



BMJ Open Prevalence of and factors associated with tobacco smoking in the Gambia: a national cross-sectional study

Md Shariful Islam ,¹ Haifaa AlWajeah,² Md Golam Rabbani ,^{1,3} Md Ferdous,⁴ Nusrat Sharmin Mahfuza,⁵ Daniel Konka,⁶ Eva Silenga,⁷ Abu Naser Zafar Ullah⁸

To cite: Shariful Islam M, AlWajeah H, Rabbani MG, *et al.* Prevalence of and factors associated with tobacco smoking in the Gambia: a national cross-sectional study. *BMJ Open* 2022;**12**:e057607. doi:10.1136/bmjopen-2021-057607

► Prepublication history for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2021-057607>).

Received 27 September 2021
Accepted 18 May 2022



© Author(s) (or their employer(s)) 2022. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

¹Public Health Foundation Bangladesh, Dhaka, Bangladesh

²Independent Researcher, Sana'a, Yemen

³Health Economics and Financing, Health Systems and Population Studies Division, icddr, Dhaka, Bangladesh

⁴World Bank, Bangladesh office, Dhaka, Bangladesh

⁵Independent Researcher, Dhaka, Bangladesh

⁶Ghana Health Service, Regional Health Directorate-Bono Region, Accra, Greater Accra, Ghana

⁷Zambia Ministry of Health, Lusaka, Zambia

⁸Daffodil International University, Dhaka, Bangladesh

Correspondence to

Md Shariful Islam;
sharifulmi2@gmail.com

ABSTRACT

Objectives To examine the prevalence of and risk factors associated with tobacco smoking in the Gambia.

Design A nationwide cross-sectional study.

Setting The Gambia.

Participants The study participants were both women and men aged between 15 and 49 years old. We included 16,066 men and women in our final analysis.

Data analysis We analysed data from the Gambia Demographic and Health Survey (DHS), 2019–2020. DHS collected nationally stratified data from local government areas and rural–urban areas. The outcome variable was the prevalence of tobacco smoking. Descriptive analysis, prevalence and logistic regression methods were used to analyse data to identify the potential determinants of tobacco smoking.

Results The response rate was 93%. The prevalence of current tobacco smoking was 9.92% in the Gambia in 2019–2020, of which, 81% of the consumers smoked tobacco daily. Men (19.3%) smoked tobacco much higher than women (0.65%) ($p < 0.001$). People aged 40–49 years, with lower education, and manual workers were the most prevalent group of smoking in the Gambia ($p < 0.001$). Men were 33 times more likely to smoke tobacco than women. The chance of consuming smoked tobacco increased with the increase of age (adjusted OR (AOR) 9.08, 95% CI 5.08 to 16.22 among adults aged 40–49 years, $p < 0.001$). The strength of association was the highest among primary educated individuals (AOR 5.35, 95% CI 3.35 to 8.54).

Manual workers (AOR 2.73) and people from the poorest households (AOR 1.86) were the risk groups for smoking. However, place of residency and region were insignificantly associated with smoking in the Gambia.

Conclusions Men, older people, manual workers, individuals with lower education and lower wealth status were the vulnerable groups to tobacco smoking in the Gambia. Government should intensify awareness programmes on the harmful effects of smoking, and introduce proper cessation support services among tobacco smoking users prioritising these risk groups.

INTRODUCTION

Tobacco use is the second-ranked leading risk factor of mortality, accounting for 8.71 million fatalities worldwide (15.4% of total deaths) in 2019.¹ It is attributed to about 100 million

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This study analysed data drawn from nationally representative surveys to investigate the prevalence of and risk factors associated with tobacco smoking in the Gambia.
- ⇒ We included all relevant sociodemographic predictor variables and ran a series of models applying a complex survey design, controlling for potential confounding factors and multicollinearity to reach a final parsimonious model.
- ⇒ The cross-sectional nature of the data in this study does not reveal a causal association.

deaths in the 20th century, the vast majority of which occurred in developed countries.^{2–3} If the current trends of smoking persist, tobacco will kill around one billion people this century, with the bulk of deaths occurring in low-income and middle-income countries.^{2–5} Along with the health consequences, tobacco smoking caused significant economic costs: yearly, it exceeds US\$1 trillion.⁶

The burden of tobacco use is increasing in low-income and middle-income countries. In 2019, around 77.5% (around 6 of 7.69 million) of total tobacco smoking-related death occurred in low-income and middle-income countries. The number of smokers has also increased by 75% in sub-Saharan Africa (68.7% in the Gambia) since 1990. Age-standardised prevalence of tobacco smoking in the Gambia had 1.6 times compared in neighbouring country, Senegal, in 2019 (12.5%).⁷ Every day, 105 000 adults use tobacco in this country. Around 98.9% of users consumed tobacco smoking. Tobacco smoking caused 4.5% (7.9% in men and 0.5% in women) of death among the Gambians in 2019, while the smoking-attributable death increased 38% since 1990.⁷ Tobacco smoking costs around US\$5 million in its economy every year.⁶ Tobacco smoking increases the chance of non-communicable diseases such as cardiovascular diseases, cancer and chronic

respiratory diseases.^{8 9} These three non-communicable diseases cause 20% of all deaths in the Gambia.¹⁰ WHO set a target of a 25% decrease in deaths from cardiovascular diseases, diabetes, cancer and chronic respiratory illnesses among people aged 30–70 from 2010 to 2025.¹¹ To reach the global target of non-communicable diseases in the Gambia, reducing tobacco smoking can be the single best preventive and cost-effective strategy.

A study conducted among the Gambian men reported that 31.4% of men aged 25–64 years old smoked tobacco in 2010.¹² Another study carried out in this country among students aged 12–20 years old found that 16.7% of students consumed tobacco in 2016.¹³ Nevertheless, the prevalence of and factors associated with tobacco smoking based on up-to-date data among both men and women and nationally representative data were not available in The Gambia. Up-to-date knowledge of the smoking prevalence and risk factors can inform policy-makers to design policies and interventions to accelerate smoking cessation. Therefore, to address this knowledge gap, we aimed to examine the prevalence of tobacco smoking among different socio-demographic groups' levels and factors associated with tobacco smoking in the Gambia using the Demographic and Health Survey (DHS) 2019–2020 data.

METHODS

Study design and data source

We analysed data from the Gambia DHS, 2019–2020. DHS is a nationally representative data stratified by local government areas (LGAs) and rural–urban areas.¹⁴ The sample was two stages cluster in design. The sampling unit was the enumeration area (EA) that was selected based on the 2013 Population and Housing Census conducted by the Gambia Bureau of Statistics. In the first stage of sampling, 281 EAs were obtained from the sample frame. The sample had 14 strata, 12 strata from 6 LGAs (urban and rural) and 2 in municipalities (Banjul and Kanifing, no rural area in municipalities). In the second stage, systematic random sampling was used to choose a fixed number of 25 households from each EA. Trained data collectors interviewed only in preselected households. The sampling selection method is illustrated in [figure 1](#). The detailed sampling procedure is given in the DHS final report in 2019–2020.¹⁴ In this study, the Strengthening the Reporting of Observational Studies in Epidemiology statement was followed.¹⁵

Study population

Women aged 15–49 years and men aged 15–59 years were interviewed using separate questionnaires during data collection in the Gambian DHS. However, we analysed data of both participants aged between 15 and 49 years to get a pooled estimate.

Outcome variables

The outcome was the prevalence of current tobacco smoking in this study. Respondents were asked, 'Do you

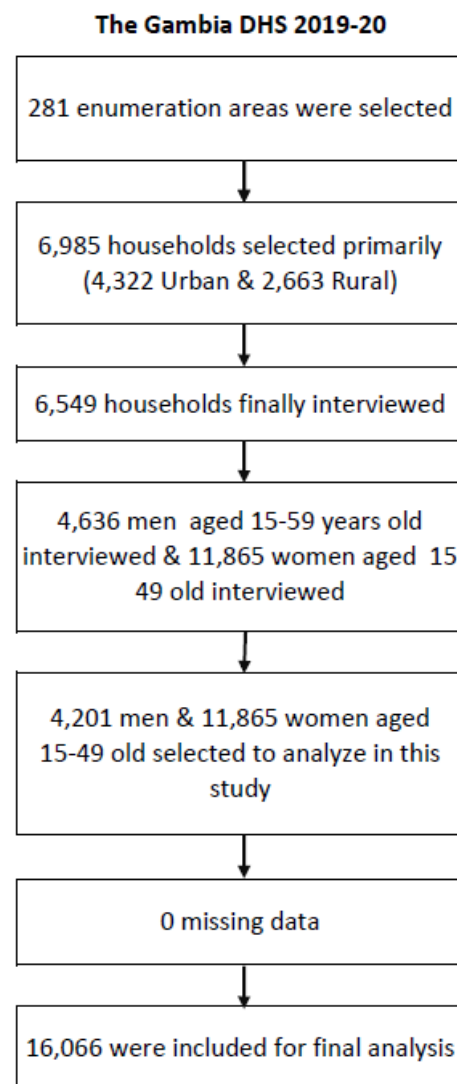


Figure 1 Flow chart of selection of sample. DHS, Demographic and Health Survey.

currently use smokeless tobacco (SLT) every day, some days or not at all?' The response was taken as 'every day', 'some days' or 'not at all'. We made the response dichotomous by coding 'every day' and 'some days' responses as 'yes' and 'not at all' as 'no'. Smoked tobacco included manufacture, hand-rolled cigarettes, e-cigarettes, pipe full of tobacco, cigars and cheroots tobacco forms.

Independent variables

We identified tobacco smoking variables based on prior research on tobacco usage in the sub-Saharan African region.^{16–18} The independent variables were age, sex, union with men/women, ethnicity, religion, parity, place of residence, region (LGA), education level, occupation, wealth status and access to information (television, radio and newspapers). Age was grouped as 15–19, 20–29, 30–39 and 40–49. Both men and women were included in this study. Union status of respondents are either categorised as 'never union' and 'currently/formally union'.

'Never union' is defined as respondents who were unmarried and never lived together with men/women in her/his life. Ethnic groups were grouped into five categories (non-Gambian, Mandinka/Jahanka, Wolof, Fula/Tukulur/Lorobo and others).

The religion of participants was categorised as Islam and others. The parity of respondents was grouped into three categories (respondents with no child, one child and one+children). Rural and urban areas were the place of residence. Regions were six LGAs and two municipalities. Education level was grouped into four categories, no education (0 schooling year), primary (1–5 schooling years), secondary (6–12 schooling years) and higher (12+ schooling years). Occupation of respondents was divided as not working, professional/technical/managerial/clerk/sales/services/armed forces/other, agriculture and skilled/unskilled manual categories. The wealth status of households was grouped into five quintiles (poorest, poorer, middle, richer and richest). Implementing partners of the DHS programme classified wealth status depending on the household asset and dwelling characteristics. Information access, newspapers/magazines, television and radio were all divided into three categories (not use at all, less than once a week, at least once a week).

Statistical analysis

We performed descriptive statistics to assess the distribution of participants and presented them as frequencies (n) and proportions (%). The prevalence of tobacco smoking was estimated among the independent variables. The prevalence was reported as a percentage with the 95% CI. To examine the relationship between variables and tobacco smoking, we used the χ^2 test. We also conducted univariable and multivariable logistic regression to investigate factors of tobacco smoking, presented as unadjusted OR, and adjusted OR (AOR) with 95% CIs and p value. All of the analyses were two tailed. Statistical significance was defined as a p value of less than 0.05. Multicollinearity of independent variables was checked. The prevalence, univariable, multivariable regression model took into account the complicated sample design and sampling weight (weight was adjusted for women and men). Missing values were excluded before conducting the final analysis (figure 1). The statistical program R V.4.0 was used to analyse the data.

Patient and public involvement

No patient was involved.

RESULTS

Sociodemographic characteristics

The response rate was 93%. Of the 16066 participants, 73.9% were women. A total of 35.2% of participants' age was between 20 and 29 years, and 65.1% were currently or formally in a union with men or women. The majority of participants were from the Islam (97.5%) religion, while

the Mandinka/Jahanka (30.7%) group was the majority in ethnic background. Almost half of the participants had more than one child. About 56.1% of respondents were living in rural areas, and one in five participants was from the Brikama region (LGA). In socioeconomic position, only 6% (970) of the participants had a higher level of education, and 40.2% of them were involved in professional/technical/managerial/clerk/sales/services/armed forces works, while 27.4% of respondents were from the poorest households (table 1).

Prevalence of tobacco smoking

The prevalence of any type of tobacco usage among all adults aged between 15 and 49 years was 9.94%, while 9.92% and 0.08% of adults used smoked and SLT, respectively, in the Gambia in 2019–2020. However, 81% of users smoked tobacco daily (data not shown). The prevalence of any tobacco consumption among men was 30 times higher than women (19.3% vs 0.65%). Smoking prevalence among men was 19.26% (95% CI 17.35% to 21.27%) and among women was 0.60% (95% CI 0.41% to 0.85%). Regarding smoking forms of tobacco, cigarettes were the popular form of tobacco use among both men and women in the Gambia (figure 2).

The prevalence of tobacco smoking increased with the increase of age among the Gambians (3.3% in 15–19 years to 16.7% in 40–49 years group). Non-Gambian (7%, 95% CI 5.1% to 9.2%) had lower smoking prevalence than other ethnic groups, while individuals with one child (12.1%) were the most prevalent class of parity. The prevalence of smoking was the lowest in the higher education category (5.7%) among all education groups. Smoking prevalence decreased among higher wealthy status. In occupation, not working groups had a smoking prevalence <2%, while the population involved in manual work had a smoking prevalence >20%. In access to information, smoking prevalence increased with the increased access to newspaper/magazines, television and radio (table 1).

Factors associated with smoking

Men (AOR 32.9; $p<0.001$) were more likely to smoke tobacco compared with women in the Gambia (table 2). Age was associated with smoking in this country. The strength of association increased with the increase of age (AOR 3.41 in 20–29, AOR 6.50 in 30–39 and AOR 9.08 in 40–49; reference group 15–19; $p<0.001$). Those who attained primary education level had a higher odds ratio (AOR 5.35, 95% CI 3.35 to 8.54) than participants with secondary education (AOR 3.26, 95% CI 2.17 to 4.9) and no education (AOR 2.73, 95% CI 1.68 to 4.44) had lower odds of self-reporting tobacco smoking compared with the individuals with higher education (≥ 12 schooling year).

The occupation was referenced to not working group, and all other occupations had a significant positive association with tobacco smoking in both univariable and multivariable regression. In wealth status, poorest (AOR 1.86, 95% CI 1.16 to 2.98, $p=0.01$) and poorer group

Table 1 Characteristics of participants and prevalence of tobacco smoking among the Gambians*

Factor	Total	Smoking tobacco		Prevalence, % (95% CI)‡	P value
	N (%)†	Yes (%)†	No (%)†		
Participants	16066 (100)	869 (100)	15 197 (100)	9.9 (8.9 to 11.0)	
Age					<0.001
15–19	3766 (23.4)	75 (8.6)	3691 (24.3)	3.3 (2.3 to 4.5)	
20–29	5648 (35.2)	269 (31.0)	5379 (35.4)	8.9 (7.6 to 10.3)	
30–39	4136 (25.7)	297 (34.2)	3839 (25.3)	13.6 (11.6 to 15.6)	
40–49	2516 (15.7)	228 (26.2)	2288 (15.1)	16.7 (14.2 to 19.4)	
Sex					<0.001
Women	11 865 (73.9)	58 (6.7)	11 807 (77.7)	0.65 (0.4 to 0.8)	
Men	4201 (27.1)	811 (93.3)	3390 (22.3)	19.3 (17.4 to 21.3)	
Union					0.421
Never union	5603 (34.9)	357 (42.1)	5246 (34.5)	9.6 (8.3 to 11)	
Currently or formally union	10463 (65.1)	512 (58.9)	9951 (65.5)	10.2 (9 to 11.5)	
Religion					0.437
Islam	15 671 (97.5)	849 (97.7)	14 822 (97.5)	10 (9 to 11)	
Others	395 (2.5)	20 (2.3)	375 (2.5)	8 (4.3 to 13.4)	
Ethnic group					0.014
Non-Gambian	1639 (10.2)	70 (8.1)	1569 (10.3)	7 (5.1 to 9.2)	
Mandinka/Jahanka	4932 (30.7)	293 (33.7)	4639 (30.5)	11.4 (9.7 to 13.3)	
Wolof	2294 (14.3)	104 (12.0)	2190 (14.4)	8.5 (6.6 to 10.8)	
Fula/Tukulur/Lorobo	3528 (22.0)	194 (22.3)	3334 (21.9)	8.7 (7 to 10.7)	
Others	3673 (22.9)	208 (23.9)	3465 (22.8)	10.6 (8.7 to 12.7)	
Parity					0.137
No child	6584 (41.0)	391 (45.0)	6193 (40.8)	9.5 (8.2 to 10.8)	
One child	1880 (11.7)	106 (12.2)	1774 (11.7)	12.1 (9.7 to 14.8)	
One+children	7602 (47.3)	372 (42.8)	7230 (47.6)	9.9 (8.6 to 11.3)	
Place of residence					0.0582
Rural	7060 (43.9)	335 (38.6)	6725 (44.3)	8.6 (7.3 to 9.9)	
Urban	9006 (56.1)	534 (61.4)	8472 (55.7)	10.3 (9.1 to 11.7)	
Region					0.066
Mansakonko	1361 (8.5)	59 (6.8)	1302 (8.6)	8.4 (6.2 to 11)	
Banjul	1414 (8.8)	102 (11.7)	1312 (8.6)	12.1 (10.4 to 13.9)	
Kanifing	2246 (14.0)	156 (18.0)	2090 (13.8)	12.1 (10.2 to 14.2)	
Brikama	3239 (20.2)	177 (20.4)	3062 (20.1)	9.6 (7.8 to 11.5)	
Kerewan	1857 (11.6)	87 (10.0)	1770 (11.6)	8.3 (6.1 to 10.9)	
Kuntaur	1693 (10.5)	81 (9.3)	1612 (10.6)	8.9 (6.4 to 11.9)	
Janjanbureh	1715 (10.7)	91 (10.5)	1624 (10.7)	8.8 (7.3 to 10.5)	
Basse	2541 (15.8)	116 (13.3)	2425 (16.0)	9 (7 to 11.4)	
Education					<0.001
No education	6214 (38.7)	241 (27.7)	5973 (39.3)	7.5 (6.2 to 8.9)	
Primary	2720 (16.9)	190 (21.9)	2530 (16.6)	14.2 (11.8 to 16.8)	
Secondary	6162 (38.4)	389 (44.8)	5773 (38.0)	10.7 (9.2 to 12.3)	
Higher	970 (6.0)	49 (5.6)	921 (6.1)	5.7 (4 to 7.9)	
Wealth status					0.9198
Poorest	4402 (27.4)	231 (26.6)	4171 (27.4)	10.3 (8.7 to 12.1)	
Poorer	3116 (19.4)	172 (19.8)	2944 (19.4)	10.6 (8.5 to 12.9)	

Continued

Table 1 Continued

Factor	Total	Smoking tobacco		Prevalence, % (95% CI)‡	P value
	N (%)†	Yes (%)†	No (%)†		
Middle	3104 (19.3)	165 (19.0)	2939 (19.3)	9.6 (7.6 to 11.9)	
Richer	2719 (16.9)	133 (15.3)	2586 (17.0)	9.8 (7.8 to 12.2)	
Richest	2725 (17.0)	168 (19.3)	2557 (16.8)	9.5 (7.6 to 11.6)	
Occupation					<0.001
Not working	4869 (30.3)	52 (6.0)	4817 (31.7)	1.9 (1.3 to 2.8)	
Professional/technical/managerial /clerical/sales/services/armed forces/other	6454 (40.2)	526 (60.5)	5928 (39.0)	12.9 (11.5 to 14.4)	
Agricultural-self employed	3651 (22.7)	114 (13.1)	3537 (23.3)	7.1 (5.2 to 9.4)	
Skilled/unskilled manual	1092 (6.8)	177 (20.4)	915 (6.0)	21 (17.3 to 25)	
Access to information					<0.001
Reading newspaper/magazine					<0.001
Not at all	13853 (86.2)	677 (77.9)	13176 (86.7)	9 (8 to 10)	
Less than once a week	1586 (9.9)	118 (13.6)	1468 (9.7)	13.5 (10.7 to 16.5)	
At least once a week	627 (3.9)	74 (8.5)	553 (3.6)	13.9 (9.6 to 18.9)	
Watching television					0.0843
Not at all	3439 (21.4)	142 (16.3)	3297 (21.7)	8.1 (6.3 to 10.2)	
Less than once a week	4106 (25.6)	211 (24.3)	3895 (25.6)	9.2 (7.6 to 11.1)	
At least once a week	8521 (53.0)	516 (59.4)	8005 (52.7)	10.6 (9.4 to 11.9)	
Listening radio					<0.001
Not at all	3507 (21.8)	82 (9.4)	3425 (22.5)	4.9 (3.6 to 6.4)	
Less than once a week	5186 (32.3)	169 (19.4)	5017 (33.0)	5.9 (4.6 to 7.3)	
At least once a week	7373 (45.9)	618 (71.1)	6755 (44.4)	14 (12.5 to 15.7)	

*Data are from Standard DHS conducted in the Gambia 2019–20. The age of respondents was 15–49 years old.

†Column percentages. Data are not weighted in this column.

‡Data are weighted in this column.

DHS, Demographic and Health Survey; N, number of respondents; Union, respondent live/lived together with men/women.

(AOR 1.48, 95% CI 1.02 to 2.14; $p=0.042$) had increased OR of reporting smoking compared with richest households. Mandinka/Jahanka ethnic group smoked 142% more likely tobacco ($p<0.001$), compared with the

non-Gambian category. Individuals who had one child had an increased odds ratio (AOR 1.88, 95% CI 1.27 to 2.77), where the reference group was the population with more than one child. In Gambia, individuals' union status

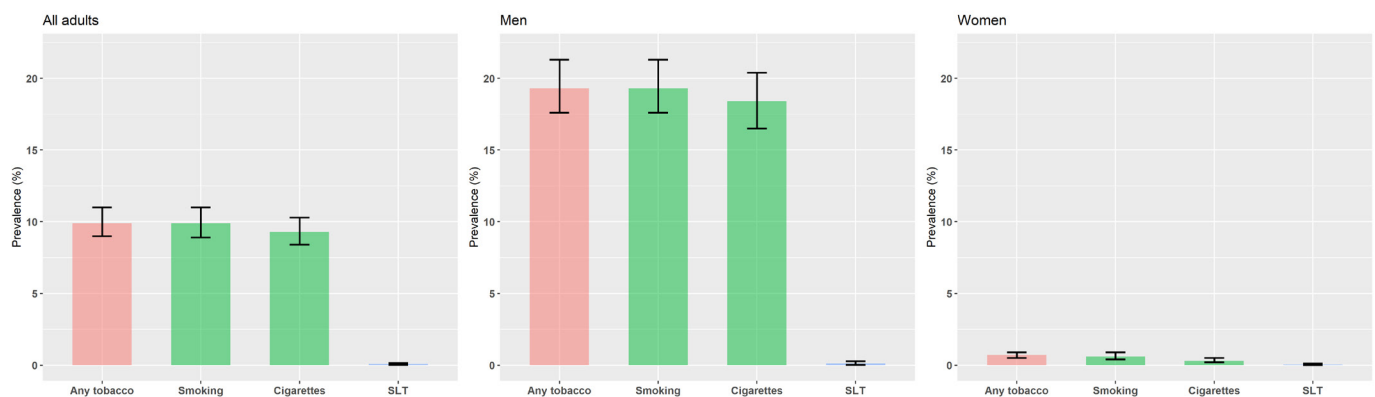


Figure 2 Prevalence of tobacco use in the Gambia in 2019–2020. Prevalence is shown in percentage with a 95% CI value. The black-coloured error bar shows 95% CI. The left bar graph shows the tobacco prevalence of all adults aged 15–49 years, the middle bar graph shows the tobacco prevalence of men and the right bar graph shows the tobacco prevalence of women. SLT, smokeless tobacco.

Table 2 Logistic regression to identify factors associated with tobacco smoking in the Gambia*

Factors	Univariable regression		Multivariable regression	
	Unadjusted OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Age				
15–19	1 (ref)		1 (ref)	
20–29	2.86 (1.99 to 4.11)	<0.001	3.41 (2.24 to 5.19)	<0.001
30–39	4.61 (3.11 to 6.84)	<0.001	6.5 (3.66 to 11.54)	<0.001
40–49	5.89 (3.98 to 8.71)	<0.001	9.08 (5.08 to 16.22)	<0.001
Sex				
Women	1 (ref)		1 (ref)	
Men	39.33 (27.08 to 57.13)	<0.001	32.9 (21.94 to 49.32)	<0.001
Union				
Currently or formally union	1 (ref)		1 (ref)	
Never union	0.93 (0.77 to 1.11)	0.420	1.14 (0.78 to 1.68)	0.497
Religion				
Islam	1.27 (0.7 to 2.32)	0.44	1.19 (0.58 to 2.44)	0.645
Others	1 (ref)		1 (ref)	
Ethnic group				
Non-Gambian	1 (ref)		1 (ref)	
Mandinka/Jahanka	1.73 (1.21 to 2.46)	0.003	2.42 (1.58 to 3.72)	<0.001
Wolof	1.25 (0.84 to 1.85)	0.269	1.46 (0.9 to 2.37)	0.124
Fula/Tukulur/Lorobo	1.28 (0.86 to 1.88)	0.223	1.47 (0.93 to 2.32)	0.101
Others	1.59 (1.07 to 2.36)	0.023	1.96 (1.22 to 3.13)	0.006
Parity				
No child	0.95 (0.79 to 1.16)	0.64	1.29 (0.86 to 1.93)	0.214
One child	1.25 (0.97 to 1.61)	0.08	1.88 (1.27 to 2.77)	0.001
One+children	1 (ref)		1 (ref)	
Place of residence				
Rural	1 (ref)		1 (ref)	
Urban	1.23 (0.99 to 1.52)	0.059	1.45 (0.98 to 2.13)	0.067
Region				
Mansakonko	1 (ref)		1 (ref)	
Banjul	1.5 (1.07 to 2.11)	0.020	1.39 (0.87 to 2.23)	0.167
Kanifing	1.5 (1.06 to 2.13)	0.025	1.48 (0.93 to 2.36)	0.102
Brikama	1.15 (0.8 to 1.67)	0.442	1.08 (0.69 to 1.71)	0.729
Kerewan	0.99 (0.64 to 1.51)	0.947	1.07 (0.66 to 1.73)	0.788
Kuntaur	1.07 (0.69 to 1.65)	0.766	1.22 (0.76 to 1.96)	0.422
Janjanbureh	1.06 (0.74 to 1.51)	0.758	1.19 (0.78 to 1.82)	0.429
Basse	1.09 (0.73 to 1.62)	0.679	1.09 (0.7 to 1.7)	0.687
Education				
No education	1.33 (0.89 to 1.99)	0.17	2.73 (1.68 to 4.44)	<0.001
Primary	2.73 (1.85 to 4.03)	<0.001	5.35 (3.35 to 8.54)	<0.001
Secondary	1.98 (1.38 to 2.82)	<0.001	3.26 (2.17 to 4.9)	<0.001
Higher	1 (ref)		1 (ref)	
Wealth status				
Poorest	1.10 (0.82 to 1.47)	0.53	1.86 (1.16 to 2.98)	0.010
Poorer	1.13 (0.82 to 1.56)	0.46	1.48 (1.02 to 2.14)	0.042

Continued

Table 2 Continued

Factors	Univariable regression		Multivariable regression	
	Unadjusted OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Middle	1.01 (0.72 to 1.42)	0.95	0.98 (0.66 to 1.47)	0.940
Richer	1.04 (0.75 to 1.44)	0.81	1 (0.7 to 1.42)	0.976
Richest	1 (ref)		1 (ref)	
Occupation				
Not working	1 (ref)		1 (ref)	
Professional/technical/managerial/clerical/sales/services/armed forces/other	7.53 (4.99 to 11.38)	<0.001	2.11 (1.32 to 3.36)	0.002
Agricultural/self employed	3.90 (2.38 to 6.39)	<0.001	2.01 (1.2 to 3.37)	0.008
Skilled/unskilled manual	13.47 (8.62 to 21.06)	<0.001	2.73 (1.67 to 4.48)	<0.001
Access to information				
Reading newspaper/magazine				
Not at all	1 (ref)		1 (ref)	
Less than once a week	1.57 (1.19 to 2.08)	0.002	1.34 (0.98 to 1.84)	0.071
At least once a week	1.63 (1.1 to 2.42)	0.016	1.01 (0.67 to 1.52)	0.958
Watching television				
Not at all	1 (ref)		1 (ref)	
Less than once a week	1.15 (0.86 to 1.53)	0.337	0.85 (0.59 to 1.23)	0.383
At least once a week	1.34 (1.02 to 1.76)	0.036	0.86 (0.62 to 1.19)	0.372
Listening radio				
Not at all	1 (ref)		1 (ref)	
Less than once a week	1.21 (0.83 to 1.77)	0.32	0.97 (0.66 to 1.42)	0.862
At least once a week	3.17 (2.34 to 4.29)	<0.001	1.28 (0.95 to 1.73)	0.106

*Data are from Standard Demographic and Health Survey conducted in the Gambia 2019–2020. The age of respondents was 15–49 years old. Data are weighted in this column.
OR, Odds ratio; Ref, reference group; Union, respondent live/lived together with men/women.

with men or women, religion, place of residence, region and access to the information (newspaper/magazine, television, radio) had an insignificant association with tobacco smoking.

DISCUSSION

Despite two decades of efforts to control tobacco smoking in the Gambia,¹⁹ this country has a high prevalence of tobacco use among adults aged 15–49 years. Moreover, one in ten adults smoked tobacco in 2019–2020, while 81% of users smoked tobacco daily. The smoking prevalence in the Gambia was higher than the average prevalence of tobacco smoking in the Western sub-Saharan Africa region and lower than Guinea, Mauritania and Sierra Leone.⁷ Chisha *et al* also found most smokers in the Gambia were daily users.²⁰ The explanation can be other Western sub-Saharan African countries has evidence-based tobacco cessation strategies, other tobacco control policies, higher taxation and smoking cessation support more than the Gambia has. For example, Ghana has a national tobacco cessation strategy and clinical guidelines.²¹ Tobacco smoking among men was significantly higher than women in this country in

2019. Smoking prevalence was significantly higher among older people. A study on 30 sub-Saharan African countries also found a higher prevalence of smoking among men than women and among older people.²² We found people involved in manual work were the most prevalent group of smoking (21%) in the Gambia. Manual workers smoked more also found in Ethiopia.²³

Sex, age, education level, occupation and household wealth were significantly associated with tobacco smoking in the Gambia. We found that the prevalence of tobacco smoking is comparatively higher among men than women. Another multicountry study conducted sub-Saharan Africa found men smoked higher than women.²⁴ This might be the result of the unacceptability of smoking practices towards women in this country. Older people smoked tobacco more likely than younger people. This finding is in line with previous tobacco studies conducted in sub-Saharan Africa.^{18 22 25 26} We can explain this by the age effects of tobacco smoking. Individuals progressively initiate tobacco smoking as they grow older, and the rate of smoking cessation is lower than the smoking initiation rate.



People with a lower level of education smoked tobacco more than people with higher education in The Gambia. This finding aligns with previous studies performed in sub-Saharan Africa and Asia.^{17 22} The protective effect of households' wealth was coherent with the finding in other sub-Saharan African countries.^{16 18} People who have lower education were less aware of their health risks.²⁷ The tobacco epidemic initiates among higher socioeconomic groups in developed countries and then extends to poorer and less educated individuals,²⁸ while in low-income and middle-income countries, the less educated may take up smoking owing to a lack of information and awareness about the harmful consequences of smoking.²⁷ In addition to this, poor people have less control to deal with the management of stress from their economic situations.²⁹

People involved in any work had a positive association with tobacco smoking compared with those not working. Manual workers had the strongest association with smoking in the Gambia. A similar finding was observed in sub-Saharan African studies^{22 26} and the USA.³⁰ Working individuals may experience work stress. At the same time, manual work represents the social status, education and income of people, all of which have an impact on healthy habits and seeking medical help.³¹

Public health implications

The Gambia implemented diverse tobacco control initiatives and ratified the WHO Framework Convention on Tobacco Control^{19 21}; however, only 3% of smoking prevalence was reduced among men since 2013.^{14 32} The reduction rate of smoking prevalence can be accelerated by increasing smoking cessation and reducing the initiation rate of smoking through the proper support in this country. First, the government should develop a national tobacco cessation strategy.²¹ Advertising and promotion of tobacco are banned. However, we found that access to media did not act as a protective factor against smoking. We also found poor, manual workers and lower educated people smoked more likely in the Gambia. Awareness about the dangers of tobacco smoking can help to reduce early initiation of smoking and increase smoking cessation. Antitobacco campaigns should include television, radio and newspapers to spread anti-smoking messages. Price incentive initiatives can be effective in this country. Currently, the excise tax rate of tobacco is 33% in the Gambia; however, WHO has recommended 70% of taxation of retail tobacco price.³³ It is documented that increasing taxes reduced tobacco smoking in this country.³⁴ Increment revenue from tax can be allocated to implement smoking cessation support from primary care to tertiary hospitals and the community, and initiate free nicotine replacement therapy and quitline, which are still absent in the Gambia.²¹

Strengths and limitations

The major strength of this study is that it analysed data from the nationally representative survey, which included

both men and women aged between 15 and 49 years with a high response rate. It provided enough power to investigate the prevalence of and factors linked to tobacco smoking. Therefore, the findings are generalisable among the population aged 15–49 years old and in similar settings. In all analyses in this study, sample weight, cluster effect and complex sampling design were employed and generated with 95% CI with point estimates. It improves the precision of the results in this study. However, this study had a few limitations. A major limitation is that we drew the data from a cross-sectional study. The smoking habit of respondents could not be followed over a period due to the study design. Causal inferences could not be drawn. Another drawback is that the sample included men and women aged 15–49 years, which does not reflect the whole population of the Gambia. The findings might be underestimated as we found tobacco smoking increases with age; we can hypothesise that people aged >49 years would smoke more in this country who were not included in this study. Furthermore, this questionnaire-based and self-reporting data were gathered based on events; there is a risk of recall bias and bias owing to social stigma and norms. The findings may have selection bias as some participants did not respond or missed the complete interview.

CONCLUSIONS

The key findings from this paper are the prevalence of tobacco smoking and its determinants in the Gambia. Men, elderly people, manual workers, those with lesser education and people with lower wealth status were the most vulnerable to tobacco smoking. In addition to monitoring current tobacco use, policies and tailoring interventions, the government should launch a public awareness campaigns using different state-of-art platforms along with regular strategies focusing on the adverse effect of smoking and appropriate cessation support services focusing on those risk groups irrespective of their health status.

Twitter Md Shariful Islam @SharifulMI

Acknowledgements We thank the DHS program for permitting to use of the data for this study.

Contributors MSI conceptualised the study. MSI, MGR and HA contributed to the study design. NSM, ES and MF conducted the literature search. MSI analysed the data. MSI, MGR, DK and HA prepared the original draft. ANZU supervised the team. All authors revised the draft of the manuscript and approved the final version.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval We analysed the publicly available DHS dataset with the approval of the DHS programme. The DHS survey followed standardised data collection procedures. They received permission from the relevant authority's ethical review committees while conducting the primary study. According to the DHS, informed consent was taken from respondents/households who enrolled in the survey.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available in a public, open access repository. DHS data are available publicly. To use data, prior request explaining reason is required at <https://dhsprogram.com/data/available-datasets.cfm>.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iDs

Md Shariful Islam <http://orcid.org/0000-0002-3015-0830>

Md Golam Rabbani <http://orcid.org/0000-0003-3166-0397>

REFERENCES

- GBD 2019 Risk Factors Collaborators. Global burden of 87 risk factors in 204 countries and territories, 1990-2019: a systematic analysis for the global burden of disease study 2019. *Lancet* 2020;396:1223-49.
- Peto R, Lopez AD. *The future worldwide health effects of current smoking patterns*, 2004.
- Jha P. Avoidable global cancer deaths and total deaths from smoking. *Nat Rev Cancer* 2009;9:655-64.
- Peto R, Boreham J, Lopez AD. *Mortality from smoking in developed countries*. Oxford University Press, 1996.
- World Health Organization. Who report on the global tobacco epidemic, 2013: enforcing bans on tobacco advertising, promotion and sponsorship. World Health organization, 2013. Available: <https://www.who.int/publications-detail-redirect/9789241505871>
- Goodchild M, Nargis N, Tursan d'Espaignet E. Global economic cost of smoking-attributable diseases. *Tob Control* 2018;27:58-64.
- Reitsma MB, Kendrick PJ, Ababneh E. Spatial, temporal, and demographic patterns in prevalence of smoking tobacco use and attributable disease burden in 204 countries and territories, 1990-2019: a systematic analysis from the global burden of disease study 2019. *Lancet* 2021.
- Maritz GS, Mutemwa M. Tobacco smoking: patterns, health consequences for adults, and the long-term health of the offspring. *Glob J Health Sci* 2012;4:62.
- O'Keeffe LM, Taylor G, Huxley RR, et al. Smoking as a risk factor for lung cancer in women and men: a systematic review and meta-analysis. *BMJ Open* 2018;8:e021611.
- World Health Organization. Noncommunicable diseases country profiles 2018, 2018. Available: <https://apps.who.int/iris/handle/10665/274512>
- World Health Organization. *Ncd global monitoring framework*. Geneva: World Health Organization, 2011. <https://www.who.int/teams/ncds/surveillance/monitoring-capacity/gmf>
- Cham B, Scholes S, Groce NE, et al. Prevalence and predictors of smoking among Gambian men: a cross-sectional national who step survey. *Int J Environ Res Public Health* 2019;16:4719.
- Jallow IK, Britton J, Langley T. Prevalence and determinants of tobacco use among young people in the Gambia. *BMJ Glob Health* 2017;2:e000482.
- The Gambia Bureau of Statistics (GBoS) and ICF. The Gambia demographic and health survey 2019- 20, 2021. Available: <https://dhsprogram.com/publications/publication-FR369-DHS-Final-Reports.cfm>
- von Elm E, Altman DG, Egger M, et al. The strengthening of reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. *Ann Intern Med* 2007;147:573-7.
- Nketiah-Amponsah E, Afful-Mensah G, Ampaw S. Determinants of cigarette smoking and smoking intensity among adult males in Ghana. *BMC Public Health* 2018;18:1-10.
- Sreeramareddy CT, Pradhan PMS, Mir IA, et al. 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;12:1-16.
- Guliani H, Gamtessa S, Çule M. Factors affecting tobacco smoking in Ethiopia: evidence from the demographic and health surveys. *BMC Public Health* 2019;19:938.
- Tobacco Control Laws. Gambia details | tobacco control laws, 2021. Available: <https://www.tobaccocontrolaws.org/legislation/country/gambia/summary> [Accessed 14 Aug 2021].
- Chisha Z, Janneh ML, Ross H. Consumption of legal and illegal cigarettes in the Gambia. *Tob Control* 2020;29:s254-9.
- World Health Organization. Who report on the global tobacco epidemic, 2019: offer help to quit tobacco use. World Health organization, 2019. Available: <https://www.who.int/publications/i/item/9789241516204>
- Sreeramareddy CT, Pradhan PM, Sin S. Prevalence, distribution, and social determinants of tobacco use in 30 sub-Saharan African countries. *BMC Med* 2014;12:1-13.
- Handebo S, Birara S, Kassie A, et al. Smoking intensity and associated factors among male smokers in Ethiopia: further analysis of 2016 Ethiopian demographic and health survey. *Biomed Res Int* 2020;2020:1-7.
- Brathwaite R, Addo J, Smeeth L, et al. A systematic review of tobacco smoking prevalence and description of tobacco control strategies in sub-Saharan African countries; 2007 to 2014. *PLoS One* 2015;10:e0132401.
- Townsend L, Flisher AJ, Gilreath T, et al. A systematic literature review of tobacco use among adults 15 years and older in sub-Saharan Africa. *Drug Alcohol Depend* 2006;84:14-27.
- Pampel F. Tobacco use in sub-Saharan Africa: estimates from the demographic health surveys. *Soc Sci Med* 2008;66:1772-83.
- Siahpush M, McNeill A, Hammond D, et al. Socioeconomic and country variations in knowledge of health risks of tobacco smoking and toxic constituents of smoke: results from the 2002 international tobacco control (ITC) four country survey. *Tob Control* 2006;15 Suppl 3:iii65-70.
- Lopez AD, Collishaw NE, Piha T. A descriptive model of the cigarette epidemic in developed countries. *Tob Control* 1994;3:242-7.
- Bobak M, Jha P, Nguyen S. *Poverty and smoking*. Oxford University Press, 2000.
- Barbeau EM, Krieger N, Soobader M-J. Working class matters: socioeconomic disadvantage, race/ethnicity, gender, and smoking in NHIS 2000. *Am J Public Health* 2004;94:269-78.
- Galobardes B, Shaw M, Lawlor DA, et al. Indicators of socioeconomic position (Part 1). *J Epidemiol Community Health* 2006;60:7-12.
- The Gambia Bureau of Statistics (GBOS) and ICF International Health. The Gambia demographic and survey 2013, 2014. Available: <https://dhsprogram.com/publications/publication-fr289-dhs-final-reports.cfm>
- Yurekli AA. Economics of tobacco taxation toolkit. the world bank, 2018. Available: <https://www.worldbank.org/en/topic/health/publication/economics-of-tobacco-toolkit>
- Nargis N, Manneh Y, Krubally B, et al. How effective has tobacco Tax increase been in the Gambia? A case study of tobacco control. *BMJ Open* 2016;6:e010413.