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Geo-spatial analysis of the tobacco consumption and cessation among working and non-working groups in India: Evidence from global adult tobacco survey-2, 2016–17

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Abstract Consistent tobacco consumption by large segments of the Indian population has resulted in a significant health burden for the country. Historical and cultural influences have influenced tobacco use to a considerable extent. As a general observation, its consumption is seen to be more prevalent among educated and working individuals. Despite the reduction in the prevalence of smoking, data shows that the proportion of male smokers aged 15–69 years has increased substantially over the last 15 years. The focus of the present study is on a state-level geo-spatial analysis of tobacco consumption and its cessation in working and non-working groups in the Indian population. Cross-sectional data from the Global Adult Tobacco Survey (2016–17) for India were used for analysis. Descriptive statistics and geo-spatial analysis were carried out. The findings show that substance use is higher in the hilly and coastal parts of the Indian states. Tobacco consumption was highest in Sikkim, the North-Eastern, Eastern and the Central states of India. However, on a positive note, the findings also show that, due to tobacco control or prevention programmes, more than 60% of the people from both working and non-working groups living in these high consumption states (excluding Karnataka Sikkim, Tripura, Nagaland and Manipur) were trying to quit the tobacco habit. Precisely targeted prevention and counselling services, nicotine replacement therapy, and medication are required to accelerate this trend. There is a need for more interventions to increase the present low levels of tobacco cessation.

Keywords Consumption · Cessation · Non-working · Tobacco · Working

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Introduction

Tobacco consumption in India is of two broad types: smoking tobacco and smokeless tobacco. Smoking tobacco includes products like bidis, manufactured cigarettes, hand-rolled cigarettes, pipes, cigars, hukkahs, water-pipes, chutta, dhumti and chillum). Smokeless tobacco is mainly consumed in chewable form and is mixed with betel leaves, khaini, gutka and paan masala. Other smokeless tobacco products, such as mishri, gul, bajjar and gudakhu, are rubbed on the gums. There is considerable heterogeneity among Indian states in the type of tobacco consumed and its extensiveness. Compared with the other states of India, adults in the North-East region are more prone to tobacco habits. Tobacco is also an essential

component of the socio-cultural milieu in Eastern and Northern India, especially in the lower socioeconomic strata. Offering tobacco to guests or sharing it among friends in social gatherings are regarded as a common courtesy (Pradhan et al., 2019).

Due to the high prevalence of regular tobacco use, its burden on public health is high. It is estimated that about 52% of the families surveyed used any form of tobacco product. The prevalence of tobacco consumption ranged from 9% in Goa to 67% in Mizoram (GATS-1, 2009–2010, as cited in Agrawal et al., 2013). India launched the National Tobacco Control Programme (NTCP) in 2007–08. Various government surveys, including the National Family Health Survey (NFHS-4, 2017) and the Global Adult Tobacco Survey (GATS-2, 2016–17), showed a decreasing trend in tobacco use among Indian adults, and the prevalence of tobacco usage has decreased from 34.6% in (GATS-1, 2009–10) to 28.6% (GATS-2, 2016–17), a significant change. The prevalence of tobacco use among minors age 15–17 years has decreased from 10% in (GATS-1) to 4% (GATS-2) (Ministry of Health & Family, 2016).

There is a need to study the geographical variations in tobacco consumption, especially among the working and non-working populations of the country. The reason is that perceptions about tobacco use have changed significantly, mainly due to the successful application of the Cigarettes and Other Tobacco Products Act (COTPA), 2003, which aimed to discourage the consumption of cigarettes and other tobacco products. Given the wide variation in tobacco use among adults across Indian states, there is a need to understand how many people desire to quit tobacco or are willing to quit. This understanding can inform strategies to focus on target groups, as well as in the planning and design of appropriate interventions. In addition, there is also a need to analyse the role of socio-economic and demographic factors in tobacco use and its cessation. There are very few studies concentrating on this aspect, especially among the working and non-working populations in the various states of India. This study uses geo-spatial analysis to estimate the prevalence of tobacco use among the working and non-working groups in the high consumption states. The study also marks recommendations, based on the findings, for facilitating the cessation of tobacco use in these states.

Literature review

Socio-economic, demographic influences and the tobacco use and quit in India

Growing household incomes, usually the outcome of higher education levels which facilitate better-paying occupations. It has a direct link with a higher probability of cigarette use but a lower chance of bidi and smokeless tobacco use in the states of the Indian Union (Ministry of Health & Family Welfare Government of India, 2017). Tobacco consumption is relatively higher in rural areas than in urban ones among both men (48% and 38.9% respectively) and women (8.1% and 4.4% respectively). Tobacco use is significantly higher among young adults (both men and women) aged 25 years and above. The numerous findings of the survey also showed that about 10% of the smokers (men as well as women) had quit smoking for a year or more. However, insufficient attention is given to the differences in occupational status as determinants of tobacco use. These differences may be significant given the association of occupation and income with education and the dangers of exposure at the workplace (Sorensen et al., 2005). Several studies show a gender difference in the prevalence of tobacco use. In rural Gujarat, usage was higher among males, the self-employed, those who were working, and the less-educated individuals (Kahar et al., 2016). Studies also show that tobacco consumption remains higher among the less educated, older adults, and agricultural workers and laborers (Bhawna, 2013). Moreover, older men preferred smokeless tobacco, while and bidis and cigarettes were preferred by those who were younger. Those who were in middle-age groups, with lower educational attainments, and working in the informal sector were at high risk of co-use of substances (Anand & Roy, 2016; Dikshit et al., 2012).

Gender disparity in the tobacco use in India among different occupational categories

A disparity was noted in the pattern of usage among educated individuals and agricultural workers. Consumption was higher among males than females. A comparison of the findings of local and national-level studies shows that males and agricultural workers and labourers were regular users of tobacco (Grover, Anand, Kishore, Tripathy, & Sinha, 2020). From an

economic perspective, the lower prevalence of smoking among women be attributed to their inadequate share in the labour market and restricted access to a personal income (Ministry of Health & Family Welfare Government of India, 2017). Hence, the relatively higher proportion of smoking among women in cities may indicate greater acceptance of smoking by employed women.

The geographical variations in tobacco intake in India show the highest prevalence in the North-East region (65.8% among men and 25% among women) and the lowest in Southern India. Based on occupation, those engaged in skilled or unskilled manual work (58.1% of the men, 12.6% of women) and agricultural workers (55.8% men and 13% women) were found to consume more tobacco than those engaged in clerical, professional or managerial work, and the non-working groups (31.1% men and 2.6% women), as reported by Karuppusamy et al. (2021). After controlling for education and age, a distinct pattern of tobacco use was observed for different occupation working and non-working groups. The use of smokeless tobacco was high among men, a statistically significant finding which was similar for unskilled workers, service workers, and unemployed individuals (Sorensen et al., 2005).

Tobacco use and health consequences in India

Higher tobacco consumption in the active and productive populations (age group of 14–50 years) is the reason for the current burden of tobacco use. Moreover, as evidence suggests, this is likely to make them prone to morbidities in the future (Bhan et al., 2012). Also, increased tobacco use among older adults is a critical public health concern due to its consequences of increased chronic diseases. The widespread consumption of tobacco leads to higher incidences of tobacco-related illness and deaths. Tobacco use was estimated to have triggered one million deaths in India (2010), with 70% of the victims in the middle age groups (Rao, 2011). In addition, it has been shown that tobacco use is a modifiable risk for non-communicable diseases, such as heart disease and type 2 diabetes (Kumar et al., 2015). The risks are higher in the urban population, among those belonging to the higher socio-economic groups and those with symptoms of respiratory ailments (Sansone et al., 2012). Worldwide, India has over 100 million current tobacco smokers and accounts for one-fifth of the world's tobacco-related deaths (Jha & Peto, 2014).

Methods and materials

Data source

This study utilizes secondary data from the cross-sectional Global Adult Tobacco Survey, India (GATS-2, 2016–17). The data was obtained to carry out sufficiently reliable estimates of the various dimensions for tobacco use for the methodically monitor adult tobacco use and its key tobacco control indicators. The data for (GATS-2) was collected between August 2016 and February 2017 by the Tata Institute of Social Sciences, Mumbai, with procedural support from the Center for Disease Control and Prevention (CDC), Atlanta, the World Health Organization, Johns Hopkins Bloomberg School of Public Health and Research Triangle Initiative International. Data for this study was achieved from a nationally representative household survey that tracks tobacco use among adults aged 15 years and above. The survey covers all 29 states and 3 union territories of India, namely, Delhi, Chandigarh, and Puducherry.

The survey used a multistage, geographically clustered sample design in each state and Union Territory. The respondents in the interviews were selected in three stages in rural areas and four in urban areas. The first stage of the sampling process was identifying the primary sampling units (PSUs). These were villages in rural areas and wards in urban ones. The PSUs for this survey were selected using the PPS sampling method. In the second stage, from each PSU, the required number of households was drawn in the rural areas. In the urban areas, households were selected from one census enumeration block. At the third stage, from each selected household in rural areas, one respondent, who was either a male or a female aged 15 years and more, was selected. In the urban areas, the required number of households from each CEB was selected. In the fourth stage of sampling, one respondent was selected from each eligible urban household. The survey covered 74,037 adult respondents aged 15 years and more, which included 33,773 men and 40,265 women. GATS collected information on the respondents' background characteristics, tobacco use (smoking and smokeless),

cessation of tobacco consumption, exposure to second-hand smoke, economics, media exposure, knowledge, attitudes, and perceptions regarding tobacco use.

Outcome variable

Assessment of tobacco use among the respondents was done with their replies to the questions: (1) Do you currently smoke tobacco (Response options: daily, less than daily, not at all, do not know, refused to reply)? (2) Do you currently use smokeless tobacco (response options: daily, less than daily, not at all, do not know, refused)? A new dependent variable was constructed based on this information currently consuming tobacco (smoking or smokeless) and currently not consuming tobacco. The second dependent variable was the occupational status of the respondents for which there were two categories: respondents who were engaged in any income generating work in the last 12 months (including government service, non-government job, daily wage/casual labourer, and self-employed) were placed in the working group. Students, homemakers, retired or unemployed (which included persons of working age who did not work or were unable to) were classified as non-working.

Explanatory variables

Analysis in this study considered a range of socio-demographic variables like age-groups (15–24, 25–44, 45–65, 65+years), gender (male, female), place of residence (urban, rural), caste (SC, ST, OBC, Others), religion (Hindu, Muslim, Christian, others), region (north, central, east, north-east, west, south), education (no formal education, up to the primary, up to secondary, more than secondary). occupation (working, non-working), aware that exposure to smoking can lead to heart attacks, strokes and lung cancer and that smokeless tobacco may result in serious illnesses (no/yes). If the respondents were tobacco users (smokeless or smoking), they were asked whether they had tried to quit tobacco in the last 12 months (response options were no or yes) and whether they were willing to stop tobacco use (no or yes).

Statistical analysis

The tobacco users in the survey included both smoking and non-smoking types. Descriptive statistics were used to estimate the prevalence of tobacco use among working and non-working groups in the population by their background characteristics. Statistical analytical software (STATA-16) was used for this purpose. Variations in tobacco use among occupational groups (working and non-working) across 29 states and 3 union territories were assessed by bivariate analysis. Bivariate logistic regression with a 95% confidence interval was used to estimate the adjusted associations of various socio-demographic and knowledge-related characteristics to determine the strength of the association. Further, the likelihood of association between occupation type and attempts to quit tobacco in the past 12 months and willingness to quit tobacco use was assessed by unadjusted and adjusted logistic regression. Finally, a state-wise bivariate analysis was done of tobacco users among both occupational groups who tried to quit tobacco and those who were willing to quit tobacco use. Geography-wise analyses were also done using geographical analytical software (Q-GIS-3.12.0) to show regional variations.

Result

From Fig. 1, it is seen that about 42.1 percent of the working and 14.3 percent of the non-working population were tobacco users. Tobacco use in India varies significantly with the state for both occupational groups. The highest prevalence of tobacco use found among working groups was 75.1 percent in Tripura and 67.7–61.3 percent in the states of Manipur, Assam, Mizoram, and Meghalaya. The lowest prevalence of tobacco use in the working population was found to be in Goa (13.4 percent). In the non-working groups, the prevalence of tobacco use varied from a low of 2.9 percent in Punjab, 3.3–6.2 percent in Chandigarh, Himachal Pradesh, Puducherry, Kerala, and Goa to 52.1 percent in Mizoram, where it was the highest. Tobacco use in all forms was much higher among working groups than among non-working groups in all states. The difference between the highest and the lowest prevalence in each state was also significantly higher in the working populations of the respective states than in the non-working ones.

Table 1 summarizes the prevalence of tobacco use among occupational groups by the background characteristics of the population. It is seen that prevalence varies significantly with the age of a user, residence,

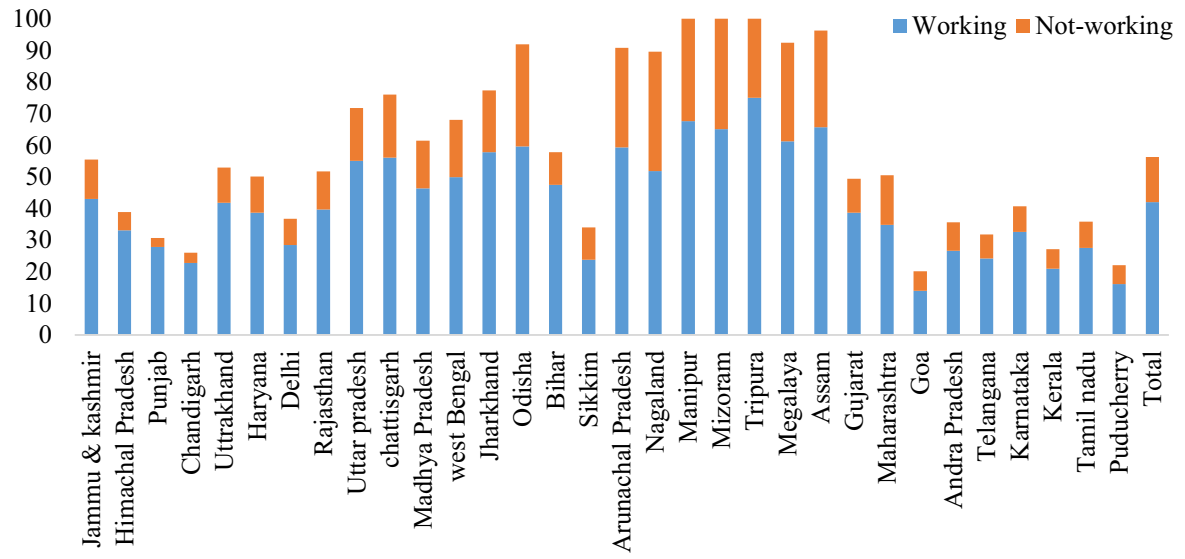

Fig. 1 State-wise Prevalence of Tobacco Consumption in The Working and Non-Working Populations (GATS-2, 2016–17)

sex, region, education, and knowledge of health hazards associated with tobacco use. Tobacco consumption in both occupational groups working and non-working was higher among the older age groups, rural males, the illiterates, younger people, urban females, and the educated. In both working and non-working groups, the prevalence of tobacco use is seen to increase with age. It was also higher among the individuals in the 65 years and older age group but lower among those aged 15–24 years. In this, the 15–24 year's age group, even though the prevalence of tobacco use was low, the difference between the working (4.9 percent) and the non-working (29.5 percent) group was high. Tobacco consumption varies significantly across India's region. For example, in the North-East, the prevalence of tobacco use was the highest in the country (65.1 and 33.1 percent, respectively, in the working and non-working groups). Prevalence was lowest in the southern region. Furthermore, the reported prevalence of tobacco use was much higher among respondents who had no information on the health threats of tobacco use, smoking or smokeless.

Table 2 presents the outcomes of bivariate logistic regression analysis of data on both working and non-working users of tobacco. The results show that age, gender, residence, and region are significantly associated with tobacco use. The highest likelihood of tobacco use in the working population group was among those in the age group 45–64 years and 65+years (2.375, 95% CI: 2.168–2.602 and 2.215, 95% CI:1.906–2.575). In the non-working population also, the likelihood was most in these age groups (5.383, 95% CI: 4.811–6.023 and 5.788, 95% CI: 5.088–6.586 respectively). Gender is also seen to have a significant association with the likelihood of tobacco use. Our results show that males were more likely than females to use tobacco in both occupational groups. The likelihood of tobacco is higher among those residing in rural areas and in the SC and ST caste groups. Tobacco use is more likely among Hindus and Muslims than in other religious groups.

A significant association of region with a likelihood of tobacco use is also seen. Probability of tobacco use highest in the North-eastern region: (5.412, 95% CI: 4.959–5.906 for the working population, and 8.866, 95% CI: 7.759–10.131 for the non-working). Tobacco practice increased among persons with no formal education in both occupational groups. Persons with no knowledge of the association of smoking with heart attacks and strokes are more likely to consume tobacco in both occupational groups. In contrast, those who do not know about the causes had significance among the working group and no significance among the non-working. Thus, the lack of awareness (or knowledge) that smoking causes lung cancer increases the likelihood of tobacco use in the working population. However, this awareness was found to have no

Table 1 Prevalence of tobacco uses by background characteristics among working and non-working groups in India

Socio-economic characteristics	Working		Non-Working	
	%	N	%	N
Age-Group (in year)				
15–24	29.5	3645	4.9	9684
25–44	40.6	21,080	11.4	14,484
45–65	49.6	11,379	25.5	9156
65+	58.4	1214	36.0	3395
Gender				
Male	49.1	26,962	20.6	6810
Female	20.2	10,356	12.2	29,909
Place of residence				
Urban	33.3	12,491	9.7	13,997
Rural	46.3	24,827	16.9	22,722
Caste				
SC	47.2	6695	17.4	6159
ST	52.2	6886	23.1	5242
OBC	39.6	14,092	12.5	13,229
Other	38.3	9645	12.8	12,089
Religion				
Hindu	42.0	27,841	14.1	26,174
Muslim	46.1	3860	15.4	4925
Christian	32.3	3642	16.1	3469
Others	33.1	1975	10.6	2151
Region				
North	34.0	6642	8.0	10,486
Central	50.5	6309	15.7	5209
East	51.9	4764	17.4	5070
North-East	65.1	7499	33.1	6075
West	36.0	4042	13.8	3859
South	27.4	8062	7.9	6020
Education				
No formal education	50.4	8543	27.2	9930
Up to primary education	51.5	9246	18.0	7122
Up to secondary education	41.1	10,999	8.2	11,441
More than secondary education	21.5	8512	5.2	8185
Aware that smoking can cause heart attacks				
Yes	39.9	29,489	12.6	28,625
No	51.5	4657	19.9	4512
Don't know	46.7	3162	18.8	3574
Aware that smoking can cause strokes				
Yes	39.2	25,638	12.4	24,449
No	49.0	6854	18.9	6646
Don't know	46.7	4816	16.0	5615
Aware that smoking can cause lung cancer				
Yes	41.5	35,046	13.4	34,302

Table 1 continued

Socio-economic characteristics	Working		Non-Working	
	%	N	%	N
No	53.1	1308	24.6	1325
Don't know	46.1	954	27.3	1083
Aware that smokeless tobacco can cause serious illness				
Yes	41.7	35,726	13.6	35,072
No	51.3	985	29.7	984
Don't know	46.2	596	24.4	656

Sources Global adult tobacco survey (GATS-2, 2016–17)

significance to the likelihood of tobacco use. However, the lack of knowledge about a high risk of serious illness from smokeless tobacco use increased the likelihood of its use in the non-working population. At the same time, the association was not significant in the working group.

Table 3 shows the percentage of tobacco users who wanted to stop tobacco use and were trying to quit the habit using various methods. The data pertains to the last 12 months preceding the survey. Results of the analysis show that a higher percentage of the working population was trying to quit tobacco than that of the non-working population. Three-quarters of the working population (75.7 percent) and 70.6 percent of the non-working population were trying to cease tobacco use. Only 9.7 percentage of the non-working population and 7.7 percent of the working population were using counselling services. About 9 percent were trying other methods to quit the tobacco habit. The percentage of tobacco users in the working population who used at least one method was 82.4, which was higher than the corresponding percentage of non-working users (78.7 percent).

Table 4 shows the unadjusted and adjusted relationship between occupational status and willingness to quit the tobacco habit and trying to. The unadjusted odds ratio shows that the tobacco users among the working population were more likely to quit tobacco use than the non-working population. After adjusting the socio-demographic and knowledge of the health hazards variables, the odds ratio showed similar results. Working tobacco users were more likely to be willing to quit than non-working tobacco users in both the adjusted and unadjusted models.

Geo-spatial analysis (Figs. 2 and 3) shows the prevalence of tobacco users in different states working and non-working trying to stop tobacco use. In ten states (Kerala, Karnataka, Andhra Pradesh, Telangana, Puducherry, Odisha, Uttar Pradesh, Rajasthan, Delhi and Himachal Pradesh), more than 40% of tobacco users in the working population were trying to quit the habit. In five states (Kerala, Rajasthan, Uttar Pradesh, Delhi, Uttarakhand), the proportion of users who were trying to end their tobacco use was the same in both groups working and non-working.

In Figs. 4 and 5, it is seen that more than 60% of users in the working population of 12 states (Kerala, Andhra Pradesh, Telangana, Puducherry, Meghalaya, Assam, Nagaland, Manipur, Haryana, Chandigarh, J&K, and Himachal Pradesh) had a stronger desire to quit tobacco as compared to their counterparts in the non-working group. In only eight states (Arunachal Pradesh, Nagaland, Manipur, Mizoram, Kerala, Chandīgarh, Himachal Pradesh and Delhi), a higher proportion of non-working users wanted to quit the tobacco habit.

In Figs. 6 and 7, it is seen that only 20% of the working population in West Bengal and Himachal Pradesh were taking counselling for cessation. In many of the other states, it was found that less than 10% of the working population were taking counselling. Among the non-working population, a significant proportion of those taking counselling was seen in Karnataka, Chhattisgarh, Himachal Pradesh. In the other states, the percentages are much less.

Figures 8 and 9 show that in the Central and North-Eastern states of the country, more than 80% of tobacco users in the working population are trying to quit tobacco without assistance. Among the non-

Table 2 Adjusted odds ratios (aOR), as estimated from bivariate logistic regression analysis of tobacco use in working and non-working groups in India

Socio-Economic Characteristics	Working		Non-working	
	(aOR)	95% CI	(aOR)	95% CI
Age				
15–24®	1.0		1.0	
25–44	2.046***	(1.878, 2.229)	2.963***	(2.666, 3.294)
45–65	2.375***	(2.168, 2.602)	5.383***	(4.811, 6.023)
65 +	2.215***	(1.906, 2.575)	5.788***	(5.088, 6.586)
Gender				
Male	5.263***	(4.951, 5.596)	4.670***	(4.289, 5.084)
Female®	1.0		1.0	
Place of Residence				
Urban®	1.0		1.0	
Rural	1.292***	(1.225, 1.362)	1.270***	(1.177, 1.37)
Caste				
SC	1.304***	(1.209, 1.407)	1.550***	(1.394, 1.722)
ST	1.568***	(1.435, 1.714)	2.037***	(1.808, 2.296)
OBC	0.933**	(0.875, 0.995)	1.032	(0.943, 1.129)
Other®	1.0		1.0	
Religion				
Hindu	2.362***	(2.101, 2.657)	2.09***	(1.766, 2.473)
Muslim	2.391***	(2.084, 2.742)	2.885***	(2.389, 3.484)
Christian	1.723***	(1.504, 1.975)	1.584***	(1.325, 1.893)
Others®	1.0		1.0	
Region				
North	1.580***	(1.454, 1.717)	0.855**	(0.745, 0.982)
Central	2.435***	(2.253, 2.631)	2.453***	(2.151, 2.799)
East	2.595***	(2.386, 2.823)	2.609***	(2.286, 2.976)
Northeast	5.412***	(4.959, 5.906)	8.866***	(7.759, 10.131)
West	1.451***	(1.325, 1.588)	1.559***	(1.341, 1.812)
South®	1.0		1.0	
Education				
No formal education	4.802***	(4.42, 5.217)	3.582***	(3.156, 4.066)
Up to primary education	3.842***	(3.567, 4.139)	2.508***	(2.216, 2.839)
Up to secondary education	2.465***	(2.299, 2.643)	1.580***	(1.404, 1.777)
More than secondary education®	1.0		1.0	
Aware that smoking can cause heart attacks				
Yes®	1.0		1.0	
No	1.116**	(1.023, 1.218)	1.102*	(0.982, 1.237)
Don't know	0.905*	(0.808, 1.014)	1.088	(0.948, 1.248)
Aware that smoking can cause stroke				
Yes®	1.0		1.0	
No	1.292***	(1.201, 1.39)	1.322***	(1.197, 1.46)
Don't know	1.299***	(1.186, 1.422)	1.077	(0.96, 1.209)
Aware that smoking causes lung cancer				
Yes®	1.0		1.0	

Table 2 continued

Socio-Economic Characteristics	Working		Non-working	
	(aOR)	95% CI	(aOR)	95% CI
No	1.215***	(1.049, 1.408)	0.973	(0.816, 1.161)
Don't know	1.051	(0.882, 1.253)	0.994	(0.818, 1.208)
Aware that smokeless tobacco can cause				
Yes®	1.0		1.0	
No	1.012	(0.864, 1.186)	1.233**	(1.024, 1.484)
Don't know	1.158	(0.94, 1.427)	0.945	(0.748, 1.195)
Constant	0.006***	(0.005, 0.007)	0.002***	(0.002, 0.003)

Sources Global adult tobacco survey (GATS-2, 2016–17); Note: (***$P > 0.01$; **$P > 0.05$; *$P > 0.1$); ® Reference category; *aOR* Adjusted odds ratio; 95% *CI* Confidence interval

Table 3 Percentage of different preventive methods user to quitting the tobacco consumption in past 12 months among working and non-working groups in India

Different preventive methods	Working		Non-working	
	%	N	%	N
Trying to quit tobacco				
No	63.5	10631	70.4	4143
Yes	36.5	5441	29.6	1642
Counselling				
No	92.4	5039	90.3	1494
Yes	7.7	402	9.7	148
Trying to quit without assistance				
No	24.3	1436	29.4	522
Yes	75.7	4005	70.6	1120
Other quitting methods				
No	90.4	4915	91.0	1464
Yes	9.6	526	9.0	178
Used at least one quitting method				
No	17.6	1080	21.3	381
Yes	82.4	4361	78.7	1261
Wiling to quit tobacco				
No	45.2	7067	55.0	2762
Yes	54.8	9005	45.0	3023

Sources Global adult tobacco survey (GATS-2, 2016–17)

working population, the corresponding proportions are highest in the North-Western and North-Eastern states.

Figures 10 and 11 show that more than 80% of people in both occupational groups in all states, excluding Karnataka, Sikkim, Tripura, Nagaland, and Manipur, tried at least one technique to quit tobacco.

Discussion

A considerable reduction in smoking, and other forms of tobacco use, is central to achieving the United Nations' 2030 goal of decreasing premature death from non-communicable diseases (Norheim et al., 2015). India faces significant mortality and epidemiological conversion and different subgroups are likely to undergo the dual burden of transmissible and non-communicable diseases due to tobacco consumption (Singh & Ladusingh, 2014). Tobacco use was found to be usually higher among educated and working individuals. This likely reflects varying levels of historical and cultural influences that have stimulated tobacco consumption in different states of India. Despite modest reductions in the prevalence of smoking, statistics reveal that the proportion of male smokers aged 15–69 years has increased substantially during the last 15 years (Mishra et al., 2016). Tobacco consumption is higher among working people than among those who are not working. Except for Sikkim, all the North-Eastern, Eastern, and Central states had the highest proportions of tobacco users in the country. The geographical location of the North-Eastern states may be one of the reasons why tobacco use is high. Most of these states share international bounders with Myanmar, from where a variety of cheap tobacco is smuggled into India (Singh 2014), which, expectedly, finds a large and user base in the Northeast. In India's

Table 4 Adjusted odds ratio (aOR) and unadjusted odds ratio (aOR) of the association between trying to quit and willingness to quit tobacco users among working and non-working users groups in India

Different quitting methods	Unadjusted		Adjusted[a]	
	(uOR)	95% CI	(aOR)	95% CI
Trying to quit tobacco				
No	1.0		1.0	
yes	1.394***	(1.368, 1.421)	1.052***	(1.026, 1.078)
Willing to quit tobacco				
No	1.0		1.0	
yes	1.217***	(1.193, 1.243)	1.066***	(1.038, 1.094)

Sources Global Adult Tobacco Survey (GATS-2, 2016–17; Note: [a]Model adjusted for (age, gender, place of residence, caste, religion, region, education, knowledge that exposure to smoking causes heart attack, stroke, lung cancer, smokeless tobacco causes serious illness); ® Reference Category; (***$P > 0.01$; **$P > 0.05$; *$P > 0.1$); *aOR* Adjusted odds ratio, *uOR* Unadjusted odds ratio; 95% *CI* Confidence interval

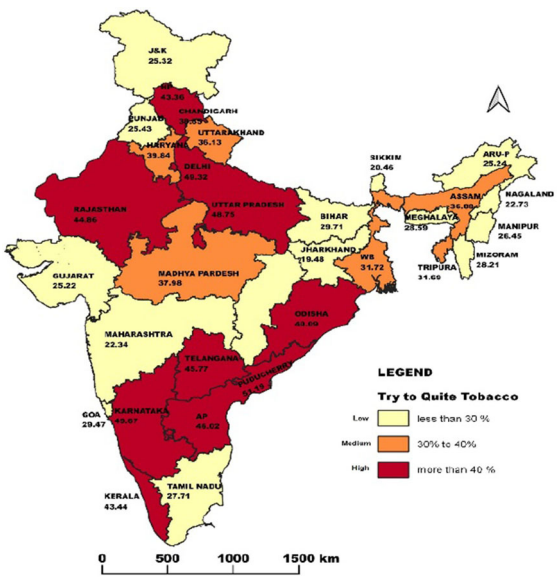

Fig. 2 Working-group try to quit tobacco

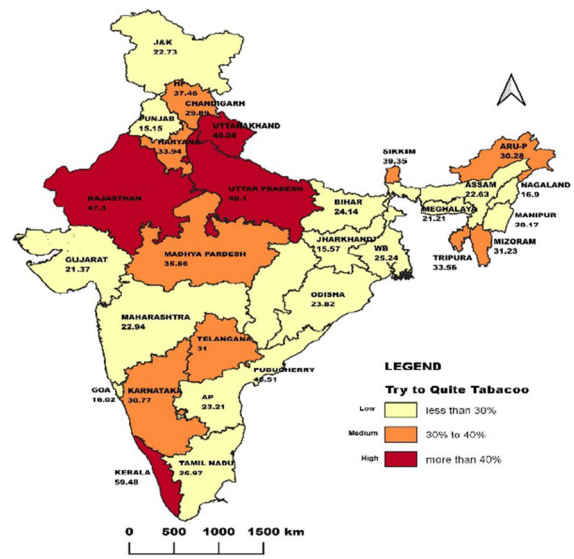

Fig. 3 Non-working group try to quit tobacco

Eastern and Central parts, different varieties of tobacco are readily available despite the ban on their sale. Also, as foreseen, most high tobacco consumption states are suffering from a high prevalence and risk of oral cancer (Sharma et al., 2018). Then again, gender, residence, educational levels, and occupation (working/non-working) are significantly connected with any form of tobacco use, as this study has shown.

The multi-factor features of tobacco use among youth point to the need to design precise health-promoting and preventive involvements to keep in mind their social liabilities (Grover et al., 2020). Carrying out regular, dependable, representative, and large scale population surveys helps accelerate the framing and implementation of appropriate tobacco control policies, as well as studying their impact. The focus should be on raising the low rates of smoking cessation in India (Mishra et al., 2016). India suffers a high burden of disease and mortality from tobacco use and to address this burden, long-term planning and actions, which take into account the combined impact of policy and domestic factors on the onset of adolescent tobacco use, are necessary (Mistry et al., 2018; Sinha et al., 2018). Operational Educational and

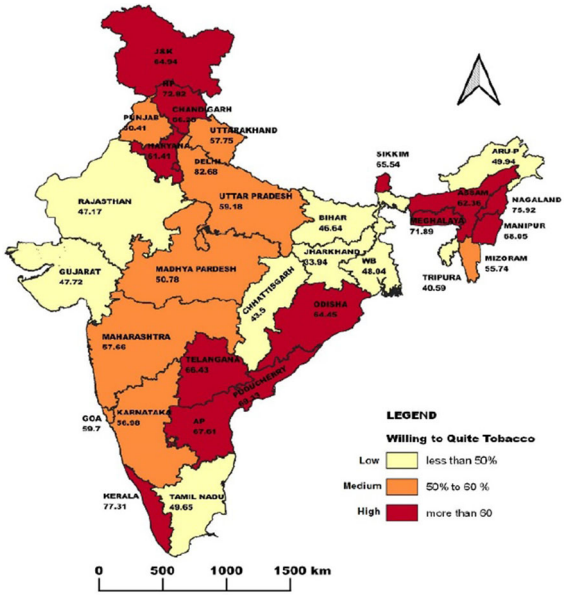

Fig. 4 Working-group willing to quit tobacco

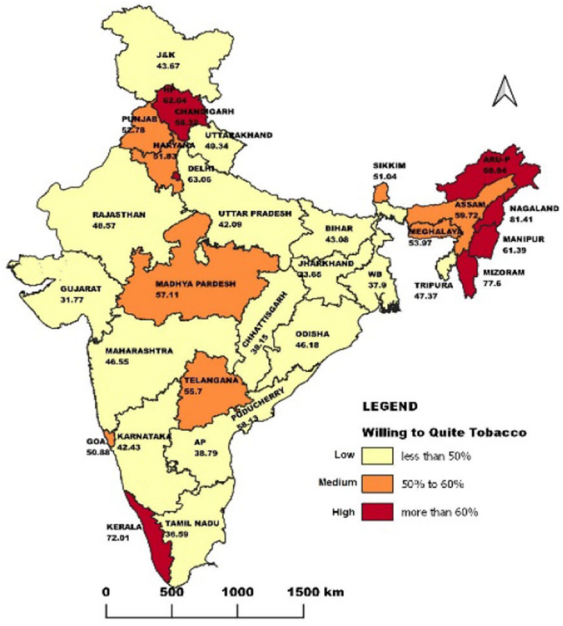

Fig. 5 Non-working group willing to quit tobacco

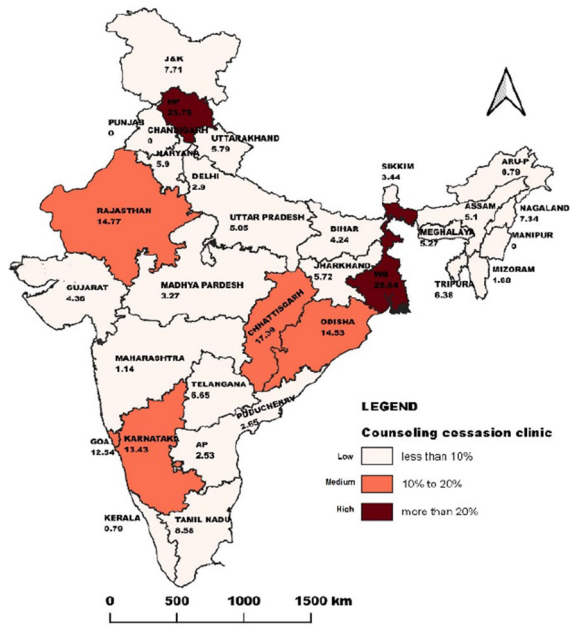

Fig. 6 Working-group use counselling cessation clinic

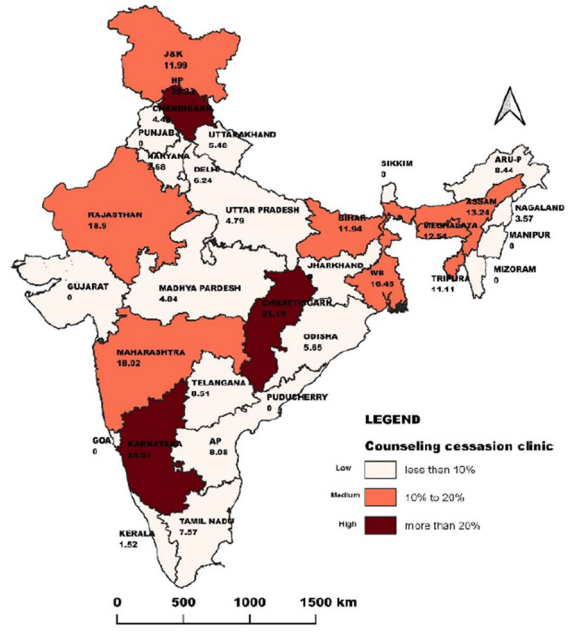

Fig. 7 Non-working group use counselling cessation

awareness programs should aim at reducing the risk of unhealthy behaviours and dispel myths surrounding the claimed 'benefits' of tobacco (Kahar et al., 2016). Several techniques are available to help quit the tobacco habit; however, three-quarters of the population use self-assistance techniques. Less than ten percent availed of counselling services. In India, public outreach interventions for tobacco cessation have found that attempts to stop smoking without professionals have had only a 0.5 percent success rate, whereas standard counselling services increased

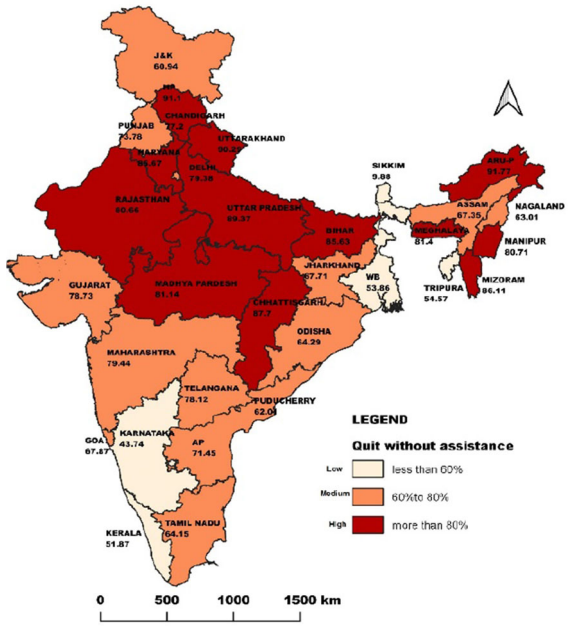

Fig. 8 Working-group quit without assistance

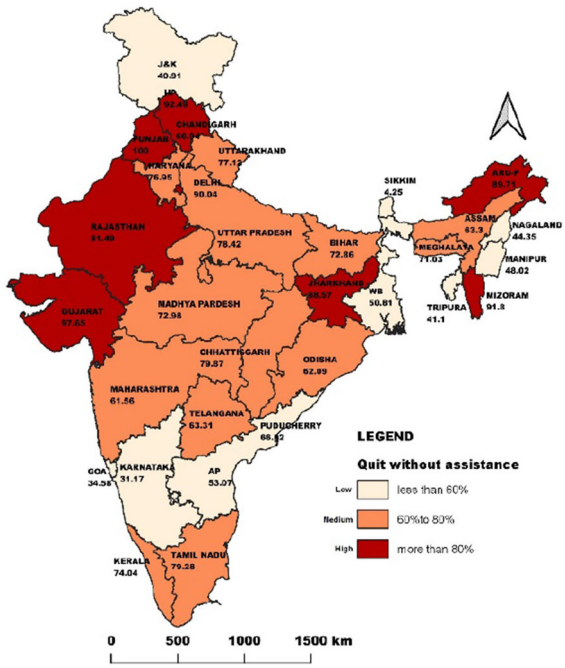

Fig. 9 Non-working group quit without assistance

abstinence rates to 2.5 percent (Sarkar et al., 2017). A study from rural Maharashtra reported that standard pharmacotherapy techniques decreased the tobacco consumption rate by 40 percent in a year (Mishra et al., 2016). Overall, the prevalence of tobacco users in India, who were willing to quit, was high among the working and the non-working population. With effective counselling and supported by reliable cessation methods like nicotine replacement therapy, medication, etc., the chances of their quitting can increase.

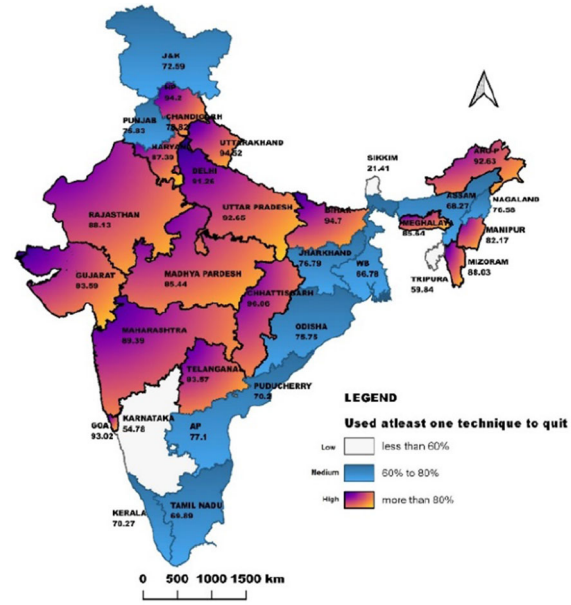

Fig. 10 Working-group use at least one technique to quit

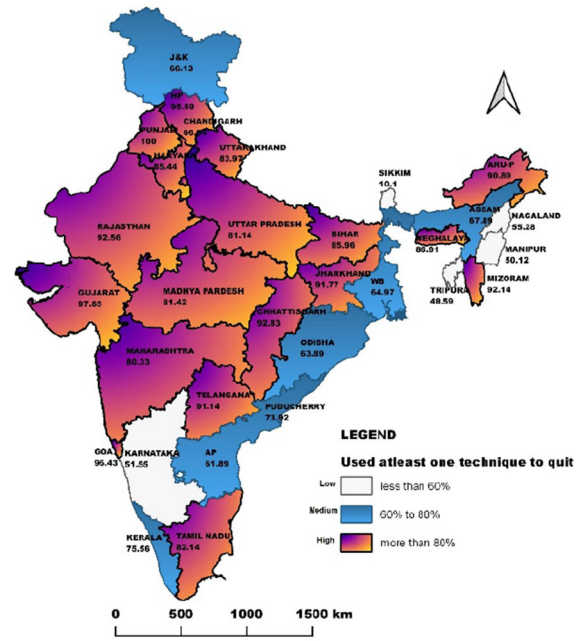

Fig. 11 Non-working group used at least one technique to quit

Interventions to raise the present low rates of tobacco cessation are required.

Furthermore, reliable, representative, and large scale population surveys can help monitor the prevalence of smoking and its consequences (Mishra et al., 2016). Higher use of tobacco among males, illiterates, economically weak, socially backward and alcohol users suggest the need for targeted efforts to raise their knowledge and awareness about the harmful effects of tobacco use and more vigorous enforcement of tobacco control policies (Pradhan et al., 2019). Modest action on tobacco taxes in India might well save millions of lives (Rao, 2011). Insights from the experiences of tobacco control programmes also show a need to monitor socio-economic and state-level inequalities in tobacco use in India. The states that require more focus and resources from tobacco control programmes are from the north-eastern states, where there is a growing trend in tobacco consumption (Singh & Ladusingh, 2014). Preventive and cessation actions should involve the community, youth, women, the less educated and poor adults to encourage them to quit tobacco use in the north-eastern states of India (Saikia et al., 2021).

Conclusion and recommendation

India has diverse physical and natural features. It is also heterogeneous socio-economically and culturally. People living in hilly and coastal areas are less resourced and more vulnerable to natural disasters. They also have fewer development opportunities. Thus, a higher prevalence of substance use was found in India's hilly and coastal parts (J&K, Himachal Pradesh, Uttarakhand, North-Eastern States, West Bengal and Odisha). Our study found that about 60% of tobacco users in these areas are trying to quit tobacco. About 90% used at least one technique to quit tobacco (the exceptions being Karnataka, Sikkim and Tripura). These are positive findings and indicate both the effectiveness and potential of tobacco control or prevention programmes. Hence policy makers must consider the socio-economic patterns of tobacco consumption while designing, executing, and assessing tobacco control interventions in the various states of India. State-level differences in tobacco use reflect variations in the implementation of tobacco control strategies, such as the increase in taxes, and creation of smoke-free workplaces, and the relative success of promotional activities by the tobacco industry (Rani et al., 2003).

For effective policy implementation, there is a need to monitor and examine social inequity in tobacco use. Channel interferences to the social groups most vulnerable to these inequalities and state governments should implement the existing national acts of tobacco control at the district level (Fu et al., 2014). There is a need to extend awareness about prevention at all national, state, and district levels to educate people about the causes and consequences of tobacco use. It must be unequivocally stressed that tobacco use leads to cancer, respiratory and cardiovascular diseases. India is a participant in the Framework Convention on Tobacco Control (Jindal et al., 2006). Although the gradual decline in tobacco use is a positive sign, there is a need to do more. For example, understanding the pattern of tobacco use in the 'hot spots' will greatly aid public health policies for targeted interventions. The problem of illegal imports of cheap tobacco from Myanmar must be addressed for more effective tobacco control in the North-East (Karuppusamy et al., 2021). Moreover, the high prevalence of tobacco use calls for designing community-based tobacco control and cessation activities (Kumar et al., 2015). More research is needed to understand the paradoxical finding the occupation and education may influence tobacco to inform tobacco control policies and interventions.

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Authors contributions SR Conceptualization, Data curation, Data analysis & Interpretation, Methodology, Supervision, Validation, Visualization, Writing an original draft. AK Conceptualization, Validation Methodology, Formal analysis, Writing-original draft, Writing-review & editing, Mapping &Visualization.

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Data availability The data used for the study was obtained from the Global Adult Tobacco Survey (GATS-2, 2016–17) and this data supporting the findings of this study. Also, this data is available in the public domain for download, follow the link: (https://www.cdc.gov/tobacco/global/gtss/gtssdata/index.html).

Declarations

Conflicts of interest The authors declare that they have no conflict of interest.

Ethical approval No separate ethics statement and consent for publication were required for this study as the Global Adult Tobacco Survey (GATS-2, 2016–17) followed ethical clearance guidelines and norms.

Consent to participate Both authors read and approved the final manuscript.

Consent for publication Both authors agreed to publication.

Appendix

Prevalence of tobacco use by state among working and non-working group in India

States	Working	Non-Working
Jammu & Kashmir	43.11	12.37
Himachal Pradesh	33.18	5.77
Punjab	27.9	2.86
Chandigarh	22.79	3.25
Uttarakhand	41.84	11.14
Haryana	38.72	11.45
Delhi	28.52	8.28
Rajasthan	39.78	11.98
Uttar Pradesh	55.09	16.69
Chhattisgarh	56.16	19.94
Madhya Pradesh	46.43	15.1
west Bengal	49.96	18.08
Jharkhand	57.9	19.54
Odisha	59.65	32.32
Bihar	47.55	10.27
Sikkim	23.88	10.15
Arunachal Pradesh	59.33	31.54
Nagaland	51.92	37.74
Manipur	67.65	35.18
Mizoram	65.13	52.13
Tripura	75.11	51.45
Meghalaya	61.29	31.22
Assam	65.72	30.56
Gujarat	38.72	10.77
Maharashtra	34.89	15.69
Goa	13.99	6.2
Andhra Pradesh	26.69	8.96
Telangana	24.21	7.6
Karnataka	32.63	8.11
Kerala	21.03	6.15
Tamil Nadu	27.56	8.31
Puducherry	16.16	5.97
Total (India)	42.07	14.25

*Sources*Global adult tobacco survey (GATS-2, 2016–17)

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