Determinants of tobacco use patterns and predictors of quit among older women in India: Findings from the study on global aging and adult health

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ABSTRACT

INTRODUCTION Despite low prevalence of tobacco smoking among women in India, smokeless tobacco (SLT) use constitutes a significantly higher burden. There is limited previous research in the field of tobacco use and quitting behavior particularly in older women in India. The study aims to ascertain the prevalence, patterns, and sociodemographic determinants of tobacco use and predictors of quit among older women in India.

METHODS Cross-sectional and nationally representative data from the first and second wave of WHO's Study on global Ageing and Adult Health (SAGE 2007 and 2015) were analyzed. Outcome variables included smoking and SLT use, with quit status assessed, while explanatory variables encompassed sociodemographic characteristics like age, education level, marital status, body mass index, religion, ethnicity, residence, wealth quintiles, and mother tongue.

RESULTS We observed a reduction in the prevalence of tobacco use in any form among women from 34.17% (SAGE-1) to 18.17% (SAGE-2). The prevalence of current tobacco use in any form was 9.89% (n=352; 95% CI: 8.74–11.17), tobacco smoking was 9.42% (n=331; 95% CI: 8.29–10.69), while the prevalence of current SLT use was 12.3% (n=454; 95% CI: 10.99–13.72). Muslim women had significantly higher odds of using SLT compared to Hindu women (AOR=1.86; 95% CI: 1.24–2.69). Successful quit after initiation to SLT use was reported in only 7.62% of the women. Women from scheduled caste ethnicity were less likely to achieve a successful quit (AOR=0.70; 95% CI: 0.09–5.81) compared to other caste groups.

CONCLUSIONS Approximately one in five older women used tobacco, with higher prevalence than GATS data, underscoring the need for continued surveillance and focused public health efforts. Furthermore, quit rates in female SLT users continue to be very low suggesting the need for strengthening access, availability, and affordability of tobacco cessation services to promote successful quitting behavior.

INTRODUCTION

Tobacco use in either smoking or smokeless forms is a major public health challenge with 80% of users living in low- and middle-income countries (LMICs). Smokeless tobacco (SLT), defined as a tobacco containing product that is consumed through chewing in the mouth, sniffing, or as a dissolvable has over 356 million users globally with 232 million in India and Bangladesh[1,2]. SLT is a nicotine containing addicting substance with other carcinogenic chemicals that increases the risk of cancers of the head and neck, especially mouth and throat, and is independently associated with incidence of various cardiovascular diseases[3,4]. As per the Global Burden of Disease 2019 estimates, SLT is attributed to cause over 8.6 million DALYs and about 350000 deaths annually[5].

In LMICs, with most tobacco smokers being men and the prevalence of tobacco smoking being comparatively very low in women, there is a lack of policy attention and neglect of the impact of SLT use among women[6]. According to the Global Adult Tobacco Survey (GATS)-2 (2015–2016), India has 29.6% male and 12.1% female SLT users, signifying high prevalence in both genders compared to tobacco smoking in 19% men and only 2% women[7]. Women might have a higher risk of SLT addiction especially due to earlier initiation during adolescence and is also linked to a practice employed for suppression of hunger[8]. Furthermore, there is evidence to suggest that female SLT users have higher odds of developing oral cancer compared with males. SLT use during pregnancy is also linked to impairment of fetal lung and brain development, adverse maternal and infant nutritional outcomes, preterm delivery, low birth weight, and stillbirth[9-12].

Evidence from the GATS is also indicative of a declining trend in smokeless tobacco use amongst women from 18.4% (2009–2010) to 12.8% (2016–2017). According to the National Family Health Survey-4 (2015–2016), a greater proportion of women in India have also reported an absence of intention to quit and also higher failure to quit SLT use compared to males[13]. Women in India are also less likely to notice health warnings related to tobacco including SLT use, suggestive of adverse social determinants such as reduced literacy contributing to higher risk of tobacco and SLT addiction compared to men. Consequently, three fifths of deaths attributable to SLT use occur in women[14]. In some cases, women may also lack confidence to access tobacco cessation services due to the perceived societal stigma linked to the phenomenon.

It is important to identify the prevalence and predictors of tobacco use through disaggregated data amongst women in India, particularly in the more vulnerable older population with prolonged addiction who, in the absence of interventions to promote cessation, have increased risk of developing cancer and heart disease due to the additive effect of multiple synergistic risk factors with tobacco[14]. However, there exists limited evidence on tobacco use characteristics by women in India. The evidence of tobacco use from demographic and health surveillance data is restricted to younger and middle-aged women who have comparatively improved educational parameters which limits generalizability of those findings to older women[13]. Consequently, the present study was conducted with the objective of ascertaining the prevalence and sociodemographic determinants of tobacco (smoking and SLT) use and the predictors of quit in SLT-using older women in India from analysis of nationally representative health survey data.

METHODS
Data source
The present study compares findings from two rounds of the WHO Study on Global Ageing and Adult Health (WHO SAGE) for India, a national survey that collected survey data from adults aged ≥50 years. Our work is based on the cross-sectional survey data collected in the SAGE Wave 1 (2007–2008) and the SAGE Wave 2 (2015), India, which were implemented in the six selected states of Assam, Karnataka, Maharashtra, Rajasthan, Uttar Pradesh and West Bengal. Both SAGE Wave 1 and SAGE Wave 2 focused on data collection in persons aged ≥50 years and another smaller comparative sample of adults aged 18–49 years. The same primary sampling units (PSUs) and households covered in the SAGE Wave 1 in 2007 comprised the follow-up sample for SAGE Wave 2 in 2015, although the extent of loss to follow-up and proportion of new recruitment is not reported. Both SAGE Wave 1 and 2, India, employed a multi-stage stratified cluster sample design. Based on the selection probability at each stage of selection, household, and individual weights for analysis at the household level and

personal level, respectively, were determined. A total of 9116 completed household interviews were included in SAGE Wave 2, of which 1998 interviews were of persons aged 18–49 years (1165 women and 833 men) and 7118 interviews of persons aged ≥50 years (3781 women and 3337 men). Data were collected using a standardized questionnaire having country-specific adaptations[9,10].

Study population
The dataset consists of individuals aged 18–49 and ≥50 years. In households identified as 'older' for sampling purposes, all household members aged ≥50 years were invited to participate in the study. We included women aged ≥50 years in this analysis.

Outcome variables
The smoking status was assessed by the variable q3001: 'Have you ever smoked any tobacco products' and q3002, 'Do you currently use any tobacco products?'. The SLT use was assessed by the variable q3002a: 'Do you currently use smokeless tobacco?', wherein both daily and non-daily users were considered as having SLT usage. SLT quit was assessed using the questions: 'Used smokeless tobacco in the past?', and 'Do you currently use smokeless tobacco?'.

Explanatory variables
In our analysis, we considered a set of individual sociodemographic and lifestyle characteristics as controlling variables. These characteristics encompassed age, education level, marital status, body mass index (BMI), religion, ethnic group, place of residence, and wealth quintiles.

Education level had 4 categories ranging from 'Not educated/less than primary' to 'College and higher'. Principal Components Analysis was used to generate scores that were transformed into 'wealth quintiles', where quintile 1 represents the lowest wealth and quintile 5 the highest. For marital status, categories of currently married and cohabiting were combined to form three categories. Similarly, the religious denomination variable was classified into three broad categories: Hinduism, Islam, and Other. Ethnic groups were classified as scheduled tribes, scheduled castes, other backward classes, and other. The WHO's standard guidelines for BMI (kg/m^2) were used to divide into three categories: normal (18.5), underweight (18.5–24.9), and pre-obese/ obese (≥25.0).

Statistical analysis
Univariate analysis was done to assess the distribution of the sample. The prevalence and frequency of SLT usage were calculated after applying sampling weights. For bivariate associations, a chi-squared test was performed. Binary logistic regression was used for multivariable regression analysis. Variables having a p<0.20 in the bivariate association were included in the binary logistic regression models for multivariable analysis. Both crude odds ratios

(ORs) and adjusted odds ratios (AOR) and their 95% CIs and p-values were calculated. A p<0.05 was considered significant in multivariable analysis. All assumptions were checked for the final logistic regression models. Data were analyzed using Stata version 15.1 (StataCorp, College Station, Texas).

Ethical considerations

The SAGE was approved by the World Health Organization's Ethical Review Board (reference number RPC149). Written informed consent was obtained from all study respondents. The de-identified datasets were obtained after a formal permission from the IIPS. Since the SAGE datasets are anonymous and publicly available with no identifiable information about the participants, no separate ethical approval is required for this secondary data analysis.

RESULTS

The SAGE-2 (2015) dataset consisted of 4946 females, with a mean age of 54.62 years (SD=14.42). The mean age of initiation of smoking in women aged ≥50 years was 27.57 years (SD=21.74) and for SLT it was 28.76 years (SD=24.28). Table 1 gives the sociodemographic characteristics in the study sample consisting of females aged ≥50 years (n=3781).

In Table 2, it can be seen that the prevalence of tobacco ever use, in any form, among women decreased from 34.17% (n=3254; 95% CI: 31.78–36.64) (SAGE-1; 2007) to 18.17% (n=3772; 95% CI: 16.63–19.82) (SAGE-2; 2015). The prevalence of current tobacco product use in any form was 9.89% (n=352; 95% CI: 8.74–11.17). Overall prevalence of current tobacco smoking was 9.42% (n=331; 95% CI: 8.29–10.69) and the mean duration of usage among current tobacco users was 18.67 years (SD=15.96). Overall prevalence of SLT usage among women aged ≥50 years was estimated as 12.3% (n=454; 95% CI: 10.99–13.72) and the mean duration of usage among current SLT users was 22.93 years (SD=16.83).

The prevalence of past SLT use in the women aged ≥50 years was 1.19% for daily but not current user (n=43; 95% CI: 0.84–1.69), while 98.67% women reported as never having initiated tobacco use (n=3731; 95% CI: 98.16–99.04) (Table 2). Among all women aged ≥50 years, 6.59% (n=267) were only SLT users, 3.72% (n=144) were only tobacco smokers, and 5.69% (n=187) were dual users. Within the tobacco users (n=598), 23.26% (n=144; 95% CI: 19.06–28.06) were only tobacco smokers, 41.17% (n=267; 95% CI: 36.11–46.42) were only SLT users, and 35.57% (n=187; 95% CI: 30.87–40.58) were dual users.

Table 3 gives the distribution of factors associated with smoking status among women aged ≥50 years. On adjusted analysis, increasing BMI and wealth quintiles were observed as having significantly lower odds of smoking in women. Furthermore, women belonging to 'Other' religions had significantly higher odds of smoking compared to Hindu

Table 1. Sociodemographic characteristics of the participants (SAGE Wave-2)

Characteristics	Women (N=3781)	
	n	%
Age (years)		
50–59	1734	45.57
60–69	1293	34.12
≥70	754	20.31
BMI (kg/m²) (n=3450)		
Underweight	927	28.22
Normal weight	1784	49.65
Pre-obese/obese	739	22.13
Marital status		
Never married	26	0.45
Currently married/cohabiting	2358	62.94
Separated/widowed	1397	36.61
Education level		
Not educated/lower than primary	451	37.37
Up to secondary school	603	44.95
High school	111	10.09
College and higher	91	7.59
Religion		
Hinduism	3182	85.36
Islam	455	11.81
Other	142	2.83
Ethnic group		
Scheduled tribes	285	6.71
Scheduled castes	635	14.95
Other backward classes	1751	49.77
Other	1108	28.57
Quintiles of wealth score		
First	752	21.35
Second	699	17.88
Third	686	17.82
Fourth	792	21.42
Fifth	852	21.53
Residence		
Urban	833	28.78
Rural	2948	71.22
Mother tongue (n=3554)		
Hindi	1372	41.10
Bengali	828	19.70
Marathi	600	20.12
Other	981	19.08

Table 2. Distribution of tobacco use in women in India

Variable	SAGE Wave-2 (N=3781)		SAGE Wave-1 (N=3534)	
	n	% (95% CI)	n	% (95% CI)
Ever used any form of tobacco (either smoking or smokeless)	3772		3254	
Yes	687	18.17 (16.63–19.82)	1047	34.17 (31.78–36.64)
No	3085	81.83 (80.18–83.37)	2207	65.83 (63.36–68.22)
Ever used smokeless tobacco in the past				
Daily but not current user	43	1.19 (0.84–1.69)		
Non-daily but not current user	7	0.14 (0.06–0.29)		
Never initiated non-user	3731	98.67 (98.16–99.04)		
Current tobacco user				
Yes	352	9.89 (8.74–11.17)	985	29.14 (26.98–31.40)
No	3429	90.11 (88.83–91.26)	2549	70.86 (68.60–73.02)
Types of current tobacco user				
Smokeless only	267	6.59 (5.61–7.74)		
Smoking only	144	3.72 (2.99–4.63)		
Dual user	187	5.69 (4.85–6.69)		
Not using	3183	83.98 (82.39–85.46)		

Table 3. Distribution of factors associated with smoking status in women (SAGE Wave-2, N=3772)

Variable	Non-smoking (N=3085) n (weighted %)	Smoking (N=687) n (weighted %)	OR (95% CI)	p[a]	AOR (95% CI)	p[b]
Age (years)				**0.0067**		0.0705
50–59 (Ref.)	1450 (47.14)	282 (38.76)	1		1	
60–69	1042 (33.19)	249 (38.52)	1.41 (1.10–1.81)		1.34 (1.03–1.74)	
≥70	593 (19.67)	156 (22.72)	1.40 (1.08–1.82)		1.23 (0.92–1.65)	
BMI (kg/m²) (n=3450)				**0.001**		**0.0003**
Underweight (Ref.)	696 (25.45)	231 (40.62)	1		1	
Normal weight	1460 (50.3)	324 (46.71)	0.58 (0.46–0.74)		0.67 (0.52–0.87)	
Pre-obese/obese	663 (24.25)	76 (12.67)	0.33 (0.22–0.49)		0.45 (0.29–0.68)	
Ethnic group (n=3771)				**0.001**		0.1087
Scheduled tribes (Ref.)	219 (6.383)	65 (8.13)	1		1	
Scheduled castes	481 (13.69)	153 (20.69)	1.19 (0.82–1.72)		1.14 (0.77–1.71)	
Other backward classes	1458 (50.48)	289 (46.6)	0.72 (0.51–1.03)		0.82 (0.56–1.20)	
Other	926 (29.45)	180 (24.57)	0.66 (0.46–0.94)		0.84 (0.56–1.24)	
Religion (n=3771)				**0.0005**		**0.0008**
Hinduism (Ref.)	2617 (86.71)	559 (79.47)	1		1	
Islam	354 (10.79)	99 (16.2)	1.64 (1.21–2.21)		1.72 (1.22–2.41)	

Continued

Table 3. Continued

Variable	Non-smoking (N=3085) n (weighted %)	Smoking (N=687) n (weighted %)	OR (95% CI)	p[a]	AOR (95% CI)	p[b]
Other	113 (2.506)	29 (4.335)	1.89 (1.16–3.08)		1.95 (1.11–3.44)	
Quintiles of wealth score				**0.001**		**0.0001**
First (Ref.)	560 (19.15)	191 (31.31)	1		1	
Second	550 (17.59)	147 (19.18)	0.67 (0.50–0.90)		0.68 (0.49–0.93)	
Third	546 (16.97)	137 (21.58)	0.78 (0.56–1.09)		0.88 (0.61–1.26)	
Fourth	657 (22.27)	135 (17.88)	0.49 (0.36–0.67)		0.55 (0.38–0.79)	
Fifth	772 (24.03)	77 (10.05)	0.26 (0.18–0.37)		0.37 (0.23–0.58)	
Residence				**0.0298**		0.9100
Urban (Ref.)	714 (30.17)	118 (22.86)	1		1	
Rural	2371 (69.83)	569 (77.14)	1.46 (1.04–2.05)		1.02 (0.69–1.51)	
Mother tongue				0.1788		
Hindi	1152 (41.38)	219 (40.1)	0.80 (0.62–1.03)			
Bengali	677 (19.67)	151 (20.06)	0.84 (0.65–1.10)			
Marathi	486 (20.59)	110 (17.62)	0.71 (0.49–1.02)			
Other (Ref.)	770 (18.36)	207 (22.22)	1			

AOR: adjusted odds ratio. **a** p<0.20 included in adjusted regression model (age, BMI, ethnic group, religious denomination, quintiles of wealth score, and residence). **b** p<0.05 considered significant. Goodness of fit, p=0.1552.

Table 4. Distribution of factors associated with current SLT use in women (SAGE Wave-2)

Variable	Not current SLT user (N=3327) n (weighted %)	Current SLT user (N=454) n (weighted %)*	OR (95 % CI)	p[a]	AOR (95% CI)	p[b]
Age (years)				**0.0057**		**0.0425**
50–59 (Ref.)	1548 (46.71)	186 (10.09)	1		1	
60–69	1135 (33.61)	158 (13.61)	1.40 (1.04–1.89)		1.33 (0.98–1.82)	
≥70	644 (19.68)	110 (15.01)	1.57 (1.17–2.21)		1.46 (1.05–2.03)	
BMI (kg/m²) (n=3450)				**0.0005**		**0.0453**
Underweight (Ref.)	784 (26.78)	143 (16.89)	1		1	
Normal weight	1559 (49.84)	225 (12.09)	0.68 (0.51–0.90)		0.76 (0.56–1.03)	
Pre-obese/obese	686 (23.38)	53 (7.51)	0.40 (0.24–0.66)		0.53 (0.31–0.90)	
Ethnic group (n=3779)				**<0.001**		**0.008**
Scheduled tribes (Ref.)	240 (6.45)	45 (15.68)	1		1	
Scheduled castes	527 (13.90)	108 (18.49)	1.22 (0.80–1.86)		1.20 (0.77–1.86)	
Other backward classes	1561 (50.16)	190 (11.61)	0.71 (0.47–1.06)		0.74 (0.48–1.14)	
Other	997 (29.50)	111 (9.47)	0.56 (0.37–0.85)		0.66 (0.42–1.04)	

Table 4. Continued

Variable	Not current SLT user (N=3327) n (weighted %)	Current SLT user (N=454) n (weighted %)*	OR (95 % CI)	p^a	AOR (95% CI)	p^b
Religion (n=3779)				**0.0115**		**0.0057**
Hinduism (Ref.)	2817 (86.11)	365 (11.53)	1		1	
Islam	387 (11.28)	68 (16.23)	1.49 (1.06–2.08)		1.83 (1.24–2.69)	
Other	121 (2.61)	21 (19.07)	1.81 (1.05–3.12)		1.48 (0.80–2.73)	
Quintiles of wealth score				**0.001**		**0.0029**
First (Ref.)	637 (20.35)	115 (16.38)	1		1	
Second	615 (18.01)	84 (11.65)	0.67 (0.47–0.97)		0.67 (0.45–1.00)	
Third	579 (16.81)	107 (17.26)	1.06 (0.73–1.56)		1.11 (0.72–1.72)	
Fourth	696 (21.7)	96 (11.15)	0.64 (0.45–0.92)		0.69 (0.45–1.06)	
Fifth	800 (23.12)	52 (5.78)	0.31 (0.20–0.50)		0.45 (0.26–0.77)	
Residence				0.2977		
Urban (Ref.)	745 (29.4)	88 (10.42)	1			
Rural	2582 (70.6)	366 (13.05)	1.29 (0.88–1.90)			
Mother tongue				0.0710		0.0619
Hindi	1255 (42.02)	117 (10.33)	0.68 (0.50–0.91)		0.66 (0.48–0.91)	
Bengali	715 (19.44)	113 (13.44)	0.91 (0.67–1.23)		0.82 (0.59–1.15)	
Marathi	512 (19.95)	88 (13.04)	0.88 (0.58–1.34)		1.01 (0.65–1.56)	
Other (Ref.)	845 (18.6)	136 (14.54)	1		1	

AOR: adjusted odds ratio. **a** p<0.20 included in adjusted regression model (age, BMI, ethnic group, religious denomination, quintiles of wealth score, and mother tongue) **b** p<0.05 considered significant. *****Row-wise percentages given. Goodness of fit, p=0.1861.

Table 5. Determinants of quitting behavior among women ever initiated on SLT (SAGE Wave-2, N=491)

Variable	Quit SLT (N=37) % (95% CI)	OR (95% CI)	p^a	AOR (95% CI)	p^b
Age (years)			0.664		
50–59 (Ref.)	42.7 (25.12–62.34)	1			
60–69	38.94 (22.49–58.35)	0.90 (0.36–2.29)			
≥70	18.36 (9.08–33.62)	0.65 (0.24–1.72)			
BMI (kg/m²) (n=452)			0.3037		
Underweight (Ref.)	32.76 (17.36–53.05)	1			
Normal weight	40.13 (22.15–61.23)	0.97 (0.37–2.55)			
Pre-obese/obese	27.11 (11.81–50.82)	2.37 (0.70–7.98)			
Ethnic group			**0.041**		**0.05**
Scheduled tribes (Ref.)	4.35 (1.06–16.21)	1		1	
Scheduled castes	5.70 (1.75–17.02)	0.5 (0.08–3.16)		0.70 (0.09–5.81)	
Other backward classes	54.35 (35.64–71.92)	2.27 (0.49–10.63)		3.40 (0.51–22.54)	

Table 5. Continued

Variable	Quit SLT (N=37) % (95% CI)	OR (95% CI)	pᵃ	AOR (95% CI)	pᵇ
Other	35.59 (19.89–55.16)	3.18 (0.66–15.41)		4.37 (0.64–30)	
Religion			0.094		0.06
Hinduism (Ref.)	62.07 (40.57–79.68)	1		1	
Islam	23.69 (9.785–47.05)	1.96 (0.66–5.85)		1.35 (0.40–4.49)	
Other	14.24 (4.099–39.22)	4.18 (0.98–17.80)		4.77 (1.28–17.76)	
Quintiles of wealth score			0.737		
First (Ref.)	28.85 (14.39–49.44)	1			
Second	19.26 (9.20–35.96)	1.12 (0.37–3.39)			
Third	20.75 (9.29–40.11)	0.82 (0.25–2.67)			
Fourth	13.26 (5.85–27.34)	0.67 (0.21–2.12)			
Fifth	17.87 (6.26–41.50)	1.74 (0.42–7.17)			
Residence			0.409		
Urban (Ref.)	33.02 (16.19–55.70)	1			
Rural	66.98 (44.30–83.81)	0.65 (0.24–1.79)			
Mother tongue			0.295		
Hindi	26.74 (12.03–49.35)	1.10 (0.35–3.45)			
Bengali	37.12 (20.75–57.09)	2.45 (0.93–6.48)			
Marathi	20.27 (9.942–36.93)	1.35 (0.48–3.80)			
Other (Ref.)	15.87 (7.89–29.35)	1			
Type of past-use (n=50)			0.368		
Daily (Ref.)	87.77 (73.62–94.86)	1			
Non-daily	12.23 (5.14–26.38)	2.87 (0.28–29.40)			
Type of addiction (n=36)			0.859		
SLT only (Ref.)	81.60 (61.99–92.34)	1			
Dual user	18.40 (7.66–38.01)	1.18 (0.18–7.80)			

AOR: adjusted odds ratio. **a** p<0.20 included in the adjusted regression model (ethnic group and religious denomination). **b** p<0.05 considered significant. Goodness of fit, p=0.89.

women (AOR=1.95; 95% CI: 1.11– 3.44).

On bivariate analysis, age, BMI, ethnicity, religion, and quintiles of wealth score, were significantly associated (p<0.05) with SLT usage (Table 4). In the multivariate logistic regression analysis, increasing age, BMI, ethnic group, religion, and quintiles of wealth score, were significantly associated (p<0.05) with SLT usage. Elderly women (aged ≥70 years) had higher odds of using SLT (AOR=1.46; 95% CI: 1.05–2.03), while increasing BMI was negatively associated with SLT usage (AOR=0.53; 95% CI: 0.31–0.90). With reference to scheduled tribes, scheduled caste women had higher odds of using SLT (AOR=1.20; 95% CI: 0.77–1.86). Muslim women had higher odds of using SLT compared to the Hindu women (AOR=1.86; 95% CI: 1.24–2.69). There were 7.62% (n=37; 95% CI: 5.23–10.99) women who reported a successful quit after initiation with SLT (Table 5). The adjusted odds of quitting SLT in women belonging to the scheduled caste ethnicity were 0.70 times less (95% CI: 0.09–5.81) compared to the scheduled tribe ethnicity group.

DISCUSSION

The present study evaluated the prevalence and sociodemographic determinants of tobacco use patterns and predictors of quit among older women aged ≥50 years. Age, BMI, lower wealth quintiles, and ethnicity were found to be the determinants associated with tobacco smoking in

the study sample, in line with the results of prior studies[12,13]. However, the prevalence of tobacco smoking in women aged ≥50 years in this analysis from the SAGE survey (9.42%) was nearly two-fold higher compared to observations from the GATS survey data (5.14%), suggesting the need for repeated surveys to validate the extent of this public health problem in India, especially in women[12].

We found that the majority of tobacco users among females aged ≥60 years were SLT users, a finding similar to a study based on GATS I and II[15]. On bivariate analysis, age, BMI, ethnicity, quintiles of wealth index, and religious denomination were significantly associated with SLT usage. These findings agree with studies conducted in other LMICs such as Pakistan[16], Bangladesh[17] and Nepal[18]. SLT usage is often initiated at an early age when children are exposed and normalized to it and are frequently involved in its purchase for family members[19]. In this study, SLT use was found to have significantly declined among women, a finding which also corroborates the trend from GATS-1 and GATS-2[12]. Similar to previous studies, age was found to be directly associated with SLT use, whereas BMI was found to have an inverse relation in our analysis[15,20].

Furthermore, we observed that women belonging to the poorest section of society (first quintile) had higher odds of using SLT, a finding similar to that observed in the GATS 2 survey[21]. In this study, spoken language did not have a statistically significant association with SLT use unlike a previous study suggesting that the association was likely to have been coincidental[22].

Nevertheless, our study findings indicate that ethnicity is possibly linked with SLT use in India as the scheduled caste ethnicity women had significantly higher odds of consuming SLT compared to women from other caste groups. A study based on the second round of the Indian National Family Health Survey (NFHS-2; 1998–1999) had also reported that tobacco consumption was significantly more prevalent among scheduled caste populations, signifying their persistent vulnerability[13]. Prior evidence also suggests that women belonging to socioeconomically disadvantaged populations employed in hard labor activities often use tobacco to suppress hunger[8,23] and reduce perceived stress. Further, our finding suggests that Muslim women were more likely to use SLT, a finding consistent with evidence from NFHS-2[13] and Bangladesh[24].

The present study findings suggest that a very small proportion of older women who are SLT users in India successfully quit tobacco. Improving the awareness of the harmful effects of tobacco and especially SLT use among women is necessary to reduce its initiation and persistence[25]. Evidence from GATS 2 had shown that nearly half of the women in India (45.3%) fail to take notice of health warnings on SLT product packages[26]. Furthermore, the use of quitline/ helpline/direct counselling is very low overall, due to difficult accessibility, lack of social support, and associated stigma[27].

Our study findings suggest the need for enhanced tobacco use surveillance and targeted interventions for promoting tobacco cessation, especially SLT, amongst older women users who experience the double impact of adverse social determinants such as lower SES, and belonging to marginalized communities that contribute to reduced access to tobacco quit services. Future research should also explore the evolving dynamics of determinants and cultural factors shaping tobacco use, since a nuanced understanding of the motivations for tobacco use in this vulnerable population can inform the design of tailored interventions which are effective in reducing tobacco consumption among women in India.

Strengths and limitations

The key strength of this study is that it used data from the SAGE survey which used standardized questionnaires, a robust sampling strategy, and validated data collection methods, with high representativeness for older populations. However, this study has a few limitations. First, the data in this study are mostly cross-sectional, and therefore causation cannot be assumed in any direction. Second, recall and social desirability bias may have led to the likely underestimation of the tobacco burden, especially due to social stigma related to tobacco use among women in India[28]. Third, data points on willingness to quit and frequency and type of quit attempts were not available in this survey.

CONCLUSIONS

Nearly one in five older women were found to use tobacco in some form. The higher prevalence of tobacco smoking and smokeless tobacco use compared to GATS data calls for continuous surveillance and focused public health efforts. Furthermore, quit rates in female SLT users continue to be very low (nearly one in ten) suggesting the need for strengthening access, availability, and affordability of tobacco cessation services to promote successful quitting behavior.

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

Ethical approval and informed consent were not required for this secondary analysis of the SAGE datasets which are anonymous and publicly available, with no identifiable information about the participants.

DATA AVAILABILITY

The SAGE-1 and SAGE-2 survey datasets are available free of charge on request from the International Institute of Population Sciences through the website: https://iipsindia.ac.in/content/SAGE-data.

PROVENANCE AND PEER REVIEW

Not commissioned; externally peer reviewed.

AUTHORS' CONTRIBUTIONS

VM and BS: concepts; literature search, data analysis, manuscript review and editing. RS: concepts; literature search, manuscript review and editing. SB: concepts, design, writing of first draft, manuscript review and editing.

REFERENCES

1. WHO report on the global tobacco epidemic 2021: addressing new and emerging products. World Health Organization. July 27, 2021. Accessed April 2, 2023. https://www.who.int/teams/health-promotion/tobacco-control/global-tobacco-report-2021

2. Radhika AG, Preetha GS, Neogi SB. Need for Gender Focused Policies Addressing Smokeless Tobacco Use among Women in India: A Review. Asian Pac J Cancer Prev. 2021;22(S2):7-12. doi:10.31557/APJCP.2021.22.S2.7

3. Liao CY, Chen YJ, Lee JF, Lu CL, Chen CH. Cigarettes and the developing brain: Picturing nicotine as a neuroteratogen using clinical and preclinical studies. Tzu Chi Med J. 2012;24(4):157-161. doi:10.1016/j.tcmj.2012.08.003

4. Rogers JM. Tobacco and pregnancy. Reprod Toxicol. 2009;28(2):152-160. doi:10.1016/j.reprotox.2009.03.012

5. Singh S, Jain P, Singh PK, Reddy KS, Bhargava B. White paper on smokeless tobacco & women's health in India. Indian J Med Res. 2020;151(6):513-521. doi:10.4103/ijmr.IJMR_537_20

6. Ashfaq M, Channa MA, Malik MA, Khan D. MORPHOLOGICAL CHANGES IN HUMAN PLACENTA OF WET SNUFF USERS. J Ayub Med Coll Abbottabad. 2008;20(2):110-113. Accessed November 5, 2023. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=d-7399038f5164ee00b9483d26b4a8d65747dbd65

7. Gupta PC, Subramoney S. Smokeless tobacco use, birth weight, and gestational age: population based, prospective cohort study of 1217 women in Mumbai, India. BMJ. 2004;328:1538. doi:10.1136/bmj.38113.687882.EB

8. Gupta PC, Subramoney S. Smokeless tobacco use and risk of stillbirth: a cohort study in Mumbai, India. Epidemiology. 2006;17(1):47-51. doi:10.1097/01.ede.0000190545.19168.c4

9. SAGE Wave-1. International Institute for Population Sciences. Accessed April 2, 2023. https://iipsindia.ac.in/content/SAGE-wave-1

10. SAGE Wave-2. International Institute for Population Sciences. Accessed April 2, 2023. https://iipsindia.ac.in/content/SAGE-wave-2

11. Gupta PC, Arora M, Sinha D, Asma S, Parascondola M, eds. Smokeless Tobacco and Public Health in India. Ministry of Health & Family Welfare, Government of India; 2016. Accessed November 5, 2023. https://portal-uat.who.int/fctcapps/sites/default/files/kh-media/Final-Version-of-SLT-Monograph.pdf

12. Singh A, Ladusingh L. Prevalence and determinants of tobacco use in India: evidence from recent Global Adult Tobacco Survey data. PLoS One. 2014;9(12):e114073. doi:10.1371/journal.pone.0114073

13. Rani M, Bonu S, Jha P, Nguyen SN, Jamjoum L. Tobacco use in India: prevalence and predictors of smoking and chewing in a national cross sectional household survey. Tob Control. 2003;12(4):e4. doi:10.1136/tc.12.4.e4

14. WHO Framework Convention on Tobacco Control: Overview. WHO Framework Convention on Tobacco Control. Accessed April 2, 2023. https://fctc.who.int/who-fctc/overview

15. Ghosal S, Sinha A, Kanungo S, Pati S. Declining trends in smokeless tobacco use among Indian women: findings from global adult tobacco survey I and II. BMC Public Health. 2021;21:2047. doi:10.1186/s12889-021-12089-6

16. Abbas SM, Alam AY, Usman M, Siddiqi K. Smokeless tobacco consumption in a multi-ethnic community in Pakistan: a cross-sectional study. East Mediterr Health J. 2014;20(6):385-390. Accessed November 5, 2023. https://applications.emro.who.int/EMHJ/V20/06/EMHJ_2014_20_6_385_390.pdf

17. Huque R, Zaman MM, Huq SM, Sinha DN. Smokeless tobacco and public health in Bangladesh. Indian J Public Health. 2017;61(suppl):S18-S24. doi:10.4103/ijph.IJPH_233_17

18. Sreeramareddy CT, Pradhan PMS, Mir IA, Sin S. Smoking and smokeless tobacco use in nine South and Southeast Asian countries: prevalence estimates and social determinants from Demographic and Health Surveys. Popul Health Metr. 2014;12:22. doi:10.1186/s12963-014-0022-0

19. Narain R, Sardana S, Gupta S, Sehgal A. Age at initiation & prevalence of tobacco use among school children in Noida, India: a cross-sectional questionnaire based survey. Indian J Med Res. 2011;133:300-307. Accessed November 5, 2023. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3103155/pdf/IJMR-133-300.pdf

20. Pednekar MS, Gupta PC, Shukla HC, Hebert JR. Association between tobacco use and body mass index in urban Indian population: implications for public health in India. BMC Public Health. 2006;6(70):1-8. doi:10.1186/1471-2458-6-70

21. Goyal LD, Verma M, Garg P, Bhatt G. Variations in the patterns of tobacco usage among indian females - findings from the global adult tobacco survey India. BMC Womens Health. 2022;22:442. doi:10.1186/s12905-022-02014-3

22. Mishra GA, Kulkarni SV, Gupta SD, Shastri SS. Smokeless tobacco use in Urban Indian women: Prevalence and predictors. Indian J Med Paediatr Oncol. 2015;36:176-182. doi:10.4103/0971-5851.166739

23. Aluckal E, Pulayath C, Chithra P, Balakrishna MS, Luke AM, Mathew S. Tobacco Cessation Behavior Among Smoking and Smokeless Form Tobacco Users in the Indigenous Population

of Ernakulam, India. J Pharm Bioallied Sci. 2020;12(Suppl 1):S194-S198. doi:10.4103/jpbs.JPBS_58_20

24. Hossain MS, Kypri K, Rahman B, Arslan I, Akter S, Milton AH. Prevalence and correlates of smokeless tobacco consumption among married women in rural Bangladesh. PLoS One. 2014;9(1):e84470. doi:10.1371/journal.pone.0084470

25. Nair S, Schensul JJ, Begum S, et al. Use of smokeless tobacco by Indian women aged 18-40 years during pregnancy and reproductive years. PLoS One. 2015;10(3):e0119814. doi:10.1371/journal.pone.0119814

26. Tata Institute of Social Sciences, Mumbai and Ministry of Health and Family Welfare, Government of India. Global Adult Tobacco Survey GATS 2 India 2016-17. Ministry of Health and Family Welfare, Government of India. Accessed April 2, 2023. https://main.mohfw.gov.in/sites/default/files/GlobaltobacoJune2018_0.pdf

27. Murthy P, Saddichha S. Tobacco cessation services in India: recent developments and the need for expansion. Indian J Cancer. 2010;47(Suppl 1):69-74. doi:10.4103/0019-509X.63873

28. Singh PK, Jain P, Singh N, et al. Social desirability and under-reporting of smokeless tobacco use among reproductive age women: Evidence from National Family Health Survey. SSM Popul Health. 2022;19:101257. doi:10.1016/j.ssmph.2022.101257