Second-hand smoke knowledge and exposure among adults in rural Pedas, Negeri Sembilan

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Background: It is an undeniable fact that exposure to tobacco smoke from the ambiance poses harmful effects to human health. Although many countries including Malaysia have imposed smoking bans and restrictions in indoor and outdoor public places, yet, to achieve a zero exposure to tobacco smoke from one's surroundings remains a challenge.

Objective: The objectives of this study were to determine the second-hand smoke (SHS) knowledge and percentage of exposure among adults of rural Pedas, Negeri Sembilan and assess the association between socio-demographics and knowledge of SHS among these adults.

Methods: A cross sectional study with convenient sampling was carried out on 485 adults in Pedas, Negeri Sembilan. The instrument used was a validated questionnaire which was adapted with permission to suit the sample under study. The data collected were analysed with SPSS Statistics for Windows, Version 24.0.

Results: The percentage of SHS exposure among the non-smoking adults in rural Pedas, Negeri Sembilan was high (95.5%). More than 30% of the non-smoking respondents reported a daily exposure to SHS. The adults from this study however have good knowledge of SHS effects on health. A Mann-Whitney U test result revealed that knowledge on SHS scores was significantly higher for the non-smokers than that of smokers ($U=17645$, $p < .001$, $r=.18$). The top three locations identified as the most common places for SHS exposure were restaurants (38.9%), followed by workplace (26.2%) and home (19.4%).

Conclusions: The percentage of SHS exposure among the non-smoking adults of rural Pedas, Negeri Sembilan is high. Although the adults in this study have good knowledge of SHS health consequences, yet they are unavoidably exposed to SHS because smoking still occurs within their home, workplaces and public places. Our findings suggest the need for more comprehensive, assertive and strongly enforced policies to ban smoking in public areas, not only in this community but all across Malaysia.

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Key words: passive smoking; smoke exposure; awareness; adults; rural area.

Introduction

Exposure to ambiance tobacco smoke among the general population of the world takes place every day. According to WHO Report on the Global Tobacco Epidemic 2011, tobacco use causes major economic damage and kills nearly six million people every year. It is estimated that the mortality rate would exceed one billion worldwide if no steps are taken to prevent this from happening. This not only includes the ones who use tobacco but also the ones around them, which is known as second-hand smoking. Second-hand smoking, otherwise known as passive or involuntary smoking is defined as persons (other than the intended active smoker) who inhale the smoke emitted from other people's cigarettes, cigars, or pipes.[1] According to the World Health Organisation, the smouldering tobacco smoke contains more than 4000 chemicals, out of which 250 are harmful and more than 50 have been found to be carcinogenic.[2] Evidence shows that the harmful chemicals released from the burning of tobacco are implicated in more than 890,000 premature deaths per year.[2,3] Second-hand smoking actually kills more than 600,000 non-smokers every year, which makes it a major threat to the society.[4] The Malaysian National Health and Morbidity Survey 2015 reported that overall, 37.1% (8.09 million) of Malaysian adults aged 15 years and above were exposed to SHS at home.

A study held in Saudi Arabia states that exposure to SHS among adolescents is quite high, with 32.7% exposed at home, 49.3% exposed outside the house and overall environmental exposure of 25%. The highest exposure to SHS were among the adolescents who are secondary school students, male, aged more than 16 years old and living with neither parent. It is also high among adolescents whose fathers have no formal education.[5]

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In Malaysia, many policies are in action against smoking and multiple campaigns are held with health warnings to provide information to public about the dangers of smoking and as well as SHS. Despite all these actions, smoking rates in Malaysia remain high with an estimated 7.6 million exposed to SHS at home and 2.3 million people exposed to SHS indoors at their workplace. At the same time, 10,000 people die from SHS and other smoke related illnesses annually.[4] An estimated 8.6 million people are also exposed to SHS in restaurants.

A study done in Malaysia by Monash University stated that 87.4% did not like people smoking around them and 95.6% did not like people smoking in their house. Startlingly, the study also stated that awareness about SHS is lower in urban areas. As SHS is dangerous and is already a global epidemic, steps should be taken to reduce the impact it has on people who are non-smokers, as it affects them largely as well.[4]

SHS is dangerous due to its toxic constituents, which can cross the placenta and directly affect the foetus causing many neonatal complications. Knowledge of SHS plays an important role in minimising the incidence of low birth weight and other neonatal morbidities among pregnant women. A study conducted at a tertiary care rural hospital in India shed light on the limited knowledge possessed by respondents on the effects of SHS in a foetus whereby only 11% were aware of this. Majority of the respondents were aware of the presence of adverse effects but were unable to describe at least one condition. Most of the respondents came to know of the information regarding SHS mainly through television. However, they claimed to have not received particular information regarding the adverse effects on a foetus from any source. Lack of information regarding the effects of SHS on a foetus was found to be the main issue resulting in lack of avoidance behaviour to SHS exposure.[6] Another study conducted in Jordan revealed that 34.6% of the participants were undecided on the effects of SHS on low infant birth weight but the majority were aware that SHS causes low birth weight (61.2%).[7] Moreover, it was revealed that the majority of respondents had suitable knowledge of the negative health impacts of SHS on adults and children. In a similar study, 90.9% of participants were aware that long-term exposure to SHS was harmful to their health. Moreover, 89.9% were aware that children's health was affected by long-term exposure to SHS. This difference in knowledge can be attributed to education level. The study conducted in Jordan involved university students contrasting with the rural population where majority (46.79%) acquired only secondary level education.[8]

A study conducted in Mumbai, India found that women from lower economic strata are more likely to be exposed to tobacco smoke. In the study conducted, only a minority (18.07%) were able to identify at least one adverse effect of passive smoking indicating the need for awareness. Furthermore, results of multivariate logistic regression analysis showed that education level and marital status were significantly related to knowledge of adverse effects. Better knowledge of adverse effects to health was present among married women and formally educated women compared with widowed women and women without formal education.[9]

Tobacco affects almost every organ in the human body. A study conducted by Haddad *et al.*[7] revealed that 75.5% of respondents were aware that SHS causes heart disease and lung cancer in non-smokers. In another study, only 7.30% of women were convinced that warnings present on tobacco products would effectively prevent smoking. In addition to media, majority (68.46%) of women claimed gaining knowledge of adverse effects through the public.

A study conducted in Madinah, Saudi Arabia revealed a decreasing risk effect of knowledge on the adverse effects of smoking and beliefs of adolescents that SHS is harmful which indicated the need for awareness in schools and families. Adolescent's smoking status, close friends smoking, parental smoking and living with neither parent are factors associated with a high risk of

SHS exposure. Educated parents and better knowledge among adolescents were factors which reduced the risk of SHS exposure.[5] This indicates that preventable approaches could address knowledge and beliefs of SHS. A study conducted in Michigan found that having a higher income was associated with having better knowledge regarding passive smoking. Furthermore, the study showed that knowledge, attitude and preventive efforts were highly correlated, but none of these were shown to correlate with age.[10] In a study conducted in Malaysia, 85.8% agreed that smoke puffed out by smokers was SHS but relatively less agreed that smoke from burning end of cigar should be included as SHS (55.4%). A total of 74.4% agreed that the health of people nearby a lit cigar in an ash tray could be affected by SHS. Furthermore, 89.9% associated SHS with a decrease in lung function and 88.4% agreed that long-term exposure to SHS increases the risk of lung cancer.[11]

A study conducted in the U.S. found that 88% of non-smokers perceived SHS exposure as a risk factor for asthma while this was reduced significantly among smokers (79%). Overall, more participants identified an association between SHS and childhood asthma than any other condition. Majority (86%) of the respondents agreed that frequently smoking in the same room or car as a child could be related to asthma in the child and 72% viewed this could be related to frequent colds along with 67% who associated SHS with pneumonia.[12] Several studies were conducted to determine public perception of SHS on children's health. In 2005, a study conducted by Winickoff *et al.*[4] showed that 84.1% of smokers and 95.4% of non-smokers viewed SHS as a factor which affects children's health adversely. It was discovered that current smokers and previous smokers were less likely to perceive the adverse effects of SHS on a child's health compared with current non-smokers and respondents who had never smoked.

There is no safe level of exposure to SHS and it can cause serious health problems, including but not limited to cardiovascular and respiratory diseases (coronary heart disease, chronic obstructive pulmonary diseases, lung cancer) in adults, low birth weight in pregnant mothers, middle ear disease in children and sudden death in infants.[2,13] Long term exposure to tobacco smoke has been shown to have a more serious negative health impact on children as compared to adults.[11] Hence, research points towards the fact that second-hand smoking is equally injurious to health as smoking, and measures must be taken to curb its prevalence. In order to combat the alarming rates of second-hand smoking, one has to assess the exact nature of the problem in the community, i.e. the prevalence and density of smoking and second-hand smoking, the knowledge of people about second-hand smoking and their attitude towards the problem.

In view of this concern, we decided to carry out a community health survey in Pedas, a rural town located in Negeri Sembilan, Malaysia. Studies have shown that due to the changes in smoking trends, it is expected that more tobacco related deaths will occur in underdeveloped and developing areas.[3] This could be because of the lack of knowledge related to the adverse consequences of smoking and SHS. This made Pedas a good focus of study to assess the condition of second-hand smoking in the community. The objectives of this study were to determine the second-hand smoke (SHS) knowledge and percentage of exposure among adults of rural Pedas, Negeri Sembilan and assess the association between socio-demographics and knowledge of SHS among these adults.

Methodology

This was a cross sectional descriptive survey where a non-probability convenient sampling technique was applied to recruit the respondents from rural Pedas, which was situated in the southeast of Kuala Lumpur. This method allowed us to recruit our respondents within the time constraints of this study. Our targeted respondents were adults of varying socioeconomic statuses, from aged 18 years and above, genders of all races and smokers and non-smokers. In view of the elongated geographical pattern of Pedas with its

scattered distribution of the housing areas, sampling was conducted within a 3.5 km quadrant of radius with Klinik Kesihatan Pedas as the centre. The sampling size was calculated with Raosoft software, basing on a margin error of 5% and confidence level of 95%. The estimated population size (N) was 16,900. The calculated sample required was 500, with an attrition rate of 20%.

Data collection was done via questionnaire through face-to-face interviews. The questionnaire was adapted with permission from a questionnaire developed by Nor Afiah *et al.*[11] to suit its use for rural site study. The questionnaire was pre-tested prior to distribution. It consisted of three sections which were the (i) socio-demographic details, including gender, age, race, education level, income and smoking status, (ii) exposure to SHS and (iii) knowledge on SHS exposure.

The data were analysed with SPSS Statistics for Windows, Version 24.0. Descriptive statistic was used to determine the prevalence of SHS and non-parametric tests were used to analyse the association between socio-demographics and knowledge on SHS.

This study was part of the project required by the IMU MBBS Semester 5 Community Health Survey module. Consent, study information sheet and the questionnaire were distributed to all respondents who agreed to participate in this study. All completed questionnaires were given a designated code with the utmost regard for confidentially and anonymity.

Results

The response rate attained from this study was 97% (N=485). Table 1 presents the socio-demographics of the respondents. The gender of the respondents was almost equal, with male comprising 52.2% and female comprising 47.8%. The age of the respondents was grouped into 18 – 49 years old (79.6%), 50 – 65 years old (16.1%) and above 60 years old (4.3%). Ethnic Malays make up the largest group in this study (78.4%), followed by Indians (11.5%), Chinese (8.2%) and others (1.9%). Most of the respondents had their formal education (88.2%) whereas the non-educated percentage was low (11.8%). A high percentage of the respondents were in the low-income group (70.1%), while 29.9% were from the high income group. Most of the respondents were non-smokers (73.2%) versus those who smoked (26.8%).

Table 1: Socio-demographics of respondents (N=485)

Characteristics	n	%
Gender		
Male	253	52.2
Female	232	47.8
Age (in years)		
18 – 49	386	79.6
50 – 65	78	16.1
> 65	21	4.3

Characteristics	n	%
Ethnicity		
Malay	380	78.4
Chinese	40	8.2
Indian	56	11.5
Others	9	1.9
Education level		
Non educated	57	11.8
Educated	446	88.2
Income		
Low income	340	70.1
High income	145	29.9
Smoking status		
Smoker	130	26.8
Non-smoker	355	73.2

Among the combined respondents of smoker and non-smoker, 59.2% of them reported that they had family members who smoke. The family members who smoke comprised of siblings (26.4%), parents (18.1%) and spouse (14.8%). The percentage of SHS exposure in this study was determined among the non-smoking adults. The percentage was high (95.5%), with 33.8% being exposed to SHS on a daily basis and 35.5% had experienced at least an exposure per week. Most of the non-smoking respondents were subjected to SHS exposure in the external environments (64.8%) while 12.4% reported exposure only inside their home and 22.8% encountered exposure to SHS both at home and external environments. The top three locations identified by these respondents as the most common place for SHS exposure were restaurants (38.9%), followed by workplace (26.2%) and home (19.4%). The SHS exposure findings are summarised in Table 2.

Table 2: Exposure to SHS (N = 485)

Characteristics	n	%
Smokers in family		
Yes	287	59.2
No	198	40.8
Family members who smoke		
Parents	88	18.1
Spouse	72	14.8
Children	29	6.0
Siblings	128	26.4
Others	25	5.2
Exposure to SHS (non-smokers)		
Yes	339	95.5
No	16	4.5
Frequency of exposure to SHS (non-smokers)		
At least once a week	126	35.5
More than once to 3 days a week	76	21.4
> 3 days a week	33	9.3
Every day	120	33.8
Location of exposure to SHS (non-smokers)		
Home	44	12.4co
External	230	64.8
Both	81	22.8
Location of highest exposure to SHS (non-smokers)		
Home	69	19.4
Workplace	93	26.2
Restaurants	138	38.9
Entertainment places	29	8.2
Other places	26	7.3

Table 3 shows that the combined smoking and non-smoking respondents' knowledge on SHS effects on health was good. All except one of the items asked, achieved 70% and above agreeable answers from the respondents that SHS posed adverse effects on health. The one question involving a negatively formatted question that asked if the health of people nearby will not be affected by a lit cigarette burning in the ashtray yielded positive knowledge but with a lower percentage (30.7%).

Table 3: Knowledge on SHS

Knowledge item	Disagree n (%)	Neutral n (%)	Agree n (%)
My health may be harmed by long-term exposure to second-hand smoke	44 (9.1)	44 (9.1)	397 (81.9)
Children's health can be affected by smoking in the house	27 (5.6)	15 (3.1)	443 (91.3)
The health of people nearby will not be affected by a lit cigarette burning in the ashtray	281 (57.9)	55 (11.3)	149 (30.7)
Smoke from the burning end of a cigarette is considered as second-hand smoke	46 (9.5)	88 (18.1)	351 (72.4)
Smoke puffed out by smokers is considered as second-hand smoke	33 (6.8)	52 (10.7)	400 (82.5)
Women exposed to second-hand smoke are more likely to have a baby with a low birth weight	39 (8.0)	105 (21.6)	341 (70.3)
Long-term exposure to second-hand smoke can result in reduced lung function	31 (6.4)	34 (7.0)	420 (86.6)
Long-term exposure to second-hand smoke can increase chances of getting lung cancer	28 (5.8)	29 (6.0)	428 (88.2)
Second-hand smoke can cause heart disease in people who do not smoke	52 (10.7)	67 (13.8)	366 (75.5)

The nonparametric Mann-Whitney U and Kruskal-Wallis tests were carried out to determine the association between socio-demographics and knowledge on SHS in this study because the distribution of the knowledge of SHS scores violated the normality test. The Mann-Whitney U test result revealed that knowledge on SHS scores was significantly higher for the non-smokers than that of smokers ($U=17645$, $p < .001$, $r=.18$). The effect size however was small. There was no statistical significance between age, gender, ethnicity, education level and income earned with knowledge on SHS. (Tables 4 and 5).

Table 4: Mann Whitney U test for statistically significant differences in knowledge of SHS scores between socio-demographics (two categorical data)

Social-demographics	N = 485				
	n	U	Z	p	r
Sex					
Male	253	27378	-1.30	.192	–
Female	232				
Education level					
Non educated	57	11209	-1.02	.310	–
Educated	446				
Income					
Low income	340	23362	-0.93	0.352	–
High income	145				
Smoking status					
Smoker	130	17642	-4.05	< .001*	.18
Non-smoker	355				

*Note. *p < .05*

Table 5: Kruskal-Wallis test for statistically significant differences in knowledge of SHS scores between socio-demographics (more than two categorical data)

Social-demographics	N = 485		
	n	x^2	p
Age (in years)			
18 – 49	386		
50 – 65	78	4.637	0.098
>65	21		
Ethnicity			
Malays	380		
Chinese	40	1.698	0.637
Indian	56		
Others	9		

*Note. *p < .05*

Discussion

The percentage of SHS exposure among the non-smoking adults in Pedas, Negeri Sembilan is high (95.5%). This is comparatively higher than a study done in Madinah, Saudi Arabia on adolescents SHS exposure, which had an overall SHS exposure of 25%.[5] Wang *et al.*[14] found that the household SHS exposure rate across six countries in China was 48.3%. This difference may be due to our study which includes both the exposure to SHS within the household as well as the external environments. In the study by Lim *et al.*[15], it was concluded that there was a statistically significant association between rural areas and higher prevalence of smoking among Malaysian males (rural OR 1.12, 95% CI [1.03-1.22]).

The combined smoking and non-smoking respondents in this study showed a good level of knowledge regarding SHS. Respondents fared particularly well to items regarding the adverse effects of SHS exposure. This is in contrast to the study done in Mumbai, India where only a small proportion of women (18.07%) could identify the ill effects of SHS.[9] A study done in New Zealand showed varying results with 80% of samples answering that SHS increased the risk of asthma to only 31% being able to answer that SHS increased the risk of strokes.[16] However, in this study, respondents were less able to answer correctly to item 'women exposed to second-hand smoke are more likely to have a baby with a low birth weight'. This rendered a public health need to educate the community regarding the effects of SHS, especially to expecting mothers.

In this study, the non-smokers' scores on SHS knowledge was significantly higher than the smokers. Robert *et al.*[12] reported a similar outcome, where the non-smokers have a higher perception of negative effects of SHS than smokers. This strong correlation may be attributed to either a lack of, or denial of information. This requires a further qualitative research to establish the relationship between smoking status and knowledge on SHS.[16]

There was no significant association between SHS knowledge with gender, ethnicity, education level, age groups and income earned in this study. These findings were consistent with several other studies.[10,17,18] However, a study done in Michigan showed better knowledge associated with higher income and more formal education.[10] One possible explanation is the difference in stratification of the income groups as well as the difference in formal education between urban and rural areas.

Conclusion

The percentage of SHS exposure among the non-smoking adults of rural Pedas, Negeri Sembilan is high. The combined smoking and non-smoking respondents exhibited good knowledge of adverse effects of SHS to health. Despite this, the exposure to SHS is unavoidable because some of the respondents themselves are smokers and even for the non-smokers, smoking still occurs within their homes, workplaces and public places in this community. Prohibiting smoking in public and workplaces has always been an uphill battle for countries across the world. The same applies to Malaysia. Until and unless a more comprehensive, assertive and strongly enforced policy on banning smoking in public and workplaces is pursued, the likelihood of reducing the prevalence of SHS exposure among people in communities across the lifespan remains questionable.

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