Youthful Choices: A Secondary Analysis of the NFHS-5 Data to Examine Tobacco Use in Indian Adolescent Girls and Young Women

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ABSTRACT

Background and aim: Tobacco use among adolescents and young women is a global health concern. This study investigates the prevalence and determinants of tobacco use among adolescents and young women in India.

Methods: Based on data from the National Family Health Survey-5, this study explored tobacco use among 241,180 young women aged 15–24 in India. The research investigated determinants of current tobacco use, encompassing any tobacco use in any form, smoked and smokeless tobacco (SLT). Independent variables include demographics, religion, caste, region, education, occupation, body mass index, wealth index, alcohol consumption, and media exposure. We used multivariable logistic regression models to estimate the adjusted odds ratio (OR) and 95% confidence intervals (95%CI).

Results: Findings revealed that 1.3% of the population are current tobacco users, with 1.2% using SLT and 0.14% smoking. Significant determinants included age, urban residence, religion, scheduled tribe status, wealth index, education, alcohol co-use, region, and pregnancy/lactation status. Young women (young women, 3.5% > adolescents, 1.5%; OR 1.78, 95%CI 1.65, 1.92), urban dwellers (OR 1.38, 95%CI 1.32, 1.43), and alcohol users (OR 5.6, 95%CI 4.88, 6.33) exhibited higher odds of tobacco use. In contrast, education (higher education OR 0.15, 95%CI 0.13, 0.18) and higher socioeconomic status (richest OR 0.3, 95%CI 0.22, 0.31) were protective factors.

Conclusion: Our research offered valuable insights into tobacco use among young Indian women. To effectively curb tobacco use in this population, it is imperative to address the identified determinants and vulnerabilities through tailored public health strategies and policies.

Keywords: National Family Health Survey, young women, India, tobacco

Key Messages: 1.3% of young women use tobacco, mainly smokeless.

Young women, urban dwellers, and those who use alcohol are at risk of tobacco use.

Those with higher education and socioeconomic status have lower odds of tobacco use.

Address determinants and vulnerabilities through targeted policies and strategies.

Globally, 22.3% of the population (36.7% of all men and 7.8% of all women) used tobacco in 2020.[1] Tobacco is estimated to kill more than 8 million users, and a majority of those who use tobacco reside in the South East Asian region, including India.[1] In India, among people aged 15 years or more, 28.6% use any form of tobacco. Although less than that of men, a substantial minority of Indian women (14.2%) consume tobacco.[2] Among those women who use tobacco, smokeless tobacco (SLT) use (12.3%) is higher than the use of smoked (1.5%) and both products (0.5%).[2] According to a study conducted in Chhattisgarh,[3] central India, women from urban areas (62.8%) were more likely to use smoked tobacco, while rural women (77.4%) had a higher likelihood of using SLT. At least one in four of the women who use tobacco are adolescents and young girls (15–24 years).[2]

Women aged 15–24 years form 3/4th of the total female population in India.[4] During this phase of the lifecycle, the

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children go from the supervision of parents to self-direction, from school to the professional world, and from pediatric to adult healthcare systems. As adolescents mature into young adults, they are more likely to engage in risky health behaviors.[5] They are more likely to underestimate harmful consequences and overestimate the chances of quitting tobacco in the future.[6] Therefore, adolescents and young girls might be more likely to experiment with tobacco use. The desire to belong to a group, assert individual freedom, become defiant, and experiment may further the risk of initiating tobacco use.[7] In Indian women, the mean age of tobacco initiation is between 20 and 24 years.[2] A population-level study from the US showed that young women exceeded the rates of smoking initiation than young men.[8] Similar trends might also be observed, with the big tobacco companies' current marketing and promotional strategies directed toward young women from low and middle-income countries.[9–11]

In general, earlier age at initiation of tobacco use is associated with higher risk and severity of addiction and lower quit rates.[12,13] Early initiation might also increase the healthcare and societal costs of tobacco use.[14] Adolescent girls who smoke tobacco are more likely than adolescent boys to develop impairment in lung functions, asthma, wheezing, respiratory hyper-responsiveness, and earlier initiation of Chronic Obstructive Pulmonary Disease.[15] Women who start early have a higher risk of major depressive and anxiety disorders than their male counterparts. The use of tobacco may also result in the impairment of fertility because of the derangement in hormone levels.[16] Early initiation in women might also be associated with a higher risk of ischemic cardiac disease.[17] Additionally, smoking cessation may be more difficult for women than men.[15] Therefore, public health policies must focus on prevention, screening, and early intervention among adolescents and young women.

Nevertheless, tobacco control has largely neglected the context and challenges of young women. There is a significant lack of developmentally appropriate, gender-sensitive policies and political will to implement the available strategies.[18] Factors such as education, wealth index,

knowledge about the consequences of tobacco, and place and region of residence were reported as determinants of tobacco usage.[19,20] Although there is published literature on the determinants of tobacco use in adolescent girls and adult women, literature is limited to young women.

The reasons for targeting young women are manifold. First, young women are particularly vulnerable to the initiation of tobacco use during their formative years. Understanding the factors influencing the onset of tobacco use in this demographic is crucial for designing preventive measures that can reduce the likelihood of long-term addiction and associated health risks. Second, the social and cultural factors influencing tobacco use can be unique for young women. Societal expectations, peer influences, and cultural norms significantly shape behaviors during adolescence and early adulthood. Examining these factors can provide insights into the specific challenges young women face. Third, young women of reproductive age may face specific health risks related to tobacco use. Research in this demographic can shed light on the potential impact of smoking on fertility, pregnancy outcomes, and the health of both mothers and their children. Finally, the public health policy can target 15–24-year-old women as a single group because of common biological, developmental, and socioeconomic contexts of use and similar challenges faced. Therefore, there is a need to explore the social, demographic, geographical, physical, and lifestyle determinants of tobacco use in any form in young Indian women.

Using the National Family Health Survey-5 (NFHS-5) data collected between 2019 and 2021, this study examined the sociodemographic determinants of tobacco use.

Methodology

Source of Data

We used data from the NFHS-5 (2019–2021).[21] It is a large-scale, multi-round survey of a representative sample of households throughout India. The International Institute of Population Sciences, Mumbai, conducted the survey on behalf of the Ministry of Health and Family Welfare, Government of India. It uses computer-assisted personal interviewing in local languages. We used data from women's schedules among the four survey schedules.

Sample Selection

The number of women interviewed in NFHS-5 was 724,115, out of which 482,415 women were excluded because they were older than 24 years. Data of young women aged 15–24 years ($N = 241,180$) were analyzed for the study.

Study Variables

Dependent variables include the current use of tobacco in any form, the use of smoked tobacco, and SLT. Smoked tobacco included cigarettes, smoking pipe tobacco, cigars, water pipes, and hookah. SLT included sniffing tobacco products, eating gutkha, pan masala with tobacco, khaini, and pan with tobacco and other types of chewable tobacco products. Current use was defined by use during the last month. Tobacco usage was a binary variable with an outcome of 0 and 1 recorded as No and Yes.

Independent variables were selected after a detailed literature review. The demographic variables included were age, religion, caste, region and location of residence, education, occupation, wealth index, and family type. We also included lifestyle factors such as alcohol consumption, body mass index (BMI), and exposure to media as independent variables. Age (15–19 vs. 20–24), religion (Hindu, Muslim, Christian, and Others), caste (SC, ST, and Others), region of residence (North, South, East, and West), location of residence (urban Vs. rural), family status (nuclear vs. nonnuclear), education status (illiterate, primary, secondary, higher), occupation status (employed vs. unemployed), BMI (underweight, normal, overweight, obesity), and wealth index (poorest, poor, rich, richer, and richest) were grouped into relevant categories. The wealth index serves as an indicator of living standards, determined by assessing households' possession of items like televisions and the quality of housing features, such as the source of drinking water. Based on this index, the population is categorized into five equal groups, with the wealthiest 20% forming the top quintile and the least affluent 20% constituting the bottom quintile. The composite variable of mass media exposure encompasses various combinations of activities, such as the frequency of radio listening, television watching, and reading newspapers/magazines. The NFHS data recorded the engagement frequencies

with each type of mass media as either not at all, occasionally, or daily. We have combined occasionally and daily as "yes" and dichotomized the variable. There were 13 inquiries regarding domestic violence. Of these, seven focused on instances of physical violence, four on sexual violence, and the remaining three aimed to gather information about emotional violence. We categorized it as "present" if any of this was present. The "autonomy index" was created out of five different variables-whether the women were allowed to go to the market alone, go to a movie, manage cash earned by their husbands, and decision-makers in contraceptive use. The variable was dichotomized as "yes" or "no" based on whether or not all responses were positive.

Data Analysis

We used STATA 16 and Statistical Package for the Social Sciences version 25.0. The estimates were a weighted percentage with a 95% confidence interval (95%CI). The chi-square test examined the association between dependent and independent variables. A multivariable logistic regression model was used to determine the social determinants of tobacco use in the study population. Independent variables with p values <.02 were considered for the multivariable logistic regression model, and the backward likelihood ratio method was used to determine the best-fit model. We calculated the adjusted odds ratio (aOR) to estimate the effects of social determinants of tobacco use. Statistical significance was defined as a p value of <.05.

Ours is a secondary analysis of the public NFHS-5 dataset. The deidentified dataset was accessed through the Demographic and Health Surveys Program. Therefore, ethics approval is not applicable.

Results

In our study population, 1.3% (95%CI; 1.2–1.4) were current tobacco users. Around 1.2% (95%CI; 1.15–1.24) of women used SLT, and 0.14% (95%CI; 0.12–0.15) smoked tobacco.

Demographic, Social, and Lifestyle Factors Associated with Tobacco Use

Any form of tobacco use (1.52% vs. 3.52%), smoking (0.12% vs. 0.21%), and SLT use (1.4% vs. 3.11%) were significantly more common in young women (20–24 years) than adolescents (15–19 years). Although tobacco use in any form (2.6% vs. 1.9%) and SLT use (2.4% vs. 1.7%) were more common among rural women, smoking was more prevalent among urban women (0.2% vs. 0.15%). Tobacco use was more common in Christians (10.6%) compared to Muslims (2%), Hindus (1.7%), and others (3.1%). All women of the scheduled tribe used tobacco more widely than others (7.02% vs. 1.56% vs. 1.18). We found that women in the lowest quartile of the wealth Index (poorer and poorest) more often used any forms of tobacco than those in the higher quartiles (4.7%, 2.8% vs. 1.9%, 1.3%, 0.5%). Tobacco use was higher among those who were illiterate (7.3%) than those who had primary (5.7%), secondary (2.1%), and higher education (0.75%). Religion, tribal status, wealth, and education—all were significantly associated with SLT use and smoking. Being employed (4.2% vs. 2.2%) and married (4.02% vs. 1.57%) increased the likelihood of any tobacco and SLT use, but not smoking. Lack of exposure to media (3.5% vs. 2.1%) and concurrent alcohol use (28.2% vs. 2.2%) were associated with significantly higher tobacco use. However, media exposure did not affect the prevalence of smoking. Young women with obesity had less prevalent tobacco and SLT use (1.88% vs. 2.6% for normal weight).

In comparison between different regions of India, women from the northeast region had a higher prevalence of tobacco use (NE 9% vs. Southern region 0.4%). Currently pregnant (3.6% vs. 2.3%) and currently breastfeeding (4.2% vs. 2.1%) women commonly used any forms of tobacco compared to their counterparts. Similar results were seen for SLT use. However, current smoking did not differ between pregnant and non-pregnant women and lactating and

TABLE 1.

Prevalence of Tobacco Use, Smoking or Smokeless Tobacco Across Various Variables, NFHS-5 (2019–2021).

Background Characteristics	Tobacco Use		Smoking Tobacco Use (%)	Smokeless Tobacco Use (%)	χ^2 (p) (Tobacco Use)	χ^2 (p) (Smoking)	χ^2 (p) (SLT)
Age	n	%					
15–19	1,865	1.52	0.12	1.4	831.5 (.000)	27.35 (.000)	807.62 (.000)
20–24	3,945	3.52	0.21	3.11			
Type of residence							
Urban	1,016	1.86	0.20	1.66	89.69 (.000)	5.16 (.023)	108.73 (.000)
Rural	4,794	2.57	0.15	2.4 ma			
Religion							
Hindu	3,137	1.73	0.13	1.6	4,900 (.000)	107.47 (.000)	4,900 (.000)
Muslim	686	2.03	0.17	1.86			
Christian	1,673	10.59	0.41	10.18			
Others	314	3.1	0.41	2.69			
Caste							
Schedule caste	766	1.56	0.13	1.43	5,100 (.000)	43.13 (.000)	5,200 (.000)
Schedule tribe	3,116	7.02	0.28	6.74			
others	1,606	1.18	0.14	1.04			

(Table 1 continued)

(Table 1 continued)

Background Characteristics	Tobacco Use		Smoking Tobacco Use (%)	Smokeless Tobacco Use (%)	χ^2 (p) (Tobacco Use)	χ^2 (p) (Smoking)	χ^2 (p) (SLT)
Wealth index							
Poorest	2,483	4.69	0.19	4.5	2,000 (.000)	16.17 (.003)	2,100 (.000)
Poorer	1,581	2.76	0.18	2.58			
Middle	972	1.9	0.15	1.74			
Richer	571	1.28	0.1	1.17			
Richest	203	0.5	0.19	0.39			
Family							
Nuclear	2,251	2.86	0.22	2.64	100.25 (.000)	21.18 (.000)	82.89 (.000)
Nonnuclear	3,559	2.19	0.14	2.05			
Region							
North	561	1.15	0.17	0.98	7,200 (.000)	269.1 (.000)	7,000 (.000)
Central	1,222	1.9	0.11	1.78			
East	457	1.06	0.11	0.96			
North East	2,875	8.99	0.5	8.49			
West	571	2.59	0.08	2.52			
South	124	0.4	0.06	0.34			
Education							
Illiterate	1,160	7.25	0.3	6.95	2,900 (.000)	22.43 (.000)	3,000 (.000)
Primary	865	5.74	0.21	5.52			
Secondary	3,470	2.06	0.15	1.92			
Higher	315	0.75	0.16	0.59			
Occupation							
Unemployed	625	2.15	0.12	2.04	93.85 (.000)	3.81 (.051)	89.89 (.000)
Employed	295	4.18	0.21	3.97			
Exposure to media							
No	1,703	3.46	0.17	3.29	289.68 (.000)	0.21 (.643)	305.91 (.000)
Yes	4,107	2.14	0.16	1.98			
BMI							
Underweight	1,592	2.27	0.13	2.14	25.43 (.000)	6.10 (.107)	22.99 (.000)
Normal	3,649	2.58	0.18	2.4			
Overweight	360	2.31	0.19	2.12			
Obese	71	1.87	0.18	1.69			
Consumption of alcohol							
No	5,321	2.22	0.13	2.09	4,900 (.000)	2,400 (.000)	3,500 (.000)
Yes	498	28.15	4.95	23.2			
Autonomy index *							
No	645	2.45	0.11	2.34	4.04 (.04)	3.31 (.061)	2.65 (.103)
Yes	278	2.83	0.19	2.64			
Exposure to domestic violence							
No	371	4.57	0.14	4.43	2.48 (.115)	7.44 (.006)	1.17 (.279)
Yes	16	6.75	0.84	5.91			
Marital status							
Not married	2,477	1.57	0.16	1.41	1,400 (.000)	1.64 (.201)	1,500 (.000)
Married	3,333	4.02	0.18	3.84			
Currently pregnant							
No	5,297	2.33	0.16	2.17	93.99 (.000)	0.3119 (.576)	97.68 (.000)
Yes	513	3.62	0.18	3.44			
Currently breastfeeding							
No	4,182	2.07	0.17	1.90	609.99 (.000)	0.38 (.535)	662.47 (.000)
Yes	1,628	4.16	0.15	4.01			
Usage of tobacco by family members							
No	1,488	1.24	0.14	1.1	1,400 (.000)	7.13 (.000)	1,400 (.000)
Yes	4,322	3.56	0.19	3.37			
Total	5,810	2.41	398	5,412			

The "autonomy index" was created out of five different variables-whether the women were allowed to go to the market alone, go to a movie, manage cash earned by their husbands, and decision-makers in contraceptive use. The variable was dichotomized as "yes" or "no" based on whether or not all responses were positive.

non-lactating mothers. Also, the prevalence of any form of tobacco was more common among those who had family members using tobacco (3.6% vs. 1.2%) (see **Table 1**).

Independent Determinants of Tobacco Use in Any Form

Young women, in comparison with adolescent women, were 78% more likely to use tobacco in any form (aOR = 1.78, 95% CI = 1.65,1.92). Women who had exposure to media (aOR = 1.25, 95%CI = 1.16–1.34), dwellers of urban areas (aOR = 1.38, 95% CI = 1.32–1.43), co-alcohol use (aOR = 5.56, 95% CI = 4.88–6.33), and family members who used tobacco (aOR = 2.43, 95%CI = 2.28–2.60) had higher odds of using tobacco. However,

women with primary (aOR = 0.66, 95% CI = 0.59–0.73), secondary (aOR = 0.31, 95%CI = 0.29–0.34), and higher education (aOR = 0.15, 95%CI = 0.13–0.18) had a lower odds of tobacco use. A higher wealth index (richest > richer > middle > poor) also reduced odds compared to the poorest quartile. Women from the North-East region had higher odds (aOR = 3.54, 95% CI = 3.14–3.99) of any tobacco use; in contrast, those from the southern region had lower odds (aOR= 0.36, 95%CI = 0.29–0.44) of use. Although the young women who were currently married (aOR = 1.87, 95% CI = 1.72–2.04) were 87% more likely to use tobacco, currently pregnant (aOR = 0.88, 95% CI = 0.79–0.99), and currently lactating (aOR = 0.86, 95% CI = 0.79–0.93) had

significantly lower odds of using tobacco in any form.

Adjusted odds for other determinants did not reach statistical significance (see **Table 2**).

Independent Determinants of Smoked Tobacco Use

The odds of smoking in young women (20–24 years) were twice that of adolescent girls (aOR = 1.53, 95%CI = 1.19–1.96). Women from urban areas were 33% more likely to smoke than their rural counterparts (aOR = 1.33, 95%CI 1.13–1.49). Higher (aOR = 0.42, 95%CI = 0.27–0.65) and secondary (aOR = 0.52, 95%CI = 0.37–0.74) education reduced the odds

TABLE 2.

Result of Logistic Regression Between Types of Tobacco Usage and Various Individual Level Background Characteristics, NFHS (2019–2021).

Background Characteristics	Current Tobacco User aOR (95%CI)	Smoking Tobacco aOR (95%CI)	Smokeless Tobacco aOR (95%CI)
Age			
15–19 years®			
20–24 years	1.78 (1.65,1.92)	1.53 (1.19,1.96)	1.79 (1.65,1.93)
Type of residence			
Urban	1.38 (1.32,1.43)	1.33 (1.13,1.49)	1.38 (1.32,1.44)
Rural®			
Religion			
Hindu®			
Muslim	1.33 (1.19,1.49)	1.56 (1.12,2.18)	1.33 (1.18,1.49)
Christian	1.8 (1.63,2.00)	1.41 (1.00,2.00)	1.81 (1.63,2.01)
Other	0.93 (0.81,1.07)	1.24 (0.85,1.80)	0.89 (0.77,1.04)
Caste			
SC®			
ST	1.78 (1.62,1.96)	0.79 (0.55,1.12)	1.88 (1.70,2.07)
Other	0.82 (0.75,0.90)	0.92 (0.69,1.24)	0.8 (0.73,0.88)
Wealth quintile			
Poorest®			
Poorer	0.66 (0.61,0.71)	0.95 (0.71,1.27)	0.65 (0.60,0.71)
Middle	0.56 (0.51,0.61)	0.96 (0.69,1.33)	0.55 (0.50,0.60)
Richer	0.46 (0.41,0.52)	0.76 (0.52,1.13)	0.46 (0.41,0.52)
Richest	0.26 (0.22,0.31)	1.2 (0.78,1.83)	0.2 (0.16,0.24)
Family type			
Nuclear®			
Nonnuclear	0.95 (0.89,1.00)	0.7 (0.57,0.85)	0.97 (0.91,1.04)
Region			
North®			
Central	1.3 (1.16,1.45)	0.72 (0.51,1.02)	1.4 (1.25,1.57)
East	0.55 (0.48,0.63)	0.71 (0.48,1.06)	0.56 (0.48,0.64)
North East	3.54 (3.14,3.99)	2.52 (1.76,3.61)	3.74 (3.30,4.24)
West	2 (1.76,2.27)	0.61 (0.37,1.02)	2.2 (1.93,2.52)
South	0.36 (0.29,0.44)	0.39 (0.23,0.64)	0.35 (0.28,0.44)

(Table 2 continued)

(Table 2 continued)

Background Characteristics	Current Tobacco User aOR (95%CI)	Smoking Tobacco aOR (95%CI)	Smokeless Tobacco aOR (95%CI)
Education			
Illiterate®			
Primary	0.66 (0.59,0.73)	0.72 (0.46,1.13)	0.65 (0.59,0.72)
Secondary	0.31 (0.29,0.34)	0.52 (0.37,0.74)	0.30 (0.28,0.33)
Higher	0.15 (0.13,0.18)	0.42 (0.27,0.65)	0.13 (0.11,0.16)
Exposure to media			
No®			
Yes	1.25 (1.16,1.34)	1.08 (0.83,1.41)	1.26 (1.17,1.35)
BMI			
Underweight®	1		
Normal	0.78 (0.73,0.84)	0.99 (0.78,1.26)	0.77 (0.72,0.83)
Overweight	0.84 (0.74,0.96)	0.94 (0.61,1.44)	0.83 (0.72,0.95)
Obese	0.87 (0.67,1.14)	1.01 (0.46,2.21)	0.85 (0.64,1.12)
Consumption of alcohol			
No®			
Yes	5.56 (4.88,6.33)	22.99 (17.45,30.29)	4.3 (3.75,4.93)
Marital status			
Not married			
Married	1.87 (1.72,2.04)	1.02 (0.76,1.37)	1.97 (1.80,2.15)
Currently pregnant			
No or unsure®	1		
Yes	0.88 (0.79,0.99)	0.8 (0.51,1.26)	0.88 (0.79,0.99)
Currently lactating			
No®			
Yes	0.86 (0.79,0.93)	0.75 (0.54,1.04)	0.86 (0.79,0.94)
Usage of tobacco by family members family members			
No®			
Yes	2.43 (2.28,2.60)	1.13 (0.92,1.38)	2.61 (2.44,2.80)
_cons	0.02 (0.01,0.02)	0 (0.00,0.00)	0.01 (0.01,0.02)

®: Reference.

of smoking. Women who belong to non-nuclear families also had lower odds of smoking (aOR = 0.7, 95%CI = 0.57–0.85).

Concurrent use of alcohol (aOR = 22.99, 95%CI = 17.45–30.29) increased the odds of smoking. Women from the country's North Eastern region (aOR = 2.52, 95%CI = 1.76–3.61) had the highest odds of smoking, while the southern region had lower odds (aOR = 0.39, 95%CI = 0.23–0.64) (see **Table 2**).

Independent Determinants of SLT Use

The odds of SLT use were higher in young women (aOR = 1.79, CI = 1.65–1.93) than in adolescent girls. Women from urban areas were 38% more likely to use SLT than their rural counterparts (aOR = 1.38, 95%CI 1.32–1.44). Women from Christianity (aOR = 1.81, CI = 1.63–2.01), and Muslim religion (aOR = 1.33, 95%CI = 1.18,1.49), and those from scheduled

tribes (aOR = 1.88, 95%CI = 1.70–2.07) had higher odds of SLT use. Women who had exposure to media (aOR = 1.26, CI = 1.17,1.35), consumed alcohol (aOR = 4.3, CI = 3.75–4.93), and had tobacco using family members (aOR = 2.61, 95%CI = 2.44–2.80) also had higher odds of SLT use. Any level of education (higher > secondary > primary), nonnuclear families (aOR = 0.97, 95%CI = 0.91–1.04), and higher wealth index (richest > richer > middle > poorer) reduced odds of SLT use. Although the young women who were currently married (aOR = 1.97, 95%CI = 1.80–2.15) were 97% more likely to use SLT, currently pregnant (aOR = 0.88, 95%CI = 0.79–0.99), and currently lactating (aOR = 0.86, 95%CI = 0.79–0.94) had significantly lower odds of SLT use. Women from the North-Eastern region had the highest odds (aOR = 3.74, 95%CI = 3.30–4.24) of SLT use, which was followed by the Western (aOR = 2.2, 95%

CI = 1.93–2.52) and central (aOR = 1.4, 95%CI = 1.25–1.57) regions. The southern region had the lowest odds (aOR = 0.35, 95%CI = 0.28–0.44).

Discussion

To the best of our knowledge, ours was the first study to estimate the prevalence and examine determinants of tobacco use in adolescents and young girls (15–24 years) from a nationally representative household sample of an LMI country.

The main findings of our study are as follows. An estimated 1.3% of the study population consumed tobacco, and SLT (1.2%) use was more common than smoking (0.14%). Although the prevalence estimates were lower than those of the Global Adult Tobacco Survey (GATS-2), the trends (smokeless > smoking) were similar. Different study populations (young women vs. adults) might explain the difference in the prevalence

of tobacco use.[2] Young women (than adolescents) and urban residents increased the odds of any forms of tobacco use, smoking, and SLT use. In contrast, any level of education and better economic status decreased the odds. Additionally, we observed a graded decrease in the odds of use with increasing levels of education and wealth quartiles. Young women from North-East India had higher odds of use, whereas those from the southern states had lower odds. Co-use of alcohol was associated with the highest odds of tobacco use. Young tribal/indigenous women had significantly higher odds of SLT use. Having a tobacco-using member in the family and media exposure increased the odds of SLT use. Although pregnancy and lactation were significantly associated with SLT use in the unadjusted analysis, these were observed to reduce the odds of SLT use after adjustments.

The direct association between tobacco use and socioeconomic disadvantages reflected by lower education, income, and scheduled tribe status has been found in the previous studies from India and the global north.[22–24] Our study extended the association to adolescents and young women. Higher tobacco use in the disadvantaged group might be due to targeted marketing strategies, positive social norms, life stress, or social networks of tobacco users.[25] More worryingly, individuals from underprivileged backgrounds are less likely to receive support for tobacco cessation; thus, they are more likely to suffer from severe use disorders and experience higher health burdens due to tobacco, including higher risks of lung cancer and diabetes.[26,27] Therefore, public health measures targeting adolescents and young people to prevent initiation of tobacco use become essential. Increasing school/college enrolment, minimizing early attrition from schools/colleges, and providing economic support and employment opportunities for poverty alleviation are some state-sponsored social welfare measures that might directly impact the population-level tobacco use among young women. There is also a need to scale up the existing school-based tobacco prevention program and support *the tobacco-free educational institutions* movement. School-based programs must engage young and adolescent girls. An inclusive health promotion and tobacco prevention program must acknowledge and address women-specific social and biological vulnerabilities and unequal power relationships between the sexes.[28] However, only school-based prevention programs are insufficient because initiation is more common among young women (19–24 years). Moreover, 25% of girls are never enrolled in schools; the ratio is worse for college enrolment. Therefore, community-based tobacco prevention programs and national policies must complement the institution-based programs.

Negative media influence on tobacco use has been demonstrated in India and elsewhere.[29,30] Hence, higher odds of SLT use among young women with media exposure were not surprising. In addition to traditional media such as television, radio, and newspapers, we are witnessing a burgeoning growth of social media and alternative digital entertainment media (e.g., over-the-top platforms). These "novel" media are largely unregulated. Hence, the tobacco industry uses these alternative platforms for marketing its products to the young population.[31] Therefore, the state must recognize this public health threat and act accordingly. Interestingly, we observed a dichotomy in the relationship between SLT versus smoking and media exposure. While media exposure increased the odds of SLT use, the odds were increased non-significantly for smoking. This, perhaps, is indicative of the regulation vacuum for SLT. Policymakers must recognize the SLT and media threat and impose/implement immediate restrictions on its direct and indirect marketing and advertisements.

Previous studies from India using the NFHS-5 and GATS-2 survey data showed regional differences in tobacco use among the adult sample.[32] We replicated similar results in young and adolescent girls. Young women from north-eastern states had higher and southern states had lower prevalence of tobacco use. Social acceptance, cultural practice, and varied implementation of tobacco control programs are potential reasons for the regional differences.[33–35] Institutional and community-based health literacy programs might be helpful, primarily targeting young women as a vehicle for change.[36]

Higher tobacco use among pregnant and lactating mothers, although worrying because of worse maternal, fetal, and neonatal outcomes,[37] gives a window of opportunity for screening and intervention during the ante-natal and post-natal health contacts. Lower odds of SLT use during pregnancy and lactation support that these are opportune moments to deliver interventions. A wide range of interventions, starting from simple health education and social support to complex cognitive behavioral therapy, were shown to have positive effects on tobacco cessation during pregnancy.[38] Moreover, pregnancy is seen as a high-motivation period for tobacco cessation, driven by the mother's concern for the fetus.[39] Therefore, affordable and scalable screening and interventions must be integrated into routine antenatal care.

Co-use of alcohol and tobacco is associated with a substantially higher risk for oral, oesophageal, laryngeal, and other cancers than those with either tobacco or alcohol use. Heavy alcohol use elevates the risk further.[40] The cardiovascular risk of concurrent use is also likely to be additive.[41] Therefore, co-use is an essential public health problem. Our study showed that concurrent use of alcohol is also significantly common in young tobacco-using women. Like the tobacco industry, the alcohol industry is targeting young women, especially from the LAMI countries. The policymakers must recognize the dual threat and act concertedly to implement tobacco and alcohol regulatory strategies with the same rigor and seriousness.

Research has consistently shown parental and social networks' influence on the initiation and continuation of tobacco use among young people and might increase the inter-generational risk of smoking.[42,43] The higher tobacco use among young Indian women with a tobacco-using family member creates another prevention/cessation window of opportunity. The family members who use tobacco might be motivated by the negative influence of their behavior on their young girls. On the other hand, young women with a family history of tobacco use must be screened for the use and receive early intervention. Those not using currently must be monitored because of their high risk of use.

Limitations

One of the limitations of this study is that it is based on a questionnaire to the head of household, and chances for impact of social desirability must be considered. The accuracy and reliability of data sources, such as surveys, might vary across regions or groups, potentially impacting the validity of the findings. As an observational study, it cannot establish a causal relationship between the identified determinants and tobacco use. While it can highlight associations, causality would require further research, such as controlled experiments. The study may not capture the cultural and social context influencing tobacco use. Factors such as cultural norms, family dynamics, and peer pressure could have complex and nuanced effects on tobacco use. Some predictors are layered concepts (e.g., wealth index, exposure to media, autonomy index); hence, measuring them in categories might raise doubts. However, we largely adhered to the definitions provided by the NFHS. Finally, the study's cross-sectional design simultaneously captures a data snapshot. Longitudinal data would provide a more robust understanding of changes in tobacco use over time.

Conclusion

Our study reinforces the importance of a multifaceted approach to tobacco control among adolescents and young girls, considering the unique challenges and vulnerabilities they face. By addressing the sociodemographic determinants, regional variations, media influence, co-use with alcohol, and family dynamics, we can work toward reducing the prevalence of tobacco use and improving the health outcomes of this demographic. This research provides a valuable foundation for developing targeted public health strategies and policies to prevent tobacco initiation and promote cessation, ultimately contributing to a healthier future for our young women and society.

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