

# Effects of Knowledge on Second-hand Smoke on Support for Tobacco Free Policy among University Students

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## Abstract

This study aims to identify support for smoke-free policies among university students. A cross-sectional study was conducted among 406 students from three main campuses of a university in 2018. A standardized questionnaire was administered on sociodemographic characteristics, knowledge, and habits towards tobacco use and tobacco influence. There was a significant association between knowledge on secondhand smoke (SHS) and the types of tobacco-free policies, support for smoke-free cars, smoke-free homes, and a peer support tobacco-free program. Knowledge of secondhand smoke, third-hand smoke, and tobacco-free policies increased support for tobacco-free campuses.

*Keywords: Tobacco-free campus, Second-hand smoker, students*

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## 1.0 Introduction

As targeted by the World Health Organization (WHO) by 2045, achieving a tobacco-free world depends mainly on the prevention of tobacco uptake among the younger generation. The number of adolescents has been gradually reducing across the globe since the year 2000s (Sanchez et al., 2015). Nonetheless, in developing countries, the statistics either remain static or have increased over the years (Rani, Thamarangsi, & Agarwal, 2017). Hence, it is a significant public health concern as adolescents, and late adolescents are strong predictors of continued smoking to adulthood.

Among the many interventions to reduce tobacco use, the best approach is to prevent the uptake of primary smokers and to reduce the number of secondhand smokers. Secondhand smoke can be defined as not smoking but inhaling the smoke voluntarily and passively from the lit cigarette or the expiration of smokers. Secondhand smokers have detrimental health effects, almost similar to primary smokers. Of 700 chemicals found in secondhand tobacco smoke, at least 250 are identified as harmful to health, and at least 69 are cancer-causing agents (DiGiacomo, Jazayeri, Barua, & Ambrose, 2019). Also, the exposure to SHS may cause respiratory airway diseases, increased risk of cardiovascular diseases like ischemic heart disease, and stroke. Exposure to SHS irritates the upper respiratory airway and increases the risk of the respiratory tract and ear infections; SHS exposure is responsible for the development of lung cancer, bronchitis, pneumonia, thrombosis, ischemic heart disease, and stroke, psychological distress and adverse effects to fetus of pregnant mothers (DiGiacomo et al., 2019).

Another pressing issue is the loss of productivity, which was estimated to be USD5.6 billion yearly (Courtney, 2015). In Malaysia, the Global Adult Tobacco Survey in 2011 revealed that the prevalence of adults exposed to SHS in the workplace in the past 30 days was 39.8%, while among nonsmokers was 33.9%. It was also found that 78.7% were exposed to SHS in bars/ nightclubs, 71% in restaurants, 84.9% in food eateries, 28.2% in government buildings, and 8.7% in healthcare facilities (Health, 2012; K. Lim et al., 2009). Thus, this awareness of the tobacco-free policy provides an opportunity to reduce future morbidity and mortality. (Pan, Wang, Talaei, & Hu, 2015).

There are many different types of tobacco products available in the market, such as electronic cigarettes, shisha, and chewable tobacco. The consumption of smokeless tobacco with the use of electronic cigarettes had increased to was reported worrisome because of almost one-fifth, 19.1% among school-going children between 10-19 years of age (Perialathan et al., 2018), although a lot lesser prevalence among adults. (3.2%) between 18-24 years old (Nik et al., 2017). Findings also showed that vaping was actively being used as a quit smoking aid, although its effectiveness is questionable. While Shisha smoking is commonly seen in educational institutions, it gained popularity due to its sweet smell and flavor. It was perceived as less harmful and cheaper than conventional cigarette smoking (Baharudin et al., 2016). Nonetheless, the consumption of tobacco products depends upon the price of the tobacco product, disposable income of the consumer, demographic characteristics of the population, socio-economic status of the community,

tobacco control intervention such as the promotion of tobacco products, knowledge, and information about the health effect of tobacco used (Liber, Ross, Omar, & Chaloupka, 2015).

Malaysian governments have implemented various measures to counteract smoking in Malaysia. These initiatives were packed under MPOWER, as recommended by the Framework Convention of Tobacco Control (FCTC), Malaysia has engaged in since 2005 (Pei et al., 2020). Among the initiatives include imposing higher prices of cigarettes, discourage new users from taking up cigarettes, encouraging existing users to quit, helping former users to stay quit, and preventing occasional smokers from turning into regular smokers. Another initiative was to reduce the consumption of tobacco products among those who continue to use tobacco after a price hike. Also, increasing in tobacco excise taxes would result in a decline of tobacco use, thus, encouraging current tobacco users to quit, reducing the number of cigarette use by existing users and reducing the initiation and uptake of tobacco use among young people with more significant impact (Pei et al., 2020).

## 2.0 Literature Review

One of the most effective interventions is creating a smoke-free environment, either in workplaces or public places (Lupton & Townsend, 2015). In university, exposure to tobacco smoke endangers all students who are in their late adolescence and early adulthood. This vulnerable group may face undue exposure to SHS because they may be in the company of friends or colleagues who smoke. Besides, being in a confined area and surrounded by various categories of workers who are adults might enhance tobacco workplace exposure. Article 8 of FCTC highlights the protection of exposures to tobacco smoke in any premises, including workplaces. The implementation of a smoke-free campus must start with a smoke-free policy.

The Tobacco-free campus policy is a written policy comprising of components of protection from secondhand smoke, a ban on the use of any type of tobacco on campus. Other vital components include health education on tobacco use, the existence of cessation services, excellent peer support, and strict enforcement of policy (Trad et al., 2018). These aim to protect from exposure to tobacco use. In addition, it seeks to prevent smoking initiation and help ex-smokers stay off cigarettes and existing smokers to quit. There are many other benefits of this comprehensive policy, including ability to provide a healthier and cleaner environment and reduce the risk of fire both indoors and outdoors (Rath et al., 2019).

Although in western nations, most universities are struggling to implement a 100% tobacco-free, and many are with success stories, this receives little attention and is relatively new in Malaysia. Those previous studies identified some facilitators of such policy, including creating a committee within the campus, establishing venues to foster student debate, and reaching out to stakeholders inside the campus. Barriers include a lack of involvement among students, faculties and administrative staff, and insufficient resources for implementation (Fallin-Bennett, Roditis, & Glantz, 2017).

The focus of this article was to focus on enacting a tobacco-free policy in a large public university. Before policy implementation, smoking on campus was already prohibited in all indoor public spaces. We report findings after two years of implementing this policy in one campus, which was planned to be adopted in another two campuses. The Tobacco-Free Initiative of the Campus was formed in 2016 following various complaints received from students and staff smoking inside university premises. The claims received support for comprehensive tobacco-free implementation. Among the campus, initiatives were establishing multiple programs based on the Ottawa Charter Health Promotion model (Fry & Zask, 2017). The application of this health promotion model is being used to ensure adequate resources are available to support the tobacco-free policy and behavioral interventions. Following this, technical assistance to smokers who wanted to quit smoking (i.e., materials, webinars, smoking cessation service, signages) was provided. To build awareness of this program, team members engaged stakeholders, attended courses on best tobacco-free practices, and visited individual campuses to highlight the program's components. Enforcement involving auxiliary police of the university were also implemented.

In this study, we took three main campuses of a large public university in Selangor as the residence. Our research aims to identify the following assess knowledge of SHS among students, identify areas of policy support among students who had knowledge of SHS, determine compliance with tobacco-free policy among different campuses.

### **3.0 Methodology**

The three campuses housed approximately 100,000 students from various courses and years of study. The distances from each campus were 20 km each, and students selected stayed on campus. Campus A had implemented tobacco-free policies since 2016, whereas campus B and C is awaiting implementation.

A cross-sectional study was conducted. This study was carried out between March 2018 until February 2019. All eligible respondents from the three campuses were invited to participate in this study. Inclusion criteria were local citizens, aged 18 years old and above, able to understand Malay language and stay within campus. Postgraduate students were excluded. Sampling involved multistage random sampling and quota sampling of all faculties on the three campuses. The first stage involved a random selection of faculties based on clusters for each campus. Next, participants were selected based on numbers by years, by quota sampling and quota sampling. The quotas were based on the number of students from each campus. Participation was voluntary, and all participants were provided written consent. A standardized, self-administered, and validated questionnaire was distributed to all participants after the briefing. The survey took approximately 5-10 minutes to complete. The Research Ethics Committee approved the study design, protocols, procedures, and informed consent of the university involved. The minimum sample size required was  $N=166$ , based on 95% CI,  $\alpha 0.05$ , and calculating 20% attrition using

would be 199 participants, based on studies by Braverman et al. (2017), (Braverman, Hoogesteger, Johnson, & Aarø, 2017).

The measures for this study were developed based on group discussions with students held during lecture classes. All respondents completed a questionnaire about sociodemographic characteristics, smoking history, awareness on tobacco-free, and support for tobacco-free. The surveys took 15 minutes to complete. The questionnaires comprised of multiple-choice questions and some binary (yes/no) questions.

There were three sections to the questionnaire. *Part A. Sociodemographic characteristics and smoking history:* Sociodemographic characteristics included gender (male or female), age, year of study (1-5), and the various races in Malaysia, education attainment, lifestyle behaviors. *Part B.* Assessing the perceived knowledge of smoking and exposure to tobacco smoke among smokers and nonsmokers. The knowledge questionnaire comprised of three main questions. The questions assess knowledge of smoke-free policy and knowledge on secondhand and third-hand smoke. *Part C:* Assess the approval of tobacco-free policy for campuses and other places, and other sites. These include support for smoke-free cars and smoke-free homes. Part B and C were based on our previously validated questionnaires used in the university population (Yasin et al., 2016; Yasin et al., 2013). All questionnaires were pretested among 40 students from other campuses than the study sites before implementation. Any misunderstanding of the individual questions was sought out and corrected. All items were rechecked by a team of public health specialists who experts in the field are also.

SPSS version 26.0 was used to analyze the data in this study. Data analyzed were displayed as frequencies, percentages, maximum value, minimum value, means, modes, medians, and standard deviations. The analysis employed includes Chi-squared tests and logistic regressions. Multiple logistic regression was used for the third part of the study involving students who had knowledge of SHS. Results were displayed as odds ratios (OR), and 95% confidence intervals (95% CI), with alpha 0.05 was taken as the level of significance.

## 4.0 Results

Out of 406 students that were approached, 392 students (94.65%) responded. The majority of students were in the age group of 21-23 years old (76%, N=298). Based on the overall data, 5.1% of respondents from the three campuses exercised more than five times a week, and 16.8% were physically inactive; and had never exercised before on campus.

The prevalence of smoking was 3.2% (N=13), and the exposure to SHS was 15% (N=58). The other sociodemographic characteristics were in Table 1. A chi-squared test was applied to explore the association between secondhand smokers and selected variables (Table 2). About 81.9% (321 students) were aware of the policy on campus and had shown support for the tobacco-free policy in Campus A compared to students from the other two campuses. ( $p < 0.05$ ). Bonferroni posthoc test indicates that Campus B showed significantly higher mean (SD) numbers of secondhand smoker 1.25(0.44), as compared

to Campus A 1.05(0.23) The difference between Campus B and Campus C was not statistically significant. Besides that, Campus A showed a significantly higher mean (SD) of secondhand smokers. They agreed on the importance of having a smoke-free campus 1.27(0.61) than Campus B. Figure 1 and 2 diagrams of support for the policies from the campuses.

Table 1: Demographic characteristics of participants

<b>Variables</b>	<b>N = 392</b>	<b>Frequency (%)</b>
<b>Age</b>		
18-20	56	14.3
21-23	298	76.0
24-26	38	9.7
<b>Gender</b>		
Male	78	19.9
Female	314	80.1
<b>Ethnicity</b>		
Malay	382	97.4
Chinese	1	0.3
Indian	0	0.0
Sabahan	5	1.3
Sarawakian	4	1.0
<b>Highest education</b>		
SRP/PMR	1	0.3
SPM	10	2.6
STPM/Matriculation/Diploma/A-level	178	45.4
Degree	199	50.8
Master	4	1.0
PHD/Sub-speciality	0	0
<b>Exercise in a week</b>		
Never	66	16.8
1-2 times	240	61.2
3-4 times	66	16.8
> 5 times	20	5.1
<b>Serving of fruits and vegetables you eat in a week</b>		
0-5	263	67.1
6-10	97	24.7
11-14	20	5.1
>15	12	3.1
<b>Mother/father smoked</b>		
No	241	61.5
Both	3	0.8
Only father	147	37.5

Only mother	1	0.3
<b>If your friend offering cigarettes to you, would you try?</b>		
Surely no	363	92.6
Maybe no	19	4.8
Maybe yes	7	1.8
Surely yes	3	0.8
<b>Knowledge of rules and regulation of smoking in your campus</b>		
Yes	375	95.7
No	17	4.3
<b>Knowledge of secondhand smoker/secondary smoker?</b>		
Yes	326	83.2
No	66	16.8
<b>Knowledge of third-hand smoker/tertiary smoker?</b>		
Yes	248	63.3
No	144	36.7

Table 2. Awareness of tobacco-free policies among students

VARIABLES	SHS knowledge (N= 392)		P value
	Yes	No	
<b>Are you aware of the tobacco-free policies at your campus?</b>			
Yes	297 (76.0%)	53(13.6%)	
No	28(7.2%)	13 (3.3%)	0.007
<b>In your opinion, should a smoke-free car be enforced?</b>			
Yes	306 (78.1%)	57 (14.5%)	0.034
No	20(5.1%)	9(2.3%)	
<b>In your opinion, should a smoke-free house should be enforced?</b>			
Yes	281(71.7%)	49 (12.5%)	0.015
No	45(11.5%)	17(4.3%)	
<b>Would you like to join as peer support in assisting other smokers to quit?</b>			
Yes	306 (78.1%)	57(14.5%)	0.034
No	20 (5.1%)	9 (2.3%)	
<b>Does breathing other people's smoke pose health risks to surrounding people?</b>			
Yes	324 (82.7%)	63 (16.1%)	

No	0 (0%)	2 (0.5%)	0.034
Not sure	2 (0.5%)	1 (0.3%)	
<b>Should smoking be banned in public areas?</b>			
Yes	289(73.7%)	50 (12.8%)	
No	11 (3.2%)	6 (1.3%)	0.020
Not sure	26 (6.6%)	11 (16.8%)	
<b>Will you support tobacco-free policies in various areas?</b>			
Yes	315 (80.4%)	56(14.3%)	
No	6 (1.5%)	4(1%)	0.000
<b>How important is it to you to have a Tobacco-free campus?</b>			
Not important	11 (2.8%)	7(1.8%)	0.009
Less important	26(6.6%)	4 (1.0%)	
Important	91(23.2%)	26 (6.6%)	
Very important	197(50.3%)	28 (7.1%)	

Table 3: Analysis of results for support towards a policy for those with knowledge on secondhand smoke

	Non-adjusted			Adjusted	
	N (%)	OR (95% CI)	P	OR (95% CI)	P
<b>In your opinion, should a smoke-free car be enforced?</b>					
No	20 (6.53)	Ref		Ref	
Yes	306 (93.8)	5.21(1.71-15.88)	0.004*	2.86 (1.28-6.39)	0.038*
<b>In your opinion, should a smoke-free house be enforced?</b>					
No	45 (16.0)	Ref		Ref	
Yes	281 (84.0)	5.94 (1.50-23.60)	0.011*	2.56 (0.99-6.61)	0.053
<b>Would you like to join as peer support in assisting other smokers to quit?</b>					
No	20 (6.5)	Ref		Ref	
Yes	306 (93.5)	5.08 (1.76-14.61)	0.003*	2.43 (1.21-4.89)	0.013*
<b>Do you think a smoker need to ask for permission before smoking near you?</b>					
No	26 (8.7)	Ref	0.002*	Ref	0.602
Yes	300 (91.3)	0.000	0.000*	1.07 (0.214-5.31)	0.939



<b>Should smoking be banned in public areas?</b>					
No	11 (3.8)	Ref	0.178	Ref	0.046
Yes	289 (96.2)	4.80 (0.80-28.81)	0.086	2.56 (0.66-9.85)	0.173
<b>Will you support non-smoking policies in various areas?</b>					
No	6 (1.9)	Ref	0.24	Ref	0.002
Yes	315 (98.1)	NAD	0.99	3.0 (30.59-15.55)	0.185
<b>How important is it to you to have a Tobacco-free campus?</b>					
Not Important	11 (3.3)	Ref	0.02*	Ref	0.020
Less important	26 (8.0)	3.42 (1.12-10.42)	0.03	2.92 (1.32-6.46)	0.008*
Important	91 (28.0)	33.67 (1.87-607.92)	0.02*	11.49 (0.839- 157.56)	0.067
Very important	197 (60.7)	7.76 (0.37-163.40)	0.19	NAD	1.000

Adjusted for other factors (tobacco use, secondhand smoker and influence of cigarette smoke) and sociodemographic characteristics

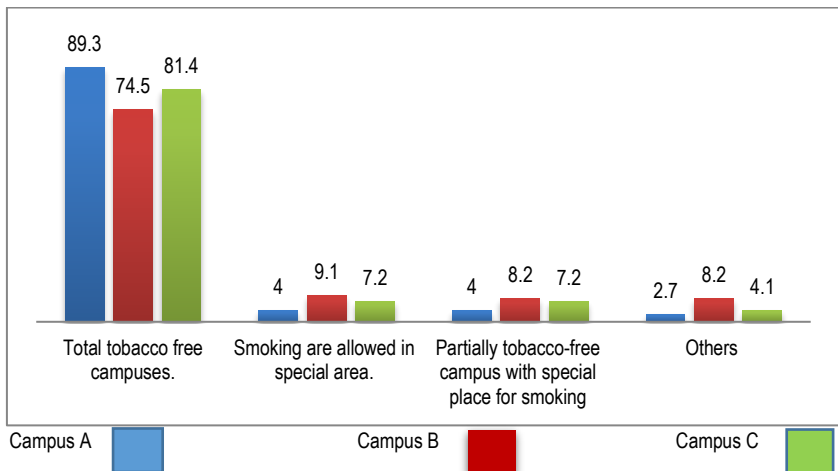


Figure 1: Preference of the different type of policy in three campuses

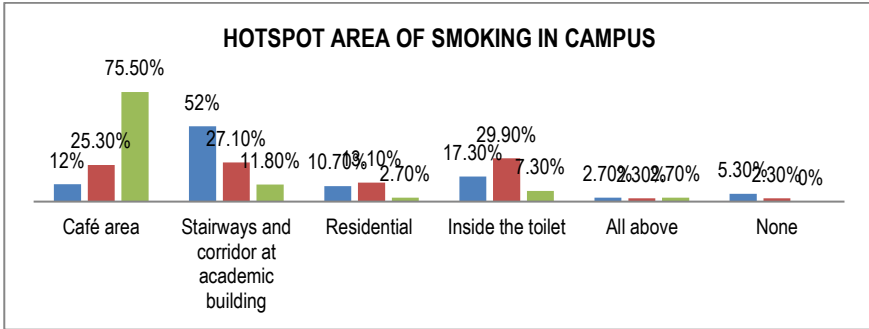


Figure 2: The hotspot area of smoking on three different campuses.

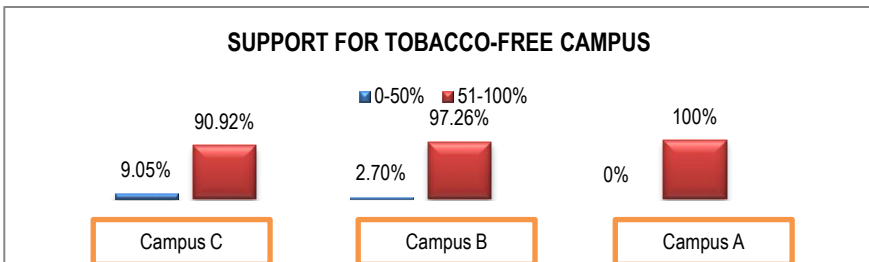


Figure 3: The scale of 0-100% for support for a tobacco-free campus.

## 5.0 Discussion

The smoking prevalence identified by 3.2% in our study was way lower than the global, national prevalence of smoking in Malaysia of 23% (K. H. Lim et al., 2018). However, since the majority of respondents were female, we assume this to be correct. On the other hand, exposure to SHS among the students was 15%, which was higher than expected. This may be related to exposure to the hotspot sites, which are common smoking areas. While the exposures are high, nonetheless, we do not know the extent this exposure occurs either on-campus or off-campus. Students could be exposed at home during weekends or off-campus in their leisure times. However, a high percentage of exposure remains a significant public health issue.

With a tobacco-free policy in place, over 89% of support were received for a tobacco-free campus policy on Campus A. The support for the other two campuses were lesser. Samples from campus B and C had substantially overestimated the support. This was most probably due to support from female predominance in our sample, as most smokers in Malaysia were among males, both in adults and adolescents (Lamin, Othman, & Othman, 2014; H. K Lim et al., 2013). Based on sociodemographic data from the three campuses, 61.5%, N=241 of the parents were nonsmokers, while the rest had either both or one of them who were smokers. Knowing the smoking history of parents may point out the

susceptibility of the youth themselves to engage in smoking (Hock et al., 2013). Nonetheless, our findings do not support such a hypothesis. Further research may investigate the issue of gender roles further and the possibility of causal pathways.

With the tobacco-free policy in place, the survey revealed distinctive differences of support between campus A (100%) as compared to the other two campuses without such policies. This support policy gives a good impression from public health perspectives, as it reflects the will of the students and student bodies. The locations of smoking hotspots identified evidenced the effectiveness. However, it is noteworthy that the patterns seen in stairways and corridors might predict that support for the policy existed, and smokers are afraid to smoke in open spaces. Nonetheless, as of restaurants, we still observed this phenomenon, which clearly showed a lack of enforcement. Also, the exposures outside the campus may be more extensive, especially outside the main gate, where the policy stated that smoking could only be allowed 50 meters from the entrance. These similar findings have also been reported by other university campuses worldwide (Braverman, Hoogesteger, & Johnson, 2015).

Knowledge of SHS was good overall among respondents, although the effects of third-hand smoke are still new. Knowledge of SHS has previously shown to translate into the attitude towards smoking (DiGiacomo et al., 2019). Students may have gained this knowledge from secondary school teachings or via extra curriculum activities. Mass media education by the government, such as television, magazines, and online local health websites, is also abundant. Malaysia had ensured that teaching to the public on the dangers of tobacco use is one of the priorities for tobacco control. Education should, however, be enhanced to include third-hand smokers and methods of quitting smoking among these youth. In addition, such support to policies should also entail awareness of the law associated with it. For instance, universities have been gazetted as smoke-free areas based on the Control of Tobacco Product Regulations, 2004.

The approval of being a peer support among those who have knowledge of SHS is consistent with a recent study (Kamimura, Ahmmad, Pye, & Gull, 2018). It is postulated that the reason behind this may be related to the idea that current or former smokers have a higher level of belief that they would smoke in front of colleagues. Similarly, those smokers are more likely to smoke if their friends smoke, vice versa (Kamimura et al., 2018). This highlights the importance of the effects of social networks on smoking. Therefore, reducing the popularity of smoking among friends may reduce the prevalence of smoking. In another aspect, this can be supported by recent evidence stating the importance of reinforcing the public perception that smoking is not a mainstream activity, by denormalization of tobacco use (Kang & Cho, 2020).

There is little published research looking into support for smoke-free homes and smoke-free cars among adolescents and youth. Our study revealed good support of above 70% in cars and homes. This is slightly lower than reported in the United States in both locations of above 80% in households and 71.5% for vehicles, (Parks, Kingsbury, Boyle, & Evered, 2018). In our study, the support for smoke-free cars was significantly higher among those with knowledge on SHS. Youth tend to misinterpret it as less harmful and be the victim of

SHS exposures at home (Barnoya & Glantz, 2005). Those with SHS awareness also tend to be more concerned about their smoking colleagues and would like to offer assistance to protect themselves. This might also mean that they perceived higher responsibility towards ensuring clean air for all. Thus, our findings clearly showed the importance of providing youth with adequate knowledge of SHS's health effects, as this knowledge translates into policy.

Nonetheless, in most instances, knowledge does not necessarily predict action, although it was proven to be associated with a better attitude and cultural change (Zhang, Martinez-Donate, & Rhoads, 2015). As for third-hand smoke, poor knowledge of this instance is a significant concern. However, it can be an essential component to gain additional support if knowledge on this issue is intensified.

Regarding implementation, some respondents were still unsure whether they should support the total tobacco ban if the policy is to be implemented on each campus. As other researchers discussed on this (Braverman et al., 2015), if the campus stakeholders perceive that SHS may affect them, then there would be a strong demand and lower level of opposition from various parties. Indeed, if we were to provide such support surveys, this might be the right way of gaining support for campus administrators. The sizable support from this study was much higher than the support obtained from other studies. We strongly believe that this was due to prior acceptance of outdoor smoking prohibition in public places and various other no smoking prohibition signages throughout campus. This affirmative acceptance will point out that if the policy were to be implemented on campus not yet tobacco-free, the support from students would be reasonable. In university settings, however, in reality, there are many other possible oppositions, such as administrators, workers, educators, external contractors, that need to be tackled. Hence, further exploration of this issue among various groups is warranted (Braverman et al., 2015). Moreover, active campaigns, seminars, or talk on the importance of policy should be intensified to ensure its success later.

The most significant limitation of this study was that this was a self-reported study and are subjected to bias. Some respondents may underreport smoking habit and were not excluded from this study. Secondly, the race involved were among Malays race and natives, and not from other races. In addition, other groups within campus, should be included in future studies. Thirdly, due to the nature of the cross-sectional study design, no inferences can be obtained, as it covers only one point of time. For instance, the findings' predictive nature as a basis for policy support was inconclusive.

This study had several strengths; first, the policy was examined in the context of a policy that had already existed for campus A. This was inherently compared to the other two campuses. Hence, the results less hypothetical, as compared to our previous study among staff. Secondly, the sampling frame and the response was excellent, higher than most studies.

## 6.0 Conclusion

In conclusion, continuous education on the danger of secondhand smokers and third-hand smokers are required to increase awareness and understanding of the health risks due to tobacco smoke exposure among students. This can be introduced in health-related and non-health-related courses or introductory courses of all university students. Secondly, students who smoke should be screened before joining medical school. Thirdly, areas with evidence of smoking should be strictly enforced by various methods of enforcement and monitoring. When students are fully aware of the dangers to SHS and third-hand smoke, support towards policy will increase. On campuses that had fully implemented the policy, exposure to tobacco smoke has not been eliminated. Hence, this highlights that more efforts and monitoring should be routinely made to ensure the sustainability of such policies. Such enforcement would require support from all levels of management, including lectures and support staff. Next, further research is needed to promote tobacco-free policies among various groups and effective methods to enforce such policies. Lastly, innovations in combating this global issue are much warranted, especially ways on how to eliminate hotspot smoking areas within the campus.

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