Smoking habits, knowledge and smoking attitudes among primary healthcare workers in Perak, Malaysia

Low Pei Kit[1], Hazizi Abu Saad[1], Rosita Jamaluddin[2], Chee Huei Phing[3]
[1]Department of Nutrition, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Selangor, Malaysia
[2]Department of Dietetics, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Selangor, Malaysia
[3]Department of Allied Health Sciences, Faculty of Science, Universiti Tunku Abdul Rahman, Perak, Malaysia

Article Info

ABSTRACT

A cross-sectional study was carried out to assess the smoking habits of primary healthcare workers, their knowledge about the harmful effects and health risks of smoking, as well as their attitudes towards not smoking. A validated self-administered questionnaire was used to collect the data. There were 261 primary healthcare workers in Perak, Malaysia recruited in this study. The results showed that there were only 4.6% (n=12) ever smokers and 2.7% (n=7) current smokers in this study. More than 75% of primary healthcare workers reported having friends and family members who smoked. The majority of the primary healthcare workers had good knowledge regarding the health risks and harmful effects of smoking. They also possessed positive attitudes towards not smoking. The females, those in the high-income group, the health service providers and the non-smokers had significantly higher scores in both their knowledge about smoking and positive attitudes towards not smoking (p<0.05). The primary healthcare workers with tertiary educational levels were significantly associated with positive attitudes towards not smoking (p<0.05). Gender and occupational status were the strongest predictors for knowledge about the health risks of smoking (p≤0.001), knowledge about the harmful effects of smoking (p≤0.001) and attitudes towards not smoking (p≤0.001). Health service providers, and females had the highest awareness of smoking. The high percentage of health service providers reported having friends and family members who smoked in this study should be given more attention. Implementation of more free-smoke areas could be use as strategy to reduce exposure to second-hand tobacco smoke.

Corresponding Author:

Hazizi Abu Saad
Department of Nutrition, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia
Selangor, Malaysia
Email: hazizi@upm.edu.my

1. INTRODUCTION

As one of the most preventable leading causes of death, tobacco smoking has been killing more than seven million people annually [1]. In addition, it is predicted to cause eight million deaths in 2030, either directly or indirectly from the side effects of tobacco, based on the current trend of tobacco usage [2]. Although tobacco smoking, together with obesity, an unhealthy diet and physical inactivity, has been found to be a risk factor for developing cancer, respiratory problems and cardiovascular disease [3], The smoke from tobacco cigarettes not only affects the smoker him or herself, but it is also harmful to second-hand or also known as passive smokers. More seriously, second-hand smoke has already caused the deaths of 2,5 million non-smokers in United States of America [4]. Second-hand smoke is the smoke released by smokers

that fills enclosed spaces [1]. Passive smoking has been found to be responsible for the occurrence of many health-related problems, such as cardiovascular disease in adults and sudden deaths and low birth weights among infants, as well as certain types of cancer, including lung and breast cancer [1], [5].

One point one billion people globally, including 80% from low-income and middle-income countries, have been recognized as being smokers [1]. Malaysia, as a middle-income country, is also facing this public health threat. Based on the findings of the National Health and Morbidity Survey (NHMS) 2015, 22.8% or nearly five million Malaysians aged 15 years old and older were current smokers [6].

Primary healthcare workers are the role models for the public in promoting wellness and healthy lifestyle, and they are responsible for advising and educating their patients about the dangers of smoking. A tools kit for treating tobacco dependence in primary care has been introduced by The World Health Organization in 2014 to offer help for patient to quit tobacco use [7]. In Malaysia, in order to combat and reduce the high smoking prevalence, various health promotion programs and campaigns have been initiated. These include the Tak Nak ('Say No') mass media campaign and the introduction of Quit Smoking Clinics in hospitals and health clinics in order to advocate smoking cessation [8]. Nevertheless, the effectiveness of such programs is highly dependent on the knowledge and attitudes of the primary healthcare workers towards smoking.

Based on the latest evidenced-based treatment in managing tobacco use and tobacco dependence effectively, the revised and updated version of the clinical practice guidelines (CPG) on Treatment of Tobacco Use and Dependence has been published in 2016 [9]. The CPG outlines the key elements and tools to make the best decisions in managing tobacco use and tobacco dependence. Health promotion activities aimed at the reduction of risk for chronic diseases among employees can prevent illness, improve productivity and reduce absenteeism.

Studies on metabolic syndrome [10], physical activity [11], obesity and lipid profiles [12] among government employees in Malaysia were reported previously. Unfortunately, less attention has been paid to investigate the smoking prevalence and patterns among the primary healthcare workers in Malaysia, and there have been only a few studies to ever report their smoking habits [13], [14]. More disappointingly, no studies have been carried out to evaluate the knowledge and attitude patterns among primary healthcare workers in Malaysia, even though these topics have been highly discussed in other countries [15]–[19]. A study among 262 primary health-care physicians in Saudi Arabia found that 25.6% of physicians had incorrect knowledge in smoking cessation [16]. Another study indicated the low prevalence of health care professionals (5.6%) received formal training on smoking cessation [18].

Thus, the aim of this study was to investigate the prevalence of smoking among primary healthcare workers, and to assess their knowledge and attitudes towards the health risks of smoking. Additionally, this study was designed to determine the factors associated with level of knowledge and attitudes towards not smoking among primary healthcare workers'.

2.   RESEARCH METHOD
2.1. Participants
Perak is the fourth largest state in Malaysia, and it is located in the northwest of Peninsular Malaysia. A cross-sectional study was carried out in 12 selected health clinics within Perak from August 2017 to April 2018. In the first stage, three districts were chosen randomly from the list of 11 districts in the state of Perak. Then 12 health clinics were selected from the Kinta District, Kuala Kangsar District and Perak Tengah District through proportional to size (PPS) sampling. The consent of the participating primary healthcare workers was obtained prior to the data collection. Primary healthcare workers in this study consist of professionals (i.e. doctor and pharmacist), 'associates' (i.e. staff nurses, community nurses, medical assistant and pharmacist assistant) and support staffs (i.e. ambulance driver, general worker, administration staff). Based on sample size calculation, the total number of respondents needed for this study (n) was 254. Number of cluster and number of respondents needed from each cluster (nc) was identified by using formula n/nc. After calculation, the clusters needed for this study were 13 clusters. A random sampling was used to identified clusters (Health Clinics) in this study and the fishbowl draw technique was used in the selection of respondents from the clinics.

2.2. Data gathering procedure
The respondents were required to answer a self-administered questionnaire on their sociodemographic characteristics, including their age, gender, ethnicity, occupational status, marital status and monthly household income. Their smoking habits were evaluated using the questionnaire by Numan *et al.* in which the reliability and validity have already been tested [20]. This original questionnaire consisting of 62 questions and all respondents were required to answer all questions. An ever smoker was defined as a person who smoked ≥100 cigarettes in his/her entire life, whereas a former smoker was defined as a person who smoked ≥100 cigarettes in his/her entire life, but was not smoking currently. To determine the percentage of second-hand

smokers/passive smokers three questions regarding smoking status of the respondents' close friends and family members were asked.

In addition, the respondents' knowledge of the health risks and harmful effects of smoking was assessed, including both the ever smokers and non-smokers. Firstly, nine questions regarding their knowledge towards smoking and the health risks due to smoking was tested using a 5-point Likert scale in which 1 indicated 'strongly disagree' while 5 indicated 'strongly agree'. The minimum and maximum scores were 9 and 45, respectively, and a higher score indicated a higher level of knowledge about the health risks of smoking. The reliability coefficient ranged from 0.822 for the attitudes towards not smoking to 0.914 for the knowledge about the health risks of smoking, which indicated that both scales were reliable [20].

Next, the participants' knowledge about the harmful effects of smoking was determined using 10 factual questions about smoking. The respondents were required to answer the individual statements by using 'Yes', 'No' or 'Don't know'. The 'Yes' responses were given 1 point, while the 'No'/'Don't know' responses were given 0 points. The maximum score for this section was 10, which indicated very good knowledge.

Finally, their attitudes towards not smoking were also assessed. The respondents were asked five questions regarding their attitudes towards not smoking using a 5-point Likert scale in which 1 indicated 'strongly agree' while 5 indicated 'strongly disagree'. The minimum and maximum scores for their knowledge were 5 and 25, respectively, and higher attitude scores indicated higher positive attitudes towards not smoking.

Ethical approval was given prior to the study by the National Medical Research Registry, Medical Research and Ethics Committee of the Ministry of Health Malaysia (Reference number: NMRR-16-2728-33440) and the Ethics Committee for Research Involving Human Subjects, Universiti Putra Malaysia (Reference number: UPM/TNCPI/RMC/1.4.18.2).

2.3. Statistical analysis

The collected data were analyzed using IBM SPSS Statistics for Windows, Version 20.0. (IBM Corp., Armonk, NY, USA). The descriptive statistics were presented in terms of the mean ± standard deviation and the percentage for the normally distributed variables. In the case of a skewed distribution, the median with the 25th and 75th percentiles was presented. The association between the knowledge about the health risks and harmful effects of smoking and the attitudes towards not smoking was tested using an independent samples t-test. Variables that showed significant association with the knowledge and attitudes towards the health risks of smoking were further analyzed using multiple linear regression to determine the predictors of the knowledge and attitudes about smoking. All of the confidence intervals were set at 95% probability levels, and a p-value of <0.05 was considered to be statistically significant.

3.   RESULTS AND DISCUSSION

A total of 261 primary healthcare workers completed the questionnaire and the response rate for this study was 82.9%. There were 36 respondents classified as professionals (i.e. doctor and pharmacist), 172 respondents were classified as 'associates' (i.e. staff nurses, community nurses, medical assistant and pharmacist assistant) and 52 were support staffs (i.e. ambulance driver, general worker, administration staff). Based on the findings, 4.6% (n=12) of the primary healthcare workers were categorized as ever smokers, while only 2.7% (n=7) of them were current smokers. There were 66% of the ever smokers classified as support staffs compared to 17.7% among non-smokers. The average of the years of smoking was 16.50±5.8 years, and, on average, most of them started smoking when they were 18.83±3.7 years old. All of the female primary healthcare workers were non-smokers. Nevertheless, both the ever smokers and non-smokers were at risk of becoming passive smokers. As shown in Table 1, 76.2% of the primary healthcare workers reported having friends and family members who smoked. The sociodemographic characteristics of the primary healthcare workers are presented in Table 1.

Table 2 summarizes the frequency distribution of the knowledge associated with the health risks due to smoking among the primary healthcare workers. The highest score for this section was 45, and the median score was 40; the scores for both genders were not far from the median. The majority of the primary healthcare workers agreed that smoking brings with it a lot of health risks, especially to their own health (95.8%) and their children's health (97.0%). Moreover, they also agreed that smoking can cause cancer (96.2%), heart disease (97.3%), strokes (85.9%) and lung disease (97.7%). Furthermore, 92.7% and 90.4% of them also agreed that smoking can cause financial burdens to them and their families, respectively. However, not every primary healthcare worker knew that smoking could cause diabetes; only 41.8% agreed that 'smoking can cause diabetes', and 26.1% were unsure about it as shown in Table 2. Further analysis revealed that the median score was higher among non-smokers 41 (37-34) as compared to ever smokers 34 (31.5–36.5).

Table 1. Socio-demographic characteristics and smoking habits of the primary healthcare workers

Socio-demographic characteristics	Categories	Frequency n (%)
Ethnic	Malay	211 (80.9)
	Non-Malay	50 (19.1)
Age (years)	≤40	190 (72.8)
	≥41	71 (27.2)
	Mean ± SD	36.8 ± 8.0
Educational level	Below tertiary	44 (16.9)
	Above tertiary	217 (83.1)
Marital status	Single	35 (13.4)
	Ever-married	226 (86.6)
Monthly household income (RM)	≤3,000	92 (35.2)
	>3,000	169 (64.8)
Occupational status	Health service providers	209 (80.1)
	support workers	52 (19.9)
Smoking habits	Ever smokers	12 (4.6)
	Non-smokers	249 (95.4)
Reported having friends and family members who smoked	Yes	199 (76.2)
	No	62 (23.8)
Gender	Male	42 (16.1)
	Female	219 (83.9)

USD1 = RM4.20

Table 2. Frequency distribution of 5 point-Likert Scale responses about knowledge associate with smoking and health risk due to smoking among the healthcare workers

Health effect or risk due to smoking	Frequency distribution of responses				
	SA n (%)	A n (%)	U n (%)	D n (%)	SD n (%)
1. Smoking is harmful for health	190 (72.8)	60 (23.0)	2 (0.8)	6 (2.3)	3 (1.1)
2. Smoking is harmful for child health	204 (78.2)	49 (18.8)	2 (0.8)	2 (0.8)	4 (1.5)
3. Smoking can cause cancer	167 (64.0)	84 (32.2)	6 (2.3)	2 (0.8)	2 (0.8)
4. Smoking can cause disease	162 (62.1)	92 (35.2)	6 (2.3)	1 (0.4)	0 (0.0)
5. Smoking can cause brain stroke	133 (51.0)	91 (34.9)	32 (12.3)	4 (1.5)	1 (0.4)
6. Smoking can cause lung disease	157 (60.2)	98 (37.5)	5 (1.9)	1 (0.4)	0 (0.0)
7. Smoking can cause diabetes	48 (18.4)	61 (23.4)	68 (26.1)	75 (28.7)	9 (3.4)
8. Smoking causes financial problem	159 (57.5)	92 (35.2)	14 (5.4)	4 (1.5)	1 (0.4)
9. Smoking causes family financial problem	141 (54.0)	95 (36.4)	18 (6.9)	6 (2.3)	1 (0.4)
Median (25th–75th percentile)	40 (36–43)				

SA = Strongly Agree, A = Agree, U = Uncertain, D = Disagree and SD = Strongly disagree

Table 3 summarizes the analysis of the knowledge about the harmful effects of smoking among the primary healthcare workers. The majority of the primary healthcare workers had good knowledge about the harmful effects of smoking, with median score of 8. The majority of them knew that current and passive smoking can cause harmful effects on newborn babies (94.3%), the premature death of babies (90.4%) and lung disease in newborn babies (79.7%). However, only 60.5% of the primary healthcare workers knew that 'smoking can cause tuberculosis', and only 33.0% of them knew that 'blindness' was one of the side effects of smoking as presented in Table 3. The median score was higher among non-smokers 8 (7-9) as compared to ever smokers 2.5 (0.50-6.0).

The attitudes towards not smoking among the primary healthcare workers are shown in Table 4. The median score for the primary healthcare workers was 25, which was the maximum score. This indicates that most of them had very positive attitudes towards not smoking. Most of them disagreed or strongly disagreed with these statements: 'smoking is good for health' (97.3%), 'smoking can increase concentration' (92.4%), 'smoking can release tension' (87.0%), 'smoking can calm you down' (88.5%) and 'smoking can help you sleep' (89.3%) as shown in Table 4. The median score was higher among non-smokers 25 (21-25) as compared to ever smokers 15.5 (13.5-17.5). Table 5 shows the associations between the variables and the knowledge about smoking and the attitudes towards not smoking among the primary healthcare workers. The independent samples t-test showed that the gender, monthly household income, educational level, occupational status and smoking habits were significantly associated with all 3 of the independent variables: knowledge about the health risks of smoking, knowledge about the harmful effects of smoking and the attitudes towards not smoking. It was found that the females, high income group and health service providers scored significantly higher than their counterparts as presented in Table 5.

Table 3. Knowledge about the harmful effects of smoking among primary healthcare workers

Factual questions	Yes n (%)	No/ Don't Know n (%)
1. Smoking increases the risk of tuberculosis	158 (60.5)	103 (39.4)
2. Smoking causes blindness	86 (33.0)	175 (67.0)
3. Smoking causes sexual dysfunction	196 (75.1)	65 (24.9)
4. Smoking causes harmful effect on newborn babies	246 (94.3)	15 (5.7)
5. Current smoking causes premature death of babies	236 (90.4)	25 (9.6)
6. Passive smoking causes premature death of babies	313 (81.6)	48 (18.4)
7. Current smoking causes lung disease of newborn babies	208 (79.7)	53 (20.3)
8. Passive smoking causes lung disease of newborn babies	187 (71.6)	74 28.3)
9. Current smoking that causes low birth weight	215 (82.4)	46 (17.6)
10. Passive smoking that causes low birth weight	193 (73.9)	68 (26.1)
Median (25th–75th percentile)		8 (6–9)

Table 4. Frequency distribution of 5 Point-Likert scale on attitudes towards not smoking among the healthcare workers

Statement	Frequency distribution of responses				
	SA n (%)	A n (%)	U n (%)	D n (%)	SD n (%)
1. Smoking is good for health	6 (2.3)	1 (0.4)	0 (0.0)	64 (24.5)	190 (72.8)
2. Smoking can increase concentration	2 (0.8)	4 (1.5)	14 (5.4)	68 (26.1)	173 (66.3)
3. Smoking can release tension	1 (0.4)	7 (2.7)	26 (10.0)	70 (26.8)	157 (60.2)
4. Smoking can calm you down	1 (0.4)	5 (1.9)	24 (9.2)	65 (24.9)	166 (63.6)
5. Smoking can help to sleep	1 (0.4)	2 (0.8)	25 (9.6)	67 (25.7)	166 (63.6)
Median (25th–75th percentile)			25 (20–25)		

SA = Strongly Agree, A = Agree, U = Uncertain, D = Disagree and SD = Strongly disagree

The results of the multiple linear regression were obtained after further analyzing the variables that were significantly associated with the knowledge and attitudes towards not smoking as presented in Table 6. Smoking habits was not included as one of the variables in the multiple linear regression analysis due to very low number of ever smokers (4.6%) in this study as compared to non-smokers (95.4%). Analysis showed that variables including females and health service providers were statistically significant with knowledge on health risk of smoking (F=21.696, p<0.001, R2=0.144), knowledge on harmful effect of smoking (F=24.741, p<0.001, R2=0.161) and attitude towards not smoking (F=22.956, p<0.001, R2=0.151). The analysis showed that both gender and occupational status was the strongest predictor for all three of the dependent variables. Male primary healthcare workers were predicted to have poor knowledge than female primary healthcare workers in their knowledge about the health risks of smoking (p=0.001), knowledge about the harmful effects of smoking (p≤0.001) and attitudes towards not smoking (p=0.005). There were predicted to have poorer knowledge (1.517–2.315 scores) and attitude (2.498 scores) than females. On the other hand, the health service providers were predicted to have a higher score in knowledge (1.972–3.386 scores) and attitude (2.024 scores) towards not smoking than support workers as shown in Table 6.

In Malaysia, approximately 22.8% or nearly five million Malaysians aged 15 years old and older are current smokers [6]. Nonetheless, this trend was not shown among the primary healthcare workers in the current study: 4.6% of them were ever smokers, and 2.7% were current smokers. These results were similar to those of another study done in Malaysia, in which only 5.8% of the healthcare workers in Kelantan were ever smokers [13] and 5.5% among the healthcare workers in Suburban District of Hulu Langat, Selangor, Malaysia [14]. However, these findings were in contrast with the results of studies from other countries in which some reported a high prevalence of smokers in the healthcare system, ranging from 18% to 46% [15]–[18].

The low smoking prevalence may be due to the fact that smoking is strictly banned in hospitals by policy [21]. This is in line with a report from the WHO which reported that a declining trend was shown for the prevalence of smoking globally [22]. In addition, because the health industries are predominantly female, and smoking among females is still considered to be a cultural barrier in Malaysia, it is not surprising that this prevalence was low among the primary healthcare workers in Malaysia [6], [23]. A review study among physicians in China also indicated gender differences in the smoking prevalence with prevalence significantly higher among male compared to female [24]. Moreover, this low prevalence of smoking among the primary healthcare workers may be due to the fact that the healthcare workers in Malaysia are equipped with knowledge about smoking.

Table 5. Association between various variables with knowledge on health risk and harmful effects of smoking and attitude towards not smoking

Variables		Knowledge on health risk of smoking (mean ± SD)	p	Knowledge on harmful effects of smoking (mean ± SD)	p	Attitude towards not smoking (mean ± SD)	p
Gender	Male	37.40±4.66	<0.001*	6.05±3.38	0.004*	20.43±4.28	<0.001*
	Female	39.97±4.17		7.71±2.19		23.08±2.84	
Age (years old)	<40	39.82±4.31	0.112	7.47±2.43	0.799	22.79±3.35	0.246
	≥41	38.86±4.40		7.38±2.65		22.27±2.99	
Ethnic	Malay	39.54±4.36	0.856	7.46±2.52	0.839	22.59±3.33	0.549
	Non-Malay	39.66±4.36		7.38±2.38		23.11±2.89	
Household income (RM)	≤3,000	38.14±4.80	<0.001*	6.92±2.86	0.021*	21.91±3.69	0.012*
	>3,000	40.33±3.88		7.73±2.22		23.05±2.93	
Educational level	Below Tertiary	37.07±4.54	0.001*	6.16±3.26	0.004*	20.95±3.75	<0.001*
	Tertiary and above	40.06±4.14		7.71±2.22		23.00±3.05	
Marital status	Single	38.77±4.55	0.250	6.74±2.69	0.073	23.06±2.68	0.430
	Ever married	39.68±4.31		7.55±2.44		22.59±3.34	
Occupational status	Health service providers	40.26±4.04	<0.001*	7.86±2.13	<0.001*	23.09±3.05	<0.001*
	Support workers	36.73±4.44		5.79±3.10		20.90±3.51	
Reported having friends and family members who smoked	Yes	39.66±4.26	<0.490	7.34±2.52	0.233	22.68±3.09	<0.811
	No	39.23±4.64		7.77±2.39		22.56±3.78	

Independent t-test was performed, p<0.05 significant

Table 6. Multiple linear regression analysis of factors associated with knowledge and attitude towards not smoking

Variables		Knowledge on health risk of smoking	Knowledge on harmful effects of smoking	Attitude towards not smoking
		Unstandardized coefficient (B)		
Gender	Male	-2.315*	-1.517*	-2.498*
Household income (RM)	≤3000	-0.124	-0.013	-0064
Educational level	Below tertiary	-0.014	-0.109	0.126
Occupational status	Health service providers	3.386*	1.972*	2.024*

p-value <0.05, significant

Nonetheless, most of the studies showed that the male respondents had higher possibilities of becoming smokers, which showed a trend similar to that of the current study, with the exception of one study from Serbia. In that study, it was reported that 45% of the female healthcare workers were smokers [15]. As reported in the current study, no female primary healthcare workers were found to be smokers. Similar finding was reported among healthcare physicians in Bahrain which reported the current smoker among female was (0%) compared to male (8%) [25]. As shown in the analysis, most of the primary healthcare workers had good knowledge about the harmful effects and health risks of smoking. They also possessed a positive attitude towards not smoking. However, the smokers were found to have a lower awareness when compared to the non-smokers, and their scores were significantly lower in all three of the scales. This finding was consistent with study from Saudi Arabia, in which the authors also reported that current smokers lacked smoking-related knowledge when compared to non-smokers [17].

As the primary healthcare workers in Malaysia are mostly female, the percentage of those being active smokers was low. However, they were at high risk of exposing themselves to passive smoking, both in the workplace and at home if their family members were smokers. Despite the percentage of current smokers being low, more than 75% of the primary healthcare workers were reported exposed to second-hand smoke, either from their family members or from their close friends. When compared to the NHMS 2015 study (37.1% were passive smokers), the primary healthcare workers in this study faced a higher risk than the general population of being affected by the negative consequences of cigarette smoking [6]. Various health problems, such as

cardiovascular disease, lung cancer and sudden infant death syndrome have been linked to second-hand smoke. More seriously, second-hand smoke has already caused the deaths of 2.5 million non-smokers [4].

As discussed, passive smokers will inhale both the smoke from the burning end of the cigarette and the smoke breathed out by smokers. These findings are almost similar to a recent study in India in which the authors found that 52.5% of the healthcare workers were passive smokers [26]. Among population age 15 years and above in China, the estimates of the prevalence of passive smoking ranged from 28.7% to 86.4% [27]. The high percentage of passive smokers in this study may be due to the fact that primary healthcare workers are still not well-prepared to educate and stop the people around them from smoking. In fact, this study showed that fathers, husbands and brothers were the major sources of second-hand smoke. These results are supported by studies from Serbia and Turkey, in which the authors reported that only a small number of healthcare workers were ready to counsel and advise their patients to quit smoking [15], [28].

Further analyses showed that the females, higher income group, health service providers and with tertiary educational level had significantly better knowledge about the harmful effects and health risks of smoking, and they also had higher scores in their attitudes towards not smoking than their counterparts. These findings were similar to those of other study conducted among healthcare workers [29]. The health service providers in health clinics represent the bridge between patients and the Malaysian healthcare system. Therefore, they are in the perfect position to provide counselling and play a key role in the smoking cessation program. To succeed in this movement, they should have a high level of knowledge regarding tobacco, and the current study showed that they do. In addition, primary healthcare workers with a tertiary educational level also showed more positive attitudes towards not smoking, had good knowledge about the harmful effects of smoking and had good knowledge about the health risks of smoking. These findings confirmed the suggestion that people with higher educational levels are more aware of the negative health risks of smoking [17]. Other studies also indicated that higher education level decreased the smoking probability [30], [31].

4. CONCLUSION

The health service providers were found to be the group with the highest awareness of the negative effects of smoking. In the Malaysian healthcare system, all of the health service providers are required to have at least their graduate certificates. They have been taught and trained about the negative effects of tobacco smoking since they were in school, and thus, they possess higher awareness than their counterparts. Likewise, the non-smokers were also found to possess better attitudes and a higher awareness of the harmful effects of smoking, and the females showed better awareness of the health risks of smoking. Since the females were predominate in this study, and all of the females were non-smokers, females were predicted to have higher knowledge, awareness and better attitudes than the ever smokers. There were some limitations in this study. Firstly, this study did not determine the perceptions towards smoking and the smoking cessation practice among the primary healthcare workers. Secondly, most of the respondents were females and non-smokers, which may have affected the results. The use of self-admistered questionnaire in the study can lead to inaccurate estimations of exposure therefore biochemical method would improve the validity of the data in this study. The sample size calculation and sampling frame was done based on only one selected state in Malaysia and results could not be generalized to the whole population of primary health care workers in Malaysia.

REFERENCES

[1] World Health Organization, "Tobacco," *WHO*, 2017. http://www.who.int/topics/tobacco/en/ (accessed Jan. 01, 2022).
[2] Centers for Disease Control and Prevention, "Smoking & Tobacco Use," *CDC*, 2018. https://www.cdc.gov/tobacco/data_statistics/fact_sheets/fast_facts/index.htm (accessed Jan. 01, 2021).
[3] World Health Organization, *Global status report on noncommunicable diseases*. World Health Organization, 2014.
[4] Centers for Disease Control and Prevention, "Health Effects of Secondhand Smoke," *CDC*, 2018. https://www.cdc.gov/tobacco/data_statistics/fact_sheets/secondhand_smoke/ health_effects/index.htm (accessed Jan. 01, 2021).
[5] S. Cao, C. Yang, Y. Gan, and Z. Lu, "The Health Effects of Passive Smoking: An Overview of Systematic Reviews Based on Observational Epidemiological Evidence," *PLoS ONE*, vol. 10, no. 10, p. e0139907, Oct. 2015, doi: 10.1371/journal.pone.0139907.
[6] Ministry of Health Malaysia, *National Health & Morbidity Survey 2015*. Institute of Public Health, 2015.
[7] World Health Organization, *Toolkit for delivering the 5A's and 5R's brief tobacco interventions in primary care*. World Health Organization, 2014.
[8] M. Y. Lee and C. L. Tam, "Smoking and Burden of Ill Health: A Review of the Malaysian Context," *International Journal of Collaborative Research on Internal Medicine & Public Health*, vol. 6, no. 7, p. 190, 2014.
[9] Ministry of Health Malaysia, *The Clinical Practice Guidelines on Treatment of Tobacco Use Disorder*. Ministry of Health Malaysia, 2016.
[10] H. P. Chee, A. S. Hazizi, M. Y. Barakatun Nisak, and M. T. Mohd Nasir, "Metabolic risk factors among government employees in Putrajaya, Malaysia," *Sains Malaysiana*, vol. 43, no. 8, pp. 1165–1174, 2014.
[11] C. H. Phing, H. A. Saad, M. Y. B. Nisak, and M. T. M. Nasir, "Effectiveness of physical activity intervention among government employees with metabolic syndrome," *Journal of Exercise Science & Fitness*, vol. 15, no. 2, pp. 55–62, Dec. 2017, doi: 10.1016/j.jesf.2017.07.003.
[12] H. K. Soon, M. N. M. Taib, H. A. Rahman, C. Y. Mun, and H. A. Saad, "Effects of a Pedometer Walking Program on Obesity and

Metabolic Parameters in Adults with Abdominal Obesity," *Journal of Physical Activity, Sports & Exercise*, vol. 2, no. 1, pp. 33–40, 2014.

[13] H. Hazmi *et al.*, "Traditional cardiovascular risk-factors among healthcare workers in Kelantan, Malaysia," *Southeast Asian Journal of Tropical Medicine and Public Health*, vol. 46, no. 3, pp. 504–511, 2015.

[14] J. Mustafa, N. M. Salle, Z. M. Isa, and H. F. Gha, "Overweight Problem among Primary Health Care Workers in Suburban District of Hulu Langat, Selangor, Malaysia," *Pakistan Journal of Nutrition*, vol. 12, no. 3, pp. 291–296, Feb. 2013, doi: 10.3923/pjn.2013.291.296.

[15] M. Stojanovic *et al.*, "Smoking habits, knowledge about and attitudes toward smoking among employees in health institutions in Serbia," *Vojnosanitetski pregled*, vol. 70, no. 5, pp. 493–500, 2013, doi: 10.2298/vsp1305493s.

[16] A. AlTurkstani, B. Alkail, A. Hegazy, and S. Asiri, "Knowledge, attitude, and practice among primary health-care physicians toward smoking cessation in Makkah, Saudi Arabia," *International Journal of Medical Science and Public Health*, vol. 5, no. 4, p. 714, 2016, doi: 10.5455/ijmsph.2016.13112015224.

[17] H. Mahdi *et al.*, "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," *Tobacco Prevention & Cessation*, vol. 4, no. August, Aug. 2018, doi: 10.18332/tpc/93787.

[18] D. S. Abdulateef, A. J. Ali, D. S. Abdulateef, and M. I. G. Mohesh, "Smoking Knowledge, Attitude, and Practices among Health Care Professionals from Sulaymaniyah City/Iraq," *Tobacco Use Insights*, vol. 9, p. TUI.S38171, Jan. 2016, doi: 10.4137/tui.s38171.

[19] M. Connolly, S. Floyd, R. Forrest, and B. Marshall, "Mental health nurses' beliefs about smoking by mental health facility inpatients," *International Journal of Mental Health Nursing*, vol. 22, no. 4, pp. 288–293, Aug. 2012, doi: 10.1111/j.1447-0349.2012.00871.x.

[20] S. M. Numan, L. Rampal, A. Alamgir, Y. Abdullah, and S. Sidik, "Prevalence and Factors Associated with Smoking: A Cross-Sectional Study among University Students and Staff," *Journal of Dhaka National Medical College & Hospital*, vol. 11, no. 1, pp. 25–30, 2006.

[21] Tobacco Control Laws, "Smoke Free Status of Indoor Public Places, Workplaces, and Public Transport," *Tobacco Control Laws*, 2017. https://www.tobaccocontrollaws.org/legislation/country/malaysia/sf-indoor (accessed Jan. 01, 2021).

[22] World Health Organization, *WHO Global Report on Trends in Prevalence of Tobacco Smoking 2000–2025*, Second. World Health Organization, 2019.

[23] Ministry of Health Malaysia, *Human Resources for Health, Country Profiles 2015*. Ministry of Health Malaysia, 2016.

[24] A. S. Abdullah, F. Qiming, V. Pun, F. A. Stillman, and J. M. Samet, "A review of tobacco smoking and smoking cessation practices among physicians in China: 1987-2010," *Tobacco Control*, vol. 22, no. 1, pp. 9–14, Dec. 2011, doi: 10.1136/tobaccocontrol-2011-050135.

[25] S. M. Borgan, G. Jassim, Z. A. Marhoon, M. A. Almuqamam, M. A. Ebrahim, and P. A. Soliman, "Prevalence of tobacco smoking among health-care physicians in Bahrain," *BMC Public Health*, vol. 14, no. 1, Sep. 2014, doi: 10.1186/1471-2458-14-931.

[26] M. T. Ahmed, J. Jadhav, and R. T. Sobagaiah, "Assessment of risk factors of non- communicable diseases among healthcare workers in Nelamangala: a cross sectional study," *International Journal Of Community Medicine And Public Health*, vol. 5, no. 2, p. 745, Jan. 2018, doi: 10.18203/2394-6040.ijcmph20180261.

[27] J. Zeng *et al.*, "Prevalence of passive smoking in the community population aged 15 years and older in China: a systematic review and meta-analysis," *BMJ Open*, vol. 6, no. 4, p. e009847, Apr. 2016, doi: 10.1136/bmjopen-2015-009847.

[28] C. I. Sonmez *et al.*, "Comparison of smoking habits, knowledge, attitudes and tobacco control interventions between primary care physicians and nurses," *Tobacco Induced Diseases*, vol. 13, no. 1, Nov. 2015, doi: 10.1186/s12971-015-0062-7.

[29] B. Unim *et al.*, "Are age and gender associated to tobacco use and knowledge among general practitioners? Results of a survey in Italy," *Annali dell'Istituto Superiore di Sanita*, vol. 49, no. 3, pp. 266–271, 2013, doi: 10.4415/ANN_13_03_06.

[30] Q. Wang, J. J. Shen, M. Sotero, C. A. Li, and Z. Hou, "Income, occupation and education: Are they related to smoking behaviors in China?," *PLoS ONE*, vol. 13, no. 2, p. e0192571, Feb. 2018, doi: 10.1371/journal.pone.0192571.

[31] H. K. Lim *et al.*, "Epidemiology of smoking among Malaysian adult males: prevalence and associated factors," *BMC Public Health*, vol. 13, no. 1, Jan. 2013, doi: 10.1186/1471-2458-13-8.

BIOGRAPHIES OF AUTHORS

Low Pei Kit received a Bachelor in Health Science (Nutrition) with First Class Honour from Universiti Sains Malaysia and MSc. in Community Nutrition from Universiti Putra Malaysia. She can be contacted at email: lowpeikit@gmail.com.

Hazizi Abu Saad is an Associate Professor of Community Nutrition in the Department of Nutrition, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia. He was Deputy Director of Sports Academy, Universiti Putra Malaysia from 2013-2020. Hazizi's research team has been involved in research focusing on physical activity, nutrition and energy balance. He is a member and expert of several national committees and research consultant in nutrition, physical activity and obesity. He can be contacted at email: hazizi@upm.edu.my.

Rosita Jamaluddin ⓘ 🔢 SC↻ is working as Profesor at Department of Dietetics, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia. She can be contacted at email: rositaj@upm.edu.my.

Chee Huei Phing ⓘ 🔢 SC↻ is the Assistant Professor at Department of Allied Health Sciences, Faculty of Science, Universiti Tunku Abdul Rahman based in Kampar, Perak, Malaysia. She can be contacted at email: cheehp@utar.edu.my.