

Prevalence and intensity of smoking among healthcare workers and their attitude and behavior towards smoking cessation in the western region of Saudi Arabia: A Cross-sectional study

Hashim A. Mahdi¹, Soha A. Elmorsy², Lojain A. Melebari³, Shrooq M. Al-Masudi³, Dina A. Sharbin³, Abrar G. Najjar³, Alaa M. Al-talhi³

ABSTRACT

INTRODUCTION This study aimed to estimate the magnitude of tobacco smoking among healthcare workers (HCWs) and to assess the need to establish a smoking cessation program.

METHODS This is an institute survey that targeted HCWs from the following specialties: physicians, allied healthcare professionals and administrative workers who are affiliated to a tertiary healthcare institution in the western region of the Kingdom of Saudi Arabia (KSA). An electronic self-administrated questionnaire was distributed among the study subjects during the day shift from June to September, 2015. The analysis was descriptive, and comparison of the characters of smokers and non-smokers was done.

RESULTS The total number of participating HCWs was 697 with about 62.3% response rate. Males (62.3%), allied health professionals (45.2%), and age group 19–30 years old (44.5%) dominated the sample. The crude prevalence of the current smoking was 18.4%, while 9.8% were past smokers, and 71.9% never smokers. Administrative workers, males and Saudis demonstrated significantly higher prevalence of current smoking ($p > 0.001$). Approximately half of the current smokers had a mild smoking intensity and the subgroups did not show any significant differences for nicotine dependence ($p > 0.05$). The results of the attitude towards smoking cessation showed that 80.3% of the currently smoking HCWs had positive attitudes and there were no statistically significant differences based on the characteristics of the participants ($p > 0.05$).

CONCLUSIONS The smoking prevalence among HCWs included in the study parallels nationally reported values. The results showed a need for the establishment of smoking cessation programs targeting HCWs, which eventually should make Mecca (Makkah) city truly free from smoking.

AFFILIATION

¹ Saudi Electronic University, Jeddah, Saudi Arabia

² King Abdullah Medical City, Mecca, Saudi Arabia

³ College of Medicine, Umm Al-Qura University, Mecca, Saudi Arabia

CORRESPONDENCE TO

Hashim A. Mahdi. Saudi Electronic University, 2624 Rayhanat Al Jazirah, Al Faisaliyyah, Jeddah 23442, Saudi Arabia. Email: h.mahdi@seu.edu.sa

KEYWORDS

smoking, healthcare workers, smoking cessation, smoking intensity

Received: 19 April 2018

Revised: 1 July 2018

Accepted: 21 July 2018

INTRODUCTION

Smoking is a major public health problem that affects people's health and social and economic life. Smoking is responsible for many fatal diseases, such as cardiovascular diseases, respiratory diseases and cancer¹. According to the World Health Organization (WHO), the estimated global prevalence of smoking

is 21% among the population aged above 15 years old². In the Kingdom of Saudi Arabia (KSA), according to a current national survey, the estimated overall prevalence of active smoking ranges from 2.4% to 52.3% (median 17.5%)³.

The smoking habit is prevalent among healthcare workers (HCWs) despite the fact that they are the

frontline of healthcare provision and that they are expected to contribute to solve this public issue⁴. In Arab countries, some studies measured the prevalence of smoking among HCWs and some of these countries showed higher percentages of smokers in the healthcare sectors compared to others⁵⁻⁹. In the KSA, the overall prevalence of smoking among HCWs ranges from 15 to 34%. Studies have been conducted in different regions in the Kingdom to assess the situation. In the central region, Saeed et al.¹⁹ studied the smoking habit among physicians, and found that the prevalence of smoking was 34%. In the south-western region of the country, the overall prevalence of tobacco use was 26.3%¹⁰. A recent cross-sectional study conducted in Najran Armed Forces Hospital concluded that the overall prevalence of tobacco use among medical and paramedical staff was 21.1%¹¹. Another study done in the eastern region revealed that 15.1% of healthcare providers were smokers¹².

Healthcare providers are considered community leaders and role models for their patients as well as for the general population. The nature of their job exposes them to substantial numbers of the public who they can inspire to change their smoking behavior⁴. The smoking habit among healthcare givers may also affect their intention to advise others to quit smoking. Thus, a smoking cessation program that targets HCWs may play a crucial role in decreasing tobacco consumption in the public context.

To the best of our knowledge, there are few studies that addressed the prevalence of smoking among healthcare workers in Makkah Governorate region^{13,14}. This study aims to estimate the prevalence of smoking among HCWs of a tertiary healthcare institution in the western region of the KSA. In addition, it evaluates the participants' intensity of smoking and their behavior and attitude towards smoking cessation.

METHODS

This is an institute survey that targeted HCWs of a public tertiary healthcare organization in Makkah city. The staff from the following sectors of service were included: physicians, allied healthcare professionals (nurses, pharmacists, physiotherapists etc.) and administrative workers. All those who

were accessible during the data collection period were invited with no gender or age restriction. A list of all employees was requested from the Human Resources (HR) Department after ethical approval of the study was obtained from the Institutional Review Board (IRB) of the King Abdullah Medical City. Epi Info 7 was used to calculate the sample size, assuming a smoking prevalence of around 34%, as in the study by Saeed et al., with a 95% precision limit of 6%. We needed a sample of 239 for all categories of participants. The ratio of physicians to allied healthcare workers to administrative workers was 5:16:7. It was decided to stratify the sample in order to respect this ratio. The lists obtained from the HR were numbered in the same order supplied and a randomization website was used to pick a random sample from each profession category. To replace those who were chosen but were not available, the process was repeated, ignoring those who had already been approached.

An electronic self-administered questionnaire was distributed among the study subjects during the day shift from June to September, 2015. The questionnaire was designed as a Google form and the participants were asked to fill it in on tablet computers. The questionnaire was modified from the Global Health Professional Survey that was originally developed by the WHO/CDC¹⁵ and the Fagerström test for Nicotine Dependence (FTND)¹⁶. In addition, the literature was consulted and other questions were added.

The questionnaire consisted of 26 questions to capture the following:

1. *Participants' demographics*, which included age, gender, nationality, educational level, profession and work shift.
2. *Participants' smoking status*, with current smokers defined as those who smoked at least 100 cigarettes in their lifetime and who, at the time of survey, smoked either every day or on some days. Respondents who reported smoking at least 100 cigarettes in their lifetime, and who at the time of the survey did not smoke at all, were defined as former smokers. Respondents who reported never having smoked 100 cigarettes were defined as never smokers¹⁷. To estimate the per cent prevalence of smoking, the following equation

was used: (Current smokers/Total sample)x100. Prevalence results were weighted according to the ratio of physicians to allied healthcare professionals to administrative workers.

3. *Participants' nicotine dependence*, or smoking intensity, to assess the participants' nicotine dependence, a scoring system from the FTND was used where the total score was divided into three equal categories: score 0–3 indicates low nicotine dependence, score 4–6 indicates medium, and score 7–10 indicates high dependence.
4. *Participants' behavior and attitude*, towards smoking cessation and their opinions about the role of HCWs. To measure this, questionnaire items were analyzed individually and a total score was reported. The maximum total attitude score was 8 and it was divided into 3 levels: negative attitude (score 0–3), indifferent (score of 4), and positive attitude (score 5–8)¹⁸.

All the subjects were informed about the study by a cover sheet before completing the survey. Participation in the study was voluntary and all the information was anonymous and confidential.

Statistical Package for the Social Sciences (SPSS) Version 21.0 was used for data coding, validation and analysis. Categorical variables were presented as frequencies and percentages whereas continuous data were expressed as mean ± standard deviation. Categorical data were compared using chi-squared test, while numeric data were compared using ANOVA if normally distributed, and Kruskal-Wallis test or Mann Whitney test if not normally distributed. A p<0.05 was considered to indicate statistical significance, and all alpha values were two sided. For analysis purposes, age was categorized into three groups (19–30, 31–40, and >40 years).

RESULTS

A total of 697 HCWs participated in the survey. The response rate was 62.3%. Table 1 shows that about half (45.2%) of the sample of 313 consisted of allied health professionals, while the physicians and the administrative workers were 179 (25.8%) and 201 (29%), respectively. Participants 19–30 years old were the most prevalent age group (44.5%). Males were more than females (62.3% vs 37.7%, respectively). The crude prevalence of current smoking in the sample was 18.4% but was weighted

Table 1. General characteristics of study participants and distribution of smokers and non-smokers

Characteristics	N (%)	Current smoker N(%)		p
		Yes	No	
Total	697 (100)	139 (19.9)	558 (80.1)	
Profession				
Physician	179 (25.8)	19 (10.6)	160 (89.4)	>0.001*
Allied Health	313 (45.2)	58 (18.5)	255 (81.5)	
Administrative	201 (29.0)	61 (30.3)	140 (69.7)	
Age, years				
19–30	310 (44.5)	63 (20.3)	247 (79.7)	0.124
31–40	290 (41.7)	64 (22.1)	226 (77.9)	
≥ 41	96 (13.8)	12 (12.5)	84 (87.5)	
Gender				
Male	434 (62.3)	120 (27.6)	314 (72.4)	>0.001*
Female	263 (37.7)	19 (7.2)	244 (92.8)	
Nationality				
Saudi	318 (45.6)	97 (30.5)	221 (69.5)	>0.001*
Non-Saudi	379 (54.4)	42 (11.1)	337 (88.9)	
Education				
Undergraduate	411 (59.2)	91 (22.1)	320 (77.9)	0.094
Postgraduate	283 (40.8)	48 (17.0)	235 (83.0)	
Work shift				
Yes	274 (39.3)	56 (20.4)	218 (79.6)	0.792
No	423 (60.7)	83 (19.6)	340 (80.4)	

*Statistically significant

for job category to become 20.1%. Former smoking was reported for 9.8%, while 71.9% of respondents had never smoked. The prevalence of current smoking is shown to be significantly higher among administrative workers, males and Saudis (30.3%, 27.6% and 30.5%, respectively, p<0.001). There were no significant differences based on educational level, shifts, or age, with p-values of 0.094, 0.792 and 0.124, respectively.

Regarding the nicotine dependence level among current smokers, the results showed that about half (46.9%) of current smokers had low nicotine dependence level, whereas only 12.8% had a severe level of nicotine dependence (Table 2). In general, there were no significant differences in nicotine dependence among the subgroups. The percentage of high nicotine dependence was higher for age 31–40 years, those who had no night shifts, who worked as administrative workers, and with postgraduate educational degrees.

It was found that 80.3% of the smoking HCWs in the study had a positive attitude towards smoking

Table 2. The nicotine dependence level among current smokers

Characteristics	Mild	Moderate	Severe	p
	N (%)	N (%)	N (%)	
Total = 137	6 (12.8)	55 (40.3)	64 (46.9)	
Profession				
Physician	4 (33.3)	7 (58.3)	6 (8.3)	0.707
Allied Health	24 (47.1)	17 (33.3)	6 (8.1)	
Administrative	36 (48.6)	32 (43.2)	10 (19.6)	
Age, years				
19–30	33 (48.4)	29 (47.6)	6 (8.8)	0.631
31–40	28 (46.7)	22 (36.7)	10 (16.6)	
≥ 41	3 (33.3)	5 (56.5)	1 (11.1)	
Gender				
Male	52 (43.7)	51 (42.9)	13 (13.4)	0.180
Female	12 (66.7)	4 (22.2)	5 (11.1)	
Nationality				
Saudi	44 (46.3)	38 (40.0)	13 (13.7)	0.617
Non-Saudi	20 (47.6)	17 (40.5)	5 (11.9)	
Education				
Undergraduate	48 (51.1)	38 (40.4)	8 (8.5)	0.050
Postgraduate	16 (38.1)	17 (40.5)	9 (21.4)	
Work shift				
Yes	25 (41.7)	30 (50.0)	5 (8.3)	0.405
No	39 (50.6)	25 (37.5)	13 (16.9)	

cessation, 12.4% were indifferent, and only 7.3% had a negative attitude. There were no statistically significant differences among the categories of age, gender, nationality, profession and shift, with regards to attitude towards smoking cessation ($p>0.05$).

Tables 3 and 4 show the attitude and behavior of HCWs towards smoking cessation programs and their opinions about the role of HCWs. Percentages of ‘yes’ answers reflect a positive attitude and behavior. Seventy-one percent of smokers agreed that health professionals serve as role models for their patients and the public. A substantial percentage (88.9%) of smokers realize that healthcare professionals have a role in giving advice or information about smoking cessation to patients. The majority of smokers (76.6%) believe that a patient’s chances of quitting smoking are increased when a healthcare professional advises him or her to quit. Only 56% of smokers think that smoking should be banned in healthcare organizations, and Saudis were more in favor with the banning than non-Saudis (61.1% vs 42.1%, $p<0.001$).

A large percentage of participants (86.5%) thought that healthcare facilities should establish

Table 3. Responses to individual attitude questionnaire items by participants’ characteristics

Characteristics	Number of those who answered ‘Yes’ (%)							
	Tobacco sales should be banned to adolescents	Smoking should be banned in healthcare organization	Healthcare organizations should establish smoking cessation clinics	HCWs should get specific training on cessation techniques	HCWs serve as role models for their patients and public	HCWs should routinely advise their patients who smoke to quit smoking	HCWs have a role in giving advice about smoking cessation to patients	Patients’ chances of quitting smoking increase if a HCW advises him/her
Total	79 (63.2)	70 (56.0)	109 (86.5)	106 (81.8)	89 (70.6)	102 (81.6)	112 (88.9)	95 (76.6)
Profession								
Physician	10 (62.5)	5 (31.3)	15 (88.2)	16 (94.1)	10 (58.8)	16 (94.1)	17 (100.0)	14 (82.4)
Allied Health	35 (63.6)	30 (53.6)	45 (80.4)	44 (78.8)	39 (69.6)	45 (83.3)	48 (87.3)	41 (75.9)
Administrative	38 (62.3)	39 (65.0)	55 (91.7)	51 (86.7)	45 (75.0)	46 (75.4)	53 (86.9)	45 (75.0)
p	0.988	0.048*	0.200	0.247	0.423	0.188	0.289	0.817
Age, years								
19–30	35 (57.4)	35 (56.5)	52 (82.5)	54 (85.7)	44 (69.8)	49 (79.0)	55 (88.7)	49 (79.0)
31–40	39 (63.9)	34 (55.7)	56 (91.8)	48 (80.0)	43 (71.7)	50 (83.3)	54 (88.5)	44 (74.6)
≥ 41	9 (81.8)	5 (50.0)	8 (80.0)	9 (90.0)	8 (72.7)	9 (81.8)	10 (90.9)	8 (72.7)
p	0.289	0.930	0.261	0.588	0.966	0.830	0.973	0.807
Gender								
Male	11 (61.1)	9 (50.0)	17 (94.4)	17 (94.4)	15 (83.3)	14 (82.4)	17 (94.4)	13 (76.5)
Female	72 (62.6)	65 (56.5)	99 (85.3)	94 (81.7)	8 (69.0)	94 (81.0)	102 (97.9)	88 (76.5)
p	0.903	0.605	0.292	0.177	0.212	0.879	0.415	0.996

Continued

Table 3. Continued

Characteristics	Number of those who answered 'Yes' (%)							
	Tobacco sales should be banned to adolescents	Smoking should be banned in healthcare organization	Healthcare organizations should establish smoking cessation clinics	HCWs should get specific training on cessation techniques	HCWs serve as role models for their patients and public	HCWs should routinely advise their patients who smoke to quit smoking	HCWs have a role in giving advice about smoking cessation to patients	Patients' chances of quitting smoking increase if a HCW advises him/her
Total	79 (63.2)	70 (56.0)	109 (86.5)	106 (81.8)	89 (70.6)	102 (81.6)	112 (88.9)	95 (76.6)
Nationality								
Saudi	59 (61.5)	58 (61.1)	83 (86.5)	82 (86.3)	74 (77.1)	75 (78.9)	82 (85.4)	75 (78.9)
Non-Saudi	24 (64.9)	16 (42.1)	33 (86.8)	29 (86.3)	21 (55.3)	33 (86.8)	37 (79.4)	26 (70.3)
p	0.716	0.047*	0.953	0.161	0.012*	0.292	0.048*	0.291
Education								
Undergraduate	50 (56.8)	49 (55.1)	72 (81.8)	72 (82.8)	63 (17.6)	69 (78.4)	76 (86.4)	64 (72.7)
Postgraduate	32 (25.6)	25 (55.6)	45 (95.7)	39 (84.4)	32 (69.6)	39 (86.7)	43 (93.5)	37 (84.1)
p	0.063	0.989	0.026*	0.756	0.806	0.249	0.215	0.147
Work shift								
Yes	29 (55.8)	27 (50.9)	42 (77.8)	45 (83.3)	39 (72.2)	45 (84.9)	49 (92.5)	40 (75.5)
No	54 (66.7)	47 (58.8)	74 (92.5)	66 (83.5)	56 (70.0)	63 (78.8)	70 (86.4)	61 (77.2)
p	0.205	0.375	0.014*	0.974	0.781	0.374	0.279	0.817

*Statistically significant. HCWs: healthcare workers.

Table 4. Responses to individual behavior questionnaire items by participants' characteristics

Characteristics	Number of those who answered 'Yes' (%)			
	Want to stop smoking now	Tried to stop smoking during the past year	Received help or advice to help you stop smoking	HCWs who smoke less likely to advise patients to stop smoking
Total	131 (64.9)	131 (70.2)	132 (57.6)	132 (75.0)
Profession				
Physician	11 (64.7)	11 (68.8)	8 (47.1)	10 (58.8)
Allied Health	37 (69.8)	37 (69.8)	29 (54.7)	38 (71.7)
Administrative	36 (60.0)	43 (70.5)	39 (63.9)	50 (82.0)
p	0.553	0.990	0.377	0.120
Age, years				
19-30	45 (75.0)	47 (77.0)	33 (54.1)	46 (75.4)
31-40	32 (53.3)	35 (59.3)	37 (61.7)	44 (73.3)
≥ 41	8 (72.7)	10 (90.9)	6 (54.5)	9 (81.8)
p	0.039*	0.031*	0.686	0.832
Gender				
Male	77 (68.1)	80 (70.8)	67 (58.8)	87 (76.3)
Female	8 (44.4)	12 (66.7)	9 (50.0)	12 (66.7)
p	0.050	0.722	0.448	0.380
Nationality				
Saudi	61 (65.6)	64 (68.8)	58 (61.7)	71 (75.5)
Non-Saudi	24 (63.2)	28 (73.7)	18 (47.4)	28 (73.7)
p	0.791	0.580	0.131	0.824

Continued

Table 4. Continued

Characteristics	Number of those who answered 'Yes' (%)			
	Want to stop smoking now	Tried to stop smoking during the past year	Received help or advice to help you stop smoking	HCWs who smoke less likely to advise patients to stop smoking
Total	131 (64.9)	131 (70.2)	132 (57.6)	132 (75.0)
Education				
Undergraduate	58 (67.4)	64 (74.4)	53 (61.6)	71 (82.6)
Postgraduate	27 (60.0)	28 (62.2)	23 (50.0)	28 (60.9)
p	0.397	0.147	0.198	0.006*
Work shift				
Yes	39 (76.5)	40 (80.0)	30 (58.8)	37 (72.5)
No	46 (57.5)	52 (64.2)	46 (56.8)	62 (76.5)
p	0.027*	0.005*	0.818	0.606

*Statistically significant. HCWs: healthcare workers.

a smoking cessation clinic, and postgraduates were more enthusiastic about starting cessation clinics ($p > 0.001$). Almost 65% of current smokers were willing to quit smoking at the time of the survey. In fact, the majority (70%) have actually tried stopping the habit during the year preceding the survey. Those aged 19–30 years were more enthusiastic about instantaneous quitting, while those above 41 years were more likely to have tried to stop smoking a year preceding the study.

DISCUSSION

We always assume that a person’s job would have an impact on his or her life and community. Therefore, a person who works in a medical field should not be practicing unhealthy behaviors but instead should be adopting and supporting the healthy ones. Yet, this assumption is not always true. The results of this survey have shown that the adjusted prevalence of smoking among healthcare practitioners (20.1%) was within the wide range of smoking in the general population of Saudi Arabia (2.4% to 52.3%; median 17.5%)⁸.

This result was also within results of other studies conducted in the Arab Gulf countries. For example, in the United Arab Emirates and Bahrain, the prevalence of smoking among HCWs was as high as 33.6% and 23%, respectively, whereas the prevalence was lower in countries like Qatar (12%) and Oman (11%)⁷⁻⁹. Searching the literature, we could only identify two studies that measured the smoking situation among HCWs in the western region of KSA^{13,14}. Both studies

showed similar results to those of our study with some differences (22.4% and 18.7%, respectively). These differences in the smoking rates between the studies can be attributed to some variations in, for example, sample size, healthcare settings, study period, and targeted healthcare professionals. When it comes to comparing our results with those of other studies in different regions of the Kingdom, our result was somewhere in the middle. For instance, in the central and south-western regions, the smoking prevalence among HCWs was high (34% and 26%, respectively). On the other hand, a survey done in the eastern region of the country indicated a low percentage of smokers. In 2001, on World No Tobacco Day, the Saudi government declared that Makkah (Mecca) and Medina would become smoke-free cities by implementing actions such as emphasis on banning sales of tobacco within the cities². These smoke-free initiatives may explain the lower prevalence of smoking among HCWs compared to other regions. Despite the fluctuations in previous results, all these studies agreed on the existence of the problem that needs to be addressed by the Saudi health authorities.

There were significantly more male HCWs smokers than women smokers. Similar trends were observed in previous studies in the Kingdom^{11,13,19}. Saudi Arabia is a very conservative country in relation to women and this cultural factor may explain the gender differences. The current survey found that smoking among physicians was relatively low (10.6%) compared to allied health professionals (18.5%) and

administrative workers (30.3%). Physicians receive a high level of education and thus more aware about the health risks of smoking. Therefore, there is a need for formal training on tobacco prevention and cessation within Medical and Nursing schools as part of the core curriculum.

To our knowledge, this is the first study in the KSA to describe nicotine dependence among healthcare providers. Fortunately, our results show that nicotine dependence is generally low. Moreover, these results indicate that administrative staff are the most intensive smokers, besides being the group with the highest smoking prevalence. As a result, smoking cessation programs should focus on this professional group.

The current survey focused on many different aspects of attitude and behavior of HCWs and their roles towards smoking cessation. The study showed very positive results for all HCWs regarding attitude and behavior towards smoking cessation. It demonstrated that about 65% of participants wanted to quit smoking, while 70.2% had actually tried to quit smoking in the past year. It is very clear that the young HCWs have a desire to stop smoking and the older HCWs have actually tried to quit but failed. Furthermore, this study showed that 86.5% of smokers had very high positive attitudes towards establishing smoking cessation clinics. This is also high compared to that reported in other studies^{10,11}. Such results indicate a strong tendency by HCWs to quit smoking and highlight their need for external support. Therefore, establishing smoking cessation services is essential to help those with the desire to quit and who need professional support.

Seventy-five percent of participants thought that health professionals who smoke are less likely to advise their patients to quit smoking. This underlines the need for hard work to reduce smoking amongst healthcare providers who are current smokers. Other studies have only focused on the role of physicians in giving advice to smokers to quit, thus neglecting the role of the other healthcare professions. Most of our participants believed that healthcare professionals have a role in giving advice or information about smoking cessation to patients, and 87.3% were in allied health professions. Allied health workers such as nurses, physiotherapists, and radiologists usually spend a considerable time with their patients and

may have a very significant influence. Thus, it is important to include them in any assessments and plans that consider smoking cessation. This has been put into focus by the current study.

More than half of our study subjects agreed that smoking should be banned in healthcare organizations, and 63.2% believed that tobacco sales to adolescents (<18 years old) should also be banned. Such percentages constitute majorities and so indicate that regulatory authorities will receive public support from healthcare employees if such legislation was to be enacted. This is even truer for Saudis.

Limitations

The biggest limitation of this study is that it was confined to a single organization, yet this may be somewhat balanced by the big sample size and that the institution was a big referral center whose employees reflect different sections of healthcare. In contrast, this study's strength is the measurement of the nicotine dependence of the HCWs. The study did focus mainly on cigarette smoking even though other forms of smoking are still important. More studies are needed to establish smoking cessation programs in all of Makkah.

CONCLUSION

The prevalence of smoking among HCWs in this study parallels reported national values. Generally, the attitude towards smoking cessation is positive, calling for the establishment of smoking cessation clinics at healthcare organizations. This service will not only make such organizations smoke-free but could be a nucleus for high-quality smoking cessation programs that aim to make Makkah city and other cities truly free from smoking.

REFERENCES

1. World Health Organization (WHO). Tobacco factsheets 2016. <http://www.who.int/mediacentre/factsheets/fs339/en/>. Accessed April 19, 2018.
2. World Health Organization (WHO), Tobacco-free cities for smoke-free air: a case study in Mecca and Medina 2011. http://www.who.int/kobe_centre/interventions/smoke_free/mecca_medina_web_final.pdf?ua=1. Accessed April 19, 2018.
3. Moradi-Lakeh M, El Bcheraoui C, Tuffaha M et al. Tobacco consumption in the Kingdom of

- Saudi Arabia, 2013: findings from a national survey. *BMC Public Health*. 2015;15(1):611. doi: <https://doi.org/10.1186/s12889-015-1902-3>.
4. Smith, D.R. and Legga P.A. An international review of tobacco smoking in the medical profession: 1974-2004. *BMC Public Health*. 2007;7(1):115. doi: 10.1186/1471-2458-7-115.
 5. Abdulateef Darya Saeed, Ali Azheen Jamil, Abdulateef Darwn Saeed, Mohesh M.I. Glad. Smoking Knowledge, Attitude, and Practices Among Health Care Professionals from Sulaymaniyah City/Iraq. *Tobacco Use Insights*. 2016;9:1-6. doi: 10.4137/TUIS38171.
 6. Al Hosani S, Al Ali M, Al-Marashda K et al. Smoking Prevalence, Attitudes and Behaviors Primary Healthcare Providers and its Impact on Their Smoking Cessation Counseling Practices. *Ibnosina Journal of Medicine and Biomedical Sciences*. 2014;7(2):47-55. doi:10.4103/1947-489x.210270.
 7. Al-Lawati JA, Nooyi SC, Al-Lawati AM. Knowledge, attitudes and prevalence of tobacco use among physicians and dentists in Oman. *Annals of Saudi Medicine*. 2009;29(2):128-133. doi:10.4103/0256-4947.51803.
 8. Borgan S.M, Jassim G, Marhoon Z.A, Almuqamam M.A, Ebrahim M.A, Soliman P.A. Prevalence of tobacco smoking among health-care physicians in Bahrain. *BMC Public Health*. 2014;14(1):931. doi: 10.1186/1471-2458-14-931.
 9. Mansoura F.I, Abdulmalik M.A, and Salama R.E. Profile of Smoking Among Primary Healthcare Doctors in Doha, Qatar 2007. *Qatar Medical Journal*. 2010;2(14). doi: 10.5339/qmj.2010.2.14.
 10. Mahfouz A, Shatoor A, Al-Ghamdi B et al. Tobacco use among health care workers in southwestern Saudi Arabia. *BioMed Research International*. 2013;2013. doi:10.1155/2013/960292.
 11. Harrabi I, Al-Harbi F, Al-Ghamdi S. The Role of Health Care Professionals in Providing Smoking Cessation Advice in Najran Armed Forces Hospital, KSA. *The Open Cancer Journal*. 2014;7(1):11-16. doi:10.2174/1874079001407010011
 12. Al-Mobeeriek A, Al-Zaki A, Al-Duhailan L, Al-Habboubi T. Prevalence of Smoking among Health Care Providers in Eastern Province, Saudi Arabia. *Pakistan Oral & Dental Journal*. 2008;28(2).
 13. Baksh M, Chaudhry A, Al-Hamdan N, Turkistani A. Knowledge, Attitude and Practices of Physicians Regarding Smoking in Makkah Region. *Saudi Epidemiology Bulletin*. 2002;9(3).
 14. Al-Turkistani A, Alkail B, Hegazy A, Asiri S. Knowledge, Attitude and practice among Primary Healthcare Physicians towards Smoking Cessation in Makkah, Saudi Arabia. *International Journal of Medical Science and Public Health*. 2016;5(4). doi:10.5455/ijmsph.2016.13112015224.
 15. The GTSS Collaborative Group. Tobacco use and cessation counselling: Global Health Professionals Survey Pilot Study, 10 countries, 2005. *Tobacco Control*. 2006;15 (Suppl 2):ii31-4. doi: 10.1136/tc.2006.015701.
 16. Heatherton T.F, Kozlowski L.T, Frecker R.C, Fagerström K.O. The Fagerstrom Test for Nicotine Dependence: a revision of the Fagerstrom Tolerance Questionnaire. *Br J Addict*. 1991;86(9):1119-27. doi:10.1111/j.1360-0443.1991.tb01879.x.
 17. (CDC), C.f.D.C.a.P. State-specific secondhand smoke exposure and current cigarette smoking among adults— United States 2008, in *MMWR Morb Mortal Weekly Report*. 2009. <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5844a3.htm>. Accessed April 19, 2018.
 18. Sabra A.A. Smoking attitudes, behaviours and risk perceptions among primary health care personnel in urban family medicine centers in Alexandria. *Journal Egypt Public Health Association*. 2007;82(1-2):43-64.
 19. Saeed A.A. Attitudes and behaviour of physicians towards smoking in Riyadh city, Saudi Arabia. *Tropical and geographical medicine*. 1991;43(1-2): 76-9.

ACKNOWLEDGEMENTS

The study team would like to thank Jehad H. Ateek, Hatem M. Assiri, and Abdulmajeed M. Al-Motairi for helping with data collection and proposal preparation.

CONFLICTS OF INTEREST

Authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none was reported.

FUNDING

There was no source of funding for this research.

PROVENANCE AND PEER REVIEW

Not commissioned; externally peer reviewed.