PUBLIC HEALTH RESEARCH

Prevalence and factors associated with smoking cessation among elderly in Malaysia- A findings from the population-based study

Kuang Hock Lim[1], Hui Li Lim[2], Sumarni Mohd Ghazali[1], Chee Cheong Kee[3], Chien Huey Teh[1], Yoon Ling Cheong[1], Pei Pei Heng[1] and Jia Hui Lim[4]

[1]*Institute for Medical Reseatch, Ministry of Health Malaysia, Jalan Pahang, 50588, Kuala Lumpur.*
[2]*Hospital Sutan Ismail, Ministry of Health Malaysia, Taman Mount Austin, 81100, Johor Bahru, Johor.*
[3]*Sector for Biostatistic & data repository, National Institute of Health, Ministry of Health* [4]*Malaysia, Setia Alam, 40170, Shah Alam, Selangor.*
[4]*Monash University Malaysia, Bandar Sunway,47500, Subang Jaya, Selangor.*

*For reprint and correspondence: Lim Kuang Hock, Institute for Medical Research, Jalan Pahang, 50588, Kuala Lumpur.
Email address: limkh@moh.gov.my/keelimkota@yahoo.com

ABSTRACT

Introduction	The information of prevalence and associated factor(s) with smoking cessation among the elderly will assist in formulating the suitable policies and reducing the mortality among Malaysian elderly due to smoking-related diseases. This paper aims to describe the prevalence and factors associated with smoking cessation among Malaysian elderly.
Methods	We carried out the population-based study using the cross-sectional study design and a sample size of 2,674 respondents obtained *via* a multistage sampling method. Validated questionnaire and face-to-face interviews approach were the methodologies employed to collect data from the selected respondents. The interview was conducted by trained enumerator using a standardized and validated questionnaire. Descriptive and multiple logistic regression were used in data analysis.
Results	The present findings demonstrated that almost 1 out of 10 of Malaysian elderly are current smokers. The prevalence of smoking was significantly higher among men (28.1%) compared to women (2.9%). Multivariable analysis showed that females (AOR 2.33, 95 CI 1.66-4.55) and those with advancing age were more likely to stop smoking compared to the younger-aged elderly (70-74 year, AOR 2.38(95 CI 1.24-4.53), 75 year and above, AOR 2.82, (95CI, 1.57-5.05. 60-64 years as reference), whiles other ethnicities (AOR 0.11, 95 CI 0.02-0.61) were less likely to cease smoking compared to elderly from Chinese descent. Based on multivariate analysis, diabetes, hypertension and hypercholesterolemia were not significant factors associated with smoking cessation.
Conclusions	The study has shown a low proportion of Malaysian elderly is ex- smoker. Suitable measures and programmes should be formulated and implemented to focus on the elderly groups identified in this study, to increase the quit smoking rate among them and subsequently to increase the quality of life by reducing the burden of smoking-related disease among the Malaysian elderly.
Keywords	Malaysian elderly - smoking cessation - chronic diseases.

INTRODUCTION

Advancements in healthcare sector have contributed to the improvement on the lifespan of the Malaysian population, from an average lifespan of 68 years in 1980 that has been increased to 75 years in 2013.[1] This has changed the population structure in Malaysia, in which the Malaysian elderly population will increase to 3.4 million (or 11.5% of Malaysian population) by 2020.[2] The Malaysian government has formulated the elderly policies in line with the current changes in population structure to ensure that Malaysian elderly can lead a normal and healthy life.[3]

However, morbidity and mortality related to smoking have been identified as factors that will jeopardise the "successful ageing" concept, in view of its contribution to diseases among the elderly. Various studies have revealed that the lifespan of elderly people who smoke is 10 years shorter than elderly people who did not smoke,[4] where the elderly who did not smoke also reported with better health conditions. Men who quit smoking at the age of 65 years gain about 1.4-2.0 years of life, while women gain up to 2.7-3.4 years. A study by Lim et al. among the Singaporean revealed significant reduction mortality of lung cancer among the smokers after they quit the smoking habits. [5] In addition, Huddlestone et al and Muizzinler at al reported the risk of developing or dying from cancer or other diseases was reduced once the elderly ceased smoking.[6,7] Furthermore, study revealed that The cost per life year saved from the use of pharmacological treatment interventions ranged between US$128 and US$1,450 and up to US$4,400 per quality-adjusted life years (QALYs) saved, and smoking cessation programs yield cost savings to the health system of between US$500 and US$614 per Life Year Gain.[8]

The studies in Malaysia in 2002, 2006 and 2018, revealed the reduction of prevalence among the elderly from 39.4%, 19.8%, and 13.3%, [9-11] respectively. which is higher among elderly reported in 2015 China (11.0%) [12] and 9.5%[13] in Singapore. the studies also showed that 67.7% of them planned to quit and 34.0% of them attempted to stop.[9-11] Given the benefit of smoking cessation, the Malaysian government, through *Kementerian Kesihatan Malaysia* (KKM), have initialised several initiatives to increase the smoking cessation rate by proving the smoking cessation services in public primary healthcare centre, pharmacological treatments, and those initiative encompass the elderly. [14]
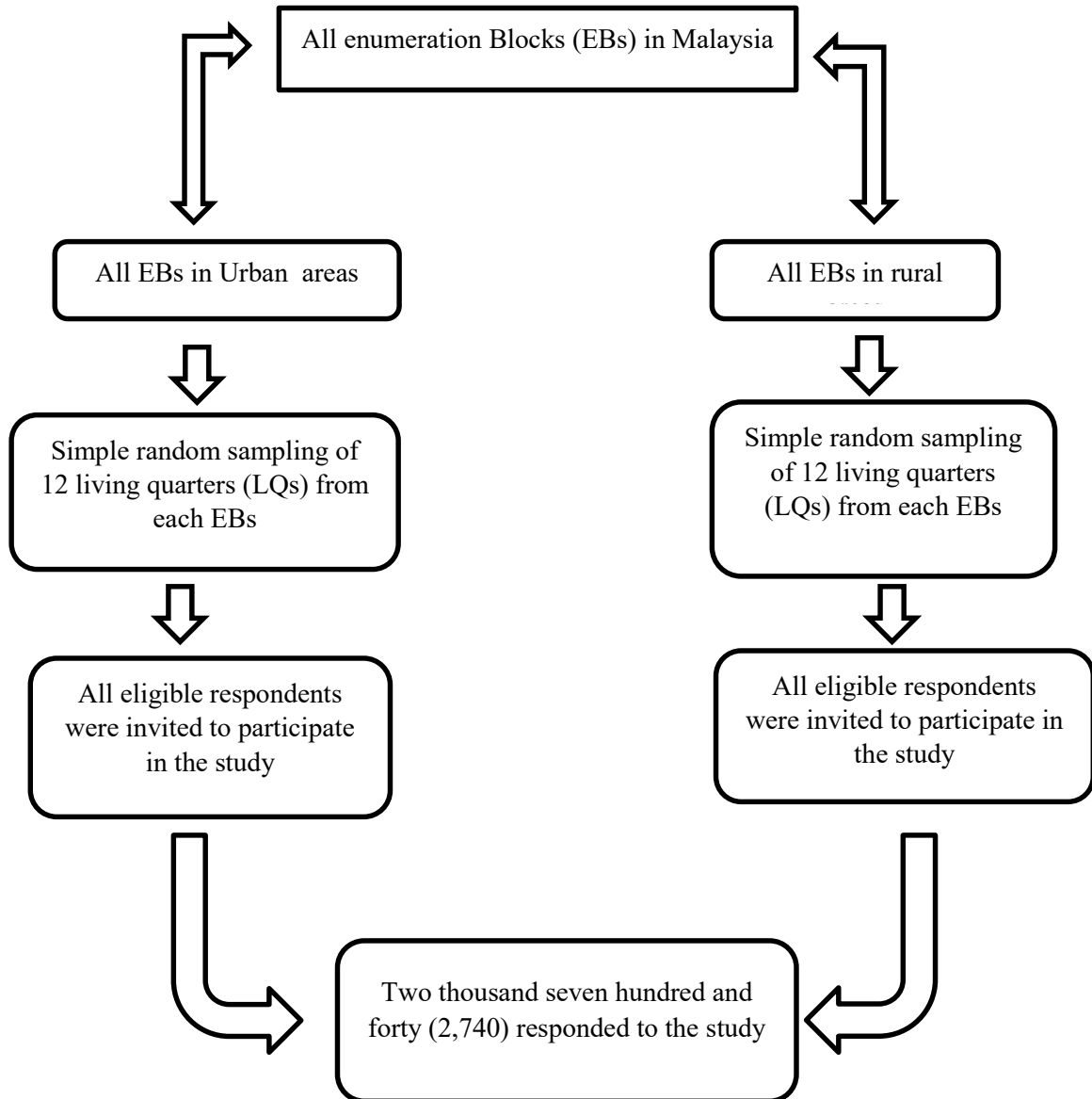
Studies showed that various factors, including advancing age, influence smoking cessation [15-16] and concern of health. [17] Those with diseases were more prone to cease smoking, [17] while higher education attainment,[18] being married, [15] and working as a professional have also been identified as factors associated with smoking cessation. [15] and qualitative study in primary care among fifty current smokers, revealed that Personal and lifestyle factors: Social cultural norms: perception among smokers that ability to quit was solely based on one's ability to achieve mind control, and perception that stopping smoking will harm the body were among the factors identified as barrier to ceased smoking.[19]

Although several studies have been carried out among the elderly in Malaysia, the scope of the studies was mainly focused in describing the prevalence and factors (both intra and interpersonal), association with smoking among elderly.[20-22]Sociodemographic and chronic diseases Factors associated with smoking cessation among the representative sample of Malaysian elderly have yet to be investigated. In addition, the factors of smoking cessation among the elderly also differ from the population in terms of duration of smoking, their health condition, and their belief in the benefit of smoking.[21-22] Given the potential differences in the associated factors, a different approach would be necessary to increase the quit smoking rate among the elderly.

This aim of the study was to describe the prevalence of smoking cessation and factors (social demographic factors) associated with smoking cessation among the elderly in Malaysia.

METHODOLOGY

We carried out the population-based study using the cross-sectional study design and a representative sample size of 2,674 respondents obtained through a multistage sampling method. The first stratum consisted of the states in Malaysia, the urban and rural areas for each state was the second-stratum. The enumeration block (Ebs) was the primary sampling unit, and 12 LQs (the secondary sampling unit) was selected from the selected Ebs. and all eligible households' members (Who are Malaysian and resided in the house for more than two weeks) in the selected LQs were invited to participate in the study. In total, 794 Ebs were selected in the survey. A detailed description of the study had been described by Fadhli et al. (2013).[23]

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┌─────────────────────────────────────────┐
│   All enumeration Blocks (EBs) in Malaysia │
└─────────────────────────────────────────┘

┌──────────────────────┐          ┌──────────────────────┐
│  All EBs in Urban     │          │  All EBs in rural     │
│  areas                │          │                       │
└──────────────────────┘          └──────────────────────┘

┌──────────────────────┐          ┌──────────────────────┐
│ Simple random         │          │ Simple random         │
│ sampling of 12 living │          │ sampling of 12 living │
│ quarters (LQs) from   │          │ quarters (LQs) from   │
│ each EBs              │          │ each EBs              │
└──────────────────────┘          └──────────────────────┘

┌──────────────────────┐          ┌──────────────────────┐
│ All eligible          │          │ All eligible          │
│ respondents were      │          │ respondents were      │
│ invited to participate│          │ invited to participate│
│ in the study          │          │ in the study          │
└──────────────────────┘          └──────────────────────┘

        ┌───────────────────────────────────────┐
        │ Two thousand seven hundred and        │
        │ forty (2,740) responded to the study  │
        └───────────────────────────────────────┘
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Figure 1 Sampling process for the study

Instrument and measurement
A pre-test validated questionnaire was the instrument used for data collection. The questionnaire was developed by a panel of experts to ensure the content validity of the instruments. Subsequently, the questionnaire was pre-tested among adults' respondents to established the face validity, minor correction on instrument was carried out based on the feedback from the respondents. They are three components in the questionnaire, namely social demography, risk behaviors (smoking, alcohol consumption), current health status (presence of diabetes, hypertension or hypercholesterolemia).

Data were obtained through face-to-face interviews by the trained enumerator (who have minimum qualification of completing secondary school education, and been selected by the research team member to ensure their competent. The selected enumerator was trained by the research team members for a period of one week on theory and practical session on the research project). In which the explanation of the purpose of the study was given to the respondents before the interview, and their participation was based on voluntary basis, all the information will only be used for the research purposes only. The interview was started after written consent was collected from the respondents.

The dependent variable is smoking cessation status, which was measured by two items, (1) "Have you ever smoked Shisha, cigarettes, cigars, pipe, etc." and (2) "Do you currently smoke". The respondents who answered "yes" to both items was categorised as "Current Smoker", "yes" to first "items" but "No" to second item was classified as "Ex-smoker/smoker who had ceased smoker". Non

smokers "(Who response No to both items) was included in bivariate analysis but not included in multivariate logistic regression.

The social demography of the respondents, i.e. gender, age (divided into categories as 60–64 year-old, 65–69 year-old, 70–74 year-old and 75 years and above), marital status (Married, single), education attainment (no formal education – did not attend any formal education, primary school (received 1-6 years of formal education, secondary school education (received 7-12 years of formal education, tertiary education (enrolled in university), Residential areas (Urban-resided in areas more than a population of 10,000 with at least 60 % of population (aged 15 years and above) were involved in non-agricultural activities." , Rural areas -respondents resided in areas Areas with population less than 10,000 people having agriculture and natural resources in which its population either clustered, linear or scattered.)was obtained, while the health status of respondents was determined by the question "Have you ever been told by a doctor or medical assistant that you have diabetes/hypercholesterolemia/hypertension" while those answered "NO" had measured systolic blood pressure of 140 mm Hg and/or diastolic blood pressure of 90 mm Hg or more (hypertension), a total blood cholesterol more than 5.2 mmol/l (hypocholesterolaemia), fasting capillary glucose (FBG) of 6,1 mmol/L or more (or non-fasting blood glucose of more than 11.1 mmol/L (diabetes) and respondents who answered "No" and negative on hypertension/biochemical measurement were categorised as not knowing/not having chronic diseases. The study protocol had been approved by the Medical Research Ethics Committee, Ministry of Health, Malaysia ((NMRR-10-757-6837)

Data were cleaned, prior to analysis. Descriptive statistics (e.g. frequency, proportion) were used to describe the respondents' social-demographic characteristics. The association between smoking cessation and all dependent variables (namely social demographics and health status of the respondent) was tested using Chi-Square analysis, while the multivariable Logistic Regression was used to determine the association between of independent variables with smoking cessation. Two-way interaction between the interdependent variable in the final model was carried out, and $p > 0.05$ indicated no significant interaction. SPSS statistical software version 20.

RESULTS

Two thousand seven hundred and forty (2,740) subjects have responded to the study, where 53.3% of them were female, 4.3% of them with tertiary education attainment, and approximately half of the respondents (50.1%) resided in urban areas and have married (66.1%). More than half of the respondents were Malay (55.6%), followed by Chinese (29.3%). Six out of ten respondents aged 70 years and below and more than 70% of respondents have income less than RM 2,000 per month (Table 1).

Table 1 Social demography and smoking status variables among elderly aged 60 years and above in Malaysia

Variable	N	%
Gender		
Male	1278	46.7
Female	1461	53.3
Ethnic		
Malay	1500	55.6
Chinese	791	29.3
Indian	203	7.5
Others Bumiputra	205	7.6
Age Group		
60-64	989	36.1
65-69	668	24.4
70-74	533	19.5
>75	550	20.1
Income Level		
<RM 1000	1059	46.7
RM 1000-1999	557	24.5
RM 2000-2999	394	17.4
>RM 3000	259	11.4
Marital Status		
Married	1811	66.1
Single	929	33.9
Locality		
Urban	1372	50.1

Rural	1368	49.9
Education Attainment		
Not Schooling	810	30.0
Primary	1358	50.3
Secondary	414	15.3
Tertiary	117	4.3
Hypertension		
Known	1074	39.4
No/Not Known	1651	60.6
Hypochloterolemia		
Known	534	19.8
No/Not Known	2169	80.2
Diabetes		
Known	624	23.1
No/Not Known	2078	76.9

The smoking cessation rate was higher among those with high education level (66.7%), advanced age (age 75 and above 55.3%), females (58.5% and respondents with chronic diseases (Known Hypertension 59.7%, Known Hypocholesterolaemia 67.4% and Known Diabetes 61.8%) (Table 2).

Table 2 Prevalence of ex-smokers and current smokers among elderly in Malaysia by sociodemographic and health status

Variable	Ex-smoker		Current smoker		Chi-square value	P value
	n	%	n	%		
Gender						
Male	307	43.7	395	56.3	8.08	0.004
Female	62	58.5	44	41.5		
Ethnic						
Malay	229	43.1	302	56.9	5.46	0.14
Chinese	81	51.3	77	48.7		
Indian	12	46.2	14	53.8		
Others Bumiputra	42	53.8	36	46.2		
Age Group						
60-64	108	37.5	180	62.5	15.1	0.002
65-69	92	45.8	109	44.2		
70-74	81	50.3	80	49.7		
>75	88	55.3	71	44.7		
Income Level						
<RM 1000	145	45.0	177	55.0	0.62	0.89
RM 1000-1999	71	42.0	98	48.0		
RM 2000-2999	54	42.9	72	57.1		
>RM 3000	34	41.5	48	58.5		
Marital Status						
Married	293	45.1	356	54.9	0.29	0.59
Single	76	47.5	84	52.5		
Locality						
Urban	173	50.1	172	49.9	4.98	0.025
Rural	196	42.2	268	57.8		
Education Attainment						
Not Schooling	86	46.5	99	53.5	8.99	0.03
Primary	188	42.4	255	47.6		
Secondary	65	49.2	67	50.8		
Tertiary	24	66.7	12	33.3		
Hypertension						
Known	142	59.7	96	40.3	26.01	<0.001
No/Not Known	227	40.0	340	60.0		
Hypocholesterolemia						

Known	89	67.4	43	32.6	30.49	<0.001
No/Not Known	275	41.2	392	58.8		
Diabetes						
Known	97	61.8	60	38.2	19.74	<0.001
No/Not Known	267	42.0	368	58.0		

Multivariable analysis showed that females were more likely to cease smoking compared to females (AOR 2.23, 95 CI 1.16-4.55). There was significant association between age group and smoking cessation where older age group have higher odds of smoking cessation where the odds of smoking cessation elderly aged 70-74 and 75 above were significantly higher than those aged 60-64 years old. Respondents who had higher educational attainment and knowing they have chronic diseases, which were significant in univariate analysis, were no longer significant after the confounding effect was adjusted (Table 3).

Table 3 Multivariable Logistic Regression to determine the association between social-demographic and "Chronic diseases" with smoking cessation" among the elderly in Malaysia

Variable	Adjusted Odd Ratio	95 CI
Gender		
Male	1	
Female	2.33	1.16-4.55
Ethnic		
Malay	0.68	0.38-1.21
Chinese	1	
Indian	0.56	0.15-2.09
Others Bumiputra	0.70	0.28-1.72
Other	0.11	0.02-0.61
Age Group		
60-64	1	
65-69	1.44	0.82-2.50
70-74	2.38	1.24-4.53
>75	2.82	1.57-5.05
Income Level		
<RM 1000	1.55	0.72-3.33
RM 1000-1999	1.50	0.65-3.47
RM 2000-2999	1.29	0.57-2.93
>RM 3000	1	
Marital Status		
Married	1	
Single	0.69	0.39-1.20
Locality		
Urban	1	
Rural	0.97	0.59-1.60
Education Attainment		
Not Schooling	0.36	0.10-1.23
Primary	0.47	0.15-1.50
Secondary	0.49	0.14-1.68
Tertiary	1	
Hypertension		
Known	1.54	0.89-2.63
No/Not Known		
Hypocholesterolemia		
Known	1.96	0.91-4.17
No/Not Known	1	
Diabetes		
Known	1.85	0.97-3.45
No/Not Known	1	

Note: Multivariable logistic regression analysis was carried out on 792 current and ex-smokers, however, the final sample of respondents was only 635 due to some incomplete information on some of the independent variable.

DISCUSSION

To the best our knowledge, this is the first paper in Malaysia that describes the rate of smoking cessation and associated factor(s) among the elderly in Malaysia. The majority of studies on smoking is concentrated on adolescents or adults, but studies that are focusing among the elderly are scarce, where most studies among this group are disability- and disease-based rather than behaviour-oriented. Thirteen-point five percent of elderly were ex-smokers. Prevalence of smoking cessation is 29.5% that is higher than the 24.8% reported by Dale et al. among the elderly in Minnesota [24] and 23.5% reported among the elderly in European countries, [25] but lower than 40% reported by Henley et al among elderly in Uniter states[26]. Therefore, proactive measures should be taken to enhance the smoking cessation among elderly smokers in Malaysia.

The study found that the proportion and likelihood of quit smoking were higher among older men (70–74 years old and more than 75 years old) to younger counterparts (60-64 years old). Sachs-Ericsson et al. also reported a similar finding in 2009,[27] as well as Ayo-Yusuf and Szymanski in 2010. [15] The possible reasons for the declined prevalence of smoking prevalence and a higher likelihood of smoking cessation could be due to the bias introduced by the higher survival of non-smokers or higher mortality among smokers. Moreover, older respondents tend to have more diseases which driven them to quit smoking to preserve their quality of life. Future longitudinal studies among the elderly are strongly recommended to ensure the real factor(s) of the current finding.

Elderly females were more likely to cease smoking compared to males after adjusting for other independent variables, but this contradicted the findings by other researchers. Some studies found that men were more likely to be successful quitters, [28, 29] while others found no relationship with gender. [30-31] However, it is in line with the observation by Kim [32] among the Korean elderly. Smoking was a social milieu among male in Malaysia, as it is the norm that existed in society. Therefore, the male is less motivated the stop the smoking behaviour compared to their counterpart, as factors such as pregnancy and childcare might be another plausible reason for current finding [33]. In addition, previous studies in Malaysia found that the majority of males started smoking at a younger age and consumed more tobacco products ,[34]which might induce more withdrawal symptoms once they try to quit smoking. Therefore, this factor might be contributing as an obstacle for them to quit smoking compared to female elderly. However, future studies are recommended to find the actual causes for the results in our research.

Marital status did not show a significant association with smoking cessation in our study, which is contradictory to the finding by Tsai et al. [35]

who reported that the odds of the elderly to quit smoking were significantly higher than those living with their spouse. [21] However, it is consistent with the longitudinal study by Lindstrom et al. [36] and Qiu et al[37] among smokers in Sweden and China, respectively. where the contradictory result might be due to support mechanisms (*via* marriage) which will motivate the smoker to cease smoking, which was not available among elderly in our study. However, a study among adult Chinese males, revealed that respondents who married were more likely to continuing smoking. [38] The differences in these findings suggested that culture plays a pivotal role in shaping the behaviours of an individual, including smoking cessation.

No association was found between respondents with hypertension, diabetes or hypocholesterolaemia with smoking cessation in multivariable analysis. These findings are consistent with the findings from the study reported by Pang et al,[13] Tsai et al[35] and Honjo et among the Japanese, Taiwanese and Singapore elderly smokers. However, our results were not in congruent with the findings reported by Kim,[32] in which they claimed that illness is the most common factor for quitting smoking among elderly in China and Europe. The findings in this study might be due to some chronic diseases investigated in this study and were not directly caused by smoking behaviour. In addition, the diseases investigated in this study were "chronic" in nature and did not affect the respondents directly, without functional impairment or "traumatised". Therefore, it did not induce enough "motivation" to cause a change in smoking status, as shown in previous studies. [18,35]

Education attainment was not a significant variable associated with smoking cessation after adjusted for the confounding factors. This contradicted the finding by Tsai et al., [35] who reported that the adjusted odds of smoking cessation were lower among the elderly with lower education attainment. It also contradicted the findings by Twardella et al. [18] who reported that higher education level was significant variables factor associated with smoking cessation in their study. However, it is in line with the finding by Qiu et al among smokers in China.[37] The finding is study might due to relatively smaller number of elderly with tertiary education in our study might be the factor that contributes to the lack of power of a study to detect the association between smoking cessation and education attainment in the multivariate analysis. Future studies with a bigger sample size of elderly people are strongly recommended to investigate the effect of education on smoking cessation.

There were several limitations in the study; the cross-sectional study design limited the establishment of the causal relationship between the dependent and independent variables. Secondly, the

smoking status was self-reported; thus, there is possible of under or over-reporting. However, the sample size was representative of Malaysian, which enable the study outcome can be generalised to the entire Malaysian elderly population.

CONCLUSION

The study found substantial proportion of elderly ceased smoking, however, more pro-active measures such as community intervention strategies intervention as these strategies have shown evidence in increasing smoking cessation among older [40]. in addition, education media campaigns, and barrier-free access to smoking cessation counselling and medications should also be implemented to enhance the likelihood of smoking cessation among the elderly. Thus, decreased the burden of disease burden due to smoking in the long term.

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DECLARATION FOR CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

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