

Prevalence, Patterns, and Factors Associated With Tobacco Consumption in Rural Varanasi: A Community-Based Study

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Abstract

Background:

Tobacco use is a leading cause of preventable diseases and deaths worldwide, with developing countries bearing the brunt of its health and socioeconomic impacts. In India, rural areas exhibit a significant burden of tobacco use, driven by socio-cultural norms, economic factors, and limited awareness of its health consequences. Rural Varanasi, located in Uttar Pradesh, is no exception, where tobacco consumption remains deeply rooted in daily life, contributing to an increased prevalence of tobacco-related morbidity and mortality.

Objectives:

1. To assess prevalence and pattern of tobacco use in community.
2. To analyse the socio-demographic factors associated with tobacco consumption.

Methodology:

A cross-sectional community-based study using Global Adult Tobacco Survey Questionnaire carried out in 300 respondents aged 14 and above in Chirgaon, rural Varanasi.

Results

Prevalence of tobacco usage in this study was found to be 54%. The prevalence of smoking and smokeless tobacco use in our study was 12% and 53%, respectively. Increasing age, male gender, and lower educational status were found to be significant risk factors for tobacco use in our study.

Conclusion

Tobacco use is a major public health concern in rural India, with smokeless forms being prevalent due to cultural acceptance and accessibility. Targeted awareness, stricter regulations, and community interventions are essential to reduce consumption and health risks.

Keywords: Tobacco use, rural population, smokeless tobacco, public health.

INTRODUCTION

Tobacco use represents one of the most significant global public health challenges of the modern era. According to the Global Burden of Disease estimates, tobacco is responsible for more than 8 million deaths each year worldwide, including deaths attributable to exposure to second-hand smoke, making it one of the leading preventable causes of mortality globally (1).

Tobacco is a widely cultivated plant primarily consumed for its nicotine content, which is highly addictive. Prolonged tobacco use is causally associated with cancers, cardiovascular diseases, chronic respiratory diseases, and numerous other debilitating health conditions. All forms of tobacco use are harmful, and there is no safe level of exposure to tobacco (2).

Tobacco products are broadly classified according to their mode of consumption into smoked and smokeless forms. Smoked tobacco products involve combustion and inhalation of smoke and include cigarettes, bidis, cigars, pipes, hookah, and kreteks. Smokeless tobacco products do not involve combustion and are consumed by chewing, sucking, or placing tobacco in the oral or nasal cavity, such as chewing tobacco, snuff, snus, gutkha, and khaini (3).

Robust epidemiological evidence has established a clear relationship between tobacco exposure and mortality. The British Doctors Study demonstrated a strong dose-response relationship between smoking and all-cause mortality, identifying tobacco smoking as a major cause of premature death (4). These findings have been corroborated by large contemporary cohort studies, which continue to show significantly higher mortality among tobacco users (5).

Smokeless tobacco use contributes substantially to the global burden of disease, particularly in South Asia. Multi-country analyses have shown strong associations between smokeless tobacco consumption and oral cancers, cardiovascular diseases, and other adverse health outcomes, underscoring its public health significance (6).

Despite extensive global evidence on the health risks associated with tobacco use, local data on the prevalence and patterns of tobacco consumption remain essential for designing effective community-level interventions.

Understanding the burden and forms of tobacco use at the community level is critical for strengthening tobacco control strategies and informing targeted preventive and cessation efforts.

OBJECTIVES

1. To estimate the prevalence and describe the pattern of tobacco use among individuals aged >13 years in a rural community of Varanasi.
2. To identify sociodemographic and behavioural factors associated with tobacco use in the study population.

MATERIALS AND METHODS

A community-based observational study was conducted in rural areas of Varanasi district, Uttar Pradesh. The study population comprised individuals aged more than 13 years who were usual residents of the selected villages at the time of the survey.

A multistage sampling technique was adopted. In the first stage, one Community Development Block was selected conveniently from the eight rural blocks of Varanasi district. In the second stage, villages within the selected block were stratified based on total population size into three strata: villages with population <2000, villages with population ≥2000 and <5000, and villages with population ≥5000. From each stratum, two villages were selected using simple random sampling, resulting in a total of six villages. In the final stage, probability proportionate to size sampling was used to select the required number of participants from each village, and eligible individuals were interviewed.

Data were collected using a pre-designed and pre-tested structured questionnaire to obtain information on sociodemographic characteristics, tobacco use status, and pattern of tobacco consumption. Tobacco use was defined as current use of any smoked or smokeless tobacco product.

Data were entered and analyzed using appropriate statistical software. Prevalence was expressed as proportions. Associations between tobacco use and independent variables were assessed using the chi-square test. Variables found to be statistically significant were further analyzed using multivariable logistic regression. A p-value <0.05 was considered statistically significant.

Ethical approval was obtained from the Institutional Ethics Committee. Written informed consent was obtained from all participants, and confidentiality of the information was ensured.

Table 1: Socio-Demographic Profile of Participants

Socio-demographic Variables	Category	Frequency	Percentage (%)
Age in completed years	15-24	61	20.3
	25-44	122	40.7
	45-64	87	29.0
	65+	30	10.0
Gender	Male	204	68.0
	Female	96	32.0
Marital Status	Married	202	67.3
	Unmarried	67	22.3
	Widowed	29	9.7
	Divorced	2	0.7
Religion	Hindu	288	96.0
	Muslim	12	4.0
Type of Family	Joint family	129	43.0
	Nuclear family	165	55.0
	Three generation family	6	2.0

Socio-demographic Variables	Category	Frequency	Percentage (%)
Education	No formal schooling	104	34.7
	Less than primary school	12	4.0
	Primary school completed	46	15.3
	Less than secondary school	57	19.0
	Secondary school completed	36	12.0
	High school completed	38	12.7
	College/University completed	5	1.7

	Post graduate completed	2	0.7
Occupation	Agriculture	22	7.3
	Labourer	79	26.3
	Public sector	8	2.7
	Private sector	27	9.0
	Others	164	54.7

Socio-demographic Variables	Category	Frequency	Percentage (%)
Socioeconomic Scale	Upper class	2	0.7
	Upper middle class	27	9.0
	Middle class	123	41.0
	Lower middle class	135	45.0
	Lower class	13	4.3

Table 2: Smoking Status Among Participants

Smoking Status	Frequency	Percentage (%)
Current Daily Smokers	27	9.0
Current Less Than Daily	9	3.0
Not at All	264	88.0
Total	300	100.0

Fig 1: Prevalence Of Smoking among Participants

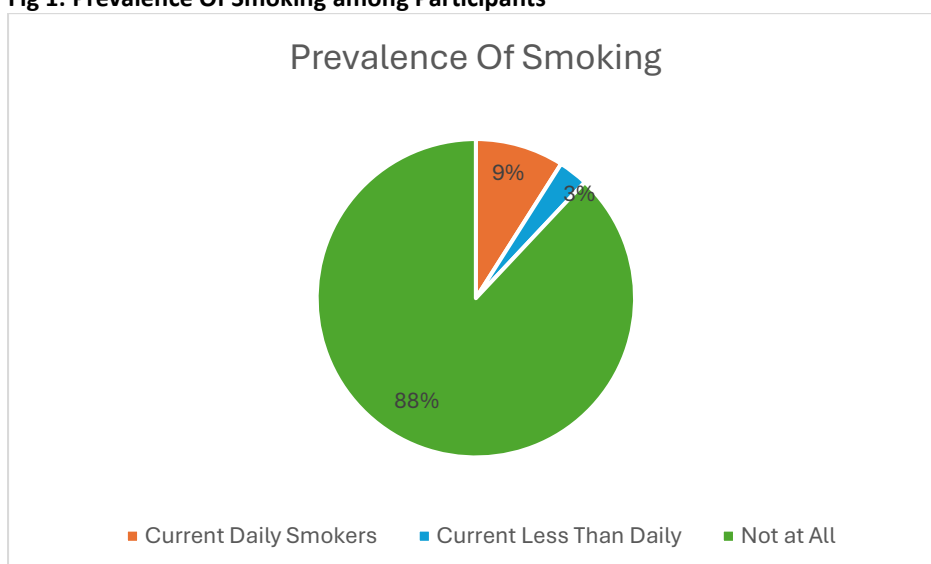


Table 3: Pattern of Tobacco Smoking

Manufactured cigarettes	Category	Daily smokers(n=27) Per day (%)	Less than daily smokers (n=9) Per week (%)
	1-5	14 (51.9)	2 (22.2)
	6-10	4 (14.8)	5 (55.6)
Hand rolled cigarettes	1-5	4 (14.8)	0 (0)
	6-10	5 (18.5)	2 (22.2)

Table 4: Prevalence of Smokeless Tobacco Use

Usage Frequency	Frequency	Percentage (%)
Daily	148	49.3
Less than daily	9	3.0
Not at all	143	47.7

Total	300	100.0
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Fig 2: Prevalence Of Smokeless Tobacco Use Among Participants

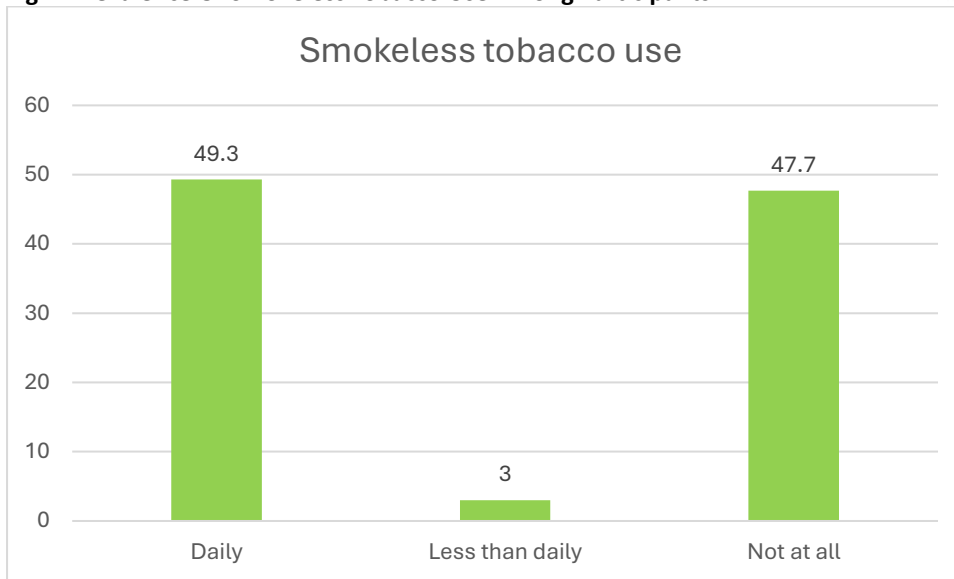


Table 5: Pattern of smokeless Tobacco Usage

Type	Daily smokeless tobacco users(n=148) Per day (%)	Less than daily smokeless tobacco users (n=9) Per week (%)
Snuff by mouth		
1-5	16(10.8)	1(11.1)
6-10	2(1.3)	2(22.2)
>10	1(0.6)	0(0)
Chewing		
1-5	59(39.9)	0(0)
6-10	68(45.9)	6(66.6)
>10	13(8.7)	0(0)
Betel quid with tobacco		
1-5	90 (57.3)	4(44.4)
6-10	4(2.5)	5(55.5)
>10	6(3.8)	0(0)

Fig 3: Prevalence of Tobacco Use

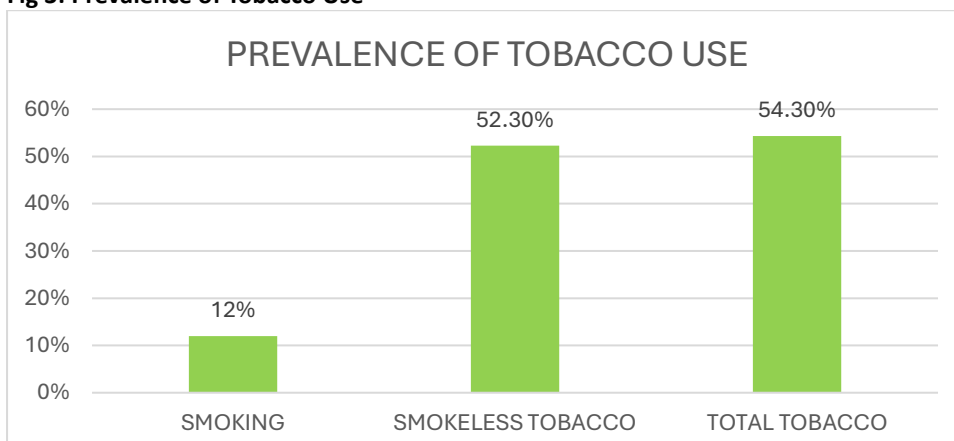


Fig 4: Age Wise Distribution of Tobacco Usage

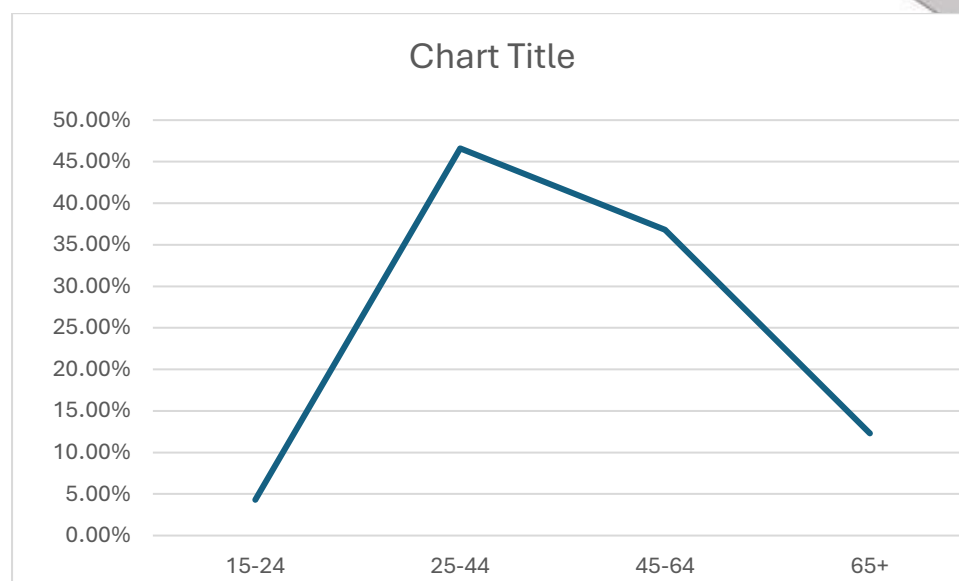


Table 6: Association Between Socio- Demographic Variables and Total Tobacco Use.

Table 4.9.1: Association Between Age, Gender, and Total Tobacco Use

Variable	Category	Non-Users (No)	Users (Yes)	Total	χ^2 Value / p-value
Age Category	15-24	54 (39.4%)	7 (4.3%)	61	$\chi^2 = 57.620, p = 0.000$
	25-44	46 (33.6%)	76 (46.6%)	122	
	45-64	27 (19.7%)	60 (36.8%)	87	
	65+	10 (7.3%)	20 (12.3%)	30	
	Total	137 (100.0%)	163 (100.0%)	300	
Gender	Male	78 (56.9%)	126 (77.3%)	204	$\chi^2 = 14.189, p = 0.000$
	Female	59 (43.1%)	37 (22.7%)	96	
	Total	137 (100.0%)	163 (100.0%)	300	

Table 7: Association Between Education, Occupation, Marital Status, and Total Tobacco Use

Variable	Category	Non-Users (No)	Users (Yes)	Total	χ^2 Value / p-value
Education	No formal schooling	37 (27.0%)	67 (41.1%)	104	$\chi^2 = 16.923, p = 0.018$
	Less than primary	5 (3.6%)	7 (4.3%)	12	
	Primary school	22 (16.1%)	24 (14.7%)	46	
	Less than secondary	26 (19.0%)	31 (19.0%)	57	
	Secondary school	15 (10.9%)	21 (12.9%)	36	
	High school	27 (19.7%)	11 (6.7%)	38	
	College/University	4 (2.9%)	1 (0.6%)	5	
	Postgraduate	1 (0.7%)	1 (0.6%)	2	
	Total	137 (100.0%)	163 (100.0%)	300	
Occupation	Agriculture	7 (5.1%)	15 (9.2%)	22	$\chi^2 = 27.670, p = 0.000$
	Labourer	18 (13.1%)	61 (37.4%)	79	
	Public sector	5 (3.6%)	3 (1.8%)	8	
	Private sector	16 (11.7%)	11 (6.7%)	27	
	Others	91 (66.4%)	73 (44.8%)	164	
	Total	137 (100.0%)	163 (100.0%)	300	
Marital Status	Married	77 (56.2%)	125 (76.7%)	202	$\chi^2 = 46.557, p = 0.000$
	Unmarried	54 (39.4%)	13 (8.0%)	67	
	Widowed	6 (4.4%)	23 (14.1%)	29	
	Divorced	0 (0.0%)	2 (1.2%)	2	
	Total	137 (100.0%)	163 (100.0%)	300	

Table 8: Association Between Socioeconomic Scale and Total Tobacco Use

Socioeconomic Scale	Non-Users (No)	Users (Yes)	Total	χ^2 Value / p-value
Upper class	0 (0.0%)	2 (1.2%)	2	$\chi^2 = 3.816, p = 0.431$
Upper middle class	14 (10.2%)	13 (8.0%)	27	
Middle class	61 (44.5%)	62 (38.0%)	123	
Lower middle class	56 (40.9%)	79 (48.5%)	135	
Lower class	6 (4.4%)	7 (4.3%)	13	
Total	137 (100.0%)	163 (100.0%)	300	

Table 4.10: Logistic Regression Analysis for Factors Associated with Total Tobacco Use

Variable	Category	AOR (95% CI)	P Value
Age Category		-	0.002
	15-24 (Ref)	-	-
	25-44	9.506 (2.845 – 31.765)	0.000
	45-64	9.709 (2.564 – 36.766)	0.001
	65+	5.438 (1.164 – 25.394)	0.031
Gender		-	0.000
	Female (Ref)	-	-
	Male	5.226 (2.382 – 11.465)	0.000
Education		-	0.379
	No formal schooling	2.670 (0.109 – 65.134)	0.547
	Less than primary	5.389 (0.155 – 187.878)	0.353
	Primary school	1.643 (0.065 – 41.520)	0.763
	Less than secondary	2.155 (0.086 – 53.869)	0.640
	Secondary school	4.118 (0.154 – 110.045)	0.398
	High school	1.112 (0.043 – 28.730)	0.949
	College/University	0.900 (0.018 – 44.887)	0.958
Occupation	Postgraduate (Ref)	-	-
		-	0.021
	Agriculture	0.893 (0.291 – 2.743)	0.843
	Labourer	1.539 (0.655 – 3.615)	0.322
	Public sector	0.271 (0.051 – 1.459)	0.129
	Private sector	0.310 (0.108 – 0.893)	0.030
Marital Status	Others (Ref)	-	-
		-	0.036
	Married (Ref)	-	-
	Unmarried	0.432 (0.149 – 1.253)	0.122
	Widowed	4.033 (1.349 – 12.055)	0.013

RESULTS

A total of 300 participants aged more than 13 years were included in the study. Table 1 shows the socio-demographic profile of the study participants. The largest proportion of participants belonged to the 25–44 years age group (40.7%), followed by 45–64 years (29.0%) and 15–24 years (20.3%). Males constituted 68.0% of the study population. Most participants were married (67.3%). More than half belonged to the Other Backward Classes (56.0%), followed by Scheduled Castes/Scheduled Tribes (29.3%). The majority of participants were Hindus (96.0%). Nuclear families constituted 55.0% of the households. About one-third of participants (34.7%) had no formal schooling, while only 2.4% had completed college or postgraduate education. Labourers constituted 26.3% of participants, and 54.7% belonged to the “others” occupational category. Most participants owned their own house (79.3%) and followed a non-vegetarian diet (62.3%). According to socioeconomic status, the majority belonged to the lower-middle (45.0%) and middle class (41.0%).

The prevalence of smoking among the study participants is shown in Table 2. Overall, 12.0% of participants were current smokers, of whom 9.0% were daily smokers and 3.0% were less-than-daily smokers, while 88.0% reported not smoking at all.

Table 3 depicts the pattern of tobacco smoking. Among daily smokers, manufactured cigarettes were the most commonly used form, with 51.9% smoking 1–5 cigarettes per day. Hand-rolled cigarettes were also commonly

used. Among less-than-daily smokers, manufactured cigarettes predominated, with more than half consuming 6–10 cigarettes per week.

The prevalence of smokeless tobacco use is shown in Table 4. Nearly half of the participants (49.3%) were daily users of smokeless tobacco, while 3.0% used it less than daily. Overall, 52.3% of participants reported current use of smokeless tobacco.

Table 5 shows the pattern of smokeless tobacco use. Betel quid with tobacco was the most commonly used product among daily users, followed by chewing tobacco. A large proportion of daily users consumed smokeless tobacco multiple times per day.

The association between socio-demographic variables and total tobacco use is presented in Tables 6–8. Tobacco use showed a significant association with age, with prevalence increasing in higher age groups ($\chi^2 = 57.620$, $p < 0.001$). Gender was also significantly associated, with a higher proportion of tobacco users among males compared to females ($\chi^2 = 14.189$, $p < 0.001$). Educational status showed a significant association with tobacco use ($\chi^2 = 16.923$, $p = 0.018$), with higher prevalence among participants with no formal schooling. Occupation was significantly associated with tobacco use ($\chi^2 = 27.670$, $p < 0.001$), with labourers showing the highest prevalence. Marital status also showed a significant association, with higher tobacco use among married and widowed participants ($\chi^2 = 46.557$, $p < 0.001$).

Multivariable logistic regression analysis (Table 9) revealed that age and gender were significant independent predictors of tobacco use. Compared to participants aged 15–24 years, those aged 25–44 years, 45–64 years, and ≥ 65 years had significantly higher odds of tobacco use. Males had significantly higher odds of tobacco use compared to females. Occupation and marital status also showed independent associations with tobacco use, while educational status was not independently associated after adjustment.

DISCUSSION

The present study demonstrates a high prevalence of tobacco use in the rural community of Varanasi, with more than half of the study population reporting current use of tobacco in some form. This prevalence is substantially higher than the national estimate reported by the Global Adult Tobacco Survey-2 (2016–2017), which documented an overall tobacco use prevalence of 28.6% among adults in India (7). Such a wide difference between national and local estimates highlights the persistence of tobacco use in rural settings and emphasizes the importance of generating region-specific evidence. Similar elevated prevalence has been reported from several community-based studies conducted in Uttar Pradesh and other northern Indian states, indicating considerable geographic and rural–urban variation in tobacco consumption patterns (8,9).

A striking finding of the present study is the predominance of smokeless tobacco use over smoking. This observation is consistent with multiple Indian studies reporting smokeless tobacco as the most commonly consumed form of tobacco in rural and semi-urban populations (10,11). Studies from Gorakhpur and Gautam-Budh Nagar districts of Uttar Pradesh have documented high consumption of chewing tobacco, betel quid with tobacco, and khaini, reflecting deep-rooted cultural acceptance, easy availability, and affordability of these products (8,9). The higher prevalence of smokeless tobacco use compared to national averages underscores the need for focused attention on non-smoked forms of tobacco, which are often underestimated in tobacco control policies and public health messaging.

The smoking prevalence observed in the present study was lower compared to national and regional estimates reported by GATS-2 and other population-based analyses (7,12). This decline in smoking may reflect increasing awareness of the harmful effects of smoking, improved enforcement of smoke-free public place legislation, and evolving social norms that discourage smoking in rural communities. However, this apparent reduction in smoking appears to be offset by the persistent and widespread use of smokeless tobacco, suggesting a substitution or shift in consumption patterns rather than an overall decline in tobacco use. Similar trends have been reported in other Indian and global studies, where reductions in smoking coexist with stable or rising smokeless tobacco use (13,14).

Gender differences in tobacco use were pronounced in the present study. Smoking was confined exclusively to males, while smokeless tobacco use was observed among both males and females. This pattern mirrors findings from national surveys and regional studies, which consistently report higher smoking prevalence among men and greater social acceptance of smokeless tobacco use among women in rural India (15,16). Sociocultural norms strongly discourage female smoking, whereas smokeless tobacco use is often perceived as socially acceptable, less harmful, and even culturally ingrained among women (16). The absence of female smokers in this study may also be influenced by underreporting due to social desirability bias, a limitation commonly reported in tobacco research conducted in conservative rural settings (12).

Age showed a significant association with tobacco use, with initiation commonly occurring during adolescence and early adulthood. This finding aligns with evidence from Indian and South Asian studies identifying the age group of 15–20 years as a critical period for initiation, influenced by peer pressure, curiosity, imitation of elders, and early accessibility of tobacco products (17,18). Early initiation substantially increases the likelihood of long-term dependence and cumulative exposure, thereby increasing the risk of tobacco-related morbidity and mortality later in life. These findings reinforce the need for early preventive interventions targeting adolescents and young adults through schools, families, and community-based platforms.

Occupation emerged as an important determinant of tobacco use, with labourers exhibiting the highest prevalence. This finding is consistent with studies conducted among construction workers, industrial labourers, and other manual workers, which report higher tobacco use associated with occupational stress, physically demanding work, job insecurity, and poor working conditions (19,20). Tobacco use in such occupational groups is often perceived as a coping mechanism to relieve fatigue, stress, and monotony during long working hours. These observations suggest that workplace-based tobacco cessation and prevention interventions could be particularly effective in reducing tobacco use among labour-intensive occupational groups.

Although socioeconomic status did not show a statistically significant association with tobacco use in the present study, tobacco consumption was more common among lower and middle socioeconomic groups. This pattern has been consistently observed in several Indian studies and reflects the widespread affordability and easy availability of smokeless tobacco products across socioeconomic strata (21,22). Educational status also did not show a statistically significant association with tobacco use; however, the absence or lower prevalence of smoking among individuals with higher education supports earlier evidence indicating a protective role of education in shaping health-related behaviours (21). Nevertheless, the persistently high prevalence of smokeless tobacco use across all educational levels highlights critical gaps in awareness regarding its health consequences. The public health implications of the high burden of smokeless tobacco use are particularly concerning. Smokeless tobacco has been strongly linked to oral cancers, cardiovascular diseases, and adverse pregnancy outcomes, contributing substantially to morbidity and mortality in South Asia (13,14). Policy-level reviews have further highlighted that smokeless tobacco control in South Asia remains weak, with inadequate regulation, limited taxation, and poor enforcement compared to smoked tobacco products (24). These policy gaps further compound the challenge of controlling smokeless tobacco use in rural communities.

Overall, the findings of this study indicate that tobacco use in rural communities is influenced by a complex interplay of cultural norms, gender roles, occupational factors, early initiation, and inadequate awareness regarding health risks. The disproportionately high burden of smokeless tobacco use represents a critical public health concern that requires urgent attention. These findings underscore the need for comprehensive, community-based tobacco control strategies that specifically address smokeless tobacco, focus on adolescents and manual labourers, strengthen culturally appropriate health education, and integrate cessation support into primary healthcare and national tobacco control programmes.

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