

Prevalence and predictors of tobacco use among currently married pregnant women in India

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ABSTRACT

INTRODUCTION Tobacco use during pregnancy has harmful consequences both to the women and their fetuses. There is a lack of national-level information on the prevalence and predictors of tobacco use among pregnant women in India. This study fills this gap by investigating the prevalence and predictors of tobacco use among currently married pregnant women in India.

METHODS Unit level data from the fourth National Family Health Survey, conducted in India during 2015–2016, were used in this study. Logistic regression analyses were performed to identify independent factors associated with tobacco use.

RESULTS Our results suggest the prevalence of tobacco use among currently married pregnant women in India is 4.6% (95% CI: 4.3–5.1), and more than 80% of pregnant tobacco users use tobacco in the smokeless form only. Age of

woman, region of residence, education level, religion, caste, wealth quintile, frequency of watching television were the independent predictors of tobacco use among currently married pregnant women in India. In general, lower socioeconomic status is positively associated with tobacco use among them.

CONCLUSIONS Around 4.6% of pregnant women in India use tobacco, and the smokeless form of tobacco use is predominant among pregnant tobacco users. Socioeconomic disadvantage is positively associated with tobacco use among pregnant women in India. The findings of the present study need to be used to reduce tobacco use among pregnant women in the country by identifying subpopulations at risk, and sensitizing them to the harmful consequences of tobacco use, by offering tobacco cessation services during prenatal checkups.

INTRODUCTION

Globally, tobacco consumption is responsible for 8 million deaths annually¹; one million of these occur in India². India remains the second-largest tobacco consuming country despite a long history of tobacco control. Apparently, the precept of tobacco control in India mainly focuses on men. The results from the first two Global Adult Tobacco Surveys show that healthcare providers predominantly advised men to quit tobacco compared to women^{3,4}, testifying this fact. Disparate cessation measures potentially accentuate tobacco use among women. Data from five nationally representative surveys from 1993–2009 showed an increasing trend of smoking among women compared to men⁵, and the social sanction that smokeless tobacco (SLT) enjoys makes its

use pervasive among women. In addition to the health risks known in men, women are further impacted due to perturbed reproductive health⁶. Moreover, tobacco consumption by pregnant women causes adverse pregnancy outcomes and also leads to the transmission of adverse effects to their progeny, affecting every stage of development from *in utero* to adult life⁷. Maternal use of tobacco use has a greater risk in children compared to paternal use⁸.

Studies from India on the effect of tobacco on women's reproductive health, and on the offspring of mothers who consumed tobacco, are limited. The available studies have reported smokeless tobacco as an independent factor for low birthweight, reduced gestational age, and stillbirth^{9,10}. In addition to these studies, high-income countries have

extensively reported life-threatening complications such as pre-eclampsia, placenta praevia, and placental abruption, among tobacco consuming pregnant women⁷. In offspring, maternal smoking is known to cause structural aberrations, preterm birth, low birthweight, stillbirth, sudden infant death syndrome, neuro-behavioral effects – attention deficit disorders, learning disabilities, childhood cancer, childhood obesity, elevated blood pressure in childhood, and deprivation of breast milk due to poor lactation^{7,11}. Thus, tobacco consumption affects pregnant women and the conceptus from the onset of conception to adulthood spanning the lifetime. Despite such severe and permanent detrimental effects, neither assessment of tobacco consumption nor anti-tobacco advice is provided in antenatal care in India. Moreover, pregnant women also lack awareness of these adverse effects¹². Presumably, SLT, which is the predominant form of tobacco consumed by women, is considered innocuous or gets subdued with betel quid use, another addictive but culturally acceptable substance. Including tobacco control as part of maternal and child healthcare can serve dual purposes, one is in tobacco control and the other is to decrease the maternal mortality rate, neonatal and infant mortality rate, both targets of sustainable development goals for 2030 and National Health Policy 2025¹³.

A prerequisite for tobacco control as part of maternal and child healthcare is the prevalence of tobacco consumption in this subpopulation. But there have been very limited efforts to study and evaluate the prevalence and predictors of tobacco use among pregnant women in India. An earlier study conducted in Jharkhand, one of the 29 states in India, showed the prevalence of tobacco use among pregnant women in the rural area of Jharkhand was 14.8%¹⁴. Another study conducted in Mumbai city found the prevalence of regular use of tobacco among pregnant women was 17.1%⁹. A multi-national study of 54 low- and middle-income countries, that used nationally representative NFHS-3 data from India showed the prevalence of tobacco use among pregnant women in India during 2005–2006 was 8.0% (95% CI: 7.1–9.0)¹⁵. It was also found that an age >25 years and poor awareness about adverse health effects of tobacco use determine tobacco use among pregnant women in India¹⁴.

Earlier studies on the prevalence of tobacco use among pregnant women have been confined to specific regions and hospitals and also heterogeneous with age groups^{9,12,16}. With the lack of nationally representative studies on the prevalence and predictors of tobacco use among pregnant women, there will be a limited understanding of this issue at the national level.

Therefore, the present study was undertaken to determine the concurrent prevalence and predictors of tobacco use among currently married pregnant women using a nationally representative sample. From the Indian context, pregnancies outside marriage are extremely rare to be reported, but possibilities are not ruled out. Therefore this study was

restricted to currently married pregnant women and aimed to estimate the prevalence and patterns of tobacco use among currently married pregnant women in India. We also aimed to evaluate the association of various socioeconomic and demographic factors with tobacco use among this subpopulation of women.

METHODS

This study used data from the Fourth National Family Health Survey (NFHS-4) that was conducted in India between January 2015 and December 2016. NFHS-4 is a nationally representative cross-sectional survey aimed at providing information on the health and welfare of women of reproductive age, their households, and their children. The survey followed a two-stage random sampling. In the first step, the required number of villages in the case of rural areas and Census Enumeration Blocks (CEBs) in urban areas were selected from each district, using probability proportional to size sampling. In the second stage, a fixed number of households were selected from each village or CEB that was selected in the first step. Households are the ultimate units of selection, and all eligible women aged 15–49 years were included in the survey. More details about NFHS-4 design and data collection can be found elsewhere¹⁷.

In NFHS-4, as part of the women's questionnaire, detailed information was collected from each respondent woman on various background characteristics including age, schooling, religion, caste/tribe, media exposure, and multiple issues related to her family wellbeing and on various aspects related to reproductive and child health. Information on current tobacco usage and different forms of tobacco used was also collected from each respondent woman. Tobacco use status is the outcome variable in this study. A respondent who smokes cigarettes or pipe or cigars or bidis or hookah was considered a tobacco smoker. A respondent who chews tobacco in the form of khaini or gutkha/paan masala with tobacco, or consumes paan with tobacco, was considered a smokeless tobacco user. A respondent is considered a current tobacco user if she reports either smoking any tobacco product or uses any smokeless tobacco product on a daily or less-than-daily basis at the time of the survey. We followed the same regional classification followed in the NFHS-4 report¹⁷. The wealth of households was measured as a composite measure of household items and assets, and was divided into five quintiles (richest, rich, middle, poor, poorest)¹⁷. The NFHS-4 data are in the public domain and available free of charge for all registered users from the DHS website that is accessible at <https://dhsprogram.com>. The data come with both national and state-level weights for each respondent woman to account for differential probabilities of selection and participation.

We estimated prevalence and associated 95% confidence intervals (CIs) for current tobacco use and for different forms of tobacco use, among currently married pregnant women. We also estimated the prevalence of tobacco use by various

socioeconomic, demographic, and cultural characteristics of currently married pregnant women. Chi-squared tests were performed to test the bivariate association of various individual factors with tobacco use among pregnant women. Logistic regression analyses were performed to find independent factors associated with tobacco use among pregnant women. Weights were used in all the analyses. All analyses were performed using STATA version 13. Complex survey procedures were used in the analyses to account for the multistage sampling design used for data collection and to take into account the clustering of observations.

RESULTS

Characteristics of the study participants

Of the 699686 women interviewed in NFHS-4 survey, 32225 women were pregnant and currently married at the time of their interview. The weighted characteristics of these 32225 women, referred to as present study respondents or married pregnant women or simply as pregnant women from here on, are shown in Table 1. The majority of present study respondents were in the age group 20–24 years (41.4%), were from the central (28.4%), eastern (25.4) and southern (17.1) regions of India, from a rural area (71.5%), were Hindus (77.6%), belong to other backward caste (45%), and belong to the poorest (23.2%) or poor (21.7%) household wealth quintile. Slightly above half (53.5%) of respondents watched television every day, and above two-thirds (69.1%) of respondents were living in nuclear families. More than half of respondents (56.4%) were either daughters or daughters-in-law of the head of their household.

Various forms of using tobacco

Table 2 shows various forms of tobacco use and their estimated prevalence among currently married pregnant women in India. On the whole, 4.6% of pregnant women use tobacco in some form in India. The majority (more than 80%) of the respondents who use tobacco use it in a smokeless form. Taking gutka/pan masala with tobacco (1.9%), paan with tobacco (1.1%), using khaini (0.9%), and chewing tobacco (0.4%) are relatively more popular forms of tobacco use among pregnant women in India. Only 0.8% of pregnant women smoke tobacco.

Prevalence of tobacco use by socioeconomic and demographic characteristics

Table 3 shows the prevalence of tobacco use among currently married pregnant women by their socioeconomic and demographic characteristics. It is clear that all the considered characteristics of pregnant women were significantly associated with their tobacco use. In particular, the prevalence of tobacco use is found to increase with the age group from 3.1% (95% CI: 2.5–3.9) in the age group 15–19 years to 21.4% (95% CI: 12.0–35.2) in the age group 45–49 years. Tobacco prevalence is the highest in North-East India (22.8%; 95% CI: 20.6–25.1) and lowest in South

Table 1. Characteristics of present study participants (N=32225)

Characteristics	Frequencies (n)	%
Age (years)		
15–19	4080	12.66
20–24	14213	44.11
25–29	9628	29.88
30–34	3147	9.76
35–39	916	2.84
40–44	183	0.57
45–49	58	0.18
Region		
North	4485	13.92
South	5497	17.06
East	8171	25.36
West	3886	12.06
Central	9143	28.37
North-East	1043	3.24
Type of residence		
Urban	9178	28.48
Rural	23047	71.52
Educational level		
No education	7903	24.53
Primary	4050	12.57
Secondary	15895	49.32
Higher	4378	13.58
Religion		
Hindu	25020	77.64
Muslim	5589	17.34
Christian	666	2.07
Other	951	2.95
Caste		
Scheduled caste	6993	21.70
Scheduled tribe	3069	9.52
Other backward class	14498	44.99
Other	7666	23.79
Wealth index		
Poorest	7472	23.19
Poorer	6978	21.65
Middle	6561	20.36
Richer	5869	18.21
Richest	5346	16.59

Continued

Table 1. Continued

Characteristics	Frequencies (n)	%
Frequency of watching television		
Not at all	9636	29.90
Less than once a week	2220	6.89
At least once a week	3118	9.68
Almost every day	17251	53.53
Household structure		
Nuclear	9972	30.94
Non-nuclear	22253	69.06
Relation with the head of household		
Self	860	2.67
Wife	11482	35.63
Daughter or daughter-in-law	18170	56.39
Other	1713	5.31

The sum of the frequencies for a few characteristics may deviate by 1 from the actual sample size 32225, due to rounding of weighted frequencies to the nearest integer.

Table 2. Prevalence of different forms of tobacco use among currently married pregnant women in India (N=32225)

Type of tobacco use	Number of women	%
Smoked tobacco		
Cigarettes	8	0.03
Pipe	4	0.01
Cigars	9	0.03
Bidis	71	0.22
Hookah	25	0.08
Other	133	0.41
Total	245	0.76
Smokeless tobacco		
Snuff	26	0.08
Chewing tobacco	142	0.44
Gutkha/pan masala with tobacco	597	1.85
Paan with tobacco	343	1.07
Khaini	294	0.91
Total	1275	3.96
Tobacco use in any form	1491	4.63

The sum of frequencies or percentages in each broad category of tobacco use need not be equal to the corresponding total in that broad category because some women may use more than one type of tobacco in those broad categories.

India (0.5%; 95% CI: 0.2–1.0), higher for rural women (5.4%; 95% CI: 5.0–5.7) than for urban women (2.8%; 95% CI: 2.2–3.6), and decreases with increasing education level. The prevalence is highest for women with no education (9.7%; 95% CI: 8.9–10.6) and lowest for those with high education level (0.4%; 95% CI: 0.3–0.6). The prevalence is higher for Christian (12.3%; 95% CI: 10.4–14.6) and Muslim (5.7%; 95% CI: 4.7–6.8) women than for Hindu women (4.3%; 95% CI: 3.9–4.6). Similarly, the prevalence of tobacco use is higher for women of scheduled tribe (13.2%; 95% CI: 12.0–14.5) than for women of all other castes.

The prevalence of tobacco use is found to steadily decrease with increasing household wealth quintile for married pregnant women. The prevalence is 9.7% (95% CI: 8.9–10.6) for women in the lowest wealth quintile and 0.9% (95% CI: 0.5–1.6) for women in the highest wealth quintile. The prevalence of tobacco use decreases with higher frequency of watching television. The prevalence is 7.5% (95% CI: 6.75–8.26) for those who do not watch television at all, and is 2.5% (95% CI: 2.2–2.8) for those who watch television daily. Tobacco use is more prevalent among pregnant women in nuclear families (6.8%; 95% CI: 6.3–7.4) than for women in joint families (3.6%; 95% CI: 3.3–4.0). Similarly, the prevalence of tobacco use is higher among pregnant women who are the heads of their household (6.4%; 95% CI: 4.8–8.4) or are the wives of heads of their household (7%; 95% CI: 6.5–7.7), compared to married pregnant women of other categories.

Results of regression analysis

The bivariate associations that were observed (Table 3) may be due to differences among various categories of considered characteristic(s) in terms of some other factors that are associated with tobacco use. So, to identify factors that are independently associated with tobacco use, multivariate logistic regression analysis was performed. To have a glimpse of how a particular factor’s effect gets affected after controlling for other considered factors, bivariate logistic regression analyses are also provided alongside the results of multivariate logistic regression analysis, as shown in Table 4.

Results of multivariate analysis show that age, region of residence, education level, religion, caste, economic condition, and exposure to media, were independently associated with tobacco use among married pregnant women. Though the place of residence, household structure, and relation to the head of household were significant in the univariate logistic regression analyses, they lost their significance in the presence of other factors in the multivariate analysis. This indicates that these factors are not independent predictors of tobacco use among currently married pregnant women in India. After controlling for other factors, the odds of using tobacco are found to change significantly with the age group of the pregnant women. In particular, the higher the age of married pregnant women the higher the odds of using tobacco among them. The odds

Table 3. Prevalence of tobacco use among currently married pregnant women in India by their socioeconomic and demographic characteristics (N=32225)

Characteristic	Prevalence			p*
	n	%	95% CI	
Age (years)				
15-19	128	3.14	2.54-3.88	<0.001
20-24	487	3.42	3.05-3.85	
25-29	490	5.09	4.46-5.81	
30-34	230	7.31	6.29-8.49	
35-39	107	11.72	9.51-14.35	
40-44	35	19.35	13.57-26.84	
45-49	12	21.36	11.91-35.30	
Region of residence				
North	120	2.67	2.23-3.20	<0.001
South	27	0.49	0.24-1.03	
East	247	3.02	2.51-3.62	
West	183	4.72	3.32-6.66	
Central	676	7.39	6.82-8.01	
North-East	238	22.78	20.60-25.11	
Type of residence				
Urban	257	2.8	2.19-3.57	<0.001
Rural	1233	5.35	5.00-5.72	
Education level				
No education	769	9.73	8.91-10.63	<0.001
Primary	287	7.08	6.05-8.28	
Secondary	416	2.62	2.27-3.02	
Higher	19	0.42	0.31-0.58	
Religion				
Hindu	1064	4.25	3.93-4.60	<0.001
Muslim	318	5.69	4.72-6.84	
Christian	82	12.34	10.43-14.54	
Other	27	2.83	1.79-4.44	
Caste				
Scheduled caste	335	4.79	4.10-5.59	<0.001
Scheduled tribe	404	13.17	11.97-14.48	
Other backward class	472	3.26	2.92-3.64	
Other	279	3.64	2.91-4.55	
Wealth index				
Poorest	722	9.67	8.85-10.56	<0.001
Poorer	392	5.61	4.99-6.31	
Middle	224	3.42	2.66-4.37	
Richer	105	1.78	1.42-2.24	
Richest	48	0.89	0.49-1.60	

Continued

Table 3. Continued

Characteristic	Prevalence			p*
	n	%	95% CI	
Frequency of watching television				
Not at all	720	7.47	6.75-8.26	<0.001
Less than once a week	145	6.55	5.45-7.85	
At least once a week	196	6.28	5.29-7.45	
Almost every day	430	2.49	2.19-2.83	
Household structure				
Nuclear	682	6.84	6.28-7.44	<0.001
Non-nuclear	809	3.63	3.27-4.04	
Relation with the head of household				
Self	55	6.37	4.80-8.42	<0.001
Wife	809	7.04	6.47-7.66	
Daughter or daughter-in-law	556	3.06	2.69-3.48	
Other	71	4.14	3.15-5.44	
Total	1491	4.63	4.31-4.96	

*Chi-squared tests were performed to test bivariate associations between the considered characteristics with tobacco use status.

of tobacco use are 56% (OR=1.56; 95% CI: 1.146-2.123) and 284% (OR=3.84; 95% CI: 1.767-8.349) higher for women in the age groups 25-29 years and 45-49 years, respectively, than for women in the age group 15-19 years. The odds of tobacco use among currently married pregnant woman in North-East, West and Central India are respectively 7.615 (95% CI 5.715-10.148), 2.0132 (95% CI 1.427-3.186) and 2.139 (1.721-2.659) times to those of women in north India. Married pregnant women in South India (OR=0.287; 95% CI: 0.134-0.617) and East India (OR=0.679; 95% CI: 0.506-0.904) have lower odds of tobacco use compared to their counterparts in North India.

Similarly, there is a significant negative association between education level and the use of tobacco among pregnant women. The odds of tobacco use are 23.8% less for the pregnant woman with primary education and 89.3% less for pregnant women with high education level, compared to pregnant women with no education. Odds of tobacco use among pregnant woman are significantly higher for Muslim (OR=1.363; 95% CI: 1.069-1.738) and Christian women (OR=1.393; 95% CI: 1.053-1.843) than Hindu women. Similarly, odds of using tobacco are significantly higher for married pregnant women of scheduled tribe (OR=2.49; 95% CI: 1.90-3.26) and scheduled caste (OR=1.35; 95% CI: 1.01-1.80) than women of other castes. The odds of tobacco use decrease with an increase in wealth quintile

Table 4. Factors associated with tobacco use among currently married pregnant women in India

Characteristic	OR	95% CI	AOR	95% CI
Age (years)				
15–19 (Ref.)	1	1.000–1.000	1	1.000–1.000
20–24	1.093	0.859–1.390	1.141	0.889–1.464
25–29	1.654**	1.282–2.134	1.560**	1.146–2.123
30–34	2.431**	1.860–3.178	1.785**	1.306–2.439
35–39	4.090**	2.987–5.600	2.300**	1.574–3.361
40–44	7.396**	4.626–11.823	3.247**	1.866–5.651
45–49	8.370**	4.048–17.305	3.840**	1.767–8.349
Region				
North (Ref.)	1	1.000–1.000	1	1.000–1.000
South	0.181**	0.086–0.382	0.287**	0.134–0.617
East	1.134	0.871–1.476	0.676**	0.506–0.904
West	1.803**	1.206–2.696	2.132**	1.427–3.186
Central	2.908**	2.370–3.567	2.139**	1.721–2.659
North-East	10.74**	8.574–13.464	7.615**	5.715–10.148
Type of residence				
Urban (Ref.)	1	1.000–1.000	1	1.000–1.000
Rural	1.960**	1.514–2.538	0.778	0.593–1.020
Education level				
No education (Ref.)	1	1.000–1.000	1	1.000–1.000
Primary	0.707**	0.584–0.856	0.762**	0.623–0.931
Secondary	0.249**	0.209–0.297	0.383**	0.300–0.488
Higher	0.0395**	0.028–0.056	0.107**	0.067–0.171
Religion				
Hindu (Ref.)	1	1.000–1.000	1	1.000–1.000
Muslim	1.359**	1.099–1.679	1.363*	1.069–1.738
Christian	3.170**	2.566–3.917	1.393*	1.053–1.843
Other	0.655	0.410–1.048	0.714	0.426–1.198
Caste				
Scheduled caste	1.332*	1.007–1.760	1.351*	1.012–1.804
Scheduled tribe	4.013**	3.120–5.163	2.489**	1.898–3.264
Other backward class	0.891	0.691–1.148	0.936	0.719–1.218
Other (Ref.)	1	1.000–1.000	1	1.000–1.000
Wealth index				
Poorest (Ref.)	1	1.000–1.000	1	1.000–1.000
Poorer	0.555**	0.476–0.649	0.630**	0.526–0.755
Middle	0.330**	0.252–0.433	0.490**	0.367–0.653
Richer	0.170**	0.132–0.218	0.299**	0.212–0.422
Richest	0.0840**	0.046–0.152	0.212**	0.105–0.426
Frequency of watching television				
Not at all (Ref.)	1	1.000–1.000	1	1.000–1.000
Less than once a week	0.868	0.698–1.080	1.113	0.860–1.440
At least once a week	0.830	0.672–1.025	1.367*	1.040–1.796
Almost every day	0.317**	0.267–0.375	1.197	0.893–1.604

Continued

Table 4. Continued

Characteristic	OR	95% CI	AOR	95% CI
Household structure				
Nuclear (Ref.)	1	1.000–1.000	1	1.000–1.000
Non-nuclear	0.514**	0.447–0.591	1.046	0.858–1.275
Relation with the head of household				
Self (Ref.)	1	1.000–1.000	1	1.000–1.000
Wife	1.113	0.818–1.516	1.161	0.825–1.634
Daughter or daughter-in-law	0.464**	0.335–0.641	0.889	0.600–1.318
Other	0.635*	0.424–0.950	1.186	0.734–1.917

AOR: adjusted odds ratio. Ref.: reference category. * Indicates significant at 5% level. ** Indicates significant at 1% level.

for pregnant women. The odds of tobacco use are 51% less for women in the medium wealth quintile (OR=0.490; 95% CI: 0.367–0.653) and 78.8% less for women in the richest wealth quintile (OR=0.212; 95% CI: 0.105–0.426), than women in the poorest wealth quintile. Interestingly, married pregnant women who watch television at least once a week but not daily have significantly higher odds of tobacco use (OR=1.367; 95% CI: 1.040–1.796) compared to women who do not watch television at all.

DISCUSSION

Maternal tobacco consumption is detrimental to the mother and her offspring at every stage of development and continues throughout life. The increasing prevalence of tobacco consumption among women imposes a great public health threat in the present and the future⁵. In this study, we investigated the prevalence and predictors of tobacco use among currently married pregnant women in India using nationally-representative cross-sectional survey data. We found 4.6% of currently pregnant women in India use tobacco in some form, and most (above 80%) of these use tobacco in a smokeless form. The most commonly consumed forms of SLT were gutkha/pan masala with tobacco, paan with tobacco, and khaini. These are relatively popular probably because of their cheaper cost and easy availability.

The relatively lower prevalence of tobacco use among pregnant women found in this study, compared to 8% during 2005–2006 found by an earlier study¹⁵, may indicate a decreased prevalence of tobacco use among the latest cohorts of pregnant women. The substantially lower prevalence of tobacco use among married pregnant women, compared to the prevalence found in other earlier regional studies in India^{9,14}, may be because of differences in the geographical representation of the present study from earlier studies together with the fact that a wide regional differential exists in tobacco use and that tobacco use is decreasing over cohorts among pregnant women in the country.

The finding that smokeless form of tobacco use is

predominant among married pregnant tobacco users in India is consistent with all the earlier studies in India^{9,14,18–20}. Earlier studies in India reported that during pregnancy some women may initiate tobacco use for a change of taste²¹, to suppress morning sickness¹². They are also influenced by the tobacco-consuming spouse or other female members in the family¹². Marriage has a crucial role to play, as husbands influence and also become the source to procure tobacco for women²². The relatively higher prevalence of smokeless tobacco use among pregnant women may be indicative of the social sanction and lack of awareness of its adverse effects^{12,14}.

This study also found a wide differential in tobacco use among married pregnant women by their socioeconomic and demographic characteristics. In particular, the differential is wide by region of residence, age group, religion, caste, education level, and household wealth quintile. All these factors were also found to be independent predictors of tobacco use in this subpopulation of married pregnant women. The prevalence of tobacco use among married pregnant women in North-East India is 22.8%, while in the remaining regions of the country it varies from a minimum of 0.5% in South India to a maximum of 7.4% in Central India. Tobacco use is found to steadily increase with age group, from 3.1% in the age group 15–19 years to 21.4% in the age group 45–49 years. Similarly, tobacco prevalence decreases steadily from 9.67% to 0.89% with a change in household wealth quintile from poorest to the richest. Women of scheduled tribe (13.2%) use tobacco more than the women of all other castes.

An increase in the prevalence of tobacco use with the age group found in this study may be due to decreased tobacco use in cohorts and/or increased women autonomy with age that is found to be positively associated with tobacco use among pregnant women²³. Regional variations in the prevalence of tobacco use among married pregnant women is an indicative of the cultural influence and differences in the implementation of tobacco control policies. The relatively higher prevalence of tobacco use among poor pregnant

women, found in this study, is a cause for concern. Tobacco use among poor pregnant women may lead to the diversion of part of household income from basic needs to tobacco consumption. This may lead to the deprivation of essential and basic needs. Apart from this, in India healthcare costs are on the rise. The Indian government expenditure on public health is meager and is one of the lowest in the world, with spending of 1.28% of GDP on health²⁴. As a result, most of the expenditure on health in India is in the form of out-of-pocket expenditure only. So, if poor pregnant women experience any health consequence due to tobacco use then it may exacerbate their weak economic condition.

Wider availability of tobacco in localities of low socioeconomic status accentuates its use among the poor²⁵. In India, tobacco is commonly consumed among women whose spouse is a tobacco consumer or has a female member of the family who is a tobacco consumer^{12,14}. It is not only used for recreation but also to control hunger pangs²⁰. There is a lack of wider tobacco cessation services for pregnant women in the country. But frequent visits made by pregnant women for antenatal care could be opportunistically used for cessation advice. However, there is no provision for cessation services in antenatal clinics²⁶.

While declining tobacco use among pregnant women in India is a great welcome sign and reflects the Indian government's commitment to bring down tobacco use in the country, a substantial differential in tobacco use still exists in the country. India being a signatory to the WHO Framework Convention on Tobacco Control (FCTC) is obligated to control and prevent tobacco use in the country²⁷. The existence of large socioeconomic differential in tobacco use among pregnant women does suggest that India's efforts to control tobacco among vulnerable subpopulations have not yet reached vulnerable subpopulations²⁸. The present study findings are very useful to improve anti-tobacco efforts, considering the contextual characteristics of the vulnerable subgroups among the general female population in India.

Earlier studies showed women who quit smoking in the first trimester had babies of similar weight and body measurements as those of babies born to non-smoking mothers²⁹. Other studies also showed a lack of knowledge about the harmful effects of tobacco use is associated with tobacco use during pregnancy^{14,30}. WHO recently reported that the odds of quitting tobacco will be more than double with the right support¹. The findings and recommendations all these studies, including the present study, need to be taken together while formulating tobacco control policies among the general population and vulnerable subpopulations including pregnant women in India.

It is worth noting that a tobacco control program specific to women does not exist in India, although it is recommended by WHO in its Framework Convention for tobacco control. To date, the tobacco control program is not part of reproductive and child health in India. It would be beneficial to integrate a tobacco control program with other

programs such as reproductive and child health, prenatal care, poverty reduction, women and child development, and tribal welfare. There is a necessity for regional and culturally sensitive tobacco cessation services. This would help pregnant tobacco users who are vulnerable, especially those who are least educated, in the lower wealth quintiles, living in North-East India, and belong to the scheduled tribe. Auxiliary nurse midwives and Accredited Social Health Activists (ASHAs) spend 7.04 hours of their working time in maternal and child health activities³¹ and these healthcare providers for women are well-positioned to advise pregnant women about the adverse effects of tobacco use. ASHAs are not only health service facilitators but are among the community and have the potential of connecting marginalized communities to maternal health services. Utilizing their services for tobacco cessation will enhance anti-tobacco interventions to antenatal care, resulting in: 1) tobacco control among pregnant women, and 2) a decrease in maternal, neonatal, and infant mortality rates, targets of sustainable development goals for 2030 and National Health Policy 2025.

Limitations

This study is based on self-reported information on tobacco use and hence the possibility of reporting errors cannot be ruled out. Moreover, most of the respondents were either daughters or daughters-in-law of the head of the household, so the possibility of social desirability bias could impact reporting. The cross-sectional nature of this study means results need to be interpreted with care as no casual inferences are possible.

CONCLUSIONS

Monitoring tobacco use is an important component that forms the basis for preventive actions. It is important to apply the MPOWER strategy not only for the population in general but also at the subpopulation level specifically to the vulnerable sections, such as pregnant women. Accordingly, this study provides valuable and timely information about the prevalence and patterns of tobacco use among the currently married pregnant women in India using a nationally-representative sample. It is important to enhance awareness through education and provide tobacco cessation services as part of antenatal care. Tobacco cessation strategies involving the spouse and other members of the family may enhance support to prevent further tobacco use.

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CONFLICTS OF INTEREST

The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none was reported.

ETHICAL APPROVAL AND INFORMED CONSENT

This study used existing data from the Fourth National Family Health Survey (NFHS-4), which was conducted in India between January 2015 and December 2016. Ethical approval and informed consent were not required for the present study, as the survey data used are publicly available with no personal identity information.

DATA AVAILABILITY

The NFHS-4 data are in the public domain and are available free of charge for all registered users from the DHS website that is accessible

at <https://dhsprogram.com>.

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AUTHORS' CONTRIBUTIONS

SSRP conceptualized the study, analyzed data, interpreted the results, and prepared the first draft. PM substantially contributed to drafting and critically commented on the draft. PJB contributed to and critically commented on the draft. All the authors approved the final manuscript.

PROVENANCE AND PEER REVIEW

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