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## PUBLIC HEALTH RESEARCH

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### Support of smoking restriction in public areas among adolescents in Malaysia-The findings from Tobacco and E-Cigarette Survey among adolescents in Malaysia (TECMA)

*Kuang Hock Lim\*, Pei Pei Heng, Hui Li Lim, Yoon Ling Cheong, Chee Cheong Kee, Sumarni Mohd Ghazali and Jia Hui Lim*

*Institute for Medical Research, Jalan Pahang, Kuala Lumpur, Malaysia.*

*\*For reprint and all correspondence: Kuang Hock Lim, Institute for Medical Research, Jalan Pahang, Kuala Lumpur, Malaysia.*

*Email: keelimkota@yahoo.com*

#### ABSTRACT

- Introduction** Adolescents are the future generation, and their support for smoke-free policies might create momentum for future stringent smoke-free initiatives. This study aimed to determine the levels and factors associated with support for smoking in public areas among Malaysian school-going adolescents aged 10-19 years.
- Methods** The data were derived from the Tobacco and E-cigarettes among adolescents in Malaysia (TECMA), which employed the cross-sectional study design and multistage sampling to select the representative samples of school-going adolescents. Data was obtained through self-administered of pre-validated questionnaire. Descriptive study, cross-tabulation and multivariable analysis were used for analysis.
- Results** Majority of respondents supported smoking restriction in public areas (86.3%, 95 CI 85.4-87.1). The proportion and likelihood of support of smoke-free initiative were higher among respondents with better knowledge of the harmful effects of second-hand smoke (SHS), been taught in school about the health effects of smoking, older age group (16-19 years), female, those students schooling in urban areas, Malay and other Bumiputras from Sabah and Sarawak. However, current smokers and ECV users were less likely to support smoke-free initiatives in public areas.
- Conclusions** The level of support for smoke-free initiative in public areas was high among youths in Malaysia, and this might offer promising prospects to expand the non-smoking areas to more public areas in the future.
- Keywords** Smoke-free public area - level of support - school-going adolescent - smoking status - TECMA.

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## INTRODUCTION

Exposure to second-hand smoke contributed to numerous health problems across the population, including exacerbation of bronchial asthma, respiratory infections, and sudden infant death syndrome (SIDS) among infants and children, and increased risk of coronary heart disease, stroke, and lung cancer among adults.<sup>1,2</sup> A total of 1% of the Global Burden of Diseases was attributed to second-hand smoke (SHS) exposure.<sup>2</sup> As a result, the World Health Organisation (WHO) had announced the article on smoke-free provision in Framework Convention on Tobacco Control (FCTC)<sup>3</sup> which had been ratified by 163 countries globally, including Malaysia.

As a signatory of FCTC, the Ministry of Health (MOH) Malaysia had introduced smoke-free areas through the provision of Control of Tobacco Product Regulation 2004<sup>4</sup> which had been amended from time to time to expand the non-smoking public areas. It aims to protect non-smokers from the SHS exposure and to de-normalise the smoking behaviours among Malaysian society.<sup>5</sup> The enforcement activities at gazetted smoke-free public areas and the introduction of the “Young Doctor Programme”.<sup>6</sup> had been implemented to ensure the stipulated objectives in the smoke-free policies were achieved. However, various studies had revealed that public support towards smoke-free policies is the pre-requisite to achieve the target of smoke-free policies, especially for a democratic country like Malaysia.<sup>7</sup> Public support will enable the implementation of any government policy together with its enforcement without much resistance. Conversely, lack of public support will leave the lawmakers more susceptible to the influence of the tobacco advocator. Therefore, it reduces the efficacious of the implementation of smoke-free policies.<sup>7-9</sup>

Given the youth is the future generation who will determine the future progress of tobacco control in the society and country, several studies have been carried out to assess the level of support among youths toward smoke-free policy in public area. Studies revealed that the level of support was between 40-85% depending on the smoke-free locality.<sup>10-11</sup> In addition, the studies also showed that male, smoking status, perception of harmful of tobacco and health effects of second-hand smoke exposure, and tobacco de-normalisation beliefs, were significantly associated with the support for smoke-free policy.<sup>10</sup> However, those studies were carried out in countries with different anti-smoking legislation, social norm and social-demographic backgrounds. Therefore, the findings might not be applicable to Malaysia. In addition, the study on the level of support in Malaysia were mainly focused on adults without much attention to adolescents. The youth is the future generation who will determine the future progress of tobacco control in the country.

Therefore, the information on the support of smoke-free policy among youths is of paramount importance as it will assist the policymaker in formulating appropriate measures in tobacco control in Malaysia.

The present study aimed to investigate (i) adolescent support for tobacco-free policy (SFP) in Malaysia, and to investigate (ii) the associations between socio-demographic and other smoking-related characteristics with the support of smoke-free smoking policies.

## METHODS

Data were derived from a nationwide school-based study “Tobacco & E-Cigarette Survey Among Malaysian Adolescents” (TECMA) in 2016. A cross-sectional study design and multiple-stage cluster sampling was employed to select a representative sample of upper primary and secondary Malaysian school-going students aged from 10 to 19 years old. Fifteen states in Malaysia were included in the first strata, while urban and rural areas for each state was considered as the second strata. The primary sampling unit (school) was selected through proportionate sampling to size based on the latest sampling frame of upper primary and secondary school enrolment provided by the Ministry of Education (MOE), Malaysia. Subsequently, the classes as the secondary sampling unit from each chosen school were selected *via* simple random sampling. All students from the selected classes were included as participants of the study. In total, 138 schools were selected (i.e. 82 urban and 56 rural schools). A total of 13,980 respondents were required for the study based on an estimated prevalence of 3% e-cigarette users among adolescents in Korea.<sup>12</sup> type one error of 0.05, with a design effect to account for any cluster effects among students in the classes, the precision rate of 1.5% and the expected non-response rate of 20%. Detailed illustration of the study can be obtained from TECMA study.<sup>13</sup>

### Measures

An active, informed consent approach was used to obtain permission from the parents/guardians of the selected respondents. Specifically, the informed consent forms and illustration of study were distributed to parents/guardians of the selected respondents via the school administration, in which the illustration consisted of the study objectives, their son/daughter's participation were based on voluntary basis, their anonymity was assured, and the data were only used for research purposes. Parents/guardians were asked to return the informed consent form if they would allow their child to participate in the study. Only selected respondents who consented by their parents/guardian could participate in the study. In addition to consent from students' parents/guardians, selected respondents

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were also asked to sign an additional consent form if they agreed to participate in the study. Data collection was carried out in a designated area identified by school administrators during the school day. To avoid biases, no schoolteachers and staffs were allowed to be present during the data collection session.

Research team members provided the details on the study prior to questionnaire completion. The briefing session has delivered clear information on the study objectives, contents of the questionnaire, and assurance that all participations were voluntary, i.e. students could skip any item(s) on the survey. A validated standard questionnaire adapted from the Global Youth Tobacco Survey (GYTS) was used in the study, which consisted of five sections: (a) social-demographic (i.e., age, gender, standard/form of study [i.e., upper primary, lower secondary, upper secondary], ethnicity, daily school pocket money); (b) tobacco use (e.g., current use status, age of initiation); (c) e-cigarette use (i.e., current status, number of quitting attempts); and (d) shisha (i.e., current use status, age of initiation). The study protocol was approved by Malaysia's MOE, MOH, and the State Education Department; ethical approval was granted by the Medical Research and Ethics Committee of Malaysia's MOH.

The dependent variable "support for smoke-free measures in public place" was measured using the item, "are you in favour of banning smoking inside enclosed public places (such as shops, restaurants, bus, taxi, train, school, playgrounds, gymnasium, sports centre and shopping malls)? Respondents were required to answer either "Yes" and "No". Independent variables in the study were socio-demographic variable, namely gender, form of study (i.e., upper primary, lower secondary, upper secondary), ethnicity (i.e., Malay, Chinese, Indian, Bumiputra

Sabah, and Bumiputra Sarawak), locality (i.e., urban/rural), smoking status (i.e., current smoker: smoked at least once in the last 30 days). Their knowledge on harmful health effect to SHS (Yes/No), exposed to SHS (at home and other places than home) E-cigarette user (Yes/No).

### Data analysis

Prior to analysis, data were cleaned and weighted based on the study design and non-response rate according to the school enrolment for upper primary and secondary schools in the year 2014. Descriptive statistics were used to describe respondents' demographic characteristics while the Chi-square analysis was used to determine the association between "support for restrict smoking in public areas," and all categorical independent variables. Multivariable logistic regression (MLR) was conducted to identify factors associated with support for smoke-free policy. The effect of each independent variable on the dependent variable was determined after adjusting for the influence of other confounding factors. All independents in the final model were examined for possible all two-way interactions, and a p-value exceeding 0.05 indicated that no interaction was detected. All statistical analyses were run at a 95% CI using SPSS software version 20 (Complex sampling method).

## RESULTS

The response rate for the study is 87.9%. From the total number of 13,250 students who responded, a nearly equal proportion of male and female subjects was observed. A similar pattern of same proportion was also found among the schooling areas of respondents. Two-third of respondents were formed Malay descents and approximately one-fourth of adolescents aged 16-19 years old (Table 1).

**Table 1** Social-demographic characteristic of respondents

Variable	Estimated population	sample	%
Gender			
Male	1881131	6582	51.1
Female	1803629	6554	48.9
Age group (years)			
12 and less	1369393	4138	37.2
13-15	1434842	5278	38.9
16-19	880523	3726	27.9
Ethnicity			
-Malay	2433437	9243	66.1
Chinese	477956	1764	13.0
Indian	213674	748	5.8
Bumiputra Sabah	211781	545	5.7
Bumiputra Sarawak	195558	447	5.7
Others	147095	385	4.0
Strata			
Urban	1677958	7689	45.3
Rural	2006801	5448	54.5

Tobacco Smoking Status			
Yes	524231	1807	14.2
No	3160528	11329	85.8

Majority of the school-going adolescents (86.3%) expressed their support for smoke-free regulation in public areas, and the proportion was significantly higher among adolescents with good knowledge on the harmful effects of SHS (90.3 vs 51.0%,  $p < 0.001$ ), and those who had been taught in school about the harmful effects of tobacco (90.5% vs 66.5%,  $p < 0.001$ ). In addition, the level of support for smoke-free regulation in public areas also significantly higher among the female (89.4% vs 83.2%,  $p < 0.001$ ), adolescents schooling in urban areas, adolescents aged 16-19 years, those who

exposed to SHS at home and places other than home. However, the proportion of current smokers and ECV users who supported smoke-free regulation in public areas was lower compared to non-smokers and non-ECV user. Similar pattern was also observed in multivariable analysis, in which the likelihood of support for smoke-free regulation in public areas was higher among respondents with higher knowledge of SHS (AOR 5.75, 95% CI 4.70\*7.03), and those who had been taught in school on danger of tobacco (AOR 2.43, 95% CI 2.03-2.89) (Tables 2 and Table 3).

**Table 2** Support for smoke free policy in Public Areas among School Going Adolescents in Malaysia.

Variable	Estimated population	Support for smoke free in public areas				
		sample	%	95% CI	p value	
				Lower	Upper	
Overall	3168437	11635	86.3	85.4	87.1	
Gender						
Male	1559678	5504	83.2	81.9	84.4	<0.001
Female	1608758	5801	89.4	88.4	90.4	
Locality						
Urban	1421043	6646	84.9	83.7	86.0	0.003
Rural	1747393	4719	87.4	86.2	88.5	
Age groups (Years)						
12 and younger	1115839	3302	81.9	80.4	83.3	<0.001
13-15	1256464	4694	87.6	86.1	89.0	
16-19	796132	3369	90.8	89.6	91.8	
Ethnicity						
Malay	2164315	8286	89.2	88.3	90.1	<0.001
Chinese	344934	1262	72.3	69.5	74.9	
Indian	157605	573	73.9	69.3	79.0	
Bumiputra Sabah	198543	508	94.3	91.7	96.1	
Bumiputra Sarawak	179539	407	90.0	86.4	92.7	
Others	122723	327	87.9	79.0	87.8	
SHS Exposure in the house						
Yes	1697795	6042	90.3	89.2	91.2	<0.001
No	1469905	5320	82.1	80.7	83.3	
SHS Exposure other than in the house						
Yes	1233901	4121	89.0	87.7	90.2	<0.001
No	1934535	7241	84.6	83.5	85.7	
Current Smoker						
Yes	337833	1162	82.1	78.8	84.9	0.002
No	2703625	9789	86.6	85.7	87.5	
E-Cigarette User						
Yes	240629	856	80.8	77.1	84.0	<0.001
No	2583112	9274	87.0	86.0	87.8	
Been taught in school about harmful of tobacco						
Yes	2530782	8962	90.5	89.7	91.3	<0.001
No	311317	1192	66.5	63.4	69.4	

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Tobacco smoke is harmful

Yes	2974221	10719	90.3	89.6	91.1	<0.001
No	194215	646	51.0	47.3	54.7	

**Table 3** Multiple Logistic regression to determine associated factors with support of Smoke Free Policy among school-going adolescents in Malaysia.

Variables	$\beta$	Standard error (S.E)	Adjusted Odd Ratio (AOR)	95% CI	
				Lower	Upper
Gender					
Male			Ref		
Female	0.386	0.088	1.37	1.14	1.64
Locality					
Urban			Ref		
Rural	-0.166	0.083	0.85	0.72	1.01
Age groups (Years)					
12 and younger			Ref		
13-15	0.826	0.104	1.64	1.35	1.99
16-19	0.599	0.099	2.08	1.70	2.55
Ethnicity					
Malay	1.152	0.101	2.61	2.13	3.29
Chinese			Ref		
Indian	0.239	0.159	1.26	0.92	1.74
Bumiputra Sabah	1.693	0.252	4.85	2.99	7.88
Bumiputra Sarawak	1.363	0.219	3.00	1.98	4.54
Others	0.958	0.219	2.35	1.31	3.67
SHS Exposure in the house					
Yes	-0.057	0.112	0.93	0.75	1.16
No			Ref		
SHS Exposure other than in the house					
Yes	0.528	0.099	1.65	1.34	1.16
No			Ref		
Current Smoker					
Yes			Ref		
No	0.383	0.179	1.47	1.04	2.12
E-Cigarette user					
Yes			Ref		
No	0.443	0.169	1.47	1.01	2.14
Been taught in school about harmful of tobacco					
Yes	0.998	0.084	2.43	2.05	2.89
No			Ref		
Tobacco smoke is harmful					
Yes	1.129	0.085	5.75	4.70	7.03
No			Ref		

## DISCUSSION

The research presented in this paper was the first study which reported on school-going adolescents' support for smoke-free regulation in public areas. The study revealed that majority of the school-going adolescents were supportive of smoke-free in public areas. Our proportion was higher than the figure of 54.1% as reported in Hong Kong,<sup>11</sup> 59% in New Zealand,<sup>14</sup> and globally of 74%.<sup>15</sup> However, it is lower than 91.4% reported by Erguder et al. among youths in Turkey.<sup>16</sup> The higher support observed in the current study was encouraging, and probably due

to a longer duration of implementation of public smoke-free laws in Malaysia compared to those studies. True enough, previous studies revealed that the level of support for smoke-free initiative increased in tandem with the period of policy implementation. In addition, these findings might be due to the comprehensive initiatives implemented by various stakeholders, including health promotion by both of the healthcare practitioners and the MOE in preventing smoking initiation among adolescents in Malaysia since the recent years. However, this should be thoroughly investigated in future studies.

In accordance with the finding by Lazuras and Chen among youth in Greece and Hong Kong, respectively.<sup>10-11</sup> Our study found that the odds of supporting smoke-free initiatives among those with knowledge on harmful effects were more than five times higher than their counterpart who possessed a lower knowledge level. Our finding was imperative as the overall health beliefs, and health-related behaviours were focused in the present study. The anticipation of the adverse health impacts that might harm the surrounding people, which does not only come from their own smoking behaviour but also *via* SHS exposure, was being assessed in the present study. Hence, it provided a more relevant and practical information on the support for smoke-free policies as the prediction on both the health consequences on self and surrounding people were taken into account following the smoking and SHS exposures.

Current smokers and ECV users were less likely to support smoke-free initiatives in public place, and the finding was congruent with the previous studies which reported that non-smokers were the most supportive group for smoke-free<sup>10-11</sup> initiatives. Smokers apprehend smoke-free policies as a barrier for them to smoke without restriction in all public localities. In addition, active smokers could perceive the distress situation that they might experience once the smoke-free legislation is enforced, thus decrease their support on smoke-free policies. Moreover, in order to justify and rationalise their smoking habit, smokers were prone to underestimate the health impacts of SHS exposure towards non-smokers, besides recognising smoking as an individual's right. Some of them might even presume that SHS is less hazardous compared to the emission of gases from motor vehicles. Festinger's cognitive dissonance theory postulates<sup>17</sup> that human has the inclination to adjust the regularity and consistency between one's perceptions, belief and behaviours. However, whenever the inconsistency exists (e.g. when smokers realise smoking is harmful somehow wish to continue the habit), they will make an adjustment in their own belief and perception (e.g. falsify the negative consequences into the positive ones) or even through behavioural modification (e.g. quit smoking) in order to restore the equity. Nevertheless, changing one's perception was found to be easier compared to behavioural change; hence smokers are more likely to espouse the risk-minimising beliefs which then post an influence on them to oppose the smoke-free policies.<sup>17</sup>

The associations between perceptions of the harmful effects of smoking and support for tobacco control policies in our study were also congruent with previous research among adolescents.<sup>10-11</sup> which profoundly suggested that

delivering the message on the health harm of smoking may increase support for smoke-free policy. The finding might be explained by a health belief model that suggested the perceived susceptibility and severity of specific behaviour might influence human perception.<sup>18</sup> Further researches on the efficacy of intervention programmes that deliver messages about the harmful effects of smoking with support for smoke-free policies are strongly recommended, to identify the most effective means and type of messages that should be delivered.

We found that females were more supportive for smoke-free policies compared to males, such a difference between the gender was consistent with the results reported by Chen et al. 2019<sup>11</sup> and Erguda et al. 2008<sup>16</sup> among youth in Hong Kong and Turkey, respectively. The norm of smoking among males is generally accepted by Malaysian society.<sup>19</sup> Norm has been identified as one of the factors associated with smoking among adolescents in previous studies.<sup>10,20,21</sup> This similar factors might be used to expound a higher likelihood of SFI support in public areas among youths schooling in urban areas, in which, majority of gazetted smoke-free localities are located in urban areas,<sup>5</sup> which may de-normalise smoking behaviour, as well as influence their perceptions toward SFP. However, our hypothesis needs to be tested in future studies through qualitative or quantitative studies.

In line with the finding reported by Lazuras et al. 2011,<sup>10</sup> our study revealed that younger age group were less likely to support smoke-free in public areas compared to the older age groups. However, this is in contrast with the findings reported by Chen et al. 2019.<sup>11</sup> We postulated that level of maturation and thinking capability might be among the influencing factors in which the older age groups might be more likely to appreciate the SFI in concern of their health.

The higher proportion and likelihood of support were found among those who have been taught in school on the danger of smoking. The findings are congruent with the studies among youth in Hong Kong and Greece.<sup>10-11</sup> In addition, it also in line with the with previous research in adults. Students who had been taught in school might have better knowledge on the harmful effects of tobacco, therefore draw them towards any policies in line in their belief as posited by the health belief model.<sup>18</sup> The finding suggested the integration of a specific module on the harm of tobacco into the curriculum to be considered under the MOE.

Although the previous study showed that respondents from higher smoking prevalence backgrounds and those exposed to SHS were less likely to support SFP in public areas,<sup>5</sup> Our study showed that the level of support and likelihood of support for SFP in public areas was significantly higher among youths from Malay, and Bumiputra

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Sabah dan Sarawak, who reported a higher prevalence of smoking in this study. In addition, the proportion and likelihood of youths exposed SHS were more likely to support SFP in public areas. The finding indicated that youths react differently to SFP in public areas compared to Malaysian adults in which adults from Malay ethnics and those reported exposure to SHS were less likely to support SFP in public areas.<sup>6</sup> which provide a better prospect for the prevention of SHS initiative in the future. However, more studies are required to elucidate and to understand the mechanism of higher support for SFP in public areas among those groups with higher smoking prevalence and SHS exposure in the country.

The study was not without limitation, and data obtained through self-administered, which might be over or under-reporting due to social bias. In addition, the cross-sectional study design can only enable the establishment of the association between the independent and dependent variables. However, the representative of the sample allows for the generalisation of finding to Malaysian youth. In addition, the anonymity of respondents' status might encourage the youths to enclose the information of their current status of smoking and other related information.

## CONCLUSION

The level of support of smoke-free initiative in public areas was high among youths in Malaysia which offered the promising prospect to expand the SFP to more public areas in the future. However, measures to enhance the knowledge about the health hazards of SHS and tobacco smoking through various school programmes targeting those high-risk group as being identified in the current study is essential. This is to ensure the SFP in public areas will be widely accepted in the future.

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