Self-reported respiratory symptoms among students exposed to second hand smoke (SHS) in academic institutions in Gaborone: Implications for public health interventions

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ABSTRACT

INTRODUCTION Tobacco smoking and the resultant second hand smoke (SHS) are recognized risk factors for acute and chronic respiratory illness. Studies have reported an increasing smoking prevalence among university students across all levels of study. This study assessed SHS and self-reported respiratory symptoms among students in three academic institutions in Gaborone, Botswana.

METHODS A cross-sectional survey was carried out among students aged ≥18 years in three randomly selected universities in March 2019. Smoking status, exposure to SHS in the past 30 days and respiratory symptoms were assessed. Logistic regression was used to analyze respiratory symptoms among non-smoking students.

RESULTS Out of 450 students, current tobacco smoking was reported by 142 (32%) participants with males 97 (68%) smoking the most. Exposure to SHS was highest at school (417; 93%) followed by public places (402; 89%) and home (217; 48%). Non-smokers exposed to SHS were 1.6 times (OR=1.64; 95% CI: 1.35–1.99) more likely to experience respiratory symptoms and 1.9 times (AOR=1.91; 95% CI: 1.55–2.35) more likely to have headaches compared to non-smokers not exposed. Non-smokers were 3.6 times (AOR=3.58; 95% CI: 2.50–5.11) more likely to feel irritated by tobacco particles in a place or car within which someone previously smoked, than non-smokers not exposed.

CONCLUSIONS Exposure to SHS and self-reported respiratory symptoms are high. Non-smokers exposed to SHS were more likely to report respiratory symptoms and irritation compared to non-smokers not exposed. Further research is recommended to inform strengthening policies and strategies to reduce exposure to SHS in academic institutions.

INTRODUCTION

Tobacco smoke has been identified as a toxic mixture of chemicals that cause diseases such as lung cancer, heart diseases and other preventable serious ailments[1-3]. The burden of disease from second hand smoke (SHS) is estimated to contribute 0.7% of the total disease burden deaths due to ischemic heart disease, adult asthma, and lung cancer as well as deaths due to lower respiratory infections (LRI) among children particularly in low-income countries[4]. Exposure to tobacco before birth and postnatal SHS has been linked with poor cognition in children[5]. Studies have further suggested that adolescent cognition was associated with SHS exposure during adolescence[6]. This is a result of carbon monoxide in tobacco smoke binding with hemoglobin to form carboxyhemoglobin in the blood, therefore depleting oxygen supply to the brain and resulting in adverse effects on the brain[7]. Recent research continues to confirm the harmful effects of tobacco smoke on academic performance. Students

regularly exposed to tobacco smoke are more likely to report poor academic performance compared to students who are not exposed[8]. Exposure to tobacco smoke causes direct harm to non-smokers violating non-smoker's right to health and clean air.

The threat posed by tobacco use and exposure to tobacco smoke has compelled developed countries to strengthen legislation and policy on tobacco control to protect public health. In response to increased regulation in developed countries, the tobacco industry has shifted its attention to poorer developing regions in Africa, Asia, Eastern Europe, and Latin America[9,10] and Botswana has not been spared. There is an increasing market for tobacco products targeted at young children and the youth[11-13]. The World Health Organization (WHO) interprets the right to health to mean that governments must generate conditions in which everyone can be as healthy as possible. Governments, therefore, have a legal obligation to ensure that the public right to health is not deprived by the tobacco industry. This is only achievable through regulating the industry through enactment of appropriate policies and programs[14-16]. While many college students smoke, little is known about their exposure to passive smoking[17]. Even though we have not come across studies on tertiary students' exposure to passive smoke in Botswana, there is evidence that 78.9% of college students in Africa are exposed to passive smoking[18,19].

This study assessed the prevalence of smoking among university students, exposure to SHS and related respiratory symptoms among non-smoking students in three academic institutions in the City of Gaborone, Botswana. Further, the study assessed students' attitudes towards tobacco control policies in their respective institutions.

METHODS

This cross-sectional study was undertaken in three academic institutions in Gaborone, Botswana, in March 2019. A total of 450 randomly selected undergraduate students from the faculties of Business, Engineering and Technology, Humanities, Health Sciences and Social Sciences were invited to take part in the study. A self-administered questionnaire was used to collect data from students in each institution. Questionnaires were anonymously answered with consent sought from participants. The study obtained ethical clearance from the Ministry of Health and Wellness Review Board, and upon attainment of ethical clearance, permission to access the three institutions was sought from the respective university management departments.

To determine the validity of each question in the study protocol, a pilot study was carried out among 40 environmental health students who were later excluded from the main study. Demographic questions such as religion, nationality, program of study and marital status were deleted from the original questionnaire to reduce the length of the questionnaire. Further, a question to assess student satisfaction with policy implementation was added to the final questionnaire.

In recognition of the increasing co-use of marijuana and tobacco including marijuana use in tobacco products or smoked marijuana mixed with smokeless tobacco[20-22], current tobacco smoking was defined in this study as those who answered yes to the question: 'In the past 30 days, have you ever used any of tobacco products (e.g. cigarette, marijuana, etc.), even if it was just a puff?'.

To measure SHS exposure, participants were asked the question: 'In the past 30 days, how often do you get exposed to tobacco smoke at home, in the school and other public areas such as bars, restaurants, etc.'. The responses for each question were then categorized into: never, 1–6, 7–14, 15–20 and >20 days. Respiratory symptoms experienced due to exposure to other people's exposure to tobacco smoke were measured by asking questions: 'Have you ever coughed or experienced flu-like symptoms after exposure to smoke from other people's cigarettes?', and 'Have you ever had headaches after exposure to smoke from other people's cigarettes?'.

We used SPSS version 27 to analyze the data. Prevalence of SHS exposure at home, school and public places as separate and combined variables were calculated. Descriptive results were expressed as frequency (n), percentage (%), and mean with standard deviation (SD). Logistic regression was used to estimate the likelihood that a student was exposed to SHS and to obtain adjusted odds ratios (AORs) of respiratory symptoms for exposure to SHS in non-smoking students exposed, and non-smoking students not exposed.

RESULTS

Demographic characteristics

A total of 450 undergraduate students participated in the study with 226 (50.2%) males. The mean age of students was 21.3 years (SD=2.6). About two-thirds of students lived off campus. Most students were in the Faculties of Business (28%) and Engineering and Technology (27.6%), with Faculty of Social Sciences having the smallest representation of 11% (Table 1).

Prevalence of current tobacco use

In all, 142 students (32%) were current tobacco smokers (Table 2). Out of these, 97 (68%) were males. Current tobacco smoking was more prevalent among students in year three (30.3%) followed by students studying Humanities (23.2%). More students living off campus (58.5%) were current smokers than those living on campus (41%). Health Sciences students reported the least current tobacco use (4.9%).

Tobacco smoke exposure in public places, the home, and school environment

Overall, exposure to SHS among males and females on any number of days was reported at school (417; 93%) followed by public places and the home environment with 402 (89%)

and 217 (48%), respectively. Only 33 (7%) of students reported having never been exposed to SHS in public places, the school or home environments. Table 3 shows that out of the 417 SHS exposed students, most (170; 41%) reported exposure for >20 days in the school environment and public places (155; 37.2%). Exposure to SHS for 1–6 days in the last month among males and females was 109 (24%), 105 (25%) and 103 (25%) in the school environment, at home and in public places, respectively.

Of the 170 students reporting exposure to SHS for >20 days, 104 (61%) resided off campus compared to 66 (39%) residing on campus. Out of the 417 (93%) students who reported exposure to SHS on any number of days whilst on the school environment, 120 (29%) were from the Faculty of Engineering and Technology, followed by Business at 115 (28%) and Humanities at 82 (20%). The least exposure was reported by students from the Faculty of Social Sciences (47; 11%).

Self-reported effects of SHS exposure on non-smokers

Table 4 shows that students who did not smoke were 1.6 times more likely to have ever coughed or experienced flu-like symptoms after exposure to smoke from other people's cigarettes compared to other non-smokers who were not exposed (AOR=1.64; 95% CI: 1.35–1.99, p<0.001). Non-smokers were also 1.9 times more likely to have headaches

Table 1. Demographic characteristics of the study population (N=450)

Characteristics	n	%
Gender		
Male	226	50.2
Female	224	49.8
Faculty		
Business	126	28.0
Engineering and Technology	124	27.6
Humanities	88	19.6
Health Sciences	62	13.6
Social Sciences	50	11.1
Level of study		
Year 1	109	24.2
Year 2	105	23.3
Year 3	111	24.7
Year 4	125	27.8
Residence		
Off campus	283	62.9
On campus	167	37.1

Table 2. Prevalence of current tobacco use among students (N=450)

Characteristics	Current tobacco use		Total (n=450)
	Yes (n=142)	No (n=308)	
	n (%)	n (%)	n (%)
Gender			
Male	97 (68.3)	129 (41.9)	226 (50.2)
Female	45 (31.7)	179 (58.1)	224 (49.8)
Total	142 (100)	308 (100)	450 (100)
Faculty			
Business	44 (31.0)	82 (26.5)	126 (28.0)
Engineering and Technology	43 (30.3)	81 (26.3)	124 (27.5)
Health Sciences	7 (4.9)	55 (17.9)	62 (13.8)
Humanities	33 (23.2)	55 (17.9)	88 (19.6)
Social Sciences	15 (10.6)	35 (11.4)	50 (11.1)
Residence			
On campus	59 (41.5)	108 (35.1)	167 (37.1)
Off campus	83 (58.9)	200 (64.9)	283 (62.9)
Level of study			
Year 1	32 (22.5)	77 (25.0)	109 (24.2)
Year 2	31 (21.8)	74 (24.0)	105 (23.3)
Year 3	43 (30.3)	68 (22.1)	111 (24.7)
Year 4	36 (25.4)	89 (28.9)	125 (27.8)

after exposure to smoke from other people's cigarettes compared to non-smokers who were not exposed (AOR=1.91; 95% CI: 1.55–2.35, p<0.001). In addition, non-smokers were 3.6 times more likely to feel irritated by the tobacco particles they could inhale in a place or car in which someone previously smoked, compared to other non-smokers not exposed (AOR=3.58; 95% CI: 2.50–5.11, p<0.001).

Self-reported effects of SHS exposure on smokers

Table 4 shows that smokers were 38% less likely to report that they ever coughed or experienced flu-like symptoms after exposure to smoke from other people's cigarettes compared to smokers who were not exposed to smoke from other people's cigarettes (AOR=0.62; 95% CI: 0.49–0.77, p<0.001). Smokers were 43% less likely to report having

Table 3. Current exposure to SHS in public places, the home and school environment (N=450)

Characteristics	Current exposure to tobacco smoke (days)				
	Never	1–6	7–14	15–20	>20
	n (%)	n (%)	n (%)	n (%)	n (%)
Public places					
Gender					
Male	15 (31.2)	54 (52.4)	35 (51.5)	44 (57.9)	78 (50.3)
Female	33 (68.8)	49 (47.6)	33 (48.5)	32 (42.1)	77 (49.7)
Total	48 (100)	103 (100)	68 (100)	76 (100)	155 (100)
Home environment					
Gender					
Male	112 (48.1)	50 (47.6)	28 (62.2)	6 (46.2)	30 (55.6)
Female	121 (51.9)	55 (52.4)	17 (37.8)	7 (53.8)	24 (44.4)
Total	233 (100)	105 (100)	45 (100)	13 (100)	54 (100)
At school					
Gender					
Male	12 (36.4)	52 (47.7)	38 (50.0)	39 (62.9)	85 (50.0)
Female	21 (63.6)	57 (52.3)	38 (50.0)	23 37.1)	85 (50.0)
Total	33 (100)	109 (100)	76 (100)	62 (100)	170 (100)
Faculty					
Business	11 (33.3)	32 (29.4)	18 (23.7)	11 (17.7)	54 (31.8)
Engineering and Technology	4 (12.1)	36 (33.0)	23 (30.3)	16 (25.8)	45 (26.5)
Health Sciences	9 27.3)	13 (12.0)	15 (19.7)	14 (22.6)	11 (6.5)
Humanities	6 (18.2)	14 (12.8)	13 (17.1)	16 (25.8)	39 (22.9)
Social Sciences	3 (9.1)	14 (12.8)	7 (9.2)	5 (8.1)	21 (12.3)
Total	33 (100)	109 (100)	76 (100)	62 (100)	170 (100)
Residence					
On campus	17 (48.5)	29 (26.6)	25 (32.9)	30 (48.4)	66 (38.8)
Off campus	16 (51.5)	80 (73.4)	51 (67.1)	32 51.6)	104 (61.2)
Total	33 (100)	109 (100)	76 (100)	62 (100)	170 (100)
Level of study					
Year 1	7 (21.2)	34 (31.2)	14 (18.4)	10 (16.2)	44 (25.9)
Year 2	5 (15.2)	32 (29.3)	14 (18.4)	11 (17.7)	43 (25.3)
Year 3	9 (27.3)	21 (19.3)	16 (21.1)	18 (29.0)	47 (27.6)
Year 4	12 (36.3)	22 (20.1)	32 (42.1)	23 (37.1)	36 (21.2)
Total	33 (100)	109 (100)	76 (100)	62 (100)	170 (100)

Table 4. Relationship between self-reported respiratory symptoms and exposure to SHS among non-smokers and smokers

Risk factors	Non-smokers		Smokers	
	AOR (95% CI)	p	AOR (95% CI)	p
Coughed or experienced flu-like symptoms				
Exposed to SHS	1.64 (1.35–1.99)	0.001	0.62 (0.49–0.77)	0.001
Not exposed (Ref.)	1		1	
Have headaches				
Exposed to SHS	1.91 (1.55–2.35)	0.001	0.57 (0.46–0.71)	0.001
Not exposed (Ref.)	1		1	
Feel irritated				
Exposed to SHS	3.58 (2.50–5.11)	0.001	0.65 (0.56–0.75)	0.001
Not exposed (Ref.)	1		1	

headaches after exposure to smoke from other people's cigarettes compared to smokers who were not exposed (AOR=0.57; 95% CI: 0.46–0.71, p<0.001). In addition, smokers were 35% less likely to report feeling irritated by the tobacco particles they could inhale in a place or car in which someone previously smoked, compared to smokers not exposed (AOR=0.65; 95% CI: 0.56–0.75, p<0.001).

Further analysis showed that students who stayed on campus were 35% less likely to have ever coughed or experienced flu-like symptoms after exposure to tobacco smoke from other people's cigarettes than those who stayed off campus (AOR=0.65; 95% CI: 0.44–0.96, p<0.05). Students staying off campus were 1.5 times more likely to have ever coughed or experienced flu-like symptoms after exposure to smoke from other people's cigarettes (AOR=1.53; 95% CI: 1.04–2.26, p<0.05).

Student views and perspectives on exposure to tobacco smoke and anti-smoking policies on campus

The Supplementary file table reports student views on exposure to SHS. Most (321; 71%) students believed that exposure to SHS may increase their chance of developing cancer, with the majority of female students having this view (167; 75%). About a quarter (26%) did not know if SHS may or may not increase their chance of developing cancer. Both males (43%) and females (39%) did not know if SHS exposure may affect their academic performance.

A total of 215 students (48%) reported that their schools have anti-smoking policies. On the other hand, 203 (45%) reported that they were not satisfied with the enforcement of anti-smoking policies in their institutions, with only 16% (75) reporting that they were very satisfied. Over 50% (252) of students would support a total ban on smoking in their school premises.

Students who smoke were 93% less likely to support a smoke-free campus than non-smokers (AOR=0.067; 95% CI: 0.040–0.11, p<0.001). Alcohol drinkers were 81% less likely to support a smoke-free campus than non-alcohol drinkers (AOR=0.19; 95% CI: 0.13–0.29, p<0.001).

DISCUSSION

Increasingly, research continues to show that exposure to SHS places the public at increased risk for premature death, ill-health, and many other undesirable effects[1-3]. Worldwide, over 40% of men smoke tobacco. On the other hand, approximately 44% of youths are exposed to tobacco smoke at home and 47% are reported to have at least one parent who smokes[23]. This study assessed SHS exposure in three academic institutions in Botswana. Our findings revealed that 32% of students were current smokers, almost twice the national prevalence of 17.6% among adults aged ≥15 years currently using tobacco[24] and in studies elsewhere[25-27]. Our results are, however, similar to more recent studies where the prevalence of smoking among medical students ranged from 28% in Germany to 31% in Italy[28]. Our study also has similarities with a study carried out among university students in Jordan where current smoking was reported at 35% with more males than females smoking[29]. Young adults elsewhere have previously been reported to smoke at rates higher than any other age group[30] because of the aggressive marketing tactics for tobacco products by the tobacco industry[31].

Our findings revealed an alarmingly high prevalence of SHS exposure in the school environment compared to public places and the home environment. The findings are slightly higher than those of Wolfson et al.[17] who found that 83% of students were exposed to SHS in the past seven days.

Most students believe exposure to SHS may increase their chance of developing cancer. However, a significant number of students did not know. This is a cause for concern as more students may stay around smokers therefore increasing their exposure to harmful tobacco smoke. Even more concerning

is that a large proportion of students did not know SHS exposure may affect their academic performance. One study found that students exposed to SHS at home for 1–4 and 5–7 days a week were 14% and 28% more likely to report poor academic performance, respectively, compared to students who were not exposed to SHS[8]. It is crucial therefore, that academic institutions invest in awareness-raising initiatives on the harms caused by exposure to tobacco moke. It is further proven that SHS exposure during adolescence affects cognitive abilities[6] and academic performance[8,29,32]. Exposure to SHS causes direct harm to non-smokers violating non-smokers' right to health and clean air. Almost half the students in our study reported that they were not satisfied with the enforcement of anti-smoking policies in their schools, with <20% reporting that they were very satisfied.

This study revealed that more than half of respondents would support a smoking ban especially non-smokers and females. This was similar to the findings of other studies[33,34], which concluded that non-smokers and females were the strongest supporters for a complete ban on smoking in universities. In contrast, one study found a large number of smokers in support of a smoking ban in universities[33]. The variance may be due to the difference in samples, as their study sample included staff and students.

The school environment is the primary source of exposure for tertiary students followed by public areas. Students' right to health and clean air is compromised. There is strong support for a smoke-free policy by students in line with the developing trends elsewhere[35,36]. We recommend the promotion of culturally tailored programs targeting especially males and non-smokers to prevent tobacco use.

Limitations

This study has limitations. First, it relied on self-report and therefore, respondents may not recall their behaviors accurately, like in all other self-report studies. Further, we acknowledge that some of the questions in the study assessing the relationship between self-reported respiratory symptoms and exposure to SHS could be seen as 'leading questions', and therefore could have been quantified independently from SHS. The definition of 'current tobacco smoking' in our study included marijuana. There is a developing trend showing that smokers often use marijuana in combination with cigarettes, e-cigarettes, and smokeless tobacco[20-22]. Further research should analyze different exposures independently, for a better understanding of the different impacts.

CONCLUSIONS

The high prevalence of smoking among students calls for the urgent provision of smoking cessation and treatment programs in academic institutions. The creation of smoke-free campuses as well as enforcement of such policies is urgently needed to protect the health of all students and preserve their right to health and life. The findings in our study support the creation of public initiatives to support the enforcement of smoking restriction. However, enforcement efforts must be coupled with smoking cessation programs that would promote a smoke-free environment for the benefit of the whole population.

REFERENCES

1. Jha P. Avoidable global cancer deaths and total deaths from smoking. Nat Rev Cancer. 2009;9(9):655-664. doi:10.1038/nrc2703
2. Samet JM. Tobacco smoking: the leading cause of preventable disease worldwide. Thorac Surg Clin. 2013;23(2):103-112. doi:10.1016/j.thorsurg.2013.01.009
3. Delamothe T. Deaths from smoking: the avoidable holocaust. BMJ. 2012;344:e2029. Accessed December 18, 2022. https://www.bmj.com/bmj/section-pdf/187484?path=/bmj/344/7848/Observations.full.pdf
4. Öberg M, Woodward A, Jaakkola MS, Peruga A, Prüss-Üstün A. Global estimate of the burden of disease from second-hand smoke. World Health Organization; 2010. Accessed December 18, 2022. https://apps.who.int/iris/bitstream/handle/10665/44426/9789241564076_eng.pdf?sequence=1&isAllowed=y
5. Herrmann M, King K, Weitzman M. Prenatal tobacco smoke and postnatal secondhand smoke exposure and child neurodevelopment. Curr Opin Pediatr. 2008;20(2):184-190. doi:10.1097/MOP.0b013e3282f56165
6. Collins BN, Wileyto EP, Murphy MF, Munafò MR. Adolescent second hand smoke exposure predicts academic achievement test failure. J Adolesc Health. 2007;41(4):363-370. doi:10.1016/j.jadohealth.2007.04.010
7. Bauman KE, Flewelling RL, LaPrelle J. Parental cigarette smoking and cognitive performance of children. Health Psychol. 1991;10(4):282-288. doi:10.1037//0278-6133.10.4.282
8. Ho SY, Lai HK, Wang MP, Lam TH. Exposure to secondhand smoke and academic performance in non-smoking adolescents. J Pediatr. 2010;157(6):1012-1017.e1. doi:10.1016/j.jpeds.2010.06.013
9. Bollyky TJ, Gostin LO. The United States' engagement in global tobacco control: proposals for comprehensive funding and strategies. JAMA. 2010;304(23):2637-2638. doi:10.1001/jama.2010.1842
10. Gostin LO. The "tobacco wars"--global litigation strategies. JAMA. 2007;298(21):2537-2539. doi:10.1001/jama.298.21.2537
11. Mbongwe B, Tapera R, Phaladze N, Lord A, Zetola NM. Predictors of smoking among primary and secondary school students in Botswana. PLoS One. 2017;12(4):e0175640. doi:10.1371/journal.pone.0175640
12. Mbongwe B. A brief overview of the tobacco industry in the last 20 years. Invited commentary. Tob Control. 2012;21(2):94-95. doi:10.1136/tobaccocontrol-2012-050437
13. World Health Organization. WHO report on the global tobacco epidemic 2019: offer help to quit tobacco use. WHO; 2019. Accessed December 18, 2022. https://www.who.int/publications/i/item/9789241516204

14. van der Eijk Y, Porter G. Human rights and ethical considerations for a tobacco-free generation. Tob Control. 2015;24(3):238-242. doi:10.1136/tobaccocontrol-2013-051125
15. Legislating abjection? Secondhand smoke, tobacco control policy and the public's health. In: Bell K, McNaughton D, Salmon A, eds. Alcohol, Tobacco and Obesity: Morality, Mortality and the New Public Health. Routledge; 2012:84-100.
16. Cabrera OA, Gostin LO. Human rights and the Framework Convention on Tobacco Control: mutually reinforcing systems. International Journal of Law in Context. 2011;7(3):285-303. doi:10.1017/S1744552311000139
17. Wolfson M, McCoy TP, Sutfin EL. College students' exposure to secondhand smoke. Nicotine Tob Res. 2009;11(8):977-984. doi:10.1093/ntr/ntp100
18. Alanazi A, Al Enezi F, Alqahtani MM, et al. Effects of passive smoking on students at College of Applied Medical Sciences, King Saud Bin Abdulaziz University for Health Sciences, Riyadh. J Nat Sci Biol Med. 2015;6(1):100-105. doi:10.4103/0976-9668.149100
19. Omaduvie U, Adisa A. Exposure to Secondhand Smoke in the Home and Public areas among Adolescents in Abuja, Nigeria: Tobacco control implications. Tobacco Prevention & Cessation. 2015;1(December):8. doi:10.18332/tpc/61178
20. Tucker JS, Rodriguez A, Dunbar MS, et al. Cannabis and tobacco use and co-use: Trajectories and correlates from early adolescence to emerging adulthood. Drug Alcohol Depend. 2019;204:107499. doi:10.1016/j.drugalcdep.2019.06.004
21. Schauer GL, Hall CD, Berg CJ, Donovan DM, Windle M, Kegler MC. Differences in the relationship of marijuana and tobacco by frequency of use: A qualitative study with adults aged 18-34 years. Psychol Addict Behav. 2016;30(3):406-414. doi:10.1037/adb0000172
22. Sumbe A, Wilkinson AV, Clendennen SL, et al. Association of tobacco and marijuana use with symptoms of depression and anxiety among adolescents and young adults in Texas. Tob Prev Cessat. 2022;8(January):03. doi:10.18332/tpc/144500
23. GTSS Collaborative Group. A cross country comparison of exposure to secondhand smoke among youth. Tob Control. 2006;15 Suppl 2(Suppl 2):ii4-ii19. doi:10.1136/tc.2006.015685
24. World Health Organization. Global Tobacco Adult Survey, Fact Sheet Botswana 2017. WHO; 2018. Accessed December 18, 2022. https://www.afro.who.int/sites/default/files/2019-01/Botswana_GATS_2017_FactSheet_Final.pdf
25. Warren CW, Jones NR, Eriksen MP, Asma S; Global Tobacco Surveillance System (GTSS) collaborative group. Patterns of global tobacco use in young people and implications for future chronic disease burden in adults. Lancet. 2006;367(9512):749-753. doi:10.1016/S0140-6736(06)68192-0
26. Steptoe A, Wardle J, Cui W, et al. An international comparison of tobacco smoking, beliefs and risk awareness in university students from 23 countries. Addiction. 2002;97(12):1561-1571. doi:10.1046/j.1360-0443.2002.00269.x
27. Merdad LA, Al-Zahrani MS, Farsi JM. Smoking habits among Saudi female university students: prevalence, influencing factors and risk awareness. Ann Saudi Med. 2007;27(5):366-369. doi:10.5144/0256-4947.2007.366
28. La Torre G, Kirch W, Bes-Rastrollo M, et al. Tobacco use among medical students in Europe: results of a multicentre study using the Global Health Professions Student Survey. Public Health. 2012;126(2):159-164. doi:10.1016/j.puhe.2011.10.009
29. Khader YS, Alsadi AA. Smoking habits among university students in Jordan: prevalence and associated factors. East Mediterr Health J. 2008;14(4):897-904.
30. National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health. Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General. Centers for Disease Control and Prevention (US); 2012. Accessed December 18, 2022. https://www.ncbi.nlm.nih.gov/books/NBK99237/
31. Ling PM, Glantz SA. Why and how the tobacco industry sells cigarettes to young adults: evidence from industry documents. Am J Public Health. 2002;92(6):908-916. doi:10.2105/ajph.92.6.908
32. Saatci E, Inan S, Bozdemir N, Akpinar E, Ergun G. Predictors of smoking behavior of first year university students: questionnaire survey. Croat Med J. 2004;45(1):76-79.
33. Polacek GN, Atkins JL. Smoking Behavior, Attitudes of Second-Hand Smoke, and No-Smoking Policies on a University Campus. Health Educator. 2008;40(1):37-45.
34. Martínez C, Méndez C, Sánchez M, Martínez-Sánchez JM. Attitudes of students of a health sciences university towards the extension of smoke-free policies at the university campuses of Barcelona (Spain). Gac Sanit. 2017;31(2):132-138. doi:10.1016/j.gaceta.2016.08.009
35. Burns S, Jancey J, Bowser N, et al. "Moving forward: a cross sectional baseline study of staff and student attitudes towards a totally smoke free university campus". BMC Public Health. 2013;13(1):738. doi:10.1186/1471-2458-13-738
36. Bardus M, El Boukhari N, Nakkash R. Development and evaluation of smoke-free or tobacco-free policies in university settings: a systematic scoping review. Health Educ Res. 2020;35(4):306-351. doi:10.1093/her/cyaa009

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The authors have each completed and submitted an ICMJE form for disclosure of potential conflicts of interest. The authors declare that they have no competing interests, financial or otherwise, related to the current work.

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This study was approved by the Ministry of Health and Wellness Review Board (Approval number: HPDME:13/18/1; Date: 30 January 2019). Upon attainment of ethical clearance, permission to access the three institutions was sought from the respective university management departments. Participants provided informed consent.

DATA AVAILABILITY
The data supporting this research can be found in the Article appendix or supplementary content.

AUTHORS' CONTRIBUTIONS
BM and MN contributed to the research concept and design. MN and TM contributed to the collection and/or assembly of data. MN, RT and TM contributed to data analysis and interpretation. BM and MN contributed to the writing of the manuscript. PN, RT, BML and TT contributed to the critical review of the manuscript. All authors contributed to the final approval of the manuscript.

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