

Prevalence and factors associated with smoking among form four students in Petaling District, Selangor, Malaysia

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Abstract. A cross-sectional study was conducted among form four students of secondary schools in the District of Petaling, Selangor, Malaysia from February 2008 to June 2008 with the aim of quantifying the prevalence of smoking and identifying the psychosocial factors related to smoking among adolescents in this district. A two-stage stratified sampling strategy was used to obtain a sample of 1300 students based on an estimated prevalence of 10%. The response rate was 80.5% (1045 out of 1298 students). Results showed that prevalence of smoking was higher among male students (22.3%) compared to females (5.5%) and the median age at smoking initiation was lower among males compared to female smokers (14 years old vs 15 years old). Modifiable risk factors associated with smoking were “percentage of friends who smoke” (OR 2.94, 95% CI [1.71-5.06]) and “having a brother who smokes” (OR 1.97, 95% CI [1.20-3.31]). There was also a correlation between smoking prevalence and the number of risk factors present. Intensification of health education and anti-smoking programmes and modification of external factors in early adolescence are recommended to prevent smoking initiation.

INTRODUCTION

Smoking-related mortality though preventable is unfortunately a significant cause of death in Malaysia. For the past three decades, smoking-related diseases accounted for approximately 10 000 deaths annually and this figure is expected to climb to 30 000 given the current trend (Ministry of Health, 2003).

Adolescence is understood as a transition period between childhood and adulthood during which major biologic, psychological and social changes occur. Environmental processes, exploration and experimentation with a wide range of behaviors including risk taking behaviors

are a part of normal adolescent development. This period is thus thought to be the point at which an individual is most vulnerable for involvement in high risk behaviours, including smoking (Santrock, 2005). The majority of smokers initiate smoking in adolescence. Those who do not smoke in adolescence are unlikely to smoke as adults. In the United States, ninety one percent of adults categorized as “ever smokers” reported that they started smoking as adolescents and a majority of them became regular smokers by the age of eighteen (USDHHS, 1994). The earlier a person starts smoking, the more difficult it would be to quit and the earlier the onset of ill effects typically associated with

longer term smoking such as lung cancer and Ischaemic Heart Disease (USDHHS 1994).

Smoking has been identified as a “gateway drug” preceding the use of alcohol and illicit drugs and subsequently progression to regular use or abuse of these substances (Fleming *et al.*, 1989; Torabi *et al.*, 1993; Chen *et al.*, 2002). According to the Malaysian Association for the Prevention of Drug Abuse (PEMADAM) drug addicts started out as smokers (PEMADAM, 2003). Therefore, preventing adolescent smoking is dually important, as a long-term control measure for averting future social as well as smoking related health problems..

Here we describe the prevalence of current smoking and examine the association between several factors, namely (gender, academic achievement, smoking among family members, percentage of peers smoking) and current smoking, among form four students in secondary schools in the District of Petaling in the period from February 2008 to June 2008.

MATERIALS AND METHODS

Study design and sampling

A sample of students was selected using two-stage stratified sampling. The first stage consisted of selecting secondary schools by zones (Puchong/Seri Kembangan, Shah Alam, Petaling, Damansara and Subang). Three schools each were selected from Subang, Petaling and Damansara. Four schools were selected from Puchong/Seri Kembangan and another two from Shah Alam, all added up to a total of 15 schools. The second stage consisted of selecting students from the selected schools by simple random sampling using random numbers generated by EpiInfo software version 6.04d. A total of 1300 male and female students were selected based on estimated prevalence of 10% which is two percent less than the national prevalence of current smokers among 16 years old (Institute for Public

Health, 2008), maximum tolerable error of 1.5%, design effect of 0.67, assumed intraclass correction coefficient of 0.5, average proportion of students per strata of 0.33 and non response rate of 30%.

Data collection

The study instrument used was a combination of validated questionnaires used previously by Hanjeet *et al.* (2001) and Lim *et al.* (2006). The resulting questionnaire consisted of items on sociodemographic characteristics, smoking habit (current smoker or non-current smoker), number of cigarettes smoked per day, age started smoking, academic performance (as measured by the examination results obtained the previous year), percentage of friends and peers who smoke and smoking among family members.

The questionnaires were self-administered in school by the students. The objectives and importance of the study were explained in detail. Each item in the questionnaire was explained by the principal investigator or a trained member of the research team. Students were allowed to withdraw from the study. Those who agreed to participate were asked to sign a consent form with assurances of anonymity. Other than their signatures, respondents were not required to disclose their names or any other information that would reveal their identity. No school staff or teachers were present at the venue at the time the questionnaires were administered. Afterwards, the completed questionnaires were examined by members of the research team to ensure all questions were answered. The study protocol and instrument had been approved by the Malaysian Ministry of Education and the Selangor State Education Department before the study commenced.

Ten percent of the questionnaires which were selected randomly and the data entered into the computer were crosschecked with the data in the questionnaires and discrepancies corrected, this was to check that data entry was accurate.

Data analysis

Smoking status was measured using two questions. Those who answered “Yes” to “Have you ever smoked even a single puff?” were categorised as “Ever smokers”. Those who answered “Yes” to “Have you smoked at least once within the past 30 days were considered as “Current smokers”. Those who were ever smokers but were not current smokers as well never-smokers were both considered as “Non-current smokers”.

Descriptive statistical analysis and inferential statistical tests by univariate and multivariate analysis were performed. In univariate analysis, Chi-squared or Fisher’s exact tests were performed to determine associations between selected categorical variables and current smoking. Associations with p-values equal to or less than 0.25 in the univariate analysis were further analysed with multinomial logistic regression to control for other variables. In multinomial logistic regression, the most significant variables were entered first, followed by other, less significant variables. Finally, the fit of the final model of factors was checked using Pearson’s Goodness of Fit test. A non significant p-value (>0.05) meant that the model had good fit. Tests for possible two-way interactions in the final custom model performed showed no significant interactions were present. All analyses were done using SPSS version 11.5 at the 95% confidence level.

RESULTS

A total of 1045 [552, 52.8% boys and 493, 47.1% girls] out of 1300 students responded, giving a response rate of 80.4%. Reasons for non-response were refusal to participate, absent from school at the time of study and attending a sports event. Analysis was carried out on the remaining 1045 students who were present and completed the questionnaires. The mean age of the respondent is 16 years old (range: 15-17 years).

Prevalence and characteristics of smoking

Two hundred and thirty six (42.9%) boys and 103 (21%) girls were “ever smokers”. The overall prevalence of current smokers was 14.3%. Prevalence among boys was higher (n=123, 22.3%) compared to girls (n=21, 5.5%) (Table 1). Among boys, the youngest age at which smoking started was 5 years old. Most boys started smoking from age 12 to 14, peaking at 14. Among female students however, there was no visible pattern. Median age started smoking for boys was 14, a year younger than the median age started smoking among girls which was 15 years old (Figure 1).

The majority of male and female current smokers smoked 1 to 2 cigarettes a day. The median number of cigarettes smoked was higher among boys (2.5 cigarettes compared to 2.0 cigarettes among girls) (Figure 2). Most of the current smokers started smoking in the company of friends (62.0% of boys and 63% of girls) followed by in the company of relatives (15.7% of boys and 18.5% of girls) (Table 2). 68.8% of the boys bought the cigarettes themselves or obtained them from friends while 65.5% of the girls got their cigarettes from these sources (Table 3).

Factors associated with smoking

There was a positive relationship between the number of risk factors and prevalence of smoking (Table 4). Multivariate analyses of the variables gender, percentage of friends who smoke, percentage of form mates who smoke, smokers in the family and academic achievement; being male, having more than 40% friends who smoke, having a brother/s who smoke and having poor academic achievement were all significantly associated with smoking (Table 5).

DISCUSSION

Several studies on adolescent smoking conducted in developed countries reported that almost 50% of adolescents who have just turned 18 have ever smoked and a

Table 1. Sociodemographic factors associated with current smoking among form four students in Petaling Jaya district, Selangor, Malaysia

Variable	Current smoking status		p value
	Non-current smoker	Current smoker	
Gender (n=1045)			
Male	429 (77.7)	429 (22.3)	p<0.001
Female	466 (94.5)	27 (5.5)	
Father smokes (n=988)			
Yes	317 (81.7)	71 (18.3)	p<0.001
No	528 (88.0)	72 (12.0)	
Elder brother smoking (n=644)			
Yes	167 (74.6)	57 (25.4)	p<0.001
No	375 (89.3)	45 (10.7)	
Percentages of best friends smoking (n= 1031)			
0–40%	635 (92.6)	51 (7.4)	p<0.001
41–100%	248 (71.9)	97 (28.1)	
Percentages of form four student smoking in the same school (n=1028)			
0–50%	503 (89.8)	37 (10.2)	p<0.001
>50%	378 (80.8)	90 (19.2)	
Academic achievement (n=1011)			
Mostly “A”	311 (93.4)	22 (6.6)	p<0.001
Mostly “B”	265 (86.9)	40 (13.1)	
Mostly “C”	183 (81.7)	41 (18.3)	
Mostly “D”	112 (75.2)	37 (24.8)	

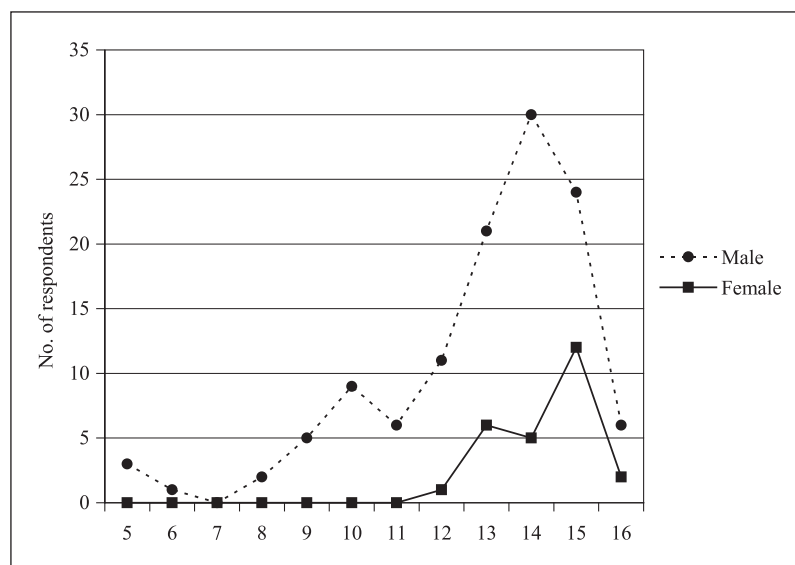


Figure 1. Age started smoking by gender among form four students in Petaling Jaya district, Selangor, Malaysia

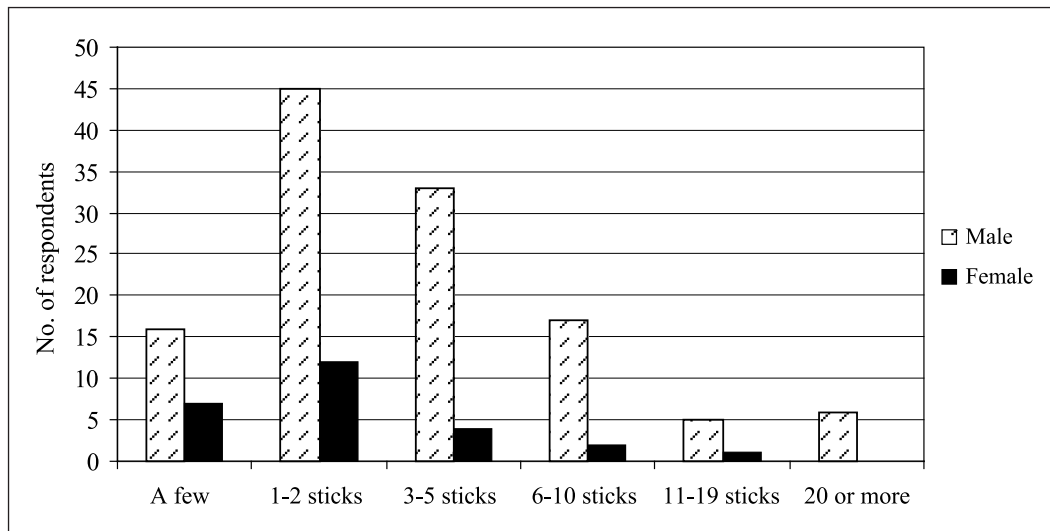


Figure 2. Number of cigarettes smoked per day by gender among form four students in Petaling Jaya district, Selangor, Malaysia

Table 2. Who was sitting beside you when you first started smoking

	(n=121)	(n=21)
Father	2 (0.8)	1 (4.8)
Older/Younger brother	7 (5.8)	2 (9.5)
Mother	10 (8.3)	0 (0.0)
Friend/s	75 (61.9)	12 (57.1)
Relative	19 (15.7)	5 (23.8)
Others	8 (6.6)	1 (4.8)

Table 3. Source of cigarettes

	Male n (%)	Female n (%)
Self-bought	84 (68.8)	17 (65.4)
Obtained from friends	35 (28.7)	9 (35.6)
Others	3 (2.5)	–

Table 4. Number of risk factors and association with current smoking status among form four students in Petaling Jaya district, Selangor, Malaysia

No. of risk factors	Current smoking status		p value
	Non-current smoker n (%)	Current smoker n (%)	
0	89 (96.7)	3 (3.3)	p<0.001
1	135 (93.8)	9 (6.3)	0.31*
2	133 (86.9)	20 (13.1)	
3	76 (70.4)	32 (29.6)	
4	78 (73.8)	17 (26.2)	
5	5 (55.6)	8 (44.4)	

Risk factors included: father smoking, brother smoking, >40% friends smoke, academic achievement and no./percentage of form-mates who smoke.

Chi squared value 54.66

* Cramer's V coefficient

Table 5. Odds ratios for current smoking according to sociodemographic variables among form four students in Petaling Jaya district, Selangor, Malaysia

	OR ^a (95% CI)	Adjusted OR ^b (95% CI)
Gender		
Male	4.95 (3.20–7.66)	3.48 (2.01–6.05)*
Female	Reference	Reference
Percentage of friends who smoke		
0–40%	Reference	Reference
41–100%	4.87 (3.36–7.05)	2.94 (1.71–5.06)*
Percentage of form-mates who smoke		
0–50%	Reference	Reference
>50%	2.10 (1.47–3.0)	1.32 (0.77–2.27)
Father smokes		
Yes	1.64 (1.15–2.32)	1.36 (0.82–2.24)
No	Reference	Reference
Brother smokes		
Yes	2.84 (1.85–4.38)	1.98 (1.20–3.31)*
No	reference	reference
Academic achievement		
Mostly As	Reference	Reference
Mostly Bs	1.48 (0.89–2.44)	1.31 (0.65–2.66)
Mostly Cs	2.19 (1.32–3.60)	1.70 (0.88–3.28)
Mostly Ds	4.67 (2.64–8.26)	2.31 (1.07–4.99)*

Pearson goodness of fit test $\chi^2 = 95.21$, $p=0.786$

^a Unadjusted odds ratio estimated by logistic regression

^b Odds ratio estimated by multinomial logistic regression, adjusted for the other variables in the table

majority of them were already established smokers (Naing *et al.*, 2004). It has been argued that it is futile to expect adolescents to make rational choices with regards to smoking (Thambypillai, 1985). Hence, we conducted this study to get a better understanding of the modifiable and non-modifiable risk factors of smoking.

The prevalence of current smokers observed in this study was 14.3%, higher compared to the national prevalence among 16-year olds of 10.9% in 2006. Prevalence of smoking among males was 22.3% and among females 5.5%, compared to the national prevalences of 15.0% and 0.5% respectively (NHMSIII). However, it is lower than the rate reported by Afiah *et al.* (2006) among sixth formers in the same district i.e. 22.8%, by Naing *et al.* (2004) 35.9% of male fourth formers in Kota Bharu (Naing *et al.*, 2004) and 29.7% in Kota

Tinggi (Lim *et al.*, 2006) Nevertheless, the reported prevalence of smoking among female students (5.5%) is a cause of concern as it is higher compared to previous reports of 4.5% in Kota Tinggi (Lim *et al.*, 2006) and 3.5% in Negeri Sembilan (Lee *et al.*, 2005).

The higher of four fold smoking prevalence in boys as compared to girls is not surprising. A possible explanation may be that Malaysia is a patriarchal country, whereby parents are more protective towards girls, the possible resignation that boys will smoke as “boys will be boys” (Thambypillai, 1985) and the fact that smoking is accepted as a male habit. Similar findings have been reported from other studies at the various districts and national level (Hanjeet *et al.*, 2001; Lee *et al.*, 2005; Lim *et al.*, 2006).

In this study we also found that the likelihood to smoke decreased with academic achievement. A similar association with academic achievement had been reported in studies by Lim *et al.* (2006) and Naing *et al.* (2004). The factors related to this association need to be investigated further in future.

The role of peers in influencing smoking among adolescents has been investigated extensively. In this study, besides gender, peer influence was found to be the strongest risk factor for smoking among adolescents. Youths with more smoking friends had a higher tendency to smoke and 80% current smokers started smoking with peers. These findings are consistent with previous studies (Wang *et al.*, 1995; Unger *et al.*, 2002; Lim *et al.*, 2006). Peer influence has been identified as a form of social reinforcement. Adolescents face the developmental task of differentiating themselves from their parents and forging independent identities, thus identifying themselves with peer behaviors and values are a natural development (Santrock, 2005). Besides that, sharing a common social and learning environment with peers may also be an influential factor.

Influence of parental smoking while statistically significant in univariate analysis was not significant when controlled for other factors. This finding is consistent with the findings by Rajan *et al.* (2003) and Lim *et al.* (2006) in Kota Tinggi. On the contrary, having a brother who smokes was significant after controlling for other factors. An explanation for this may be that younger adolescents often turn to older siblings as sources of support in social and scholastic activities rather than their parents (Santrock, 2005). Male siblings who are closer in age, may better understand the problems faced by the adolescent and are probably able to communicate more effectively with adolescents than parents in discussing matters related to peer relationships and coping with difficult situations.

The higher smoking prevalence among girls compared to previous studies and the finding that more than 60% smoking girls were able to purchase cigarettes from retail outlets point to the erosion of traditional values in the community. Not only is smoking among women no longer frowned upon, but merchants have no qualms in selling cigarettes to them. More effective policies and measures need to be sought to prevent smoking among women in developing countries as this group presents an underpenetrated market to tobacco companies whose markets have dwindled or are saturated elsewhere (Perry, 1999)

The findings from this study indicate that interventions should target the modifiable internal and external factors. This includes raising health and social awareness by dispersing knowledge on the short and long-term effects of smoking. Seeing that smoking starts at 12-14 years of age for male respondents, health education and smoking prevention messages should be given before then, i.e from primary school level and continued through secondary school and especially at the point of entering secondary school.

Peer influence is an external modifiable variable that contributes to smoking. While it would be impossible to prevent adolescents from mingling with smoking peers, peer influence can be a double-edged sword (Wen *et al.*, 2007). Non-smoking peers can play positive roles by steering other adolescents away from smoking. The involvement of non-smoking adolescents in anti-smoking campaigns should be considered as its implementation elsewhere has proven successful (Zhong *et al.*, 2001).

Families can also be involved in smoking prevention. Traditional Asian societies place high value on social etiquettes such as respect for parents and elders, especially one's own parents. These positive values may be utilized in smoking prevention for adolescents. Positive examples and gentle admonishments from parents against smoking and creating

environments not conducive to smoking may discourage adolescents from taking up smoking (Shakib *et al.*, 2005).

Effective law enforcement will also help by deterring acquisition of cigarettes by youths from commercial and social sources. Studies have shown that this measure will reduce smoking prevalence (DiFranza, 2003). In the United States, cigarettes are mainly sourced from social contacts after the law prohibiting the sale of tobacco to minors was introduced (Johnson *et al.*, 2004; Widome, 2007). In Malaysia, the Control of Tobacco Products Regulation 2004 prohibits the sale of tobacco and its products to anyone below 18 years of age, the breach of which constitutes an offence punishable by law. Regulations notwithstanding, in this study almost 70% of male respondents and 60% of female respondents bought their cigarettes from retail premises by themselves, while the rest obtained them from social contacts. This implies that the law is not taken seriously and/or the existing enforcement is inadequate. This calls for stricter enforcement of the regulations, so that adolescents are denied easy access to cigarettes.

In conclusion, the findings from this study indicate that the aforementioned measures need to be considered by all parties involved to ensure that the current smoking prevalence does not culminate in social and health problems in the future for these youngsters.

Several limitations are inherent in this study. The cross-sectional design limits the establishment of causal relationships between the risk factors and smoking. In addition, smoking information was elicited using questionnaires without biochemical verification, which may result in under-reporting of current smoking. Nevertheless, prevalence using anonymous questionnaires has been shown to correlate highly with biochemical verification (Kentala *et al.*, 2004). This study is limited to the investigation of environmental factors (psychosocial and environmental), while other established factors which may

be relevant (psychological factors such as stress and depression and family relations) were not examined. This may have had implications on the results.

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