

Are Anti-Tobacco Messages Delivered through Different Mass-Media Channels Effective in India? Results from GATS-II Survey

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Abstract

Background: Anti-tobacco mass-media campaigns are an integral part of tobacco control. There is still a need to understand which mode of mass-media channels aids in promoting tobacco cessation. This study aimed to examine if exposure to anti-tobacco messages delivered through different media channels is associated with tobacco user's thoughts and attempts to quit. **Methods:** We selected a sample of tobacco users (N=21857) from the Global Adult Tobacco Survey (GATS-2), and assessed the association of noticing the anti-tobacco information through different media channels with tobacco user's thoughts and attempts to quit. **Results:** Males reported noticing anti-tobacco information more than females in almost all modes of media channels. Among males, the odds were significant and were highest with exposure to radio (1.78 (1.4-2.27)), and internet (1.68 (1.12-2.52)) for thoughts to quit smoking and to radio (2.17 (1.63-2.89) and newspaper (1.46 (1.2-1.79) for thoughts to quitting smokeless tobacco (SLT). The attempt to quit smoking and SLT use among males was significant for exposure through public transportation (1.22 (1.03-1.44)), public walls (1.44 (1.21-1.71), internet (1.68 (1.06-2.66)), and radio (1.44 (1.1-1.87)). Exposure to more than two media resulted in a higher likelihood of thoughts of quitting tobacco, and those exposed to more than one media attempted to quit tobacco among males. Females reported no influence from the media exposure. **Conclusion:** The study underscores the importance of targeted and combination of different mass-media channels to maximize the quit behaviors among male tobacco users. The current study also highlights the need for future studies to identify effective ways to communicate anti-tobacco information to women and all socio-economic groups in the country.

Keywords: Mass media- Tobacco cessation- Tobacco control- India

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Introduction

Tobacco cessation or successful quitting is a multi-stage process [1], influenced by various predictors such as motivation to quit, addiction level, frequency, past quit attempts, and duration of abstinence during past attempts [2,3]. Article 12 in the WHO-Framework Convention of Tobacco Control (FCTC) treaty obliges the parties to increase the effectiveness of education, communication and training efforts that raise public awareness related to tobacco control [4]. To fulfil the requirements of Article 12, the national and regional systems have carried out anti-tobacco mass-media campaigns to raise awareness, provide enabling environments and facilitate behavioral and social change towards tobacco control [5]. Extensive research has demonstrated that public education through media campaigns is an effective strategy to reduce tobacco consumption globally [6–8]. These campaigns run across various countries [9–11] and have contributed to a decline in smoking [12,13] and smokeless tobacco (SLT) [14,15]

and resulted in increasing public knowledge of the health hazards, changing social norms about tobacco and motivating quitting behaviors.

The impact of these national mass-media campaigns has been studied in India as well. Generally, studies have explored the factors, and socio-demographic correlates to quitting attempts [14–17] due to the reach of mass-media [18], and exposure to mass-media channels and their impact on smoking [19,20] and SLT cessation [21–23]. However, there is a paucity of literature in India addressing the relationship between the modes of media channels disseminating anti-tobacco campaigns to promote cessation. Communication research states very well that we should identify the effective communication channels through which an audience receives information [24]. Furthermore, it is not known if communication channels and their impact differ among subgroups of tobacco users, males and females. Thereby, utilizing the principles of audience segmentation [25,26] we could identify the best communication channels for each subgroup, based on

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their preferences, access, and impacts on their behaviors. In addition, there is a lack of nationally representative analysis in this domain.

The recent Global Tobacco Epidemic Report (2023), stated that only 1.5 billion people from 4.3 billion in 2014 had access to high-quality national anti-tobacco mass-media [27]. India has also seen a similar recent decline [27] in the performance of anti-tobacco mass-media campaigns from being one of the highest-performing countries in 2011 [4,28]. However, for a maximum and constant reach of the anti-tobacco mass-media campaigns, the Government of India with the COTPA, under the National Tobacco Control Programme (NTCP) has allocated around US\$ 5 million every year for national dissemination in 18 languages [29]. The current progress of the anti-tobacco campaigns demonstrates the lack of widespread exposure to a larger part of the world's population including India which harbors 267 million [26] tobacco users. Therefore, recognizing the different modes of media channel exposure in India and determining the impactful, and prominent channel to disseminate the anti-tobacco campaigns would be important to ensure the reach and benefits of the campaigns. Additionally, understanding the impact of distinctive communication channels will help plan mass media efforts to increase the promotion of cessation services, such as national quit-lines in the upcoming campaigns. In this study, we used the latest national representative GATS-2 (2016-2017) data to evaluate the effects of national anti-tobacco campaigns delivered through different mass-media channels' on cessation behaviors such as thoughts and attempts to quit among male and female adult smokers and SLT users in India. We also examined the impact of individual media and a combination of different media channels on the quit behaviors among male and female tobacco users.

Materials and Methods

Study Design and Methods

The study was a cross-sectional secondary analysis of the GATS-2 data [30]. GATS systematically monitors adult tobacco use and tracks key tobacco control indicators using standardized tools and procedures globally. A standardized questionnaire was used to collect data on tobacco use behaviors among individuals aged 15 years and above in India. For this study, we selected the data of tobacco users (21857) from the total surveyed participants (74037) of the GATS-2. Our study sample included data on socio-demographic variables, mass-media channel exposure with anti-tobacco information, and the cessation behaviors for the 9499 smokers (exclusive smokers=6622 and smokers plus SLT users =2877) and 12358 exclusive SLT users.

Ethics Statement

The GATS India study tools and procedures were approved by the Ethics Review Committee and IRB of Tata Institute of Social Sciences, Mumbai and the ethics boards of CDC, Atlanta. Consent for adults aged 18 years or more was obtained from all participants. Parent or guardian consent was obtained for interviews of minors

aged 15–17 years.

Data Source

The GATS-India data sets are freely accessible and available from the Global Tobacco Surveillance System Data (GTSS Data) for research purposes to use, on the CDC website. This study had no patient, or public involvement directly. The link to the GATS data sets was accessed on September 5, 2023, from <https://nccd.cdc.gov/GTSSDataSurveyResources/Ancillary/DataReports.aspx?CAID=2>. Further details on the GATS-2 methodology and questionnaire can be referred to here. <https://ntcp.mohfw.gov.in/assets/document/surveys-reports-publications/Global-Adult-Tobacco-Survey-Second-Round-India-2016-2017.pdf>

Study Variables

The dependent variables were 1)“Thoughts to quit”: Those who reported thoughts of quitting smoking and smokeless tobacco after noticing anti-smoking tobacco and anti-smokeless tobacco information respectively on different mass-media channels during the last 30 days, and 2)“Attempt to quit”: Those current tobacco users who tried to quit during the past 12 months prior to the interviews. The independent variables included (Supplementary Table 1) residence, age; occupation; wealth index; marital status; and the exposure to different modes of mass-media channels (Table 1b).

Data Analysis

Data analysis was carried out using Statistical Package for the Social Sciences (SPSS) version-21 software. Descriptive analyses including unweighted counts, weighted percentages using GATS weights at 95% confidence intervals for the demographic variables, and the exposure of different modes of mass-media channels, which delivered the anti-tobacco information were calculated against the outcome variables for the tobacco users. From the data set package the missing responses, don't know, not applicable and refused responses were excluded from all analyses. To estimate the association of exposure to anti-tobacco messages with thoughts and attempts to quit among tobacco users, bivariate and multivariable logistics regression was carried out. A comprehensive multiple media exposure index [1] (media channels, such as no media exposure, any 1 media, 2-3, 4-5, 6 and more) was computed and its association was studied with the outcome variables. Further, how the wealth index and marital status moderated the association of the exposure of mass media channels to the outcome variables were studied. These demographic variables were studied as they influenced the study outcomes.

Results

The study sample (21857) comprised of 9499 smokers (91.0% males; 9.0% females) and 12358 SLT users (66.6% males; 33.4% females) as per our study definitions (Table 1a). Analysis showed that 62.0% of smokers and 53.7% of SLT users reported thoughts of quitting. While 36.4% of smokers and 32.3% of SLT users had attempted

Table 1a. The Proportion of Tobacco Users who thought to Quit and Attempted to Quit in the Selected Study Sample

Outcome variables	Total Tobacco Users (Study Sample: N=21857)						
	Smokers N 9499 n (wt ⁰ %)	Male Smokers N (%) 8434 (91.0) n (wt ⁰ %)	Female Smokers N (%) 1065 (9.0) n (wt ⁰ %)	Outcome variables	SLT users N 12358 n (wt ⁰ %)	Male SLT user N (%) 7142 (66.6) n (wt ⁰ %)	Female SLT user N (%) 5216 (33.4) n (wt ⁰ %)
Thought to quit smoking after noticing the anti-tobacco information in any media channel 30 days preceding the survey	Yes 4193 (62.0)	3943 (62.5)	250 (53.4)	Thought to quit SLT after noticing the anti-tobacco information in at least one media channel 30 days preceding the survey	Yes 4012 (53.7)	2801 (56.4)	1211 (45.0)
Attempted to quit smoking in the last 12 months	Yes 3203 (36.4)	2876 (36.9)	327 (31.0)	Attempted to quit SLT in the last 12 months	Yes 3667 (32.3)	2303 (35.0)	1364 (26.9)
	No 6287 (63.6)	5550 (63.1)	737 (69.0)		No 8684 (67.7)	4836 (65.0)	3848 (73.1)

Note: N denotes the total study sample of tobacco users and total number of smokers and SLT users. The N(%)= Unweighted count and weighted percentages of male and female, smokers and SLT users included for our study analysis. "n" is the unweighted count of those smokers and SLT users who responded to the outcome variables. From the data set package, the missing responses, don't know, not applicable and refused responses are excluded from all analysis.

to quit within the past 12 months. Male users reported (Supplementary Table 1) thoughts and attempts to quit smoking and SLT, and noticed anti-tobacco information (Table 1b) in the different media channels more than the female users.

The association (Table 2a) of thoughts to quit smoking and SLT with noticing the anti-tobacco information in different mass-media channels was observed with exposure through newspapers/magazines, radio, billboards, cinemas (only smoking), internet (only smoking), public transportation, and public walls among males. The odds of thoughts to quit (smoking and SLT) were highest with the exposure through radio. No noticeable impact of any media channels except through newspapers/magazines on thoughts of quitting smoking was observed among females.

The association (Table 2b) between attempts to quit smoking and SLT use with exposure to the anti-tobacco information in different mass-media channels were found to be significant through public transportation, and public walls among males. Further, exposure through newspapers/magazines, TV, radio, billboards, the internet, public transportation, and public walls has resulted in attempts to quit SLT among males.

Exposure to multiple media channels significantly (Table 3a) increased thoughts of quitting smoking and SLT, particularly among males. This increase was observed with each additional media exposure to just one media channel. However, among females, exposure to any 2 to 3 media resulted in thoughts to quit SLT. Attempts to quit (Table 3b) smoking and SLT due to exposure to multiple media were found when media exposure was from more than any 2 media channels when compared to no exposure to any media channels among males.

The moderation effect of the wealth index revealed that the middle class (Supplementary Table 2a and 2b) had thoughts to quit smoking when exposed to all media channels, whereas radio, public transportation and public walls (richest also) influenced the poorest class among males. The radio and newspaper/magazines affected the thoughts to quit smoking among the poorest class females. Attempts to quit smoking were seen only among males and with exposure through TV (poorest), radio (poorest), public transportation (poorest), and public walls (all classes).

For SLT, male users, the middle class thought to quit when exposed to most media channels except TV, cinema, and the internet, while radio predominantly influenced the poorest class. Among males, the attempts to quit SLT were influenced in one class or another by all media except cinema and the internet. However, among females, the attempts to quit SLT were seen with exposure through newspapers/magazines (richest), TV (richest), billboards (richest), cinema (middle), and public transportation (poorest).

The impact of marital status revealed that mostly married males (Supplementary Table 2a and 2b) had thoughts about quitting smoking when exposed to all media channels except TV and attempted to quit smoking when exposed to billboards, the internet, and public walls. Similarly, married males thought to quit SLT when

Table 1b. Distribution of Tobacco User's Exposure to Anti-Tobacco Information in Different Mass Media Channels 30 Days Preceding the Survey among Males and Females

Mass -media channels		Noticed information about the dangers of smoking tobacco in last 30 days		Noticed information about the dangers of smokeless tobacco in last 30 days	
		Smokers N=9499		Smokeless Tobacco Users N=12358	
		Male N (%)	Female N (%)	Male N (%)	Female N (%)
		n (Wt%)	n (Wt%)	n (Wt%)	n (Wt%)
TV*	Yes	5742 (67.2)	448 (33.2)	4089 (60.2)	2006 (41.4)
	No	2519 (32.8)	570 (66.8)	2846 (39.8)	2950 (58.6)
Public transportation vehicles*	Yes	3371 (44.5)	194 (12.1)	2466 (38.6)	552 (11.9)
	No	4946 (55.5)	813 (87.9)	4562 (61.4)	4396 (88.1)
Newspaper/ Magazine*	Yes	3308 (42.2)	150 (7.0)	2521 (39.7)	531 (9.1)
	No	4791 (57.8)	809 (93)	4308 (60.3)	4124 (90.9)
Billboard/Hoardings*	Yes	2880 (38.7)	135(9.4)	2246 (33.9)	516 (11.1)
	No	5374 (61.3)	858 (90.6)	4723 (66.1)	4353 (88.9)
Public walls*	Yes	2666 (32.5)	157 (8.4)	1991 (30.1)	506 (9.9)
	No	5652 (67.5)	860 (91.6)	5042 (69.9)	4490 (90.1)
Cinemas*	Yes	2410 (30.1)	112 (8.3)	1788 (25.6)	589 (11.2)
	No	5759 (69.9)	846 (91.7)	5090 (74.4)	4219 (88.8)
Radio*	Yes	1162 (13.8)	69 (3.6)	778 (12.3)	190 (2.4)
	No	6641 (86.2)	850 (96.4)	5760 (87.7)	4427 (97.6)
Internet*	Yes	426 (5.5)	38 (3.2)	265 (4.7)	71 (1.5)
	No	7342 (94.5)	859 (96.8)	6229 (95.3)	4360 (98.5)
Somewhere else*	Yes	116 (0.6)	30 (2.2)	47 (0.5)	51 (1.2)
	No	8315 (99.4)	1034 (97.8)	7091 (99.5)	5160 (98.8)

Note: The N, Unweighted count of the total number of smokers and SLT users included for our study analysis. "n" is the unweighted count of those smokers and SLT users who did/did not notice anti-tobacco information in the mass media channels. From the data set package the missing responses, don't know, not applicable and refused responses are excluded from all analysis. The Chi-square statistic* is significant at the .05 level. P value for all variables =0.000. The statistical tests were run to compare the exposure to anti-tobacco information between males and females in the respective tobacco user categories.

exposed to all media except TV, cinema, and the internet and attempted to quit SLT with exposure to newspapers/ magazines, TV, billboards, public transportation, and public walls.

Discussion

India's GATS-2 data revealed a noteworthy gender disparity in exposure to anti-tobacco information across different media channels and their impact on thoughts and attempts to quit smoking and SLT use. Exposure to anti-tobacco information through individual mass media channels was more prevalent among males and predominantly resulted in thoughts to quit smoking and SLT use among males only. The attempts to quit smoking were associated only with exposure to anti-tobacco information on public transportation and public walls, whereas attempt to quit SLT was associated with almost all media channels. Our findings underscored that exposure to anti-tobacco information through two or more media channels was significantly associated with thoughts and attempts to quit among male tobacco users. Further, the most impact of the media channels was seen on the middle-class and married male tobacco users.

Our results were in line with a study which also reported

that majorly anti-smoking information was noticed in the electronic media(62%) and print media(54%), while a lower proportion of anti-smokeless tobacco information in electronic media (52%), and print media(45%), and overall, it was noticed less by females than males [29]. Television which has been used as a mass-media channel for decades with campaigns globally [6,31] was also found to be the most common media of exposure in our study similar to another study [32]. However, we found no overall impact of TV on quit behaviors in our overall study sample, but exposure to TV resulted in thoughts and attempts to quit smoking among the poorest-class male smokers. In our study, radio had the highest role in thoughts and attempts to quit among tobacco users similar to other studies [7,29,33,34]. Radio-based campaigns [24,33] have been reported as a cheaper alternative for low and middle-income countries(LMICs), which is well established from our results too and can be used as an efficient media channel for the Indian population.

Interestingly, although internet exposure was lower than the other media channels among male tobacco users, it still resulted in significant thoughts about quitting smoking and attempts to quit SLT. A systematic review has also highlighted how internet-based interventions played a vital role in smoking cessation with appropriately

Table 2b. Association of Attempt to Quit Smoking and SLT Noticing the Dangers of Smoking and SLT on Different Mass Media Channels -Gender based Analysis

Noticed information about the dangers of smoking/SLT tobacco	Male Smokers		Female Smokers		Male SLT users		Female SLT user	
	Attempt to quit smoking Yes n (Wt%)	AOR OR (CI)	Attempt to quit smoking Yes n (Wt%)	AOR OR (CI)	Attempt to quit SLT Yes n (Wt%)	AOR OR (CI)	Attempt to quit SLT Yes n (Wt%)	AOR OR (CI)
Public walls	1118(43.3)	1.44(1.21-1.71)*	59(20.9)	0.43(0.18-1.03)	769(40.3)	1.31(1.09-1.56)*	157(31.5)	1.02(0.68-1.54)
Internet	181(44.4)	1.33(0.9-1.96)	9(3.3)	0.01(0-0.36)*	130(49.3)	1.68(1.06-2.66)*	27(43.1)	1.41(0.47-4.22)
Public transportation vehicles	1338(40.1)	1.22(1.03-1.44)*	75(19.1)	0.41(0.19-0.87)*	940(41.2)	1.46(1.23-1.72)*	173(31.5)	1.05(0.73-1.52)
Radio	478(41.4)	1.20(0.95-1.51)	27(54.3)	1.68(0.67-4.24)	325(42.9)	1.44(1.1-1.87)*	60(38.3)	1.26(0.61-2.62)
TV	2098(38.7)	1.16(0.95-1.41)	159(30)	0.85(0.47-1.55)	1428(37.8)	1.21(1.01-1.45)*	638(29.9)	1.14(0.89-1.47)
Billboard/Hearings	1151(40)	1.16(0.98-1.37)	44(11.9)	0.21(0.07-0.61)*	822(39.9)	1.28(1.07-1.53)*	172(32.8)	1.14(0.79-1.66)
Newspaper/ Magazine	1295(39.9)	1.13(0.95-1.34)	61(31.4)	0.89(0.35-2.28)	971(40.5)	1.39(1.17-1.64)*	210(36.3)	1.22(0.8-1.86)
Cinemas	938(39.5)	1.06(0.87-1.29)	42(23.9)	0.63(0.22-1.81)	648(37.7)	1.02(0.84-1.23)	160(31.7)	1.2(0.84-1.72)

Note: OR's are adjusted by age, residence, occupation, marital status, wealth index *P value less than 0.05 denoting statistical significance. The Reference category for the OR is "No- Attempt to quit smoking/SLT respectively. The Wt% represented here are the R% of the outcome variables (Yes/No) for attempt to quit.

Table 2a . Association of Thoughts to Quit Smoking and SLT to Noticing the Dangers of Smoking and SLT on Different Mass-Media Channels-Gender Based Analysis

Noticed information about the dangers of smoking/SLT tobacco	Male Smokers		Female Smokers		Male SLT users		Female SLT user	
	Thoughts to quit smoking Yes n (Wt%)	AOR OR (CI)	Thoughts to quit smoking Yes n (Wt%)	AOR OR (CI)	Thoughts to quit SLT Yes n (Wt%)	AOR OR (CI)	Thoughts to quit SLT Yes n (Wt%)	AOR OR (CI)
Radio	827(73.4)	1.78(1.4-2.27)*	29(66.8)	1.56(0.59-4.11)	532(71)	2.17(1.63-2.89)*	100(45.6)	0.86(0.43-1.71)
Internet	292(74.5)	1.68(1.12-2.52)*	19(88.2)	3.71(0.72-19.18)	171(58.8)	1.08(0.68-1.71)	42(47.4)	0.9(0.34-2.4)
Public walls	1792(69.9)	1.67(1.38-2.03)*	81(59.2)	2.32(0.81-6.64)	1212(60.1)	1.31(1.07-1.6)*	298(46.6)	1.1(0.78-1.56)
Billboard/Hearings	1926(67.7)	1.52(1.28-1.81)*	66(62)	1.86(0.66-5.18)	1384(60.6)	1.37(1.11-1.69)*	290(45.3)	1.02(0.73-1.44)
Newspaper/ Magazine	2166(67.2)	1.51(1.24-1.83)*	82(72.1)	2.45(1.05-5.7)*	1541(60.7)	1.46(1.2-1.79)*	347(52.3)	1.34(0.91-1.96)
Public transportation vehicles	2206(66.5)	1.44(1.21-1.72)*	94(54.1)	1.09(0.47-2.52)	1512(60.7)	1.44(1.19-1.75)*	318(47.2)	1.18(0.83-1.69)
Cinemas	1593(67.2)	1.3(1.08-1.57)*	57(39.3)	0.33(0.12-0.86)*	1086(56.7)	1(0.82-1.22)	319(49.5)	1.27(0.91-1.78)
TV	3459(63.3)	1.24(0.95-1.62)	207(50.8)	0.71(0.28-1.82)	2353(56.6)	1.13(0.88-1.45)	1053(44.7)	0.87(0.53-1.42)

Note: OR's are adjusted by age, residence, occupation, marital status, wealth index *P value less than 0.05 denoting statistical significance. The Reference category for the OR is "No- Thoughts to quit smoking/SLT respectively. The Wt% represented here are the R% of the outcome variables (Yes/No) for Thoughts to quit.

Table 3b. Association of Attempt to Quit Smoking and SLT Tonoticing the Dangers of Smoking and SLT Respectively with Combination of Different Mass Media Channels among for Tobacco Users-Gender based Analysis

Noticed information about the dangers of smoking tobacco	Male Smokers		Female Smokers		Male SLT users		Female SLT user	
	Attempt to quit smoking	AOR	Attempt to quit smoking	AOR	Attempt to quit SLT	AOR	Attempt to quit SLT	AOR
No media channel	460 (29.1)	Ref	128 (30.5)	Ref	591 (29.3)	Ref	630 (23.8)	Ref
any 1 media channel	394 (34.7)	1.26 (0.97-1.64)	78 (35.6)	1.22 (0.67-2.22)	324 (32.7)	1.11 (0.86-1.43)	323 (28.7)	1.24(0.95-1.63)
any 2 to 3 media channel	460 (38.9)	1.5 (1.15-1.97)*	42 (42.7)	1.29 (0.54-3.1)	324 (35.1)	1.22 (0.94-1.58)	184 (31.5)	1.35 (0.96-1.9)
any 4 to 5 media channel	767 (39.8)	1.55 (1.21-1.99)*	48 (20.8)	0.42 (0.17-1.03)	500 (36.5)	1.29 (1.04-1.59)*	153 (32.4)	1.33 (0.87-2.03)
any 6 and above media channel	795 (41.2)	1.66 (1.27-2.16)*	31 (12.6)	0.27 (0.06-1.11)	563 (43)	1.71 (1.35-2.17)*	74 (35.5)	1.43 (0.75-2.74)

Note: The attempt to quit was asked to all the study sample participants irrespective of their exposure to media channels. OR's are adjusted by age, residence, occupation, marital status, wealth index *-P value less than 0.05 denoting statistical significance. The Wt% represented here are the R% of the outcome variables (Yes/No) for attempt to quit.

Table 3a. Association of Thoughts to Quit Smoking and Quit SLT to Noticing the Dangers of Smoking and SLT Respectively with Combination of Different Mass Media Channels among the Tobacco Users-Gender based Analysis

Noticed information about the dangers of smoking tobacco	Male Smokers		Female Smokers		Male SLT users		Female SLT user	
	Thoughts to quit smoking	AOR	Thoughts to quit smoking	AOR	Thoughts to quit SLT	AOR	Thoughts to quit SLT	AOR
any 1 media channel	612 (48.7)	Ref	98 (50.9)	Ref	499 (47.1)	Ref	473 (40)	Ref
any 2 to 3 media channel	1388 (61.6)	1.67 (1.34-2.09)*	86 (57)	1.6 (0.72-3.57)	979 (54.3)	1.32 (1.03-1.69)*	498 (52.1)	1.6(1.19-2.17)*
any 4 to 5 media channel	1168 (65.4)	2.01 (1.57-2.57)*	46 (54.7)	1.52 (0.47-4.92)	838 (62.1)	1.86 (1.42-2.44)*	186 (45.8)	1.35(0.81-2.23)
any 6 and above media channel	775 (75.8)	3.3 (2.4-4.55)*	20 (57.9)	0.7 (0.17-2.93)	485 (63.1)	1.99 (1.4-2.83)*	54 (46.5)	1.21(0.49-2.97)

Note: The thoughts to quit was asked if and only the respondents have noticed the dangers of smoking or SLT in atleast one of the media channels. OR's are adjusted by age, residence, occupation, marital status, wealth index *-P value less than 0.05 denoting statistical significance. The Wt% represented here are the R% of the outcome variables (Yes/No) for Thoughts to quit.

tailored messages to the users [35], also bringing out the fact that nowadays internet access and availability have increased in LMICs [36,37]. A study using the GATS(I &II) survey data in India stated that intention to quit among SLT users was highest among those who noticed warnings on the internet, and noticing of the messages also increased across the surveys [15]. In the same line, it was reported that the most effective medium among the youth population for anti-smoking was the Internet, followed by posters, and the least effective medium was newspapers [38]. We found that the internet influenced attempts to quit behaviors for the richest class in our study sample. Therefore, the internet can be leveraged as a next-generation tool for tobacco control [39] and it should be explored in future research on how to extend its use towards all socio-economic groups in our population.

Our study emphasized that exposure through public transportation, public walls, and billboards had resulted in an impact on quit behaviors among male tobacco users. Further, studies reported similar results that those exposed to anti-tobacco messages in newspapers/magazines [15,16,21] cinemas [16,21], and public transportation [21] were more willing to quit compared to those non-exposed. Our study has highlighted the significant role of public spaces/places in influencing quit behaviors among male tobacco users. However, it is imperative to acknowledge that women also visit these spaces yet the media channels have not influenced their intention or attempts to quit tobacco. This brings the need for future tobacco control research probing and identifying how to exploit these spaces for females and make the best opportunity to influence their tobacco use behaviors. Additional research on reasoning why these media channels have little or no impact on the female population of the country or qualitative research would allow us to understand women's perspectives and expectations of the mass media channels and the messages delivered through them.

Studies have reported that females reported lesser intention or attempts to quit than male tobacco users [16,17,21]. However, the association of gender towards intention to quit or attempt to quit have been varied as one study showed no significant (Males: 1.01[0.62-1.66]) [21] impact whereas others showed a significant (Males: 1.24 [1.17-1.32] [16]; Males: 1.27 [1.15-1.40]) [17], impact. Another study conducted in China reported there was a significant difference among genders in seeing the advertisements (males viewed more than females) and the females were less likely to be affected by the advertisement to stop and think about quitting smoking compared to males (0.517(0.281–0.950)) [32]. In addition, to our knowledge, this study is the first of its kind that describes the influence of the mass media channels on the different genders, as other studies have shown only the association of gender to quit behaviors.

We found that exposure to a number of different media channels had an increasing impact on thoughts to quit smoking and SLT among males. Attempts to quit were higher among those exposed to multiple media than those who were unexposed to any media. In a study conducted in 14 LMICs, those who were exposed to one media channel had increased odds of contemplation and those exposed

to more than one channel showed increased odds of being in both contemplation and preparation stages [19]. Our results are also echoed by the CDC report which stated that in nine of 17 countries, the intention to quit was associated with awareness of antismoking messages in a single media channel, and in 14 countries, it was associated with exposure to multiple channels versus no awareness [1]. Other studies also found that the male smokers who attempted to quit (37.1%) were associated with exposure from 3 or more channels than those not exposed to any [40] and the intention to quit was 1.71 times higher for those with exposure to six or more channels [37].

Audience segmentation in our study perfectly underscored how the delivery of anti-tobacco information through different media channels influenced different types of tobacco users and gender subgroups as well. This establishes the fact that sufficient access to multiple and modern media communication channels delivering anti-tobacco information would be effective in raising thoughts to quit and subsequent transition to quit attempts among tobacco users. Just as highlighted in other studies [5,41], it is essential for India also to understand the research needs under Article-12, to develop culturally appropriate media channels, and gender-specific and targeted mass-media campaigns to reach all segments of audiences. In this study, we found that the females, both smokers and SLT users, overall have lesser exposure to the mass media along with the lesser options available for them to be exposed to than the males. In addition, the most exposure in our study for women comes from only television denoting the lack of access to other electronic media and other modes of media channels. Having seen no impact on behaviors with exposure to media channels we also suggest that the targeting of the media channels and campaigns tailored to women's needs is the need of the hour.

Further, tobacco users in India are majorly smokeless, and campaign improvements in that direction could have a significant effect on motivations or attempts to quit SLT. In addition, it is imperative to notice that the odds of quit attempts were higher in smokers than the SLT users. These gaps in the reach of anti-tobacco messaging argue for the need to direct anti-SLT tobacco campaigns more aggressively towards dual and exclusive SLT users [42], especially women, and those who do not have exposure to electronic media [29]. Further, public places as a media channel have impacted quit behaviors in our study sample and these channels are very under-utilized currently for anti-tobacco campaigns in India. Going forward, these spaces can be more utilized for tobacco control campaigns and promotion of cessation-related information such as the national quit line similar to TV and cinemas that are currently used.

This study has some limitations, including the use of cross-sectional data, which limits the ability to establish causation between the exposure to media channels and the outcomes. In addition, in the GATS survey, we did not measure each survey participant's exposure to the specific media type such as the number of times the media channels were exposed making it difficult to be able to associate a quantitative measure of the exposure to the outcomes. However, for us to be able to associate the different modes

of media exposure to the thoughts to quit within 30 days of exposure and if there was any attempt to quit in the past 12 months served as a proxy measure. Our findings are correlational and the direction of association needs to be established in longitudinal studies.

In conclusion, we highlight that the exposure through the majority of media channels led to thoughts of quitting smoking and SLT predominantly among males. Further, the majority of the media channels had resulted in attempts to quit SLT among males exclusively. The results are very conclusive that when the exposure of anti-tobacco information was from two or more media channels it resulted in higher thoughts to quit among male smokers and SLT users. Moreover, attempts to quit were reported among individuals exposed to multiple media channels compared to those who were not exposed at all. Additionally, the impact of the mass media channels on female tobacco users did not result in positive quit behaviors. Our study specifically gives direction to exploit the predominantly accessible common public spaces/ places, for tobacco mass media campaigns in the future. We also recommend using a targeted and appropriate mix of media channels based on research engaging different genders and audience segments to reach the diverse population in a country like India. Thereby allowing us to reach the masses efficiently, build awareness, and change beliefs, attitudes and behaviors among tobacco users.

Author Contribution Statement

KS conceptualized the study, developed the design of the study, conducted the statistical analysis and drafted the manuscript. MSP conceptualized the study, developed and refined the study design, provided feedback on the statistical analysis and reviewed the manuscript. NG contributed to the design of the study, provided data analysis feedback and reviewed the manuscript. All authors have read and approved the final manuscript.

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Approval

This study used secondary data and no primary data collection was involved. Hence, there is no approval required from the institutional review board.

Ethics statement

The GATS-India data set is available in the public domain from the CDC and is de-identified. All the Global Adult Tobacco Surveys were approved by ethical boards of survey countries and CDC, Atlanta. Study protocols and survey materials for GATS 2 were approved by the Ethics Review Committee and IRB of Tata Institute of Social Sciences, Mumbai. Consent was obtained from all participants. Parent or guardian consent was obtained for interviews of minors aged 15–17 years.

Data Availability

The GATS-India data sets are freely accessible and available from the Global Tobacco Surveillance System Data (GTSS Data) for research purposes to use, on the CDC website. The link to the GATS data sets was accessed on September 5, 2023, on 5th September 2023 from <https://nccd.cdc.gov/GTSSDataSurveyResources/Ancillary/DataReports.aspx?CAID=2>.

Conflict of Interest

The authors declare that they have no conflict of interest.

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