

Original Research Article

Smokeless Tobacco Use among Madhesi Communities of Nagarain Municipality, Dhanusha, Nepal

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Abstract

Smokeless tobacco consumption is a major cause of NCDs and is associated with six leading causes of global death. It is common among people in the Terai area of Nepal with its high burden in the Madhesi community. This study assessed the status of smokeless tobacco (SLT) use and the factors associated with it among the Madhesi community of Nagarain Municipality. A descriptive cross-sectional survey was conducted among 175 people of Nagarain municipality following the systematic random sampling technique. A structured questionnaire was used for data collection using the face-to-face interview technique. The proportion of ever-use and current use of SLT was 70.9% and 70.3% respectively. Males were more likely to consume SLT products (AOR=7.18) than females. Similarly, respondents whose family members (AOR=8.29) and friends (AOR=8.597) used SLT products were more likely to use SLT products themselves. There were 91.9% current users of smokeless-tobacco who reported its use daily. *Khaini* was the most consumed SLT product followed by betel-quid. The majority of the respondents (70%) had a lower level of knowledge regarding the harmful effects of SLT. The study revealed a significant proportion of smokeless tobacco, linked with the factors like gender, family education, employment status, alcohol consumption, SLT use by family members, and SLT use by friends. To tackle this issue, the strategy can focus on the male, restricting the use of SLT among the family and peer groups.

Introduction

The tobacco epidemic is increasing and shifting towards developing and middle-income countries like Nepal (Eriksen & Mackay, 2002). Globally, over 300 million individuals use smokeless tobacco (SLT), resulting in 8 million Disability-Adjusted Life Years (DALYs) lost while 300 thousand deaths. Particularly prevalent in South and Southeast Asia, SLT poses a substantial public health challenge (National Cancer Institute, 2014; Siddiqi et al., 2020; Townsend et al., 2006). In Nepal, tobacco use ranks as the second leading cause of death, being the reason for 19.4% of total mortalities (DoHS, 2020).

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Among the South East Asian Region (SEAR) countries, the proportion of use of SLT in Nepal by males is ranked the second highest while it is 3rd highest for the females of Nepal (Sreeramareddy et al., 2014). The proportion of SLT use among the adult population aged 15-69 was found 18.3% which is in the increasing trend since 2006 with decreasing trend of smoking tobacco (MoHP et al., 2007, 2012, 2017; Shrestha et al., 2019). Similarly, the use of SLT among the males of the Terai belt was found 50.7% whereas the hilly and mountain regions had 29.8% and 28.4% respectively. SLT use alone accounts for 40.1% of males and 3.8% of females in Nepal with the highest SLT use in Madhesh Province among males that is 58.5% and among females 1.9% who majorly belong to the Madhesi Community (Shrestha et al., 2019).

Nepal's anti-tobacco policy regulates tobacco consumption, trade, and advertising. Public areas, including healthcare and educational facilities, restaurants, and public transport, are designated smoke-free zones, with limited exceptions for indoor spaces. The taxation on tobacco products comprises a 16.18% excise tax as a percentage of the retail price. Nepal prohibits direct advertising and restricts most indirect advertising, adhering to the protocol of covering 90% of the pack with warning labels (GoN, 2019; Eriksen & Mackay, 2002). Despite huge national efforts, there is high proportion of tobacco use in Nepal and limited studies are conducted regarding SLT use in the Madhesi community. Thus, this study aims to assess the proportion of smokeless tobacco use and its associated factors among the Madhesi community of Nagarain Municipality.

Methods and Material

Study Design

A study following a cross-sectional study design was conducted in Nagarain municipality of Dhanusha district from February to March 2022. Utilizing the single population proportion formula $N_0 = Z^2 pq / d^2$, a 95% confidence interval (CI) and allowable error of 5% were applied with a proportion rate of 14.7% for the use of SLT products in Madhesh province (Shrestha et al., 2019). For the finite population (N=896, obtained from the electricity authority), the calculated sample size was 175 including the 10% non-response rate.

Study Tool and Study Variables

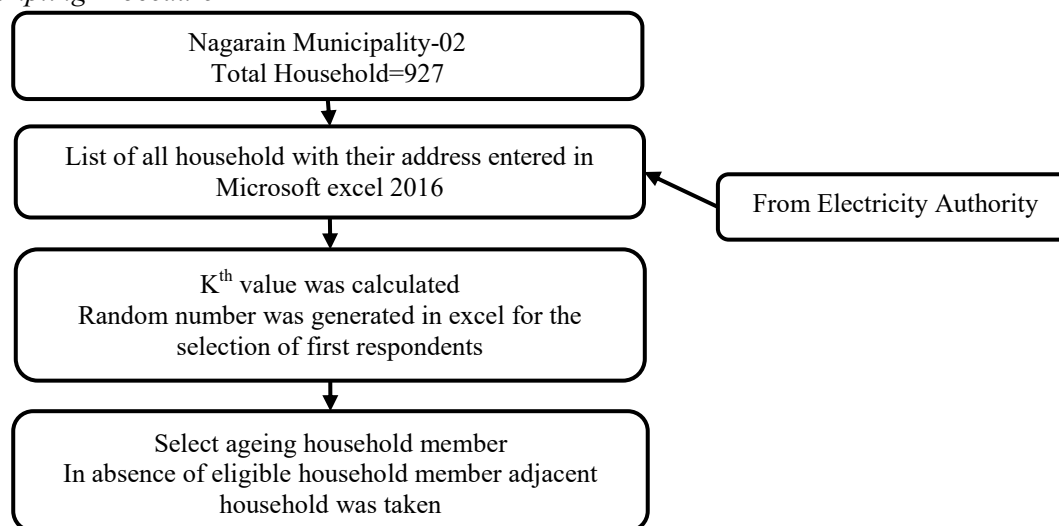
The data collection tool involved the development of a structured questionnaire derived from reference standard questionnaires such as GYST survey and STEPS survey, similar studies, and an extensive literature review (Global Youth Tobacco Survey Collaborative Group, 2023; WHO, 2020). The dependent variable "current use of SLT product" was defined as using SLT products; *khaini*, chewing tobacco, *guthka*, *gul*, areca nut and betel quid (paan) at least once in the past 30 days by self-report. The independent variables encompassed socio-demographic factors, including age, sex, education, ethnicity, religion, occupation, marital status, family type, family income, highest family education, family occupation, use of SLT among family, use of SLT among friends, alcohol consumption, smoking tobacco consumption, and level of knowledge on SLT. Both English and Maithili (local language) versions of the questionnaire were prepared and pre-tested among 10% of the sample population in Ward No. 1 of Nagarain Municipality, with modifications made based on feedback. The modifications were majorly made regarding the wording of the questions in the Maithili language and questions

regarding the use of SLT products when consuming alcohol and smoking tobacco were added. The data was finally programmed into the KOBO Toolbox for data collection.

Sampling Technique and Study Population

Figure 1

Sampling Procedure



The study was quantitative and assessed using a structured questionnaire. The study followed a systematic random sampling technique. The list of households of ward-2 of Nagarain was obtained from the Electricity Authority Office, Janakpur which was considered as the sampling frame for the study. Out of the total of 927 households in the sampling frame, 175 households were selected using a systematic random sampling method. Finally, the most aged member present in the selected household who was above 18 years old during the survey was selected as the respondents. In the absence of eligible respondents in selected households, it was replaced with adjacent households.

Ethical Consideration

Ethical clearance was obtained from the Institutional Review Committee, Chitwan Medical College (Ref. no. CMC-IRC/078/079-154). Verbal informed consent was obtained from the respondents during the data collection.

Data Analysis

Data collected through the Kobo toolbox were later exported to IBM SPSS V20 for analysis. Descriptive analysis including frequency, percent, mean, median, and standard deviation was performed. The Chi-square test/Fisher's Exact Test was performed to determine associations between dependent and independent variables. Bivariate logistic regression and multivariate logistic regression analysis were conducted to test the likelihood of the use of SLT products. Nagelkerke R Square and Variation Inflation Factor (VIF) tests assessed the goodness of fit for multivariate logistic regression, confirming no multicollinearity among independent variables.

Results

The mean age and standard deviation of the study population was 52.27 ± 10.64 . The majority (77%) of the respondents were male. The highest proportion of Terai Brahmin/Chhetri

(43%) participated in the study, followed by Terai Dalit (29%). The larger majority (88%) of respondents were married. Notably, one in two respondents was illiterate (50%) while the higher proportion of households' highest level of education completed in the family was a bachelor's or above (51%). More than half of the respondents were employed (54%) among which a higher proportion were involved in service-related employment (35%) followed by foreign employment (22%). More than four-fifths of the respondents had seen/heard the anti-tobacco messages in the last 30 days (81%).

Table 1
Sociodemographic Characteristics of the Respondents

		No. (n)	Percent (%)
Age (in years)	20-40	19	10.9
	41-60	61	34.9
	51-60	53	30.3
	More than 60	42	24.0
Age (Mean \pm SD)		52.27 \pm 10.64	
Sex	Male	135	77.1
	Female	40	22.9
Ethnicity/Caste	Terai <i>Brahmin/Chhetri</i>	76	43.4
	Terai <i>Janajati</i>	17	9.7
	Terai <i>Dalit</i>	51	29.1
	Others	31	17.7
	Unmarried	6	3.4
Marital status	Married	154	88.0
	Divorced	1	.6
	Widow/ Separated	14	8.0
	Illiterate	87	49.7
Educational status	Able to read and write	10	5.7
	Primary	27	15.4
	SLC/ SEE	27	15.4
	Secondary level	18	10.3
	Bachelor and above	6	3.4
	Highest Level of education completed in family	Primary	5
SLC/ SEE		15	8.6
Secondary level		65	37.1
Bachelor and above		90	51.4
Employment status	Employed	94	53.7
	Unemployed	81	46.3
Occupation	Service	34	36.2
	Business	24	25.5
	Agriculture	18	19.1
	Daily Wages	18	19.1
	Joint	71	40.6
Family type	Nuclear	104	59.4
	Service	61	34.9
Family occupation	Business	27	15.4
	Agriculture	29	16.6
	Daily Wages	20	11.4
	Foreign employment	38	21.7
	Anti-tobacco media message seen/heard in last 30 days	Yes	143
No		32	18.3

Among the study population, 7 in 10 had ever used SLT products and more than half of them used it for the first time at the age of 20-19 years. Current use of SLT products was 71%. Among the ever users of SLT products, almost all of them have used it in the last 30 days (99%). The most used SLT products in the last 30 days were Khaini (68%) followed by Betel quid (49%), and Guthka (34%). Only 17% of the respondents consumed alcohol while only 9% reported smoking tobacco. SLT products were available within the walking distance of 15 minutes from almost all of the households (97%). Furthermore, less than half of the family members used SLT products (42%) while more than four-fifths of the respondents' friends used SLT products (83%). The mean level of knowledge was found only 2.88 ± 1.17 and the majority were only able to answer between 0-3 questions correctly out of 10 questions (70%).

Table 2
Use of SLT Products

		No. (n)	Percent (%)
Ever used SLT products	Yes	124	70.9
	No	51	29.1
Current use of SLT products	Yes	123	70.3
	No	52	29.7
Age when SLT was used for the first time	10-19 years old	37	29.8
	20-29 years old	68	54.8
	30 years and older	19	15.3
Number of days using SLT product in last 30 days among those who currently use SLT	0 days	1	.8
	1 to 5 days	4	3.2
	6 to 15 days	4	3.2
	16 to 29 days	2	1.6
	All 30 days	113	91.1
SLT product used in last 30 days*	Khaini	84	68.3
	Chewing tobacco	10	8.1
	Guthka	42	34.1
	Gul	10	8.1
	Areca nut (Supari)	22	17.9
	Betel quid (Paan)	60	48.8
Consumption of alcohol by the respondents	Yes	29	16.6
	No	146	83.4
Smoking tobacco by respondents	Yes	16	9.1
	No	159	90.9
Use of SLT products by family members	Yes	73	41.7
	No	102	58.3
Use of SLT products by friends	No	29	16.6
	Yes	146	83.4
Level of knowledge on SLT	0-3	123	70.3
	4-10	52	29.7
Mean level of knowledge on SLT	2.88±1.17		

* Multiple responses

The chi-square test between the dependent and independent variables shows that sex (p-value<0.001), higher family education (p=0.040), employment status (p<0.001), consumption of alcohol by the respondent (p=0.009), use of SLT product by the family member (p=0.010) and use of SLT product by friends (p<0.001) is significantly associated with the current use of SLT product.

The bivariate regression analysis of the current use of SLT with associated factors and multiple regression analysis among the variables sex, higher family education, employment

status, consumption of alcohol by the respondents, use of SLT products by family members, use of SLT by friends were also performed.

In comparison with females, males were almost 12.84 times more likely to use SLT products currently (COR=12.84, CI=5.62-29.34) while adjusting other variables males were still 7.167 times more likely to use SLT products (AOR=4.29, CI=0.96-19.19). It is notable that, the odds of currently using SLT products were higher among the employed respondents than the unemployed ones (COR=4.43, CI=2.19-8.96). Alcohol consumers were found 15.03 times more likely to use SLT products than non-alcohol consumers (COR=15.03, CI=1.99-113.71). Similarly, respondents whose family members were using SLT products were 2.5 times more likely (COR=2.50, CI=1.23-5.08) to currently use SLT products than the respondents whose family member didn't consume SLT, while adjusting for other variables likelihood of use of SLT product increased to 8.29 times (AOR=8.29, CI=2.42-28.42). Furthermore, respondents with friends using SLT products were 20.23 times more likely to use SLT products than their counterparts (COR=20.23, CI=7.1-57.69), whereas after controlling other variables likelihood of current use of SLT products reduced to 8.597 times (AOR=8.597, CI=1.90-39.00).

Table 3

Factors associated with current use of SLT products

		Yes: N (%)	No: N (%)	χ^2	P	COR (95% of CI)	AOR (95% of CI)
Sex	Male	112(83.0)	23(17.0)	45.45	0.000***	12.84*** (5.62-29.34)	7.167** (1.75-29.32)
	Female	11(27.5)	29(72.5)				
Highest family education	Up to SLC/SEE	18(90.0)	2(10.0)	4.20	0.041*	4.29 (0.96-19.19)	9.902(0.94-104.52)
	Above SLC/SEE	105(67.7)	50(32.3)				
Employment Status	Employed	79(84.0)	15(16.0)	18.403	0.000***	4.43*** (2.19-8.96)	1.383(0.53-3.59)
	Unemployed	44(54.3)	37(45.7)				
Consumption of alcohol by the respondents	Yes	28(96.6)	1(3.4)	11.48	0.000***	15.03** (1.99-113.71)	4.369 (0.53-36.02)
	No	95(65.1)	51(34.9)				
Use of SLT by family members	Yes	59(80.8)	14(19.2)	6.66	0.010*	2.50* (1.23-5.08)	8.29** (2.42-28.42)
	No	64(62.7)	38(37.3)				
Use of SLT by friends	Yes	118(80.8)	28(19.2)	46.83	0.000***	20.23*** (7.1-57.69)	8.597* (1.90-39.00)
	No	5(17.2)	24(82.8)				

Chi-square and Fisher's Exact Test significant at *= P<0.05, **=P<0.01, ***=p<0.001

Discussion

Overall, the proportion of the respondents consuming SLT products was found 71% with a higher proportion of males (83%) than females (28%). This study also concludes that males were more likely to consume SLT products than females. Employed individuals were more likely to use SLT products. In addition, the individuals consuming alcohol, the respondents whose friends and family used SLT products were more likely to consume SLT products than their counterparts.

This study revealed that seven out of ten respondents were current users of SLT products which is similar to a study conducted in an industrial township of India showing that around 60% of the people residing in rural communities were using SLT products (Karmakar & Banerjee, 2017). Different studies show contrasting results; with SLT users of the Madhesh Province in 2016 AD at 14.8% and Bihar in 2000 AD at 39.59% (Shrestha et al., 2019; D. Sinha et al., 2003). The difference may have been observed as the proportion of males was high in our study while the study of Madhesh and Bihar had a higher proportion of females as respondents. The higher usage of SLT in this study could be because the study site was closer to the Indian border. The result of our study also contrasts with the findings of Nepal's STEPS survey 2019 which suggests that current smokeless tobacco users are 18.3% (Dhimal et al., 2019). The STEPS survey represents the national scenario and thus includes the larger population group from different parts of the country which may have resulted in differences in findings. The study conducted in the USA during 2019 highly contradicts (2.4%) regarding the proportion of SLT users in our study (Patten et al., 2018). Such differences in findings may be due to the differences in study population character, sample size, and literacy rate and due to differences in national tobacco control initiatives.

The ever users of SLT products (70.86%) were found similar to the current SLT users in the present study. Among them, more than half of the respondents had tried SLT products in their earlier adulthood followed by the adolescent age group. While the study conducted in Alaska suggests that one-third of the ever users initiated using SLT during their early adulthood most users initiated SLT use during adolescence (Patten et al., 2018). The inconsistency could be due to differences in the character of the population along with the availability of the products. Among the various SLT products, consumption of khaini was found the highest in this study which is supported by the study conducted in Bihar and Rachi (Shukla et al., 2019; D. Sinha et al., 2003).

The previous national representative study of Nepal conducted in 2016, NCD STEPS Survey 2019 along with a systematic review article of sub-Saharan African countries in 2006 have shown an association between sex and SLT use (Dhimal et al., 2019; Shrestha et al., 2019; Townsend et al., 2006). In this study, males were more likely (COR=17) to consume SLT products than females which is similar to the findings of DHS 2006, where males were more likely (COR=13) to consume tobacco than females (Sinha et al., 2012).

The study conducted to assess the proportion of tobacco users in Gujarat from 2010 to 2015, DHS survey of 2013 in 49 counties shows the association of employment status with tobacco use (Ansara et al., 2013; Kahar et al., 2016). Employed individuals were more likely to consume SLT products but when controlled for other factors there was no significant association found for the variable.

The previous study of 2016 conducted in the Indian context shows the linkage between SLT use by individuals and SLT use by parents and friends (Ray et al., 2016). The result is also supported by the study conducted among the adolescents of Birgunj in 2016 (Chaudhary & Bhandari, 2019). Similar findings were discovered in our study as well, there was an increase in the likelihood of consumption of SLT products among the respondents whose friends and family members were using SLT products.

Similar to our study, higher family education was found related to SLT use in a study from the USA in 2013 (Assari et al., 2020). Another study conducted in the Czech Republic contradicts this research finding (Zaloudíková et al., 2012). The inconsistency in the findings may be due to differences in the cultural aspects along with different age groups of the target population.

Co-use of alcohol is linked with the use of SLT products as concluded in the study of Burkina Faso's of 2013, a study in sub-Saharan African countries from 2013 to 2016 (Boua et al., 2021; Diendéré et al., 2020). This is similar to our study, where respondents using alcohol are more likely to consume SLT products as well.

The study found that half of the respondents had no education. The frequency of illiterate persons who consume tobacco products was found higher in the Nepal STEPS survey 2019, nationally representative survey of 2016 and NDHS 2016 which also could be the cause of the high use of SLT in this study (Dhimal et al., 2019; MoHP et al., 2017; Shrestha et al., 2019). The satisfactory level of knowledge regarding the harmful effects of SLT products was found very low and the highest scoring question. A GATS study conducted in India from 2009 to 2010 found 61.3% were aware of the harmful effects of SLT use (Kankaria et al., 2021). Similarly, in another study of Ahmedabad 2017, 4.3% respondents assumed that SLT causes no harm to health (Rangey et al., 2018). The observed difference can be the result of the high illiteracy rate in this study and also due to lesser media exposure.

People learn new behaviour by observing others, imitating behaviour (Bandura, 1999). People imitate and learn from their close circle which are mostly friends and family members in most cases. Our study findings also suggest the same, respondents whose family members and friends used SLT products were more likely to consume or use SLT products (AOR=8.29 and AOR=8.597).

Strength and Limitation of the Study

This is a cross-sectional study, and data were collected based on self-reporting which may introduce recall and social desirability biases. The study's generalizability might be constrained to the Madhesi community in Nagarain Municipality, and caution should be

exercised when generalizing findings to broader populations. Despite these limitations, the study serves as a valuable resource for informing targeted interventions to mitigate SLT use in the Madhesi community and contributes to the broader discourse on tobacco control in Nepal.

Conclusion

The study underscores the high use of SLT products among the Madhesi community of Nagarain. The high usage of SLT products was found among individuals who are male, employed, consume alcohol, have peer groups and families using SLT products. Ever use of SLT products was also reported at raised levels. The inferential analysis underscores the influence of various factors, including ethnicity, employment status, highest family education, gender, SLT use within family and friends, and alcohol consumption on SLT use. Importantly, the study highlights a notably low level of knowledge among respondents regarding the harmful effects of SLT, coupled with a low literacy rate. These findings emphasize the urgent need for targeted interventions and awareness programs to address the high proportion of individuals using SLT within the Madhesi community. The study urges the attention of concerned authorities to develop and implement effective interventions for tobacco control, with a particular focus on improving awareness and knowledge about the detrimental health effects associated with SLT use. The strategy to limit the use of SLT products can focus on males, families with SLT users, and peer groups.

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Conflict of Interest

The authors declared that they have no conflicts of interest.

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Authors' Contribution

AK, HCG, GK, HKS, SK, and SP conceived of the presented idea; actively involved in the design, coordination, and implementation of all study field activities; conducted the statistical analysis; and drafted the manuscript. All authors discussed the results and contributed to the final manuscript.

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