

RESEARCH COMMUNICATION

Exploring Factors Influencing Smoking Behaviour in Malaysia

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Abstract

Objective: The objective of present study is to investigate the determinants of smoking behaviour among adults in Malaysia. **Method:** Findings of the Third National Health and Morbidity Survey (NHMS-3) by the Ministry of Health, Malaysia, were used. The sample consisted of 34,539 observations. A logistic regression model was thus applied to estimate the probability to participate in smoking. **Results:** Age, income, gender, marital status, ethnicity, employment status, residential area, education, lifestyle and health status were statistically significant in affecting the likelihood of smoking. Specifically, youngsters, low income earners, males, unmarried individuals, Malays, employed individuals, rural residents and primary educated individuals were more likely to smoke. **Conclusion:** In conclusion, socio-demographic, lifestyle and health factors have significant impacts on smoking participation in Malaysia. Based on these empirical findings, several policy implications are suggested.

Keywords: Cigarette smoking behaviour - determinants - tobacco policy - Malaysia

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Introduction

Cigarette smoking is one of the main causes of death worldwide. Globally, around 6 million of mortalities each year are due to smoking related diseases (World Health Organization, 2011a,c). In other words, in every minute, seven people pass away from using tobacco. Worst of all, it is estimated that, by the year 2030, the smoking related mortalities will increase tremendously to more than 8 million (World Health Organization, 2011a). Smoking causes most deaths in the low- and middle-income countries. With estimated 80% of deaths each year (World Health Organization, 2011a,c). Statistic shows that approximately 4 out of every 5 reported lung cancer cases are caused by smoking. Besides, smoking also causes almost half (42%) of the chronic respiratory disease worldwide (World Health Organization, 2011b).

In Malaysia, smoking brings about approximately 20% of all deaths annually, which accounting for almost 10000 deaths in the region (Lim et al., 2009; Tan et al., 2009). On top of that, in 2006, estimated more than 15% of the total hospitalisations in the country are due to smoking related illnesses. The recent report of Institute for Public Health (2008) illustrates that almost quarter (23%) of the total adult populations in Malaysia are smokers, and majority of them are males. In terms of economic burden, Malaysian government is spending more than RM 3 billion yearly on treating smoking related diseases such as lung cancer, cardiovascular diseases and chronic respiratory diseases (Tan et al., 2009).

In spite of these commonly known facts, a lot of people

still smoke. To date, several anti-smoking policies are introduced by the Ministry of Health Malaysia. These include pictorial package warnings, bans on all sorts of tobacco advertisements, sponsorships and promotions, prohibit smoking in the public areas as well as imposition of heavy taxes on tobacco products. Meanwhile, several national anti-smoking campaigns are also organised in tandem such as “Tak Nak” and World No Tobacco Day. Unfortunately, an in-depth review of these measures indicates that there remains much room for improvement, and there is also an urgent need for more government interventions.

Considering the adverse impacts of smoking, it is utmost important to study the determining factors of smoking behaviour. Better understanding of this topic may provide a clearer picture for the policy makers of the directions to design proper intervention strategies. To our knowledge, numerous studies have examined this issue in Malaysia (Siahpush et al., 2008; Lim et al., 2009; Tan et al., 2009; Al-Naggar et al., 2011; Al-Naggar and Saghier, 2011). However, they only focus on investigating the socio-demographic differences in smoking participation. Whereas, other potential determinants such as lifestyle and health related factors are neglected. It is, therefore, the main objective of present study is to fill this research gap by examining the determinants of smoking in a more in-depth manner.

Overall, present study makes three substantial contributions to the existing literatures on smoking. First, lifestyle variables such as participation in physical activity and use of nutrition label are taken into account in present

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study for analysis. Second, present study also includes several health variables such as being diagnosed with diabetes, hypertension and hypercholesterolemia, with an attempt to explore their impacts on smoking behaviour. Third, present study uses a larger and more representative nationwide survey data (31263 observations), thus the observed outcomes would be more reliable and useful for policy makers.

Materials and Methods

Data

Third National Health and Morbidity Survey (NHMS-3) is the most recent cross sectional population-based survey study that carried out by the Ministry of Health Malaysia. The survey is conducted in the urban and rural areas in the 13 states of Malaysia as well as the federal territory of Kuala Lumpur. The survey period is from April 2006 till January 2007. Based on the sampling frame from Department of Statistics Malaysia, a two stage stratified sampling with proportionate to the size of population is used to collect the data. The first stage sampling unit [Enumeration Blocks (EB)] is based on geographically contiguous areas of the country. The second stage sampling unit is based on Living Quarters (LQ), while all the households and individuals that are within the selected LQ are surveyed. The inclusion criteria are those males and females from all the ethnic groups, and aged 18 and above.

In the survey, the piloted bi-lingual (Bahasa Malaysia and English) questionnaires are used by the health professionals to face-to-face interview the respondents. Respondents are asked to respond to several questions about smoking. First, have you ever used any tobacco products? Second, in the last one month, how many days did you smoke? Meanwhile, socio-demographic, lifestyle and health profiles of the respondents are also canvassed. The sample comprises 34539 observations. However, after rejecting those with incomplete information, only 31263 (90.52%) are retained for analysis. More detailed information about the data is described in the report of Institute for Public Health (2008).

Variables

Yen (2005) uses the data from Continuing Survey of Food Intakes and finds that age of individual is negatively associated with the probability to smoke. Similarly, Aristei and Pieroni (2008), who based their study on Italian Household Budget Survey, also find that age reduces the likelihood of participating in smoking. In present study, age of respondents in continuous form is included.

The effects of income are mixed. A study conducted based on the city of Thessaloniki, an urban area in northern Greece, ascertains that income increases the likelihood to smoke (Raptou et al., 2005). On the other hand, Bauer et al. (2007) use the German Socio-Economic Panel data and find that income is negatively related to the odds of smoking. As such, respondents' monthly individual income (RM) is taken into account for analysis.

As pointed out by Bilgic et al. (2010) using Turkish Household Expenditure Survey and Lin (2010) using

Taiwan nationwide panel data, there are significant gender differences in smoking behaviour as men are more likely to smoke than women. Hence, respondents' gender is included as one of the variables in present study.

Cho et al. (2008), a study exploring the relationship between marriage and smoking behaviour in Korea, has found that the prevalence of smoking is lower among the married individuals as compared to the unmarried. In the case of US, Hersch (2000) uses the Current Population Survey and observes that married individuals have lower propensity to smoke. In current study, respondents' marital status is included as married and unmarried (single, widow, divorce) to allow comparison.

Manrique and Jensen (2004) uses Spanish households data to investigate the influencing factors of both smoking and drinking behaviour, and find that household heads who are currently being employed are less probable to smoke than the unemployed. On one hand, Bauer et al. (2007) have found the opposite result that employed individuals have higher probability to smoke. In this study, respondents' employment status is segmented into employed and unemployed (student, housewife, retiree, job seeker).

Previous studies have consistently found that education is negatively associated with the probability to smoke (Yen, 2005; Aristei & Pieroni, 2008; Bilgic et al., 2010; Lin, 2010). In other words, individuals who with higher education background are less likely to smoke as compared to the lower educated. In present study, respondents' education background is segregated into three categories – primary, secondary and tertiary.

In terms of rural-urban comparison, Alam et al. (2008), who based their study on Pakistan, find that urbanites are less likely to smoke compared to the rural dwellers. However, in the case of Germany, the effect of residential area is quite the opposite where the urban residences have higher likelihood to smoke than the rural residences (Bauer et al., 2007). In this study, respondents' residing area is categorised into urban and rural (gazetted areas with less than 1000 population).

As the literatures thus far have revealed, ethnicity does play a significant role in determining smoking behaviour. For instance, Tan et al. (2009) use Malaysian Household Survey data and find that there are ethnic differences in households purchase decision of tobacco products. Similarly, Yen (2005) also observes that races may influence the propensity to smoke in US. Thereby, respondents' ethnic profile is included in the model as three categories – Malay, Chinese and Indian/others.

Raptou et al. (2005) and Aristei and Pieroni (2008) have all found that healthy lifestyle such as avoid of alcohol consumption would reduce the odds of participating in smoking. Similarly, Charilaou et al. (2009), who study the relationship between physical activity and smoking behaviour among the adolescents, find that frequent participation in physical activity is also able to decrease the likelihood of smoking. Given the availability of data, two lifestyle variables are included for examination – physical activity participation and nutrition label use. For the first variable, respondents who spend at least 150 minutes per week in moderate physical activities or at least 60 minutes

per week in vigorous physical activities are defined as physically active. For the second variable, respondents who read the information about calories, sugar, fat and sodium in the nutrition label while purchasing or receiving foods are denoted as using nutrition label.

Previous empirical studies such as Yen (2005) and Lin (2010) have consistently found that self-perceived health status is significant in affecting the probability to smoke as individuals who perceive their health as poor face higher probability to smoke compared to those who perceive their health as fair or excellent. In present study, three health variables are included – self-report being diagnosed with diabetes, hypertension and hypercholesterolemia.

Statistical analysis

The outcome variable of present study, smoker, is defined as respondents who smoke at least one day in the past 30 days preceding the survey (Institute for Public Health, 2008). Logistic regression model is applied to analyse the odds of being a smoker, and Likelihood Ratio (LR) test is used to test the robustness of the regression model. The level of significance is based on p-value of less than 5% (two-sided). Meanwhile, correlation coefficients between all the variables are calculated to detect the potential multicollinearity problem in the model. The data is analysed using Stata version 9.2 (StataCorp, 2005).

Results

Characteristics of survey respondents of present study are presented in Table 1. Of the total 31263 respondents, 7174 (23%) are smokers, while 24089 (77%) are non-smokers. The average age of the respondents is around 42 years, and the average monthly individual income is approximately RM 1962. In terms of gender distribution, 45% of the sample are males and 55% are females. Overall, the sample consists of 71% of married individuals and 29% of unmarried individuals.

The ethnic breakdown comprises 57% Malays, 21% Chinese and 22% Indian/others. Approximately 58% of the respondents are employed. Meanwhile, there are 60% of the respondents are from urban areas and 40% are from rural areas. A large proportion of the respondents have secondary education (52%), followed by those who have primary (38%) and tertiary (10%). Majority (56%) of the respondents are physically active, whereas only a minority (24%) have the habit of using nutrition label. Last but not least, the sample consists of only 12%, 39% and 24% of respondents self-report being diagnosed with diabetes, hypertension and hypercholesterolemia, respectively.

Results for logistic regression analysis for smoking participation are demonstrated in Table 2 with odds ratios, 95% confidence intervals, z-statistics and p-values. In present study, the calculated correlation coefficients between all the variables are less than 0.8, thus implying that there is no multicollinearity problem in the regression model. Besides, the results show that the value of Likelihood Ratio (LR) χ^2 with 15 degrees of freedom is 12508.7 and has the p-value of <0.05. Hence, it can be concluded that the model is very good fit. Out of all the variables, only physical activity and hypercholesterolemia

Table 1. Descriptive Analysis of Variables in the Statistical Model

Variables	Mean (SD)/n (%)*		
	Smokers (n = 7174)	Non-smokers (n = 24089)	Total sample (n = 31263)
Age	40 (15)	43 (16)	42 (16)
Income	1720 (1932)	2034 (2851)	1962 (2672)
Gender			
Male	6851 (96)	7126 (30)	13977 (45)
Female	323 (4)	16963 (70)	17286 (55)
Marital status			
Married	5034 (70)	17281 (72)	22315 (71)
Unmarried	2140 (30)	6808 (28)	8948 (29)
Ethnicity			
Malay	4518 (63)	13155 (55)	17673 (57)
Chinese	1182 (16)	5553 (23)	6735 (21)
Indian/others	1474 (21)	5381 (22)	6855 (22)
Employment status			
Employed	5985 (83)	12287 (51)	18272 (58)
Unemployed	1189 (17)	11802 (49)	12991 (42)
Residential area			
Urban	3746 (52)	14830 (62)	18576 (60)
Rural	3428 (48)	9259 (38)	12687 (40)
Education			
Tertiary	481 (7)	2742 (11)	3223 (10)
Secondary	4048 (56)	12102 (50)	16150 (52)
Primary	2645 (37)	9245 (38)	11890 (38)
Physical activity			
Active	4779 (67)	12872 (53)	17651 (56)
Inactive	2395 (33)	11217 (47)	13612 (44)
Nutrition label use			
Yes	1379 (19)	6168 (26)	7547 (24)
No	5795 (81)	17921 (74)	23716 (76)
Diabetes			
Yes	666 (9)	3053 (13)	3719 (12)
No	6508 (91)	21036 (87)	27544 (88)
Hypertension			
Yes	2375 (33)	9744 (40)	12119 (39)
No	4799 (67)	14345 (60)	19144 (61)
Hypercholesterolemia			
Yes	1466 (20)	5992 (25)	7458 (24)
No	5708 (80)	18097 (75)	23805 (76)

*For age and income variables, the value refers to mean (SD), whereas for the rest of the variables, the value refers to n (%).

variables are found to be not statistically significant in affecting the odds of smoking.

The results suggest that an additional of age decreases the odds of smoking (OR: 0.99). Likewise, an increase in monthly individual income reduces the odds of smoking (OR: 0.99). Males face higher odds of smoking than females (OR: 48.2). Married individuals have lower odds of smoking compared to the unmarried (OR: 0.85). Compared to Malays, Chinese (OR: 0.55) and Indian/others (OR: 0.71) possess lower odds of smoking. The odds of smoking among the employed individuals are found to be higher as compared to the unemployed (OR: 1.82).

The results also illustrate that urbanites have lower odds of smoking than the rural dwellers (OR: 0.81). Compared to individuals with primary education, both tertiary (OR: 0.35) and secondary (OR: 0.74) educated individuals face lower odds of smoking. Meanwhile,

Table 2. Logistic Regression for Smoking Participation

Variables	OR	95% CI	Z-statistic	P-value
Age	0.99	0.99, 1.00	-7.52	0.00
Income	0.99	0.99, 1.00	-5.91	0.00
Gender				
Male	48.2	42.7, 54.3	63.6	0.00
Female	1.00	-	-	-
Marital status				
Married	0.85	0.78, 0.93	-3.54	0.00
Unmarried	1.00	-	-	-
Ethnicity				
Malay	1.00	-	-	-
Chinese	0.55	0.51, 0.61	-12.8	0.00
Indian/others	0.71	0.65, 0.77	-8.03	0.00
Employment status				
Employed	1.82	1.66, 1.98	13.3	0.00
Unemployed	1.00	-	-	-
Residential area				
Urban	0.81	0.75, 0.87	-5.66	0.00
Rural	1.00	-	-	-
Education				
Tertiary	0.35	0.30, 0.40	-14.6	0.00
Secondary	0.74	0.68, 0.80	-6.92	0.00
Primary	1.00	-	-	-
Physical activity				
Active	1.03	0.96, 1.11	0.93	0.35
Inactive	1.00	-	-	-
Nutrition label use				
Yes	0.78	0.71, 0.84	-5.90	0.00
No	1.00	-	-	-
Diabetes				
Yes	0.79	0.71, 0.88	-4.17	0.00
No	1.00	-	-	-
Hypertension				
Yes	0.66	0.61, 0.71	-10.9	0.00
No	1.00	-	-	-
Hypercholesterolemia				
Yes	1.02	0.94, 1.11	0.56	0.58
No	1.00	-	-	-

*LR $\chi^2(15) = 12508.7$, $P > \chi^2 = 0.00$; OR, Odds ratio; CI, Confidence interval; LR, Likelihood ratio

individuals who have the habit of using nutrition label are found to have lower odds of smoking as compared to their counterparts who do not have the habit (OR: 0.78). In terms of health variables, individuals who self-report being diagnosed with diabetes (OR: 0.79) or hypertension (OR: 0.66) possess lower odds of smoking as compared to those who do not have such health outcomes.

Discussion

In present study, it is found that socio-demographic (age, income, gender, marital status, ethnicity, employment status, residential area, education), lifestyle (use of nutrition label) and health (diabetes, hypertension) factors possess significant impacts on smoking behaviour. Particularly, youngsters, low income earners, males, unmarried individuals, Malays, employed individuals, rural residents and primary educated individuals have higher probability to smoke. Whereas, individuals who have the habit of using nutrition label and being diagnosed with diabetes or hypertension are less probable to smoke.

Age is observed to be negatively related to the

likelihood of smoking as individuals grow older their probability to smoke decreases. This finding is also shared by Yen (2005) and Aristei and Pieroni (2008), who also find that older individuals are less probable to smoke. There exist two reasons for these outcomes (Manrique and Jensen, 2004; Yen, 2005). First, older individuals, especially those who face a profound deterioration in health, tend to have higher awareness level on their own health condition as well as the risks of smoking. Second, older individuals are likely to live a more relax lifestyle, and consequently would not choose to participate in smoking. As such, government intervention strategies that directly aim at delivering the messages about the disadvantages and dangerous of smoking to the youngsters may seem promising. One way of doing so is to publicise these facts in the websites that are frequently accessed by the youngsters such as Facebook and Twitter.

In agreement with Bauer et al. (2007), who based their research on Germany, lower income earners are found to be more likely to smoke as compared to the rich. Perhaps, this may be because higher income earners are likely to value their health more given that they can have more healthy time in the future for productive works (Grossman, 1972). Therefore, they would be more inclined to live a healthy lifestyle such as avoid from using tobacco and alcohol products. This result somewhat implying that, in Malaysia, imposition of heavy taxes on tobacco products alone may not work very well. Hence, it is suggested that government should also limit the supply of tobacco products via establishing the import quota or reducing the tobacco distributor license.

Findings of present study suggest that there are gender differences in smoking behaviour as males have higher likelihood to smoke than females. This observed outcome lends support to the studies of Bilgic et al. (2010) and Lin (2010), who also ascertain the similar effect of gender. Reason arises is that female smoking is usually less acceptable in the society as compared to male. Also, it may be due to women, who usually possess a natural characteristic as a family caretaker, are more alert to the adverse effects of smoking on health (Bilgic et al., 2010).

Following the findings of Hersch (2000) and Cho et al. (2008), married individuals are observed to have lower probability to smoke than the unmarried. In essence, married individuals tend to have the advantages of receiving financial, social and psychological supports from their spouses, and thus would be facing less stress (a condition that is likely to lead to smoking) in their life than the unmarried. It appears, therefore, policy that specifically focuses on reducing the life stresses among the unmarried individuals may yield guaranteed result. For example, social activities that designed to provide supports to the divorcés, widows and widowers should be frequently organised in the community. Meanwhile, the involvement of charity bodies in providing counselling services is also encouraged.

It is worthwhile to note that there exists significant relationship between ethnicity and smoking behaviour as Malays are more likely to smoke than Chinese and Indian/others. These outcomes are somehow consistent with the earlier studies of Tan et al. (2009). To some

extend, this finding indicating that different cultural background of individuals may have different taste for smoking. Considering this phenomenon, government is postulated to create more health awareness campaigns to the society with particular attentions on the Malay population. In these campaigns, effort should be made to invite the health professionals such as medical doctors, nurses and pharmacists, preferably are from the Malay ethnic background to become the spokespersons.

In line with the study of Bauer et al. (2007), employed individuals are found to be more likely to smoke than the unemployed. There are two plausible explanations for this finding. First, employed individuals are often suffering from job pressure that would, in turn, lead to smoking participation. Second, employed individuals are usually more financially independent and thus would be more capable of purchasing tobacco products (Hersch, 2000). In terms of policy implication, workplace health promotion programmes such as health seminars and workshops are suggested to be held time to time. In particular, these programmes should specifically focus on educating the employee the healthier ways to cope with the job pressure.

In terms of residential area variable, it is found that rural dwellers are more likely to smoke than the urbanites. This finding collaborates with the study of Alam et al. (2008), who have also found the similar effect of residential area on smoking in Pakistan. As reasoned by Alam et al. (2008), rural dwellers are prone to have low awareness levels on the risks of smoking because of lack of anti-smoking media in the rural areas. As a result, tobacco industry may borrow this opportunity to target their sales at those rural dwellers. In light of these situations, public health authorities should urgently come out with more anti-smoking advertisements and campaigns in the rural areas. In the meantime, the supply of tobacco products in the rural areas should also be controlled through limiting the sales licence.

Present study shares the similar findings of Yen (2005), Aristei and Pieroni (2008), Bilgic et al. (2010) and Lin (2010) that higher educated individuals are less probable to participate in smoking. This may be attributed to the notion that higher educated individuals tend to have better interpreting skill and more general health knowledge, and thereby would be more aware of the negative impacts of smoking (Bilgic et al., 2010; Lin, 2010). Besides, it could be also owing to higher educated individuals, who have better human capital, may value their future more and consequently would avoid from smoking. For these reasons, Ministry of Education Malaysia should think of making more health related subjects and courses compulsory at all the education level, especially the primary and secondary. Moreover, more smoking related reading materials such as books, newspapers and magazines should also be made more easily available in the schools as well as in the public.

It is of interest to note that individuals who have the habit of using nutrition labels are less likely to smoke. This observed outcome appears to display that living a healthy lifestyle is negatively associated with smoking as individuals who are more aware of their own health are less likely to indulge in risky behaviour. Likewise,

individuals who are being diagnosed with diabetes or hypertension are also less likely to smoke as they are more alert to their health condition. In view of these matters, Ministry of Health Malaysia is thus recommended to immediately design more national health enhancement programmes to highlight and promote the importance and benefits of living a healthy lifestyle. Ideally, multi-lingual media like television, radio, newspaper, for instance, can be used as the channel to deliver these messages.

In conclusion, given the secondary nature of the data, several limitations are noted. First, few important variables which claimed by the previous studies that are significant in determining smoking participation are excluded. Among them are presence of children in a family, household size and household income. Second, present study only takes into account of current smokers for analysis, whereas others like ex-smokers, light smokers and heavy smokers are neglected. Therefore, with data availability, future studies should take into consideration the impacts of those variables on different kinds smoking behaviour.

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