RESEARCH REPORT

A study of the determinants of smoking behaviour and the association of smoking with lung function of male secondary school students in Kota Bharu.

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INTRODUCTION

Smoking in Malaysia has mostly been a male activity and it is among men that there has been a high prevalence of smoking prevalence. This is true for adult as well as for adolescents, based on the National Health and Morbidity Surveys (NHMS) and several studies conducted in Malaysia (Country Report: Malaysia, 2001). The high overall smoking prevalence in Malaysia has been actually contributed by the prevalence among male population. In the National Health and Morbidity Survey 1996, the smoking prevalence of Malaysian population aged 18 years and above was 24.8 percent. The prevalence among men was 49.2 percent compared to 3.5 percent among women. This was higher than the previous National Health and Morbidity survey conducted in 1986 that found a total smoking prevalence of 21.5 percent, with male smoking rates at 41 percent compared to 4 percent among women (Country Report: Malaysia, 2001). The prevalence can be considered high in both surveys even though they are not comparable due to the differences in population characteristics.

Adolescent smoking continues to be a major problem in schools. A number of studies have been done throughout the world concerning smoking problems among this group of population. In Malaysia, based on the second National Health and Morbidity Survey, smoking prevalence among adolescents aged 12 to 18 years was 30.7% for male and 4.8% for the female (Country Report: Malaysia, 2001). In Kelantan, one of the published data stated that of form four male students the smoking prevalence was 44.2%. However, none of the female students smoked (Naing, *et al.*, 1996). Another study by Naing, *et al.* (1996) on form four and five male students also in Kelantan found that prevalence of smokers was 35.9% of the 451 students surveyed.

Regarding smoking behaviour, it has also been shown that most adult smokers begin to smoke regularly during adolescence (Kent, 1998). Furthermore the early onset of smoking increases the number of cigarette smoked per day in adult life (Taioli & Wynder, 1991) and the more likely they become regular smokers as adult (Escobedo, *et al.,* 1993). Generally, once a person becomes a regular smoker it will be very difficult for him to quit. It has been stated that tobacco is one of the most addictive product known and the majority of people who quit smoking relapse within days. One of the reviews has found that only 2 to 3% of regular cigarettes smokers successfully quit smoking each year, and the addition of nicotine replacement can only triple the result (Henningfield, 1995). In a local study on smoking habit among adolescents by Naing, *et al.* (1996b), 72% of the smokers thought of quitting smoking and of these 83% had tried at least once. It would be therefore preferable to concentrate efforts on smoking prevention and these smoking prevention programmes should be started during childhood or early adolescence.

Rationale of this study

Much of our current knowledge on adolescents smoking comes from other countries especially western countries. There are wide ranges of information available starting from smoking prevalence, the risk groups, the associated risk factors and examples of intervention programmes. There are however, very few published data on these aspects with regards to our local population. In order to develop a good anti smoking campaign and promotion that is suitable for the target group, it is very important to have local information on the problem. One of the most important factors that must be considered is the factors associated with smoking. Numerous studies on this aspect have been done overseas (Escobedo, *et al.,* 1993; Greenlund, *et al.*, 1997; Meijer, *et al.,* 1996; Ogawa, *et al.,* 1988; and Reimers, *et al.,* 1990).

Most of smoking prevention programmes in schools emphasize on the awareness of the health hazards of smoking. Some smoking prevention programmes have been found to be effective (Biener, 2000; and Jason, *et al.,* 1991). However, many studies have shown that the efficacy of smoking programmes is very poor despite the increasing student knowledge about the effects of smoking (Murray, *et al.*, 1994; and Nutbeam, *et al.,* 1993). Further research is therefore necessary to develop more effective smoking prevention programmes which is suitable and more targeted to our local population. The purpose of this study is to determine the factors that are associated with smoking behaviour of secondary school students in Kota Bharu district. There is no published data so far on such study in Kelantan. Hopefully, the outcome of this study will be helpful to the development of an effective smoking prevention programme for Malaysia.

Factors and development of smoking behaviour

The development of smoking may be a gradual process. It can take a considerable time for smokers to acknowledge themselves as such. Studies have shown that various factors may be influential at different times (Greenlund, *et al.,* 1997; and Reimers, *et al.,* 1990).

The process of becoming a smoker has been separated into several stages that reflect the transition from non-smoker to experimental smoker and from experimental smoker to regular smoker as illustrated in a model developed by Flay and colleagues (Bellew & Wayne, 1991). In the 'preparatory' stage, attitudes toward early smoking are formed by influences from friends, family and the media. The second stage is the 'initiation of smoking – the trying of the first cigarette. The third stage is that of proper 'experimentation' where young person actually learns how to smoke – any negative (physical) effects tend to recede and the positive (psychological) experiences

are strengthened during this stage (Belew & Wayne, 1991). Regarding the initiation of smoking, the most frequently cited reasons were imitate other's behaviour' and 'to see what it was like' (Zhu, *et al.,* 1996). Meijer, *et al.* (1996) in his study on students aged 11 to 17 years also stated that the most common reason (55%) for starting to smoke was "to try something new".

Tobacco products are readily accessible to adolescents. Studies overseas found that a majority of adolescents responding to a survey reported that it would be easy to obtain cigarettes (Forster, *et al.*, 1992; and Smith, 1991). Forster, Hourigan and McGovern (1992) in their study on the availability of cigarettes to underaged youth also found that the successful rate of buying cigarettes by adolescents aged 12 to 15 years was high. A success rate of 53% over the counter and 79% from vending machines was achieved. In Malaysia, the scenario was in fact worse. Zulkifli and Rogayah (1998) found that the successful rate of purchasing cigarettes among minors in Kota Bharu, Kelantan was more than 97%. This shows that minors have easy access to cigarettes in our population. It has also been shown that most of the smokers obtain their first cigarette from a non-retail or social source, usually a friend (Greenlund, *et al.,* 1997). A study by Wolfson, *et al.* (1997) found that more than two third of adolescent smokers had provided tobacco to another adolescent. This again strengthens the fact that tobacco products are easily accessible to adolescents.

Association with friends who smoke

Many studies have been done on factors that are associated with smoking behaviour among adolescents or school children (Escobedo, *et al.,* 1993; Greenlund, *et al.*, 1997; Meijer, *et al.,* 1996; Morello, *et al.*, 2001; Ogawa, *et al.,* 1988; and Reimers, *et al.,* 1990). Of the factors examined, association with friends who smoke was consistently associated with adolescent smoking status in most of the study

(Greenlund, *et al.*, 1997; Morello, *et al.*, 2001; Ogawa, *et al.*, 1988; Reimers, *et al.*, 1990; Zhu, *et al.*, 1992; and Zhu, *et al.*, 1996).

Morello, *et al.*, (2001) in their study of tobacco use among high school students in Buenos Aires, Argentina stated that current smokers had reported that more than half of their friends of the same gender smoke. Reimers, *et al.* (1990) have examined the longitudinal influences of several behavioral and social factors on the smoking status. They found that eleven graders who smoked not only had the tendency to associate with other smokers more than non-smokers while they were in 11^{th} grade but they also already had this tendency in the three years before when most of them were not smoking. A study by Zhu, *et al.*, (1996) stated that of all variables investigated, variables reflecting peer pressure were among the strongest risk factors for cigarettes smoking of elementary school students in Beijing. Meijer, *et al.* (1996) in his study on cigarettes smoking habits among school children also stated that having a friend who smoked substantially increased the likelihood of smoking.

Several other factors were also related including adolescents' relationship with their parents, level of parental supervision, involvement in extracurricular activities, school performance, attitudes regarding positive and negative effects of smoking (Reimers, *et al.*, 1990)

Smoking status of the family members

Smoking among family members was also found to be significantly associated with adolescents smoking status (Anonymous, 2000; Greenlund, *et al.*, 1997; and Ogawa, *et al.*, 1988). Ogawa, *et al.* (1988) in their study to observe the smoking patterns as well as to examine social and psychological aspects of smoking of junior high schools boys and girls in Japan revealed that smoking status was significantly associated with smoking behaviour among people around the students. With

increasing number of smoker among parents, elder siblings and intimate friends, the percentage of current smoker among students increases. The Bogalusa Heart Study group in their study on cigarette smoking attitudes and first use among third through sixth grade students has also stated that the access to cigarette was greater among those from families where either parent smoked compared to those where neither parent smoked (Greenlund, *et al.* 1997). Similarly, Hesketh, *et al.*, (2001) have also reported that maternal and paternal smoking was among the strongest association with adolescents smoking behaviour.

The effects of parental smoking on adolescent smoking was however inconclusive. There has been inconsistency in the findings between studies from different populations and interestingly, some studies did not show any significant relationship between parental smoking and adolescent smoking. West, *et al.*, (1999) in their study on the family and friends' influences on the uptake of regular smoking from mid adolescent to early adulthood stated that, there was no independent effect of parental smoking on the uptake of cigarettes among adolescents at any period of time when other variables are adjusted. A study by Meijer, *et al.*, (1996) has also shown that there was no relationship between the smoking status of the parents and that of the students.

Regarding the effects of sibling smoking on adolescent smoking status, some studies have shown that the effects are more confined at the early adolescent ages compared to the later ages. West, *et al.*, (1999) in a longitudinal survey of adolescents, starting at the age of 15 and followed-up until 23 years of age reported that the effects of sibling smoking being confined to uptake between 15 and 16. In another cohort study, Swan, *et al.*, (1990) reported that the risk of taking up regular

smoking was higher if at the age of 11.7 – 12.7 years, the children had a smoking who smoked.

Socioeconomic status and smoking

Socioeconomic status has an influence on the smoking status. In some countries, a low socioeconomic status increases the chances of a young person smoking. As described in the model by Flay, socioeconomic status is indirectly associated with the stage of smoking behaviour by giving direct effects on family influences and selection of peers (Bellew & Wayne, 1991). Zhu, *et al.* (1996) also reported that smoking was positively associated with having parents of low educational and occupational status. Hesketh, *et al.* (2001) in their study of smoking among youth in China has also reported the same findings. In Malaysia, Habil (1997) has also stated that Malay in lower income groups are those most at risk for smoking. A major reason for their increase is that cigarette smoking has a special cultural connotation, where cigarettes are offered during any feast and celebration (Habil, 1997). Another reason why tobacco has managed to penetrate the Malay culture is that it is considered non-toxic and there is no need to be avoided (Habil, 1997).

Many of researchers did not include financial status of students as one of the possible predictors of adolescents smoking behaviour. It is very hard to find even a single literature locally or internationally on this aspect. Regarding the price of cigarettes, it is quite expensive in Malaysia and one need to have enough money to continue smoking. With regard to this, it is important to investigate whether financial status of the students is an important predictor of their smoking behaviour. Since parents are the most important source of money for most of students in our population, the most possible and practical way of assessing students' financial status is by determining how much pocket money is given to them by their parents to school.

Student's perceptions of the effects of smoking

Students generally agreed that smoking have adverse health, psychological and social consequences (Greenlund *et al.* 1997). Apart from this general attitudes and beliefs, Greenlund *et al.* (1997) have however stated that there were significant differences of these characteristics between those who ever smoked and those who never smoked. A study by Meijer, *et al.* (1996) found that there was a significant difference between views of students with different smoking statuses regarding children who smoke. Non-smoking children associated more negative characteristics to smoking. However, all of the children studied were well aware of the health hazard of smoking. The students who become regular smokers consistently had more positive opinions and less negative opinions about cigarette smoking (Reimers, *et al.* 1990). In their cohort study, they found that the opinion of 11^{th} grade regular smokers, especially when they reached 10^{th} and 11^{th} grades became more positive about cigarette smoking, thus widening the opinion gap between regular smokers and non-smokers. Similar result was also reported by Morello, *et al.* (2001) where they found that attitudes and belief score were higher among smokers indicating more favourable attitudes and beliefs about smoking.

Academic and extra-curricular activities

Students who began smoking regularly tended to be less academically oriented and less involved in extra-curricular activities. Reimers, *et al* (1990) stated that the results for the measures of extra-curricular activities and academic involvement were similar. In their cohort study, they found that the non-smokers were consistently more involved in extra-curricular activities and more academically oriented throughout the 4 years study period. In term of academic performance, Hesketh, *et al.* (2001) have

also found that a poor academic record is associated with students smoking status. Escobedo, *et al.* (1993) in their study on sports participation and the risk of smoking among US high school students reported that the students who participate in sports were less likely to be regular and heavy smokers. It is possible that the lower rate of smoking for students who participate in sports may be the result of greater self confidence derived from such participation, additional counseling from coaching staff about smoking, perceptions about reduce sports performance because of smoking and greater awareness about health consequences of smoking. It has also been mentioned that student's school performance was a key factor in predicting smoking and quitting attempts when other socio-demographic factors were controlled (Hu, *et al.* 1998).

Religious aspect of smoking

As described in Flay model on influences of smoking behaviour and stages of smoking, preparation and anticipation is one of the main factors that influence the initiation of smoking. Knowledge, values, beliefs, attitudes and intentions are among the important components of this stage. Perceptions on the religious aspect or religious opinion of smoking will come under this part. With regard to this, Habil (1997) has also mentioned that since religious can counteract certain cultural beliefs and even modify cultural behaviours and since virtually all Malays are Muslim, one of the strategy for smoking prevention among Malays is through the religion of Islam. In Malaysia, the National Consensus on the Islamic view of smoking by a group of religious people has agreed that smoking is "haram" or is a prohibited behaviour in Islam (Country report: Malaysia, 2001). Unfortunately, the consensus was not stressed in public and not enacted by many of the states. Regarding scientific data, there is also no published study so far on this aspect in our country. Studies overseas have also not specifically investigated this area. This factor is probably unrelated and

less important in their population. In Malaysia, since the National Religious Consensus on Islamic view of smoking was produced, it is important to include this factor in studying the associated factors of smoking behaviour in this study.

Relationship with the parents

Most of the studies examining the risk factors of adolescents smoking did not assess the relationship with or attachment of students to their parents. Reimers, *et al.* (1990) in their study however have included this factor and reported that regular smokers consistently indicated that they were less attached to and less supervised by their parents. As described in a conceptual framework by Flay *et al.* (Bellew & Wayne, 1991), family influences not only contribute to the development of smoking behaviour but also important in determining self-image and personality of adolescents which also contribute to smoking development. Therefore, in studying factors that are associated with students smoking behaviour it is important to include the relationship or attachment of students to their parents

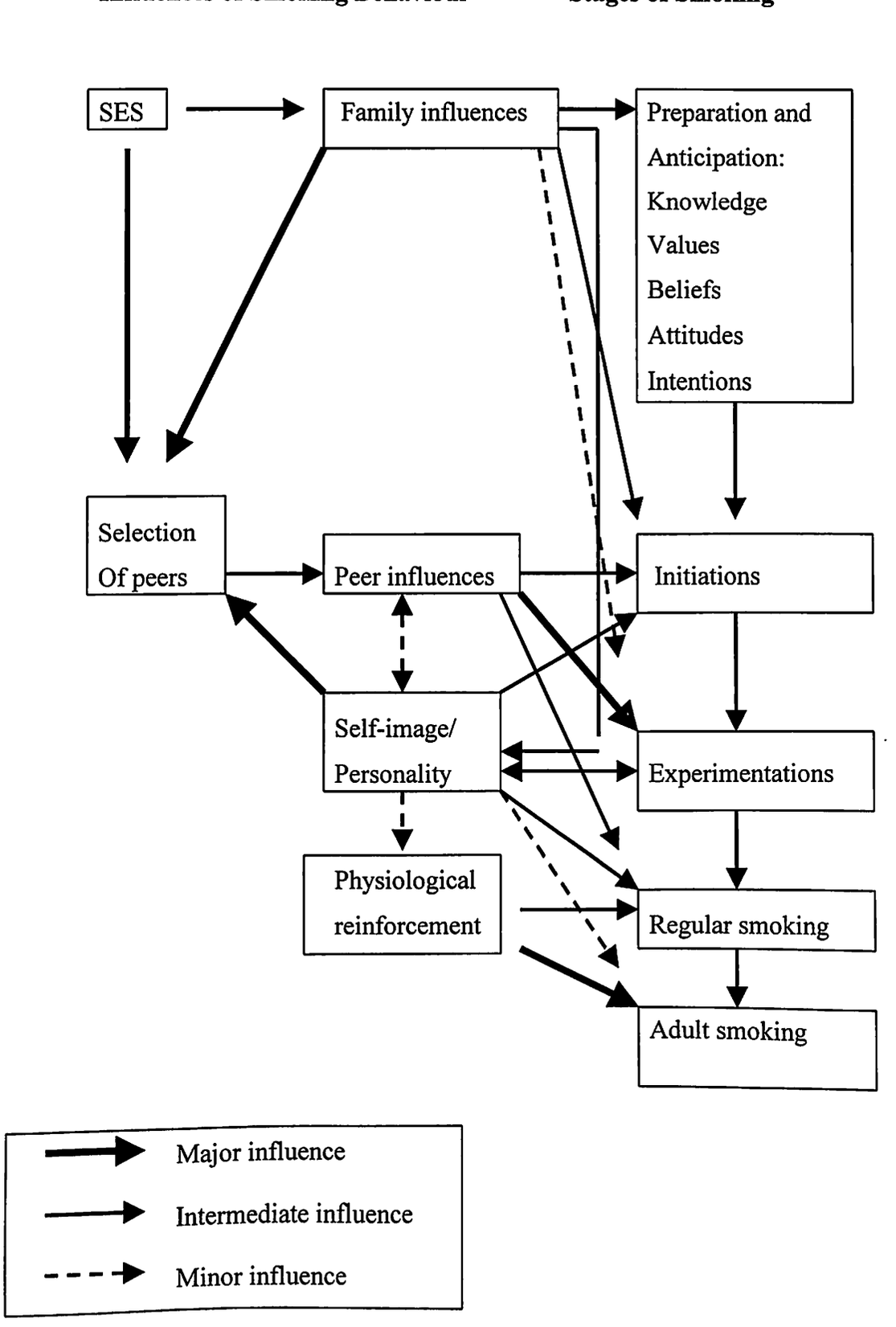
Cigarettes advertisements and smoking

In Malaysia, cigarettes advertisements are subject to the Control of Tobacco Products Regulations 1993 (Country Report: Malaysia, 2001). Although direct advertising of cigarettes on radio, television, newspapers and magazines was banned, the Government still allow indirect advertisements by tobacco companies. Rogayah *et al.*, (1998) have conducted a study among standard six students in two schools in Kota Bharu on children's perceptions of indirect cigarettes advertisements in Malaysia. They have found that 28.8% of the children identified the advertisements as promoting cigarettes. In relation to that, it was also reported that perceptions of advertising are higher among young smokers compared to adult (Pierce, *et al.* 1991).

There was not many published data on the effects of advertisement on smoking behaviour in our population. We also do not know whether it has really increased the number of smoker. Therefore, more exploratory studies to investigate the association of cigarettes advertisements on smoking behaviour are required.

Conceptual framework of smoking development

A model of influences and their relative strengths on stages of smoking behaviour produced by Flay *et al.* (Bellew & Wayne, 1991)



The relationship of lung function and cigarette smoking

The association between cigarette smoking and diseases of the respiratory system such as chronic bronchitis and lung cancer has been well proven and widely accepted (The World Health Report, 1999). Its association with respiratory illness in those who are exposed to environmental tobacco smoke was also recognized (O'Connor *et al.* 1987; Peter, *et al.* 1996; and Wong, *et al.* 1999). Peters, *et al.* (1996) and Lam, *et al.* (1998) reported that respiratory complaints among children who had been exposed to cigarette smoking were significantly higher than those who had not been exposed. It was also reported that significant trends were noted between the number of smokers living with and respiratory illness of the children (Lam, *et al.* 1998).

The small airways of the lungs have been recognized to be primarily or secondarily affected parts in a variety of clinical conditions (Wright JL. *et al.*, 1992). Regarding their association with cigarette smoking, Wright JL. *et al.* (1992) has also stated that the alteration of the membranous and respiratory bronchioles was one of the temporally early changes in the lung produced by cigarette smoking, and if the distortion of these airways could be detected using sensitive tests, the severity of airflow obstruction could be prevented.

The effects of cigarettes smoking on the lung function test among children or adolescents are however less clear. Lower values for force expiratory volume in one second (FEV1) was reported for children living with parents who smoke (O'Connor *et al.*, 1987; and Kauffmann, F. *et al.*, 1989). Tager *et al.*, (1985) in their study on the effect of cigarette smoking on the pulmonary function of children and adolescents

found that there was a significant decrease in the rate of growth of FEV1 and FEF 25-75% among those who smoked. Gold *et al.*, (1996) however, noted larger values for both FEV1 and forced vital capacity (FVC) in children who smoked than those who did not. In his study, even thought FEV1 and FVC were both higher among smoking children, the percentage of FEV1 over FVC and mean force expiratory flow during the middle half of the FVC (FEF 25-75%) were both lower in smoking group. Apart from that, Gold, *et al.*, (1996) also noted a dose response relation between smoking and lower level of FEV1/FVC and FEF 25-75%.

Objectives of the Study

General Objective

The general objective of the study is to identify factors that are associated with smoking behaviour and to see the association of smoking status with the lung functions of secondary school male students in Kota Bharu District, Kelantan.

Specific Objectives

1. To determine the prevalence of smoking among secondary school male students in Kota Bharu.

2. To identify the factors that are associated with smoking behaviour of secondary school male students with reference to:
   - 2.1. Financial status of the students
   - 2.2. Extra curricular involvement in school
   - 2.3. Psychosocial influences
   - 2.4. Relationship with the parents
   - 2.5. Level of parental supervision
   - 2.6. Attitudes and perceptions of the students on the effects of smoking
   - 2.7. Student's perceptions on the religious opinion of smoking
   - 2.8. Student's perceptions on the advertisements of cigarettes

3. To produce a model to predict smoking status of secondary school male students.
4. To compare the pulmonary function of the secondary school male students with regard to their smoking status

Materials and methods

The study was conducted in the District of Kota Bharu, Kelantan. A sample of all students from form four in eight schools randomly choosen from 35 school lists obtained from Kota Bharu department of education.

The students were administered with self administered questionnaire in one room identified by one of the teacher. To encourage reliable response from the students, the teacher was not allowed to be at the room through out the conduct of the survey

Information related to the children's socio economic background, possible exposure variables of smoking behaviour of the students and smoking status of the students were among the questions sought in the questionnaire.

Lung Function was measured with spirometer (Microlab 3300 series). Each subject was asked to inhale deeply in standing position with the nose clamped, blow rapidly and completely as possible. The procedure was explained and demonstrated to each subject. At least three measurements were taken on each subject. Only the best blow was recorded and printed. Result were automatically corrected to body temperature. Height and weight were recorded to nearest 0.5 cm and 0.5 kg respectively.

Sample size

Objective 1 - To determine the prevalence of smoking among form four male students in Kota Bharu

The sample size was calculated using a single proportion formula to get the prevalence of smoking of secondary school students. Based on previous studies, the prevalence of smoking of secondary school boys was around 35 to 45% (Naing *et al.* 1996a, 1996b). The prevalence of smoking among form four students in the pilot study was 34 %. Based on all the available information, for this study, a prevalence of 40% was used in sample size calculation. Taking the precision of 0.05, the minimum

required sample size to study the prevalence of smoking among secondary school male students was 369. However, the sample size has been 20 percent over estimated to 462 to consider for any missing information.

Objective 2 – To determine the associated factors of smoking behaviour of secondary school boys

The sample size was calculated using formula to compare two proportions. Since there was limited information on the associated factors of smoking behaviour among secondary school students in our population, data from the pilot study was used to estimate the sample size of this study. There were five categorical and eight numerical independent variables selected in the study. The estimated sample size calculation was done based on the difference in the proportion of characteristics of categorical variables between smokers and non-smokers.

In the pilot study, the proportion of father's smoking among smokers and non-smokers was 0.69 and 0.33 respectively. In calculating the sample size it was however decided to detect a 0.15 difference in the proportion of paternal smoking status between students who smoke and students who do not smoke. The detectable difference of 0.15 was decided after considering the practical aspect of the study. Taking an alpha of 0.05 and power of 0.8, the minimum required sample size based on smoking status of the father was 167 per group.

Regarding smoking status of the siblings, the proportion of siblings smoked among smokers and non-smokers was 0.62 and 0.33 respectively. Considering the practical aspect of the study, it was also decided to detect 0.15 differences in this proportion between the smoking status groups. By using the same precision and power of the study, the minimum required sample size was also 167 for each group.

Regarding the perception of religious opinion on smoking, 16.7% of the non-smokers believed that smoking is prohibited by their religion whereas none of the smokers did. Even though in the pilot study, none of the smokers believed that smoking is prohibited by their religious, the proportion of 0.1 was taken as the detectable difference of this variable in the population. Similarly with previous variables, the sample size was calculated using an alpha of 0.05 and power of the study of 0.8 and the minimum required sample size was 165 for each group.

In the pilot study, 69.2% of the smokers and 73.9% of the non-smokers believed that advertisements on television using cigarette brands were also promoting cigarettes. Even though the difference was very small, considering the practical aspect of the study it was decided to detect the proportion of 0.15 as the detectable difference in the actual study. Using the same precision and power of the study, the minimum required sample size was 104 for each group.

It was decided that the minimum sample size of 167 for each group must be obtained to study the associated factors of smoking behaviour among secondary boys. Based on the prevalence of smoking of about 35 to 45 percent among secondary school male students, it was likely to get 184 smokers if 462 students were included in the study. This will satisfy the minimum sample size requirement of 167 for each group.

Objective 3 – To compare the pulmonary functions of the male secondary school students between smokers and non-smokers

Since the dependent variables in the analysis for this objective were all a continuous variable, the sample size in objective 2, which was calculated, based on the comparison of two proportion would be enough to study the difference of lung

function test between smokers and non smokers. Therefore, it was decided to use the sample size in objective 2 for this objective.

Data analysis was done by SPSS software at the Unit of Biostatistics, School of Medical Sciences, Universiti Sains Malaysia.

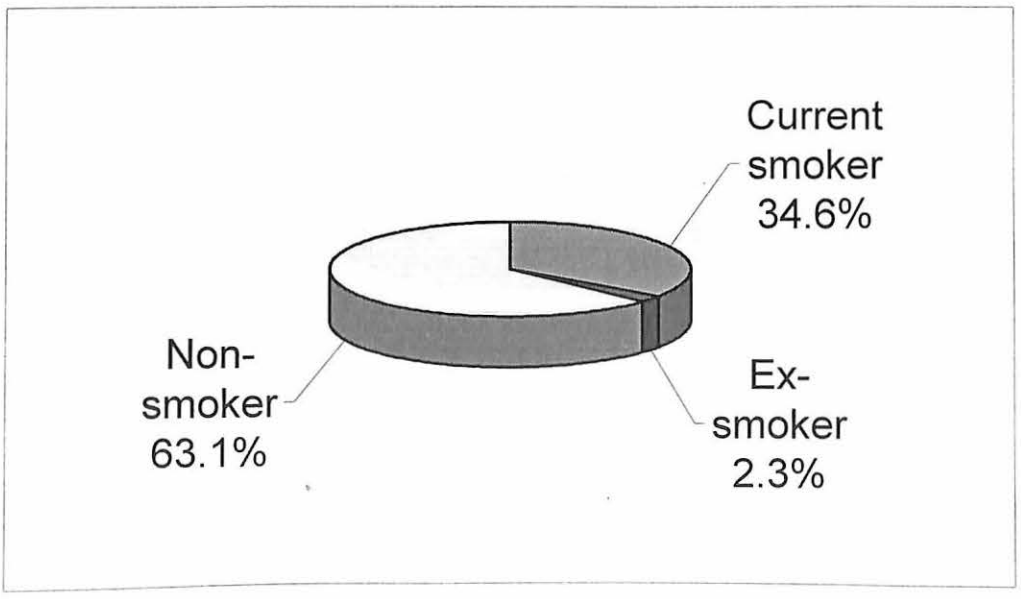
RESULTS

A total of 541 Form Four students from eight selected schools in Kota Bharu participated in the study. They were 15 to 17 years old at the time of the survey. Most of them were Malay and Muslim (75.4%), 125 were Chinese (23.1%), 5 were Indian (0.9%) and 3 were from other races (0.6%).

a) Prevalence of smoking

Out of 541 subjects, 526 (97.2%) were classifiable according to smoking classification and fifteen subjects (2.8%) were unclassified due to missing data. One hundred and eighty two students (34.6%) were current smoker, twelve students (2.3%) were ex-smoker and 332 (63.1%) were non-smoker. Figure 5.1.1 shows the percentage of subjects based on their smoking status.

Figure 1 – Percentage of current smoker, ex-smoker and non-smoker

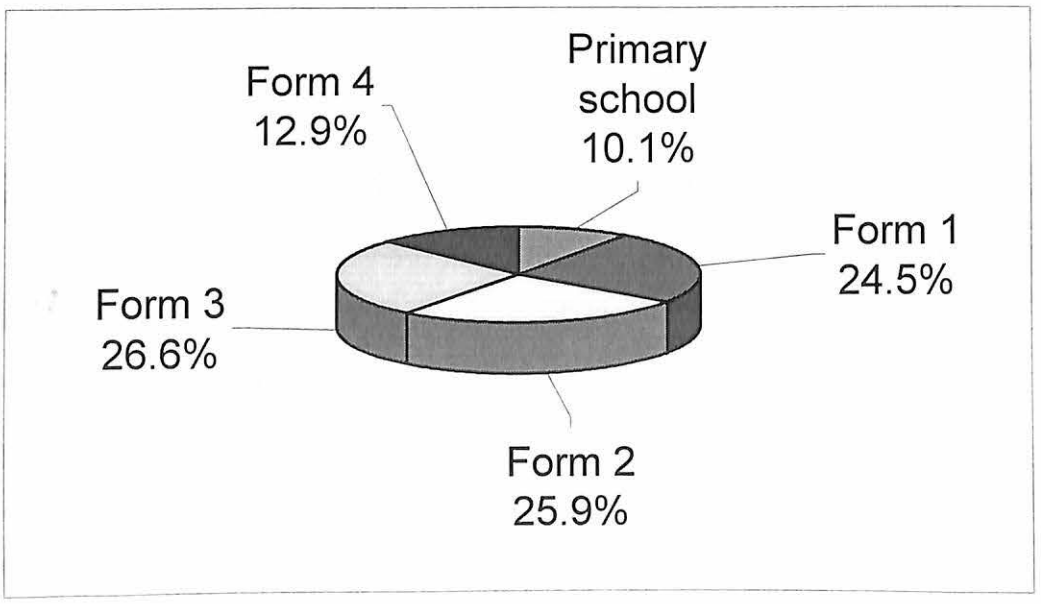


More than half (53.4%) of the students who were labeled as current smoker smoke regularly that is at least one cigarette daily. About half of the current smokers smokers (48.9%) smoke one or two cigarettes per day and 1.4% were heavy smokers.

The most common reason for starting to smoke was 'just to try' (48.0%) and the most common reason for continuing smoking was 'addiction' (66.0%). The majority of the smokers (54.5%) got their first cigarette from a friend and most of them (83.5%) continued to buy cigarettes from shops.

Regarding the duration of smoking, 14 (10.1%) of the smokers started to smoke while in primary school, 34 students (24.5%) in Form 1, 36 students (25.9%) when they were in Form 2, 37 students (26.6%) in Form 3 and 18 students (12.9%) in Form 4. Figure 2 shows the percentages of the smokers based on their level when they started to smoke.

Figure.2 – Percentage of the smokers according to level when they started to smoke.



b) The associated factors of smoking behaviour

Based on the smoking classification, only 12 students (2.3 %) were classified as the ex-smoker. Since the number was small, they were then excluded from the

analysis to determine the factors that have been associated with smoking behaviour of the secondary school students.

Exploration of individual variable based on current smoker and non-smoker found that the mean score for the association with friends who smoke and perceptions on the benefit of smoking were significantly higher in smoking group compared to the non-smoking group whereas the mean score for the supervision by the father, supervision by the mother and students' perceptions on the negative effects of smoking were significantly higher in non-smoking group. Table 1 shows the mean score and standard deviation of continuous independent variables of current smokers as well as non-smokers and their p-value.

Table 1 – The mean score and standard deviation of continuous independent variables of current smokers and non-smokers and p-value.

Variables	Current smoker		Non-smoker		# p value
	Mean	(SD)	Mean	(SD)	
1. Amount of pocket money per day	2.06	(1.08)	2.00	(1.05)	0.534
2. Association with friends who smoked	5.23	(2.82)	1.84	(2.30)	<0.001**
3. Relationship with father	10.76	(2.38)	11.03	(2.41)	0.223
4. Relationship with mother	12.24	(2.32)	12.63	(2.21)	0.064
5. Supervision by father	3.48	(1.14)	3.68	(1.02)	0.047*
6. Supervision by mother	3.57	(1.10)	4.01	(0.90)	<0.001**
7. Perception on negative effects of smoking	31.43	(5.07)	35.02	(3.73)	<0.001**
8. Perception on the benefits of smoking	23.56	(6.14)	16.15	(6.20)	<0.001**

p value of the independent t test

* $p < 0.05$

** $p < 0.001$

As for the categorical variables, the proportions of students who have participated in school uniformed society and who said that smoking is prohibited by their religion were significantly higher in the non-smoking group whereas the proportion of students whose siblings smoked and who responded that advertisements on television using cigarette brands were also advertising cigarettes were significantly higher in smoking group. Table 2 shows the difference in percentages of the categorical variables between current smokers and non-smokers and their p-value.

Table .2 – Number and percentages of responses for categorical variables among current smokers and non-smokers and their significant value.

Variables		Current smoker		Non-smoker		p value#
		No.	(%)	No.	(%)	
1. Joining School Uniformed society	Yes	92	(50.8)	242	(73.3)	<0.001**
	No	89	(49.2)	88	(26.7)	
2. Smoking status of father	Yes	102	(57.6)	158	(48.8)	0.058
	No	75	(42.4)	166	(51.2)	
3. Smoking status of siblings	Yes	77	(43.5)	100	(30.6)	0.004*
	No	100	(56.5)	227	(69.4)	
4. Smoking is prohibited by religion	Yes	25	(14.0)	115	(34.8)	<0.001**
	No	154	(86.0)	215	(65.2)	
4.1 Smoking is prohibited by religion (Muslim)	Yes	19	(11.9)	69	(30.9)	<0.001**
	No	140	(88.1)	154	(69.1)	

4.2. Smoking is prohibited	Yes	6	(30.0)	46	(43.0)	0.278
by religion (Non-muslim)	No	14	(70.0)	61	(57.0)	
5. Indirect advertisements	Yes	157	(87.4)	245	(76.6)	0.004*
are promoting cigarettes	No	22	(12.6)	75	(23.4)	

p value of chi-square test

* $p < 0.05$

** $p < 0.001$

Simple logistic regression was done for each of the variable to determine the association with smoking when other variables were not included. Based on LR statistic, at alpha 0.05, out of thirteen variables tested, nine variables were significantly associated with smoking. The significant variables were; joining school uniformed society ($p < 0.001$), smoking status of the siblings ($p = 0.004$), relationship with friends who smoke ($p < 0.001$), level of supervision from the father ($p = 0.047$), level of supervision from the mother ($p < 0.001$), students' attitudes and perceptions on the negative effects of smoking ($p < 0.001$), students' attitudes and perceptions on the benefits of smoking ($p < 0.001$), perceptions of the students on the religious opinion on smoking ($p < 0.001$) and perceptions of the students on the cigarette advertisements on television ($p = 0.003$).

It was found that of the significant variables in univariate analysis; smoking status of the siblings, relationship with friends who smoked, students' attitudes and perceptions on the benefits of smoking and students' perception that advertisements on television using cigarette brands were also promoting cigarettes were positively associated with current smoking status. On the other hand, joining school uniformed