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Was there any change in tobacco smoking among adults in Bangladesh during 2009–2017? Insights from two nationally representative cross-sectional surveys

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ABSTRACT

Objective This study assessed the changes in prevalence and associated factors of tobacco smoking among Bangladeshi adults over time.

Design Nationally representative cross-sectional surveys.

Setting Two most recent Global Adults Tobacco Survey (GATS) data from Bangladesh, carried out in 2009 and 2017.

Participants Adult population aged 15 and above (n=9629 in 2009; n=12 783 in 2017).

Outcome measures Current use of tobacco smoke, including cigarettes, bidi, hukkah, cigars or pipes, which was dichotomised ('yes'/'no').

Methods We analysed data from two recent rounds of GATS (2009 and 2017). Multivariate logistic regression analysis was used.

Results The overall prevalence of tobacco smoking among Bangladeshi adults was noted (23.00%, 95% CI 22.98 to 23.00 in 2009; 16.44%, 95% CI 16.43 to 16.45 in 2017). Being male (adjusted OR (AOR)=59.72, CI 40.56 to 87.93 for 2009; AOR=71.17, CI 41.08 to 123.32 for 2017), age between 25 and 64 years (all AORs >2 and p<0.05), smoking permissible at home (AOR=7.08, CI 5.88 to 8.52 for 2009; AOR=5.90, CI 5.34 to 6.95 for 2017), and watching tobacco smoking product use in movie/drama scenes (AOR=1.26, CI 1.11 to 1.44 for 2009; AOR=1.34, CI 1.17 to 1.54 for 2017) were found to be significantly associated with increased tobacco smoking among adults both in 2009 and in 2017. However, being offered free tobacco sample products (AOR=0.66, CI 0.57 to 0.77 for 2009; AOR=0.87, CI 0.76 to 0.99 for 2017) and having primary, secondary or higher education (all AORs <1 and p<0.05) as well as being a student (AOR=0.16, CI 0.09 to 0.29 for 2009; AOR=0.32, CI 0.19 to 0.53) were associated with lower odds of tobacco smoking in both surveys.

Conclusions Although the prevalence of tobacco smoking has declined over the period, it is still high among those who were relatively older, men, less educated and exposed to a movie/drama where tobacco smoking is promoted. Therefore, appropriate interventions are required to stop tobacco smoking among the Bangladeshi population.

Strengths and limitations of this study

- ► This study used the most recent nationally representative surveys with appropriate statistical techniques to estimate the change in tobacco smoking prevalence and associated factors.
- ► Our findings can be considered generalisable to the national population.
- ► The inherent limitations of a cross-sectional study design limited our ability to infer causality.
- ► Self-reporting of tobacco smoking data can be subject to information bias.

INTRODUCTION

Tobacco smoking is a serious public health threat and is an established risk factor for non-communicable diseases including cardiovascular diseases, chronic respiratory diseases and cancer.[1] Over the past three decades, tobacco smoking has accounted for more than 200 million preventable deaths worldwide, with the population of current tobacco smokers exceeding 1 billion.[2] With this high number of tobacco smokers worldwide, the WHO urged reducing tobacco use as it is quintessential to reducing the global burden of non-communicable diseases, which account for nearly 71% of global mortalities.[3]

Tobacco smoking is a huge concern in low-income and middle-income countries as 80% of tobacco smokers reside in these regions.[2 4] Specifically, the South-East Asian region accounts for nearly 90% of the total tobacco smokers across the globe.[5] Bangladesh, a South Asian country, is one of the top 10 countries where two-thirds of the world's total number of smokers live.[2 6] According to

the most recent data, more than one-third of the adult population in Bangladesh smoke tobacco.[7]

Previous studies have identified several factors associated with tobacco smoking. For example, parental tobacco smoking and media showcase of favourite television or film stars using tobacco smoking products are documented as significant predictors of tobacco smoking.[8 9] Studies from South Africa,[1] Beijing[10] and Bangladesh[11] have also identified other factors such as age, gender, marital status and level of education to be associated with tobacco smoking. Prior evidence from Bangladesh has also indicated that 3% of seventh-grade to ninth-grade students smoke.[12] This is worrying because more than half of teenagers who start tobacco smoking at an early age could become habitual smokers in later life, predisposing them to the risk of non-communicable diseases.[13]

Acknowledging the high burden of tobacco smoking worldwide, the WHO implemented the Framework Convention on Tobacco Control (FCTC) as well as the Protocol to Eliminate Illicit Trade in Tobacco Smoking Products.[3] The FCTC is further iterated in the Sustainable Development Goals, particularly target 3.a. Bangladesh is identified as the first signatory to the WHO FCTC.[8] The Government of Bangladesh has enacted the Tobacco Smoking and Tobacco Smoking Products Usage (Control) Rule 2015, which includes increased price and tax on tobacco smoking products, prohibiting tobacco smoking in public places, and preventing the sale of tobacco products by and to minors.[14] In addition, in March 2021, the Ministry of Local Government, Rural Development and Cooperatives released implementation instructions to guarantee that the Tobacco Control Act is properly implemented by local governments. This endorsed that all retailers have licences and limit location-based sales, along with other tobacco control steps.[15]

Tobacco smoking constitutes the major form of tobacco use in Bangladesh.[16] It endangers human health while also putting financial strain on smokers. Thus, a continuous watch on the prevalence of tobacco smoking must be maintained. Despite the legislative to control tobacco smoking in Bangladesh, it is unclear to what level the policies have been implemented over the years. This suggests the need to track the pattern of tobacco smoking in Bangladesh over the years. It is also important to identify whether there was any change in factors associated with tobacco smoking. Therefore, this study examined the change in prevalence of tobacco smoking and the factors associated with tobacco smoking over time among the adult Bangladeshi population using two nationally representative surveys.

METHODS

Data sources and sampling frame

We used data from the two most recent Global Adults Tobacco Surveys (GATS) in Bangladesh (GATS 2009 and GATS 2017). GATS is a nationally representative survey that follows a consistent and standardised process.[17 18] This survey's target population comprises all Bangladeshi men and women aged 15 years and above. A three-stage stratified cluster sample of households was used for the GATS 2009 survey. The first stage involved selecting 400 primary sampling units (PSUs) (Mauza in rural areas and Mohalla in urban areas) using a probability proportional to size approach, followed by a random selection of one secondary sampling unit (SSU) per PSU. In the third stage, households from a particular SSU were selected systematically from the list of households. The GATS 2017 survey used a two-stage stratified sampling methodology. In the first step, eight administrative divisions were created, with further stratification within each division based on the Bangladesh Bureau of Statistics's (BBS's) categorisation of urban and rural Enumeration Areas (EAs). Then 496 PSUs (EAs) from the 8 divisions (62 each) and further equal allocation of PSUs to urban (31 PSUs) and rural (31 PSUs) stratum. In the second step of selection, 30 households were systematically selected from each sampled PSU (EA) with an equal probability using the fractional interval technique. Finally, one participant was picked randomly from among all eligible men and women in a participating household. The GATS 2009 and 2017 Bangladesh survey report contains details about the data collection procedures, methodologies and questionnaire.[11 19]

Outcome variable

Current tobacco smoking was the outcome variable for this study. All individual participants were asked: Does this person currently use tobacco, including cigarettes, bidi, hukkah, cigars, or pipes? The response was dichotomous ('yes'/'no').

Independent variables

Selection of independent variables was based on a thorough literature review by the authors. The independent variables considered were age, sex, place of residence, level of education, occupation, household income, whether tobacco smoking is allowed at home, whether free tobacco smoking products are offered and whether participants had seen any tobacco smoking scenes in a movie/drama.[20] Notably, drama is a 30–50 min television programme that tells a story and is widely broadcasted in Bangladesh.

Statistical analysis

We analysed each data set individually to determine, compare and contrast factors associated with tobacco smoking. All the variables used in the study were categorical and recoded where necessary. After removing missing information from the variables, the data were appropriately weighted to estimate the national tobacco smoking prevalence with 95% CI. The outcome variables and the selected independent variables were tested for association using the χ^2 test. P<0.05 was considered statistically significant. To examine the association, adjusted OR (AOR) with 95% CI was calculated using logistic regression.

Finally, multivariate logistic regression model was used to identify the factors independently associated with tobacco smoking. AOR with 95% CI was calculated. Then, by computing the area under the curve (AUC), we used receiver operating characteristic curve (ROC) analysis to verify the performance of the models (AUC). An ROC curve portrays 1–specificity on the horizontal axis and 1–sensitivity on the vertical axis, where AUC represents model accuracy. The AUC value ranges from 0 to 1, with 0 demonstrating a completely inaccurate classifier and 1 indicating a perfectly accurate classifier. An AUC of 0.5 indicates that the model has no discriminatory ability. Generally, the model is better to be fitted if the AUC value is close to 1[21] (online supplemental figures 1 and 2). The Stata/MP V.16 statistical program was used to conduct all analyses.

Patient and public involvement

No patients were involved.

RESULTS

Participants' characteristics

A total of 9629 participants in GATS 2009 (10 287 respondents were invited to participate; the overall response rate was 93.6%) and 12 783 participants in GATS 2017 (14 078 respondents were invited to participate; the overall response rate was 90.8%) were included in the present study. About half of the participants were from rural areas and were female in both survey periods. The highest percentage of respondents was aged between 25 and 34 years both in GATS 2009 (27.68%) and in GATS 2017 (26.28%), followed by the 35–43 years age group. More than one-third of the participants (36.14%) in GATS 2009 had no formal education, while this was about 28.01% in GATS 2017. About 40% of the participants belonged to poor wealth index families in both waves of the survey. We found that 24.16% of the respondents in GATS 2009 were allowed to smoke at home, while this was about 16% in GATS 2017 (table 1). Distribution of tobacco smoking status for both GATS 2009 and GATS 2017 (unweighted frequency and percentage) across the different subcategories of the study sample is shown in table 2.

Prevalence of tobacco smoking by participants' characteristics

Table 3 shows the changes in prevalence (weighted) of current tobacco smoking. The overall prevalence of current tobacco smoking was 23.00% (95% CI 22.98 to 23.00) in GATS 2009 and 16.44% (95% CI 16.43 to 16.45) in GATS 2017. The prevalence was higher among men than among women both in GATS 2009 (44.72% vs 1.51%) and in GATS 2017 (32.98% vs 0.81%). The highest prevalence was found in the 45–54 years age group in both survey periods. Participants with no formal education and who were involved in agriculture had a higher prevalence of tobacco smoking compared with other groups. Notably, the prevalence of tobacco smoking decreased between GATS 2009 and GATS 2017 among all strata of participants, except when the wealth index of the family is considered. With regard to the wealth index of the family, the prevalence of tobacco smoking increased between GATS 2009 and GATS 2017 among the rich, while it decreased among those of poor and middle wealth status.

Factors associated with tobacco smoking

Table 4 depicts the multivariate regression analysis of factors associated with overall tobacco smoking among adults in Bangladesh. We found that male participants were 59 times and 71 times more likely to smoke than female participants in GATS 2009 (AOR=59.72, 95% CI 40.5 to 87.93) and GATS 2017 (AOR=71.17, 95% CI 41.08 to 123.32), respectively. Adults and older adults (25–64 years) had higher odds of tobacco smoking than young adults (15–24 years). This finding was found to be significant in both waves of the survey. The likelihood of tobacco smoking decreased as education level of participants increased, where having at least primary (AOR=0.74, 95% CI 0.64 to 0.86), secondary (AOR=0.59, 95% CI 0.50 to 0.69) or higher (AOR=0.34, 95% CI 0.26 to 0.43) education was associated with lower odds of tobacco smoking compared with those having no formal education. Students were associated with lower odds of tobacco smoking compared with unemployed participants both in GATS 2009 (AOR=0.16, 95% CI 0.09 to 0.29) and in GATS 2017 (AOR=0.32, 95% CI 0.19 to 0.53).

Surprisingly, GATS 2009 showed that participants from rich wealth index families were less likely to smoke than those from poor families (AOR=0.74, 95% CI 0.62 to 0.89); however, a reverse finding was detected in GATS 2017 (AOR=1.19, 95% CI 1.02 to 1.40). We also found that tobacco smoking being allowed at home and having no rules were associated with higher odds of tobacco smoking among adults in both surveys. Interestingly, participants who were offered free tobacco sample products were less likely to smoke compared with those who were not offered such products both in GATS 2009 (AOR=0.66, 95% CI 0.57 to 0.77) and in GATS 2017 (AOR=0.87, 95% CI 0.76 to 0.99). When participants see anyone using tobacco smoking in a movie/drama scene, 26% of participants in GATS 2009 (AOR=1.26, 95% CI 1.11 to 1.44) and 34% of participants in GATS 2017 (AOR=1.34, 95% CI 1.17 to 1.54) are more likely to smoke. GATS 2017 showed that self-employed respondents were 42% more likely to smoke than those who were unemployed (AOR=1.42, 95% CI 1.14 to 1.78). Again, participants from rural areas were less likely to use tobacco compared with urban residents (AOR=0.88, 95% CI 0.77 to 1), but no significant association was found between place of residence and tobacco smoking in GATS 2009 (table 4).

DISCUSSION

The present study showed that the prevalence of tobacco smoking among Bangladeshi adults declined by more

Table 1 Background characteristics of study participants (unweighted frequency, weighted and unweighted percentage)

Characteristics	GATS survey year: 2009 (total: 9629)			GATS survey year: 2017 (total: 12 783)		
	n	Unweighted percentage	Weighted percentage	n	Unweighted percentage	Weighted percentage
Place of residence						
Urban	4857	50.44	26.17	6356	49.72	25.11
Rural	4772	49.56	73.83	6427	50.28	74.89
Sex of participants						
Male	4468	46.40	49.72	6079	47.56	48.60
Female	5161	53.60	50.28	6704	52.44	51.40
Age of participants (years)						
Mean age (±SD)	36.89 (14.90)			38.76 (14.78)		
15–24	2073	21.53	29.46	2293	17.94	27.47
25–34	2665	27.68	23.50	3360	26.28	24.03
35–44	2232	23.18	19.62	3053	23.88	20.18
45–54	1329	13.80	12.77	2029	15.87	12.58
55–64	755	7.84	8.04	1188	9.29	8.15
≥65	575	5.97	6.61	860	6.73	7.59
Education level						
No education	3480	36.14	35.96	3581	28.01	27.79
Primary	2602	27.02	27.82	3630	28.40	28.44
Secondary	2600	27.00	28.26	3897	30.49	32.30
Above secondary	947	9.83	7.95	1675	13.10	11.47
Current profession						
Service	961	9.99	6.36	1154	9.03	7.50
Business	993	10.32	9.37	1418	11.09	9.67
Agriculture	1200	12.47	16.63	1176	9.20	10.53
Self-employed	1276	13.26	12.71	1951	15.26	14.22
Housewife	4030	41.89	39.22	5338	41.76	39.64
Student	460	4.78	7.86	869	6.80	10.68
Unemployed	701	7.29	7.85	877	6.86	7.76
Wealth status						
Poor	3934	40.86	42.04	5143	40.23	38.70
Middle	1732	17.99	20.42	2561	20.03	22.08
Rich	3963	41.16	37.54	5079	39.73	39.22
Tobacco smoking at home						
Allowed	2326	24.16	25.49	2072	16.21	18.73
Not allowed	4312	44.78	42.41	6555	51.28	53.13
No rules	2991	31.06	32.10	4156	32.51	28.14
Being offered free tobacco smoking products						
No	6811	70.73	70.86	9444	73.88	72.47
Yes	2818	29.27	29.14	3339	26.12	27.53
Seen anyone using tobacco smoking products in movie/drama scenes						
No	4852	50.39	49.75	10683	83.57	84.60
Yes	4777	49.61	50.25	2100	16.43	15.40

GATS, Global Adults Tobacco Survey.

Table 2 Comparison of the study sample according to tobacco smoking (unweighted frequency and percentage)

Covariates	GATS 2009			GATS 2017–2018		
	No tobacco smoking, n (%)	Tobacco smoking, n (%)	P value	No tobacco smoking, n (%)	Tobacco smoking, n (%)	P value
Place of residence			0.003			0.001
Urban	3793 (78.09)	1064 (21.91)		526 (82.69)	1100 (17.31)	
Rural	3603 (75.50)	1169 (24.50)		5172 (80.47)	1255 (19.53)	
Sex of participants			<0.001			<0.001
Male	2311 (51.72)	2157 (48.28)		3774 (62.08)	2305 (37.92)	
Female	5085 (98.53)	76 (1.47)		6654 (99.25)	50 (0.75)	
Age of participants (years)			<0.001			<0.001
Mean age (±SD)	35.89 (15.09)	40.18 (13.77)		37.89 (14.94)	42.65 (13.38)	
15–24	1841 (88.81)	232 (11.19)		2161 (94.24)	132 (5.76)	
25–34	2078 (77.97)	587 (22.03)		2777 (82.65)	583 (17.35)	
35–44	1586 (71.06)	646 (28.94)		2375 (77.79)	678 (22.21)	
45–54	924 (69.53)	405 (30.47)		1536 (75.70)	493 (24.30)	
55–64	537 (69.80)	228 (30.20)		904 (76.09)	284 (23.94)	
≥65	440 (76.81)	135 (23.19)		675 (78.49)	185 (21.51)	
Education level			<0.001			<0.001
No education	2451 (70.43)	1029 (29.57)		2699 (75.37)	882 (24.63)	
Primary	2003 (76.98)	599 (23.02)		2873 (79.15)	757 (20.85)	
Secondary	2146 (82.54)	454 (17.46)		3358 (86.17)	539 (13.83)	
Above secondary	796 (84.05)	151 (151.95)		1498 (89.43)	177 (10.57)	
Current profession			<0.001			<0.001
Service	700 (72.84)	261 (27.16)		915 (79.29)	239 (20.71)	
Business	515 (51.86)	478 (48.14)		891 (62.83)	527 (37.17)	
Agriculture	537 (44.75)	663 (55.25)		656 (55.78)	520 (44.22)	
Self-employed	713 (55.88)	563 (44.12)		1174 (60.17)	777 (39.83)	
Housewife	3979 (98.73)	51 (1.27)		5301 (99.31)	37 (0.69)	
Student	445 (96.74)	15 (3.26)		848 (97.58)	21 (2.42)	
Unemployed	499 (71.18)	202 (28.82)		643 (73.32)	234 (26.68)	
Wealth status			<0.001			<0.001
Poor	2841 (72.22)	1093 (27.78)		4381 (85.18)	762 (14.82)	
Middle	1330 (16.79)	402 (23.21)		2073 (80.94)	488 (19.06)	
Rich	3225 (81.38)	738 (18.62)		3974 (78.24)	1105 (21.76)	
Tobacco smoking at home			<0.001			<0.001
Allowed	1543 (66.34)	783 (33.66)		1375 (66.36)	697 (33.64)	
Not allowed	3606 (83.63)	706 (16.37)		5768 (87.99)	787 (12.01)	
No rules	2247 (75.13)	744 (24.87)		3285 (79.04)	871 (20.96)	
Being offered free tobacco smoking products			<0.001			<0.001
No	5148 (75.58)	1663 (24.42)		7609 (80.57)	1835 (19.43)	
Yes	2248 (79.77)	570 (20.23)		2819 (84.43)	520 (15.57)	
Seen anyone using tobacco smoking products in movie/drama scenes			<0.001			<0.001
No	3821 (78.75)	1031 (21.25)		8902 (83.33)	1781 (16.67)	
Yes	3575 (74.84)	1202 (25.16)		1526 (72.67)	574 (27.33)	

GATS, Global Adults Tobacco Survey.

Table 3 Comparison of the prevalence of current tobacco smoking in Bangladeshi adults between GATS 2009 and GATS 2017 surveys (weighted prevalence with 95% CI)

Covariates	Survey year: 2009 Prevalence of tobacco smoking (95% CI)	Survey year: 2017 Prevalence of tobacco smoking (95% CI)	P value	Remarks
Overall	23.19 (22.27 to 24.13)	18.42 (17.73 to 19.14)	<0.001	Decreased
Place of residence				
Urban	21.28 (21.26 to 21.29)	15.18 (15.17 to 15.20)	<0.001	Decreased
Rural	23.60 (23.59 to 23.61)	16.86 (16.85 to 16.87)	<0.001	Decreased
Sex of participants				
Male	44.72 (44.70 to 44.73)	32.98 (32.96 to 32.99)	<0.001	Decreased
Female	1.51 (1.51 to 1.52)	0.81 (0.80 to 0.82)	<0.001	Decreased
Age of participants (years)				
15–24	12.03 (12.02 to 12.04)	5.01 (5.00 to 5.02)	<0.001	Decreased
25–34	22.62 (22.61 to 22.64)	15.93 (15.92 to 15.94)	<0.001	Decreased
35–44	29.77 (29.75 to 29.79)	21.84 (21.82 to 21.85)	<0.001	Decreased
45–54	32.86 (32.83 to 32.88)	24.67 (24.65 to 24.69)	<0.001	Decreased
55–64	31.62 (31.59 to 31.65)	24.26 (24.23 to 24.29)	0.002	Decreased
≥65	23.50 (23.47 to 23.53)	23.00 (22.98 to 23.04)	0.380	No significant difference in change
Education level				
No education	30.61 (30.60 to 30.63)	24.52 (24.51 to 24.54)	<0.001	Decreased
Primary	22.60 (22.59 to 22.62)	19.33 (19.31 to 19.34)	0.041	Decreased
Secondary	16.06 (16.04 to 16.07)	9.90 (9.89 to 9.91)	<0.001	Decreased
Above secondary	14.55 (14.53 to 14.58)	8.11 (8.09 to 8.12)	<0.001	Decreased
Current profession				
Service	27.94 (27.91 to 27.98)	20.96 (20.93 to 20.99)	0.001	Decreased
Business	43.58 (43.54 to 43.61)	31.61 (31.58 to 31.64)	<0.001	Decreased
Agriculture	53.55 (53.52 to 53.57)	41.85 (41.82 to 41.88)	<0.001	Decreased
Self-employed	43.43 (43.40 to 43.46)	35.79 (35.77 to 35.81)	0.015	Decreased
Housewife	1.40 (1.40 to 1.41)	0.70 (0.69 to 0.71)	0.004	Decreased
Student	3.41 (3.40 to 3.42)	1.91 (1.90 to 1.92)	0.367	No significant difference in change
Unemployed	24.15 (24.12 to 24.18)	23.63 (23.60 to 23.66)	0.346	No significant difference in change
Wealth status				
Poor	27.58 (27.57 to 27.59)	12.83 (12.82 to 12.84)	<0.001	Decreased
Middle	23.23 (23.21 to 23.24)	17.19 (17.18 to 17.21)	0.001	Decreased
Rich	17.73 (17.72 to 17.75)	19.58 (19.58 to 19.59)	<0.001	Increased
Tobacco smoking at home				
Allowed	33.03 (33.01 to 33.05)	29.72 (29.70 to 29.74)	0.987	No significant difference in change
Not allowed	16.69 (1.68 to 16.70)	10.36 (10.35 to 10.37)	<0.001	Decreased
No rules	23.36 (23.34 to 23.37)	19.08 (19.07 to 19.10)	<0.001	Decreased
Being offered free tobacco smoking sample products				
No	24.39 (24.38 to 24.40)	17.59 (17.58 to 17.60)	<0.001	Decreased
Yes	19.60 (19.59 to 19.62)	13.40 (13.38 to 13.41)	<0.001	Decreased
Seen anyone using tobacco smoking products in movie/drama scenes				
No	20.76 (20.75 to 20.77)	14.86 (14.85 to 14.87)	<0.001	Decreased
Yes	25.20 (25.19 to 25.21)	25.10 (25.08 to 25.12)	0.058	No significant difference in change

GATS, Global Adults Tobacco Survey.

Table 4 Multivariate logistic regression analysis of factors associated with overall tobacco smoking among the Bangladeshi adult population

	Survey year: 2009		Survey year: 2017	
Covariates	**AOR (95% CI)**	**P value**	**AOR (95% CI)**	**P value**
Place of residence				
Urban (RC)	1		1	
Rural	0.89 (0.77 to 1.03)	0.115	0.88 (0.77 to 0.99)	0.044
Sex of participants				
Female (RC)	1		1	
Male	59.72 (40.56 to 87.93)	<0.001	71.17 (41.08 to 123.32)	<0.001
Age of participants (years)				
15–24 (RC)	1		1	
25–34	2.07 (1.66 to 2.58)	<0.001	3.52 (2.76 to 4.5)	<0.001
35–44	2.33 (1.86 to 2.91)	<0.001	4.03 (3.15 to 5.15)	<0.001
45–54	2.68 (2.09 to 3.44)	<0.001	4.41 (3.4 to 5.71)	<0.001
55–64	2.08 (1.56 to 2.76)	<0.001	3.63 (2.74 to 4.81)	<0.001
≥65	1.18 (0.86 to 1.6)	0.300	2.83 (2.08 to 3.85)	<0.001
Education level				
No education (RC)	1		1	
Primary	0.65 (0.55 to 0.77)	<0.001	0.74 (0.64 to 0.86)	<0.001
Secondary	0.55 (0.45 to 0.67)	<0.001	0.59 (0.50 to 0.69)	<0.001
Higher	0.36 (0.27 to 0.47)	<0.001	0.34 (0.26 to 0.43)	<0.001
Current profession				
Unemployed (RC)	1		1	
Service	0.83 (0.62 to 1.11)	0.207	1.10 (0.84 to 1.42)	0.495
Business	1.07 (0.82 to 1.4)	0.619	1.13 (0.9 to 1.41)	0.302
Agriculture-related	0.91 (0.7 to 1.18)	0.456	1.14 (0.91 to 1.44)	0.252
Self-employed	1.02 (0.79 to 1.32)	0.866	1.42 (1.14 to 1.78)	0.002
Housewife	0.34 (0.21 to 0.55)	<0.001	0.61 (0.32 to 1.17)	0.133
Student	0.16 (0.09 to 0.29)	<0.001	0.32 (0.19 to 0.53)	<0.001
Wealth status				
Poor (RC)	1		1	
Middle	0.79 (0.66 to 0.95)	0.014	1.06 (0.90 to 1.26)	0.493
Rich	0.74 (0.62 to 0.89)	0.001	1.19 (1.02 to 1.40)	0.030
Tobacco smoking at home				
Not allowed (RC)	1		1	
Allowed	7.08 (5.88 to 8.52)	<0.001	5.90 (5.34 to 6.95)	<0.001
No rules	2.42 (2.09 to 2.82)	<0.001	2.34 (2.05 to 2.66)	<0.001
Being offered free tobacco smoking sample products				
No (RC)	1		1	
Yes	0.66 (0.57 to 0.77)	<0.001	0.87 (0.76 to 0.99)	0.041
Seen anyone using tobacco smoking products in movie/drama scenes				
No (RC)	1		1	
Yes	1.26 (1.11 to 1.44)	<0.001	1.34 (1.17 to 1.54)	<0.001

AOR, adjusted OR; RC, Reference Category.

than 6% between 2009 and 2017. This finding is consistent with a recent study in Bangladesh[6] that noted a decline in the prevalence of tobacco smoking. This shows that the pattern of tobacco smoking in Bangladesh should be monitored in order to determine whether or not it is changing. It is also crucial to see if any of the factors linked to tobacco usage have changed. The observed change in the prevalence of current tobacco smoking from this study may possibly be explained by the effects of the tobacco smoking control policy in Bangladesh, such as the Tobacco Smoking and Tobacco Smoking Products Usage (Control) Rule.[12] Furthermore, increased health literacy among the general public over time, elimination of all forms of advertising and promotion, labelling of cigarette packs with warnings, and religious obligations may have contributed to this decrease.

We found a significant association between gender and tobacco smoking. In both GATS surveys, men had higher odds of tobacco smoking compared with women. This finding aligns with other studies conducted in Bangladesh[12] and Malaysia.[13] A plausible explanation for this observation could be the differences in social acceptability in tobacco smoking in Bangladesh, where tobacco smoking is not accepted among women but is usually indifferent to tobacco smoking among men.[6] Another cause could be the impact of modernisation, which may provide boys greater independence than girls, as well as easier access to tobacco products.

The results of our study also indicated that age was significantly associated with tobacco smoking. Adults and older adults (ie, those aged 25–64) had a higher prevalence of tobacco smoking compared with younger adults (15–24 years). Our finding is supported by previous evidence from Bangladesh[18 20] which indicated a higher prevalence of tobacco smoking among older adults than younger adults. This finding can also be explained by the social acceptance of tobacco smoking, sociocultural or family environment, or the way of life of older people.[6] It is also not unlikely that tobacco smoking by young people in Bangladesh may be under-reported.

Educational attainment emerged as a significant factor associated with decreased tobacco smoking in both waves of the survey. Consistent with a preponderance of studies conducted in Bangladesh,[22 23] we found higher odds of tobacco smoking among those who had no formal education compared with those who had at least primary level of education. This is possible because formal education is likely to provide individuals with relevant health awareness on the health hazards of tobacco smoking, which can influence their informed decision to avoid tobacco smoking. However, evidence suggests good awareness of the health impacts of tobacco smoking among smokers.[6] Sensitising students at all levels of the education system, along with ensuring smoke-free policies at educational institutions, would assist in decreasing the burden of tobacco smoking in Bangladesh.

Unemployment also emerged as a significant factor associated with increased tobacco smoking. This finding could be explained by the fact that increased psychological distress due to unemployment led to adopting unhealthy behaviours such as tobacco smoking.[24] We also found that persons from wealthy households had lower risk of tobacco smoking compared with those from poor households. This is consistent with earlier studies which showed a higher prevalence of tobacco smoking among individuals from lower wealth index households.[18 25] Individuals who were unemployed and belonged to the poor household could have adopted tobacco smoking as a conduit to escape the realities of their poor socioeconomic status, and their environment could have an impact on their continued tobacco smoking behaviour. Interestingly, in GATS 2017, those in rich wealth index households had higher prevalence of tobacco smoking, which could be due to their affordability to purchase tobacco smoking products as tobacco smoking prices increased between the two survey periods.

Our findings also identified that participants who see anyone using tobacco smoking in a movie/drama scene were more likely to smoke than their counterparts. This finding was in line with prior evidence which showed a strong association between watching favourite actors/actresses using tobacco smoking products in movie and/or drama scenes and increased tobacco smoking.[8 9] We also found that the odds of tobacco smoking were high when tobacco smoking was allowed at home, which could be explained by Bandura's self-efficacy/social learning theory, indicating that individuals learn through observation and imitation.[26] It is widely known that the use of self-efficacy theory in cigarette cessation has been examined in a number of publications.[27 28] Through motivational, cognitive and decision processes, self-efficacy beliefs aid in achieving desired changes.[29] Following a strategy in Singapore in line with the self-efficacy theory, in Bangladesh we can adopt person-to-person behavioural support (eg, cognitive–behavioural therapy) and skills training as well as develop evidence-based tobacco use cessation treatments for individuals and specific population groups who use tobacco.[29] Therefore, implementing tobacco smoking-free policies in media might be effective in reducing the prevalence of tobacco smoking among Bangladeshi adults.

The decrease in tobacco smoking prevalence between 2009 and 2017 in Bangladesh might be demonstrated by several factors, such as the impact of tobacco smoking control policies and advocacy, increasing literacy rate, and awareness of health consequences. However, our study identified a few areas for further attention which should be acted upon through a coordinated approach between the Government of Bangladesh and other non-governmental organisations working on tobacco smoking control. Health literacy and antitobacco smoking campaigns could be targeted to high-risk populations such as those who are unemployed, men and those aged 25–65 years or older. Strong advocacy and lobbying can also be established among directors, producers and media owners, which are paramount in this regard.

Because any laws and regulations do not put this issue in place of enforcement. Findings of this study could also assist the government in strengthening the enforcement of tobacco smoking regulatory frameworks.[14]

The strengths and limitations of this current study were prudently accredited. First, this study used the most recent nationally representative surveys with appropriate statistical techniques to estimate the prevalence. Therefore, the study results could be generalisable to Bangladesh. In addition, the results of this study identified factors of tobacco smoking and whether there was any change over the period of 8 years due to change in relevant tobacco smoking control policies. The inherent limitations of a cross-sectional study design limited our ability to infer causality. Second, self-reporting of tobacco smoking data was subject to information bias. Third, although we have used the most recent data of 2017, the most recent changes over the period of the last 4 years were not reflected in this paper.

CONCLUSIONS

The current study found a decline in the prevalence of tobacco smoking among the Bangladeshi adult population over the period of 2009–2017. However, it remained high among men, older adults aged over 24 years, those with no formal education and unemployed population. Appropriate interventions (eg, awareness-raising initiatives) need to be designed particularly targeting men, older population aged over 24 years, and the less educated and unemployed segments of the community. People follow media persons; thus, policies could be made so that media personnel cannot promote smoking. Moreover, prioritising social and home-based health literacy programmes on the harmful impact of active and passive tobacco smoking as well as strict regulations of tobacco smoking advertisement could facilitate a faster decline in tobacco smoking in Bangladesh.

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