the main occupation category for one-third (33.4%) of the respondents. In terms of spatial factors, a majority of the study participants resided in the urban area (65.2%), Province No. 3 (24.8%), and in the Terai region (49.7%). More than half of the respondents (51%) watched television at least once a week. Around 40% of them listened to the radio at least once a week. But, comparatively few of them (21.7%) read newspapers or magazines (Table 2).

Fig. 1. Process of selection of respondents.

3.2. Prevalence of tobacco use among Nepalese men by socio-demographic characteristics

The prevalence of tobacco use, including both smoking and SLT use, was significantly higher among the older age group (≥ 20 years) compared to the younger age group (< 20 years), but was lower among those with a higher education level compared to those with lower

educational attainment. The prevalence was significantly greater among respondents who were separated/divorced/widowed, manual workers, within the poorest wealth index, or were residents of Province No. 2 (Table 2). The prevalence of tobacco use and smoking was also significantly higher among the disadvantaged ethnic population. Expectedly, residents of the Terai region and those who did not consume print/visual media at all had a higher prevalence of smokeless tobacco

Table 1

Prevalence of different forms of tobacco use among Nepalese men, Nepal Demographic and Health Survey 2016 (N = 4059).

Outcomes	Frequency	Percentage (95% CI)
Smokes any form of tobacco	1108	27.3 (24.5, 30.3)
Uses smokeless tobacco	1630	40.2 (38.0, 42.4)
Consumes tobacco in any form	2122	52.3 (50.0, 54.6)

use (Table 2).

3.3. Factors associated with tobacco use

Table 3 demonstrates the results from the logistic regression analysis, including both COR and AOR with 95% CI, of the factors associated with tobacco use among Nepalese men. In the final model, respondents' age, marital status, educational status, wealth index, religion, ecological region of residence, and frequency of listening to radio, were all individually associated with tobacco use. The odds of being a smoker increased with age; respondents of 40–44 and 45–49 years of age both had almost four times (40–44 age group: AOR = 3.598, 95% CI: 2.371–5.460, $p < 0.001$; 45–49 age group: AOR = 3.903, 95% CI: 2.646–5.758, $p < 0.001$) higher odds of consuming tobacco compared to those in the 15–19 years age group. Educational status was negatively associated with tobacco use. Those with a higher than secondary level education had 69% lower odds (AOR = 0.311, 95% CI: 0.211–0.458, $p < 0.001$) of being a tobacco consumer. Being a manual worker (AOR = 1.639, 95% CI: 1.264–2.124, $p < 0.001$) increased the odds of being a tobacco consumer when compared to agricultural workers. Like education, tobacco use had an inverse association with one's wealth quintile. Men belonging to the richest quintile had around 50% lower odds (AOR = 0.516, 95% CI: 0.360–0.739, $p < 0.001$) of consuming tobacco products compared to those belonging to the poorest quintile. Respondents following other religions were 26% less likely to be tobacco consumers (AOR = 0.742, 95% CI: 0.558–0.986, $p = 0.040$) when compared to Hindus, the dominant religious group.

In the case of spatial factors, residents of the Terai region were more likely to consume tobacco compared to residents of the Mountain region (AOR = 1.674, 95% CI: 1.209–2.319, $p = 0.002$). None of the variables categorized under 'access to information' had any significant association with tobacco use, except those who listened to the radio at least once a week, who were 26% less likely to consume tobacco (AOR = 0.736, 95% CI: 0.600–0.902, $p = 0.003$).

3.4. Factors associated with smoking and smokeless tobacco use

Most of the factors associated with tobacco use were also associated with smoking and SLT use. Higher age, lower educational status, and being separated/divorced/widowed were associated with both smoking and SLT use (Tables 4 and 5). Belonging to the disadvantaged Janjati ethnic group increased one's odds of being a smoker (AOR = 1.601, 95% CI: 1.320–1.941, $p < 0.001$) but decreased one's odds of consuming SLT by almost 25% (AOR = 0.757, 95% CI: 0.594–0.966, $p = 0.025$).

Men belonging to the richest wealth quintile had a 40% lower likelihood of being a SLT consumer (AOR = 0.602, 95% CI: 0.404–0.897, $p = 0.013$). Regional differences were also noticed in smoking and SLT usage. Residents of Province No. 5 were 34% less likely to be smokers (AOR = 0.669, 95% CI: 0.494–0.906, $p = 0.009$) than residents of Province No. 1. On the other hand, the residents of the Hills (AOR = 1.612, 95% CI: 1.221–2.129, $p = 0.001$) and the Terai (AOR = 2.395, 95% CI: 1.519–3.778, $p < 0.001$) regions had higher odds of consuming SLT than the residents of the Mountain region (Tables 4 and 5).

4. Discussion

4.1. Prevalence of tobacco use

This study aimed to determine the prevalence and associated social determinants of tobacco use among Nepalese men using the NDHS 2016. The study found that more than half of the respondents were tobacco consumers (52.3%). Around two-fifth (40.2%) of Nepalese men were SLT consumers, while more than one-fourth (27.3%) were smokers. Prevalence of tobacco use was higher among those who were elderly, separated/divorced/widowed, had a lower educational status, in the poorest quintile, part of a disadvantaged ethnic group, residents of Province No. 2 and those who did not read newspapers or watch television.

The prevalence of tobacco use in 2016 was 52.3%, which was slightly higher than the NDHS 2011 estimate (51.9%),¹³ but lower than 2006 estimate (56.5%).¹² The prevalence is higher than in neighboring India, where 44.8% of males (15–49 years) were tobacco consumers in 2015–16.¹⁹ The prevalence of smoking, 27.3%, was reduced from 32.8% in 2006¹² and 33.6% in 2011.¹³ In 2016, around 40.2% of Nepalese men consumed SLT, which is higher than both the 2011 estimates, 34.82%, as well as the rate reported in India, 36.72%.⁷ In our study, the prevalence of SLT use was higher than the prevalence of smoking. An almost similar finding was reported in India.²⁰ There is a similarity between the residents of South Nepal (the Terai region) and North India in terms of sociocultural and demographic characteristics. Moreover, an enormous number of Nepalese men earn their livelihood in India, which may influence the tobacco usage in Nepal.^{13,21} Conversely, this finding is not in accordance with findings from Bangladesh, another country in South Asia, where smoking (58.68%) had a much higher prevalence than tobacco chewing (21.63%) among Bangladeshi men.²² It should be mentioned that although Bangladesh also shares its border with India, the sociocultural and demographic profiles of the people on either side are different. This may explain, the difference between Bangladesh and Nepal.

4.2. Factors associated with tobacco use

In our study, increased age was associated with tobacco use, which is in accordance with the findings from previous studies conducted in Nepal,^{12,13} Bangladesh,²² India,²³ Ethiopia,²⁴ and a multi-country study conducted in South and Southeast Asia.⁷ This is reflected in the lower incidence of tobacco initiation within the last few years prior to this survey as well as the lower prevalence among the younger respondents.¹²

Our study found that educational attainment was negatively associated with tobacco use, which is also supported by previous studies.^{12,13,22,23} Similarly, a lower wealth index is associated with increased tobacco use, which is also coherent with the literature in developing countries.^{12,22,25} It has been found that education and economic status are two important social determinants. Individuals with lower educational achievement and poor economic status are prone to risky behavior, like tobacco use and alcohol intake, especially in developing countries.^{7,12} This also explains the higher probability of tobacco use among manual workers. Manual workers are less aware of the health impact of tobacco use. This may be due to any combination of having less education, having poor awareness due to lack of information about the harmful effects of tobacco use, and being in a poor economic condition.^{23,25} Ethnicity was also an important predictor of tobacco use. The disadvantaged Janjati group had higher odds of being smokers. This is similar to the findings of Pradhan et al. (2013)²⁶ and the Nepal Adolescent and Youth Survey,²⁷ where they found that tobacco use is highly prevalent among Janjatis.

The residents of the Terai region had a higher propensity to consume tobacco. These findings are supported by that of Khanal et al. (2013).¹³ Province No. 2 had a higher prevalence of tobacco use than

Table 2
Prevalence of tobacco use among Nepalese men by socio-demographic characteristics, Nepal Demographic and Health Survey 2016 (N = 4059).

Factors	Total		Any Tobacco Use		<i>p</i> -value	Smoking		<i>p</i> -value	Smokeless Tobacco		<i>p</i> -value
	N	%	n	%		n	%		n	%	
Demographic factors											
Age of the respondents											
15–19	931	22.9	248	26.6	< 0.001	147	15.8	< 0.001	154	16.5	< 0.001
20–24	647	15.9	312	48.2		201	31.1		198	30.6	
25–29	523	12.9	287	54.9		163	31.2		222	42.4	
30–34	535	13.2	346	64.8		165	30.8		280	52.5	
35–39	544	13.4	338	62.1		146	26.8		295	54.2	
40–44	463	11.4	305	65.9		133	28.8		261	56.4	
45–49	415	10.2	286	68.9		153	36.9		221	53.1	
Marital status											
Single	1353	33.3	410	30.3	< 0.001	270	20.0	< 0.001	239	17.7	< 0.001
Married	2673	65.9	1683	63.0		815	30.5		1364	51.0	
Separated/Divorced/Widow	33	0.8	29	90.0		22	70.2		27	83.9	
Sociocultural factors											
Educational Status											
No education	391.1	9.6	302.7	77.41	< 0.001	149.1	38.11	< 0.001	253.9	64.92	< 0.001
Primary	786.7	19.4	556.2	70.7		287.6	36.56		466.7	59.33	
Secondary	1989	49.0	968.6	48.69		503.4	25.31		730.3	36.71	
Higher	891.5	22.0	294.9	33.09		168.3	18.88		179.5	20.14	
Occupation											
Agriculture	1144	28.2	630	55.1	< 0.001	319	27.9	< 0.001	505	44.1	< 0.001
Professional/clerical/service	1357	33.4	664	49.0		334	24.7		503	37.0	
Manual (skilled/unskilled)	952.4	23.5	657	68.9		343	36.0		526	55.2	
Not working/not specified	605.1	14.9	171	28.3		112	18.6		98	16.1	
Ethnicity											
Advantaged	2243	55.3	1117	49.8	0.0004	501	22.3	0.0004	910	40.6	0.0082
Disadvantaged (Dalit)	476.7	11.8	303	63.6		158	33.2		231	48.5	
Disadvantaged (Janjati)	1339	33.0	702	52.5		450	33.6		489	36.5	
Religion											
Hindu	3466	85.4	1836	53.0	0.1546	985	28.4	0.0042	1408	40.6	0.3767
Others	593	14.6	286	48.3		123	20.8		223	37.6	
Wealth quintile											
Poorest	623	15.3	358	57.4	< 0.001	213	34.2	0.0124	264	42.3	< 0.001
Poor	706	17.4	404	57.2		199	28.2		330	46.8	
Middle	756	18.6	436	57.7		205	27.2		362	47.9	
Rich	981	24.2	530	54.0		278	28.3		435	44.3	
Richest	992	24.4	395	39.8		213	21.5		239	24.1	
Spatial factors											
Place of Residence											
Urban	2645	65.2	1362	51.5	0.2989	755	28.5	0.1703	1007	38.1	0.0093
Rural	1414	34.8	761	53.8		354	25.0		623	44.1	
Province of Residence											
Province 1	689	17.0	369	53.6	< 0.001	184	26.7	0.0085	285	41.3	< 0.001
Province 2	795	19.6	494	62.2		174	21.8		465	58.5	
Province 3	1007	24.8	450	44.7		322	32.0		242	24.1	
Province 4	376	9.3	158	42.0		92	24.6		107	28.4	
Province 5	658	16.2	364	55.2		145	22.0		323	49.2	
Province 6	204	5.0	97	47.9		59	29.0		72	35.4	
Province 7	330	8.1	190	57.6		132	40.2		136	41.2	
Ecological zone											
Mountain	252	6.2	119	47.2	< 0.001	81	31.9	0.4827	72	28.4	< 0.001
Hill	1789	44.1	810	45.3		500	28.0		534	29.9	
The Terai	2017	49.7	1193	59.2		528	26.2		1025	50.8	
Access to information											
Reading newspaper or magazine											
Not at all	1817	44.8	1061	58.4	< 0.001	512	28.2	0.6689	876	48.2	< 0.001
Less than once a week	1360	33.5	692	50.9		372	27.4		522	38.4	
At least once a week	881	21.7	370	42.0		225	25.5		233	26.4	
Frequency of watching television											
Not at all	806	19.9	480	59.6	0.0011	238	29.5	0.2287	393	48.8	< 0.001
Less than once a week	1182	29.1	627	53.0		342	28.9		495	41.8	
At least once a week	2070	51	1016	49.1		529	25.5		743	35.9	
Frequency of listening radio											
Not at all	1150	28.3	641	55.8	0.0187	316	27.5	0.9468	487	42.3	0.2523
Less than once a week	1440	35.5	764	53.1		397	27.6		587	40.8	
At least once a week	1468	36.2	717	48.8		396	27.0		557	37.9	

the other provinces, though it was not statistically significant in the final model. The Terai region and Province No. 2 of Nepal shares a border with Northern India. This region has population movement with India due to the porous and free border. Tobacco and its associated

products are available in the bordering Indian cities, which can be easily accessed by anyone.^{13,23} Also, betel quid and betel are delicacies in the Terai region. The accessibility to tobacco, tobacco products, and betel quid along with its cultural acceptance are an important

Table 3

Bivariate and multivariable logistic regression to identify factors associated with tobacco use among Nepalese men, Nepal Demographic and Health Survey 2016.

Factors	Unadjusted OR	95% CI		p-value	Adjusted OR	95% CI		p-value
		Lower Limit	Upper Limit			Lower Limit	Upper Limit	
Demographic factors								
Age of the respondents								
15–19	Ref				Ref			
20–24	2.565	2.022	3.252	< 0.001	2.474	1.882	3.251	< 0.001
25–29	3.353	2.529	4.446	< 0.001	2.808	1.887	4.179	< 0.001
30–34	5.073	3.850	6.683	< 0.001	3.589	2.396	5.376	< 0.001
35–39	4.510	3.377	6.023	< 0.001	2.822	1.853	4.295	< 0.001
40–44	5.325	3.969	7.144	< 0.001	3.598	2.371	5.460	< 0.001
45–49	6.096	4.653	7.988	< 0.001	3.903	2.646	5.758	< 0.001
Marital status								
Single	Ref				Ref			
Married	3.908	3.242	4.712	< 0.001	1.500	1.094	2.058	0.012
Separated/Divorced/Widow	20.590	5.770	73.468	< 0.001	7.803	1.907	31.928	0.004
Sociocultural factors								
Educational Status								
No education	Ref				Ref			
Primary	0.704	0.512	0.969	0.031	0.976	0.680	1.400	0.895
Secondary	0.277	0.209	0.367	< 0.001	0.589	0.417	0.830	0.003
Higher	0.144	0.102	0.203	< 0.001	0.311	0.211	0.458	< 0.001
Occupation								
Agriculture	Ref				Ref			
Professional/clerical/service	0.783	0.646	0.949	0.013	1.048	0.810	1.356	0.719
Manual (skilled/unskilled)	1.811	1.450	2.260	< 0.001	1.639	1.264	2.124	< 0.001
Not working/not specified	0.322	0.252	0.412	< 0.001	0.934	0.700	1.246	0.642
Ethnicity								
Advantaged	Ref				Ref			
Disadvantaged (Dalit)	1.760	1.327	2.335	< 0.001	1.290	0.810	2.054	0.282
Disadvantaged (Janjati)	1.112	0.926	1.335	0.256	1.011	0.827	1.236	0.914
Religion								
Hindu	Ref				Ref			
Others	0.828	0.638	1.074	0.155	0.742	0.558	0.986	0.040
Wealth index								
Poorest	Ref				Ref			
Poor	0.994	0.785	1.259	0.959	0.829	0.650	1.057	0.129
Middle	1.012	0.790	1.297	0.924	0.727	0.534	0.990	0.043
Rich	0.871	0.676	1.123	0.287	0.745	0.537	1.035	0.079
Richest	0.491	0.385	0.625	< 0.001	0.516	0.360	0.739	< 0.001
Spatial factors								
Place of Residence								
Urban	Ref				Ref			
Rural	1.098	0.920	1.310	0.299	0.797	0.669	0.951	0.012
Province of Residence								
Province 1	Ref				Ref			
Province 2	1.426	1.106	1.838	0.006	1.077	0.798	1.452	0.628
Province 3	0.702	0.488	1.009	0.056	0.883	0.649	1.200	0.424
Province 4	0.627	0.451	0.873	0.006	0.720	0.501	1.033	0.075
Province 5	1.071	0.806	1.423	0.636	0.842	0.637	1.114	0.228
Province 6	0.799	0.586	1.088	0.153	0.858	0.601	1.225	0.398
Province 7	1.181	0.896	1.556	0.238	1.235	0.932	1.636	0.142
Ecological zone								
Mountain	Ref				Ref			
Hill	0.926	0.712	1.204	0.565	1.155	0.899	1.485	0.259
The Terai	1.622	1.296	2.031	< 0.001	1.674	1.209	2.319	0.002
Access to information								
Reading newspaper or magazine								
Not at all	Ref				Ref			
Less than once a week	0.596	0.615	0.887	0.001	1.016	0.803	1.286	0.892
At least once a week	0.522	0.378	0.705	< 0.001	0.975	0.706	1.347	0.879
Frequency of watching television								
Not at all	Ref				Ref			
Less than once a week	0.765	0.596	0.983	0.036	1.041	0.769	1.409	0.795
At least once a week	0.653	0.522	0.818	< 0.001	1.266	0.933	1.717	0.129
Frequency of listening radio								
Not at all	Ref				Ref			
Less than once a week	0.896	0.746	1.077	0.242	0.843	0.675	1.053	0.131
At least once a week	0.757	0.615	0.931	0.009	0.736	0.600	0.902	0.003

Table 4

Bivariate and multivariable logistic regression to identify factors associated with smoking among Nepalese men, Nepal Demographic and Health Survey 2016.

Factors	Unadjusted OR	95% CI		p-value	Adjusted OR	95% CI		p-value
		Lower Limit	Upper Limit			Lower Limit	Upper Limit	
Demographic factors								
Age of the respondents								
15–19	Ref				Ref			
20–24	2.395	1.845	3.109	< 0.001	2.441	1.797	3.314	< 0.001
25–29	2.406	1.756	3.296	< 0.001	2.468	1.563	3.896	< 0.001
30–34	2.365	1.709	3.274	< 0.001	2.182	1.373	3.467	0.001
35–39	1.948	1.419	2.674	< 0.001	1.632	0.994	2.679	0.053
40–44	2.144	1.505	3.056	< 0.001	2.000	1.247	3.206	0.004
45–49	3.107	2.256	4.280	< 0.001	2.824	1.780	4.480	< 0.001
Marital status								
Single	Ref				Ref			
Married	1.757	1.444	2.137	< 0.001	1.023	0.731	1.430	0.896
Separated/Divorced/Widow	9.432	3.974	22.382	< 0.001	4.491	1.861	10.841	0.001
Sociocultural factors								
Educational Status								
No education	Ref				Ref			
Primary	0.936	0.734	1.194	0.593	0.917	0.681	1.235	0.566
Secondary	0.550	0.405	0.748	< 0.001	0.634	0.459	0.876	0.006
Higher	0.378	0.259	0.552	< 0.001	0.387	0.259	0.579	< 0.001
Occupation								
Agriculture	Ref				Ref			
Professional/clerical/service	0.846	0.666	1.075	0.171	1.012	0.729	1.406	0.941
Manual (skilled/unskilled)	1.454	1.169	1.809	0.001	1.440	1.133	1.830	0.003
Not working/not specified	0.590	0.441	0.788	< 0.001	1.120	0.814	1.541	0.487
Ethnicity								
Advantaged	Ref				Ref			
Disadvantaged (Dalit)	1.729	1.107	2.700	0.016	1.255	0.767	2.052	0.365
Disadvantaged (Janjati)	1.757	1.436	2.151	< 0.001	1.601	1.320	1.941	< 0.001
Religion								
Hindu	Ref				Ref			
Others	0.660	0.496	0.878	0.004	0.522	0.392	0.696	< 0.001
Wealth index								
Poorest	Ref				Ref			
Poor	0.758	0.571	1.005	0.054	0.801	0.607	1.056	0.115
Middle	0.719	0.533	0.969	0.031	0.845	0.590	1.212	0.359
Rich	0.761	0.508	1.141	0.186	0.903	0.613	1.329	0.604
Richest	0.526	0.373	0.743	< 0.001	0.602	0.404	0.897	0.013
Spatial factors								
Place of Residence								
Urban	Ref				Ref			
Rural	0.837	0.648	1.080	0.171	0.747	0.601	0.927	0.008
Province of Residence								
Province 1	Ref				Ref			
Province 2	0.769	0.564	1.048	0.096	0.725	0.522	1.009	0.057
Province 3	1.294	0.799	2.095	0.294	1.453	0.980	2.156	0.063
Province 4	0.897	0.659	1.221	0.489	0.994	0.679	1.456	0.975
Province 5	0.778	0.571	1.060	0.111	0.669	0.494	0.906	0.009
Province 6	1.122	0.801	1.573	0.503	1.166	0.778	1.747	0.456
Province 7	1.849	1.368	2.499	< 0.001	1.824	1.337	2.487	< 0.001
Ecological zone								
Mountain	Ref				Ref			
Hill	0.828	0.538	1.274	0.389	0.827	0.575	1.192	0.308
The Terai	0.756	0.527	1.083	0.127	0.946	0.619	1.446	0.798
Access to information								
Reading newspaper or magazine								
Not at all	Ref				Ref			
Less than once a week	0.962	0.786	1.176	0.703	1.114	0.887	1.400	0.353
At least once a week	0.875	0.549	1.394	0.572	1.214	0.839	1.757	0.303
Frequency of watching television								
Not at all	Ref				Ref			
Less than once a week	0.971	0.735	1.282	0.834	1.037	0.772	1.394	0.807
At least once a week	0.818	0.653	1.024	0.079	1.064	0.822	1.377	0.636
Frequency of listening radio								
Not at all	Ref				Ref			
Less than once a week	1.006	0.811	1.248	0.957	0.858	0.683	1.077	0.185
At least once a week	0.975	0.768	1.238	0.836	0.834	0.676	1.027	0.088

Table 5

Bivariate and multivariable logistic regression to identify factors associated with smokeless tobacco among Nepalese men, Nepal Demographic and Health Survey 2016.

Factors	Unadjusted OR	95% CI		p-value	Adjusted OR	95% CI		p-value
		Lower Limit	Upper Limit			Lower Limit	Upper Limit	
Demographic factors								
Age of the respondents								
15–19	Ref				Ref			
20–24	2.223	1.658	2.981	< 0.001	1.887	1.332	2.674	< 0.001
25–29	3.710	2.671	5.153	< 0.001	2.848	1.934	4.193	< 0.001
30–34	5.571	4.020	7.720	< 0.001	3.592	2.314	5.574	< 0.001
35–39	5.961	4.491	7.911	< 0.001	3.672	2.464	5.471	< 0.001
40–44	6.525	4.839	8.800	< 0.001	4.139	2.756	6.215	< 0.001
45–49	5.718	4.108	7.958	< 0.001	3.364	2.135	5.299	< 0.001
Marital status								
Single	Ref							
Married	4.839	3.873	6.047	< 0.001	1.701	1.222	2.366	0.002
Separated/Divorced/Widow	24.204	8.131	72.051	< 0.001	10.871	2.678	44.126	0.001
Sociocultural factors								
Educational Status								
No education	Ref							
Primary	0.788	0.580	1.071	0.128	1.202	0.856	1.686	0.287
Secondary	0.313	0.229	0.429	< 0.001	0.741	0.523	1.052	0.093
Higher	0.136	0.095	0.196	< 0.001	0.362	0.240	0.545	< 0.001
Occupation								
Agriculture	Ref							
Professional/clerical/service	0.745	0.611	0.908	0.004	1.138	0.894	1.449	0.294
Manual (skilled/unskilled)	1.559	1.216	1.998	< 0.001	1.415	1.076	1.862	0.013
Not working/not specified	0.244	0.175	0.340	< 0.001	0.739	0.530	1.031	0.074
Ethnicity								
Advantaged	Ref							
Disadvantaged (Dalit)	1.377	1.086	1.745	0.008	0.994	0.717	1.379	0.972
Disadvantaged (Janjati)	0.842	0.669	1.060	0.142	0.757	0.594	0.966	0.025
Religion								
Hindu	Ref							
Others	0.879	0.661	1.170	0.377	0.905	0.671	1.219	0.510
Wealth index								
Poorest	Ref							
Poor	1.199	0.960	1.497	0.11	0.935	0.672	1.300	0.688
Middle	1.254	0.969	1.623	0.085	0.758	0.508	1.131	0.174
Rich	1.087	0.848	1.393	0.509	0.871	0.557	1.362	0.543
Richest	0.434	0.328	0.574	< 0.001	0.470	0.291	0.758	0.002
Spatial factors								
Place of Residence								
Urban	Ref							
Rural	1.282	1.064	1.546	0.009	0.822	0.674	1.002	0.052
Province of Residence								
Province 1	Ref							
Province 2	1.998	1.526	2.616	< 0.001	1.544	1.081	2.206	0.017
Province 3	0.450	0.317	0.640	< 0.001	0.549	0.347	0.870	0.011
Province 4	0.564	0.394	0.807	0.002	0.637	0.441	0.921	0.016
Province 5	1.374	1.010	1.871	0.043	1.151	0.839	1.580	0.383
Province 6	0.779	0.556	1.092	0.147	0.857	0.577	1.272	0.442
Province 7	0.997	0.733	1.356	0.984	1.029	0.723	1.464	0.876
Ecological zone								
Mountain	Ref							
Hill	1.072	0.825	1.394	0.6	1.612	1.221	2.129	0.001
The Terai	2.601	2.043	3.313	< 0.001	2.395	1.519	3.778	< 0.001
Access to information								
Reading newspaper or magazin								
Not at all	Ref							
Less than once a week	0.669	0.558	0.802	< 0.001	0.915	0.732	1.143	0.431
At least once a week	0.385	0.298	0.497	< 0.001	0.781	0.580	1.052	0.104
Frequency of watching television								
Not at all	Ref							
Less than once a week	0.755	0.600	0.951	0.017	1.063	0.791	1.429	0.686
At least once a week	0.587	0.468	0.737	< 0.001	1.239	0.916	1.674	0.164
Frequency of listening radio								
Not at all	Ref							
Less than once a week	0.939	0.760	1.159	0.557	0.987	0.796	1.225	0.905
At least once a week	0.833	0.640	1.082	0.171	0.975	0.758	1.255	0.845

contributing factor to the high prevalence of tobacco use in the Terai region.¹³

4.3. Policy and programmatic perspectives

The Government of Nepal has introduced several laws and policies in order to control tobacco. In 2010, the Tobacco Product (Control and Regulation) Act 2010 was introduced, which prohibited smoking in public places and set limits to the advertisement and promotion of tobacco.²⁸ In the following year, a directive was introduced by the Nepalese government to further control the advertisement and promotion of tobacco. In particular, it instructs manufacturers to add warning labels on every individual tobacco packet (Population Division, Ministry of Health and Population a, 2011). The requirements were implemented in April 2014, following an unsuccessful challenge by the tobacco industry initiated in 2011. The Tobacco Product Control and Regulatory Directive 2014 provided implementing details under the Tobacco Product (Control and Regulation) Act 2010. It further included definitions of several key terms, which helped to clarify the scope of the restrictions on smoking in public places, workplaces, and public transport. In addition, it strengthened the ban on tobacco advertising, promotion, and sponsorship and contained provisions to protect against industry interference.²⁹ In that same year, another directive was introduced, which increased the size of mandatory health warnings to 90% of the front and back of all tobacco product packaging. The Directive also instituted new text pictorial warnings.³⁰ The reduction in the prevalence of smoking may be attributable to the new rules and regulations; however, the overall prevalence of tobacco usage has not decreased. In fact, the increase in SLT prevalence has mostly negated the progress made by reductions in smoking tobacco usage. In South Asian countries, SLT is considered less harmful than smoking tobacco.³¹ Therefore, policymakers in Nepal should come forward to develop a novel and cost-effective model in order to prevent the burden of SLT. Programs should target the highest at-risk population, such as the less educated, those of lower economic status, manual workers, and the populations of the Terai region and Province No. 2, in order to curb tobacco use. Social Behavior Change Communication (SBCC) campaigns should be launched in order to spread health messaging regarding the harmful use of tobacco, especially SLT. Finally, the implementation of rules and legislation to control tobacco use should regularly be monitored and its effectiveness should be evaluated.

4.4. Strengths and limitations

This study utilized a nationally representative sample to estimate the prevalence of tobacco use among men aged 15–49 years in Nepal. As such, the findings of the study are generalizable to the target population. Moreover, the probability of the existence of measurement error in the study is lower, compared to any other cross-sectional study of the Nepalese population, because of the utilization of standard and validated measurement tools by the DHS program. However, the study is not free from limitations. The temporal relationship between the exposure and the outcome variable cannot be established in a cross-sectional study. There may be some under-reporting of the prevalence rate due to the presence of social desirability bias among the study participants.

5. Conclusions

The current study has shown that more than half of Nepalese men aged 15–49 years are tobacco consumers. The prevalence of SLT use is higher than that of smoking. Older age, lower educational attainment, lower economic status, manual work as an occupation, and residence in the Terai region are some important predictors of tobacco use in Nepal. Implementation of tobacco control acts should be enforced and efforts should be taken to create cultural unacceptability of tobacco use, with

an equal emphasis on both smoking and SLT use.

Ethical consideration

NDHS 2016 protocol was reviewed and approved by the ethical review board of the Nepal Research Council and ICF International. Written informed consent was taken from the head of the households and the respondents before data collection. The DHS program provided permission and access to the dataset for this study in February 2019.

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Declaration of competing interest

The authors declare that there is no conflict of interest.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.cegh.2020.01.014>.

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