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Original Research Article

Avoidance of environmental tobacco smoke among non-smoking pregnant women in Malaysia

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Abstract

Background: This study aimed to examine the association between environmental tobacco smoke (ETS) and avoidance of tobacco smoke among pregnant non-smoking women.

Methods: A cross-sectional study was used to obtain a representative sample of non-smoking pregnant women who attended health clinics (n = 661) six states in Malaysia. The durations of ETS exposure within and outside of the home were obtained by self-report. Exposure to ETS was assessed by the second-hand smoke (SHS) avoidance subscale. The analyses were conducted using logistic regression adjusted for demographic variables and other variables.

Results: Among non-smoking pregnant women, the prevalence of ETS exposure was 66.3%. The overall knowledge of ETS was good (>50%). The odds of ETS exposure were higher among those in the low-salary (RM1000-RM1999) group (OR=2.37; 95% CI=1.22, 4.62) and those with a history of chronic disease (OR=2.47; 95% CI=1.09, 5.62), whereas ETS exposure was significantly lower among those working full time during pregnancy (OR=0.31; 95% CI=0.17, 0.59). In the multivariate model, compared with non-ETS-exposed individuals, ETS-exposed individuals showed significantly different avoidance behaviour in situations that involved speaking to smokers who were smoking in same room (OR=2.31; 95%CI= 1.26, 4.21), sitting in a smoking section on public transport (OR=2.15; 95% CI= 1.07, 4.34) and frequently associating with smokers (OR=3.01; 95% CI=1.14-8.30).

Conclusions: Our findings revealed that knowledge about ETS exposure failed to manifest as avoidance behaviour. The knowledge was good but avoidance was poor, especially among women frequently exposed to ETS.

Keywords: environmental tobacco smoke, pregnant women, avoidance behavior

Introduction

Tobacco is the leading cause of premature morbidity and mortality worldwide and is a major concern in developing countries. This situation is expected to persist over the next 10 years, and there is no safe level of tobacco exposure for non-smokers (Murray and Lopez, 1997). In developed countries, there have been major efforts to combat tobacco smoke, including educating non-smokers on the adverse effects of tobacco smoke and creating smoke-free areas. Nonetheless, in developing countries, these efforts have been minimal, as the main target has been smoking itself instead of second-hand smoke (SHS) or environmental tobacco smoke (ETS) (Nakkash and Lee, 2009).

Researchers have shown that ETS poses a greater risk to unborn babies and pregnant women than to other groups (J. Lee et al., 2015). According to the World Health Organization, approximately 3.7 million premature deaths worldwide were caused by environmental exposure to air pollutants, including tobacco smoke, in 2012 (Vieira, 2015). ETS exposure during pregnancy can cause various health problems in infants and children, such as a decrease in infant birth weight, and is associated with increased risk of preterm delivery (Rua Ede et al., 2014; Zhang et al., 2015).

Although the preconception period is an important moment for the prevention of neonatal deaths, previous studies have revealed that in general, pregnant women have a lack of knowledge about maternal risk factors, including passive smoking (Esposito et al., 2015). In developed countries, such as Italy, nearly half of pregnant women were unaware of the effects of ETS pollutants to their babies (Gharaibeh et al., 2011). Similarly, in developing countries in the Middle East region, parents typically have a less comprehensive understanding of the effects of ETS on pregnant women and children, and this knowledge is lower among those with a lower socioeconomic status. The rate of exposure is also high across all trimesters, with most exposures occurring in the home (Abu-Baker et al.,2010).

Malaysia, a country located in Southeast Asia, is a developing country that has seen various efforts targeted towards reducing tobacco exposure in the general population. Malaysia, which has adopted the Framework Convention for Tobacco Control, has intensified its efforts to control tobacco over the past 10 years, and the aim for its tobacco endgame is 2045 (Thomson et al., 2012; S. M. Yasin et al., 2016). Its efforts include the prohibition of smoking in public places and workplaces, a provision of smoking cessation services, increased taxation and the strict control of smuggled cigarettes. Nonetheless, the enforcement of anti-smoking laws in public places is still rather loose. As a result, there was only a minor reduction in cigarette smoking among the male population, of less than 3%, from 2006 to 2011; 43.9% of the male population and 1% of the female population were smokers, according to the Global Adult Tobacco Survey (GATS) 2011 (Lim et al., 2013). Although the national prevalence of smoking among pregnant women is unknown, from the alarming number of male smokers in Malaysia, we may assume that half of pregnant women are exposed to ETS either at the workplace or at home.

To develop effective programmes and to increase ETS awareness, it is pertinent that we know the amount of exposure, the amount of knowledge, and the behaviour towards ETS among this vulnerable group. Furthermore, we also need to know the factors that cause an increase in avoidance behaviour among pregnant women. Although there are previous studies that looked into the knowledge and attitudes of pregnant women in other areas of the world, no research has actually studied the avoidance behaviour of this vulnerable group. This knowledge is required to ensure that the programme developed can be tailored to the specific characteristics of individuals and, thus, optimize healthcare resources. Therefore, the present study, which was conducted with a representative sample of pregnant women in Malaysia, had two primary aims. The first aim was to assess the level of knowledge and the attitudes towards exposure to passive smoking in pregnancy. The second aim was to assess the avoidance behaviour among women exposed to ETS compared with that among non-exposed individuals.

Materials and Method

A cross-sectional study was conducted from May 2014 - Feb 2015. Sampling was performed by multistage, stratified, random sampling across six states in Malaysia. The chosen states were Kelantan, Johor, Melaka, Sabah, Selangor and Pahang. Two clinics in each state were randomly chosen. Data collection was conducted by the researchers and a trained group of research assistants. In each clinic, participants were randomly selected based on their registration number during two antenatal visit days per week. The inclusion criteria included women with singleton pregnancies and without congenital defects. The women also needed to be able to understand and read the Malay language. Women with medical conditions before and during their pregnancies were excluded from this study. Participants excluded were those with pregnancies complicated by diabetes, hypertension, heart diseases and renal problems, as they may affect mental health.

The questionnaires were self-administered, and misunderstandings of any section were explained by the research assistants. A token of appreciation, in the form of light refreshments, was given to participants

who answered the questionnaires. Participation in this study was voluntary, and informed consent was obtained from the participants and the administrator of each clinic before data collection. This study was approved by the institutional review board of the university and the local public health investigation board. The participants were required to answer a self-reported questionnaire after they attended a health clinic for an antenatal appointment. The questionnaire gathered sociodemographic characteristics, pregnancy history, pregnancy intention, knowledge, attitudes and a second-hand smoke (SHS) avoidance scale.

The questionnaire on knowledge and attitudes comprised three sections: 1) knowledge about the effects of ETS exposure; 2) attitudes towards ETS exposure; and 3) statements of avoidance behaviour towards exposure to ETS in their surroundings. The first two sections, knowledge and attitude, consisted of a 5-point Likert response scale (1=strongly agree; 2=agree; 3=undecided; 4=disagree; 5=strongly disagree). The Cronbach's alpha coefficient for the scale was 0.79 (Kurtz, Kurtz, Contreras, & Booth, 2003). The third subsection was a set of questions developed by Wang, Herting, and Tung (2008). The subscale included nineteen items to assess the respondent's efforts to avoid SHS exposure. The subscale was in the form of a 4-point Likert response scale (1= almost always true; 2= usually true; 3= usually not true; 4 = almost never true). Scores for avoidance were summed and ranged from 19-76, with scores above 47 indicating confidence in avoiding SHS. In previous research, the Cronbach's alpha for this scale was 0.82 (Wang et al., 2008). Two bilingual experts from the Universiti Teknologi MARA translated the scales into Malay. Both translators were native speakers and had experience in conducting tobacco-related research. The translated Malay version of the questionnaires underwent pretesting by facial validity and cognitive debriefing for linguistic validation among 30 pregnant women. Any discrepancies in the appropriateness of the language and in the understanding from the original version were sought and corrected. Only the Malay version was used in this research. Information on sociodemographic variables was collected, including race, education level, working status, and household income. With respect to pregnancy history, the variables were as follows: weeks of pregnancy, previous pregnancy, purpose of pregnancy, whether the pregnancy was planned, spouse happiness regarding current pregnancy, previous medical illnesses, and pregnancy complications. We also asked about their spouse's smoking status, household smoking habits and confidence in avoiding ETS. The data were entered into and analysed with IBM SPSS version 21.0. Descriptive statistics, e.g., number and percentage, were determined. The comparison of the variables by logistic regression was used as the mainstay of the analysis. A bivariate logistic regression analysis was used to determine the associations between sociodemographic characteristics and ETS exposure. To examine the association between ETS exposure and avoidance behaviour, we used separate logistic models. Dummy terms were used to model ETS exposure. Model A was composed of an unadjusted crude model. Model B was adjusted for sociodemographic characteristics and pregnancy related variables.

Results

Sample characteristics

A total of 661 pregnant Malay women were included in this study, of which 66.3% (n=438) were exposed and 33.7% (n=223) were not exposed to any SHS. The mean age of respondents was 28.6 (SD=5.26) years old, with a range from 14-46 years old. The majority (n=145, 21.9%) of respondents were in their second trimester of pregnancy, followed by the third (n=193, 29.2%) and first (n=145, 21.9%) trimester of pregnancy. Fourteen percent (n=94) of women were pregnant with their first child, and the largest proportion of women (n=152, 23%) already had two children. Among the pregnant women, 1.2% (n=8) were ever smokers, and all of them quit smoking before pregnancy.

Spouse smoking status and household smoking rules

Nearly half (45.2 %) of the respondents reported living with a smoking spouse. More than half of the respondents had a no smoking rule at home (63.4%), some (20.4%) allowed smoking in certain parts of the house, and a few (3.6%) allowed only certain individuals to smoke, while a minority had no smoking restrictions in the house (9.2%). When asked about the support that the respondents received with regards to ETS exposure prevention, the majority responded that they received no support/very little support (62%). Additionally, only 42.5% had some confidence in avoiding ETS exposure. The exposures to ETS occurred at home (11.0%), the workplace (13.9%),

restaurants (32.7%), bus stations (20.1%) and other locations (2.9%).

Knowledge, attitudes and avoidance behaviour

The majority of pregnant women in this study had some knowledge about the dangers of ETS to their unborn child (> 50%) (Table 1). This included asthma (91.3%), the child's general health (37.1%), allergies (82.1%), heart attacks (75%) and low birth weight (76.6%).

The majority of respondents also had good knowledge about the effects of ETS on their own health. Negative perceptions regarding ETS exposure were consistent throughout all of the responses (>70%). However, the percentage decreased tremendously when the subjects were asked whether they allowed visitors to smoke in their houses. Similarly, only half of the respondents asked people around them to put away their cigarettes. When the attitude score was summed to create a total score for attitude, the group mean was 13.03 (SD= 3.78), with a range from 6.0-30.0. Higher scores showed better agreement with policies and procedures to reduce ETS. The mean for the knowledge score was 11.6 (SD 3.66), with a range from 6-30. The higher the score, the greater the knowledge of ETS.

Table 1: Knowledge, attitudes and preventive efforts to avoid SHS exposure among exposed women

		Strongly agree (%)	Agree (%)	Undecided (%)	Disagree (%)	Strongly Disagreed (%)
	KNOWLEDGE					
1	SHS causes low birth weight	48.2	28.4	22.0	0.5	0.9
2	SHS causes ear infections in children	19.9	17.2	47.8	10.1	5.0
3	SHS causes heart attacks in children	37.2	37.8	22.7	1.8	0.5
4	SHS is associated with crib death (SIDS)	36.0	31.2	31.0	1.4	0.5
5	SHS is associated with allergies in children	47.9	34.2	15.1	1.8	0.9
6	SHS is associated with asthma in children	59.6	31.7	7.6	0.5	0.7
	ATTITUDE					
1	Smoke from other people's cigarettes will shorten my life	48.4	21.9	10.0	18.7	0.9
2	Smoke from other people's cigarettes is harmful for me	52.7	37.8	7.1	1.5	1.0
3	Smoking should be banned in public	58.0	32.3	7.3	1.9	0.5
4	SHS makes my child's health worse	43.8	27.4	23.5	5.1	0.2
5	I let visitors smoke in my home	5.8	11.2	9.7	33.7	39.6
6	I ask people around me to put out their cigarettes	23.7	32.4	30.5	9.7	3.6

The factors associated with ETS exposure were first pregnancy, no previous underlying diseases and a salary from RM1001-1999.00. Being in the middle income group, i.e., having a family income from RM5000-RM9999, had the greatest protective effect against ETS. (Table 2)

Table 2. Factors associated with ETS exposure in pregnant women

	SHS exposed n (%)	SHS exposed OR (95% CI)	P value
Race			
Malay	339 (81.7)	Ref	
Chinese	34 (8.2)	0.53 (0.25- 1.11)	0.09
Indian	5 (1.2)	0.42 (0.11-1.58)	0.20
Others	37 (8.9)	0.49 (0.25- 0.97)	0.04
Highest Education			
PhD/Masters	2 (0.5)	Ref	
Degree	61 (14.8)	3.47 (0.19- 61.97)	0.39
Diploma	98 (23.7)	3.39 (0.19- 60.51)	0.41
SPM/Certificate	210 (50.8)	2.36 (0.13- 41.49)	0.56
No formal education	42 (10.2)	3.22 (0.16- 61.78)	0.44
Employment			
Employed full time	259 (63.5)	Ref	
Employed part time	37 (9.1)	1.29 (0.48- 3.42)	0.61
Unemployed, employed before pregnant	72 (17.6)	0.61 (0.35- 1.07)	0.09
Never employed	40 (9.8)	0.32 (0.16- 0.59)	0.00
Household Income			
<RM1000	50 (11.7)	Ref	
RM1000-1999	196 (46.0)	2.37 (1.22- 4.62)	0.01
RM2000-4999	169 (39.7)	1.20 (0.58- 2.49)	0.62
RM5000-9999	10 (2.3)	0.26 (0.08- 0.85)	0.03
RM10000 and more	1 (0.2)	2.09 (0.03-137.76)	0.73
Previously pregnant			
Yes	286 (67.1)	Ref	
No	140 (32.9)	1.61 (0.99- 2.62)	0.05
Pregnancy Intentions			
Planned pregnancy	181 (42.9)	Ref	
Unplanned pregnancy	234 (55.5)	1.35 (0.88-2.06)	0.17
Unwanted pregnancy	7 (1.7)	3.05 (0.12- 78.68)	0.50
Happiness with pregnancy			
Very excited	264 (62.0)	Ref	
Excited	157 (36.9)	1.36 (0.85-2.18)	0.21
Unhappy	5 (1.2)	0.23 (0.01-5.13)	0.35
Father excited with pregnancy			
Yes	397 (93.0)	Ref	
No	12 (2.8)	2.25 (0.23- 22.06)	0.49
Unsure	18 (4.2)	4.25 (0.66- 27.30)	0.13
Underlying disease			
Yes	28 (6.6)	Ref	
No	399 (93.4)	2.47 (1.09- 5.62)	0.03
Complications during pregnancy			
Yes	25 (5.9)	Ref	
No	399 (94.1)	0.59 (0.22-1.60)	0.29

Table 3. Multivariate analysis of avoidance behaviours of ETS-exposed women

No		Agreed with statement		Model Aa OR (95% CI)	Model Ba OR (95% CI)
		Non-SHS Exposed N (%)	SHS Exposed N (%)		
1	When I encounter someone who is smoking, I distance myself to ensure that I will not be exposed to the smoke.	205 (32.2)	432 (67.8)	1.11 (0.10-11.90)	0.13 (0.06-0.90)*
2	I allow people to smoke in my house.	124 (31.1)	275 (68.9)	1.00 (0.59-1.71)	1.07 (0.54-2.13)
3	If I am with a group of people and someone begins to smoke, then I will remain with the group.	151 (31.3)	332 (68.7)	0.76 (0.42-1.37)	0.90 (0.42-1.88)
4	If I encounter a friend or relative who is smoking, then I will seek and talk with him/her while he/she is smoking.	180 (34.9)	336 (65.1)	2.47 (1.30-4.67)**	1.85 (0.86-3.98)
5	When I am in a public place, such as a restaurant, office or clinic, I will leave it if I am unable to sit in the non-smoking section.	191 (31.6)	414 (68.4)	0.45 (0.18-1.14)	0.27 (0.08-0.86)*
6	When I travel by bus or any other public transportation, I request a non-smoking seat.	199 (32.0)	423 (68.0)	0.27 (0.06-1.31)	0.13 (0.02-0.99)*
7	When I trip by taxi I will ask the bus driver not to smoke.	202 (32.6)	418 (67.4)	2.24 (0.40-12.59)	11.46 (0.83-157.89)
8	I allow people to smoke in my car.	101 (31.5)	220 (68.5)	1.24 (0.66-2.33)	1.62 (0.75-3.48)
9	If my husband, friends or relatives are gathering in a designated smoking area to smoke, then I will join them rather than be alone.	128 (34.3)	245 (65.7)	1.34 (0.71-2.53)	2.30 (1.06-5.01)*
10	If I am with people who are smoking and I cannot leave, then I will ask them to refrain from smoking.	195 (32.9)	398 (67.1)	1.19 (0.33-4.35)	1.25 (0.12-7.95)
11	I will sit in the smoking section of a public place or bus station if there are no seats available.	152 (29.1)	370 (70.9)	0.27 (0.14-0.54)**	0.12 (0.04-0.30)**
12	At an outdoor function where smoking is present, I will move away to avoid it.	197 (33.3)	391 (66.5)	5.98 (0.89-39.95)	1.78 (0.22-14.71)
13	At an outdoor function where water pipe smoking is present, I will move away to avoid it.	197 (33.6)	390 (66.6)	4.67 (0.77-28.37)	1.80 (0.29-12.71)
14	When exposed to second-hand smoke, I wash my clothes solely to remove the smell of smoke from them, even if they are otherwise clean.	196 (32.8)	401 (67.2)	0.45 (0.09-2.21)	0.22 (0.02-2.87)
15	I find it unpleasant to be around second-hand smoke.	196 (32.6)	405 (67.4)	0.97 (0.20-4.66)	0.16 (0.01-3.94)
16	I routinely associate with people who smoke.	161 (30.4)	368 (69.6)	1.07 (0.53-2.16)	3.07 (1.13-8.29)
17	When eating out, I always sit in the non-smoking section.	177 (31.8)	380 (68.2)	0.36 (0.17-0.80)**	0.19 (0.07-0.54)
18	I frequently visit places where smoking is prevalent.	119 (31.3)	261 (68.7)	1.26 (0.67-2.36)	1.10 (0.53-2.30)
19	I do not find second-hand smoke offensive.	117 (32.5)	243 (67.5)	0.82 (0.49-1.39)	0.58 (0.31-1.10)

* <0.05, ** <0.01. [a]Unadjusted model , [b]Model adjusted for sociodemographic characteristics and pregnancy behaviour

Table 3 displays the findings of the avoidance behaviour subscales. The results revealed that the majority of women in the exposed and non-exposed groups tried to move away from smokers (99% for both groups). On the other hand, 59.9% of women in the non-exposed group allowed smokers to smoke in their homes, whereas 63.7% in the exposed group did so. During exposure circumstances, many respondents would leave a public place (94.5%) if there were a lot of smokers, and the majority would request a non-smoking seat on public transport (97%). In addition, 58% of overall respondents did not find second-hand smoke to be offensive, and 62% frequently visited places where smoking was prevalent.

In Model B, compared with those in the non-ETS-exposed group, those in the ETS-exposed group were more likely to join their spouse in the smoking section as opposed to sitting alone. The exposed were also significantly less likely to distance themselves when they encountered someone who smoked, less likely to leave if they were in a restaurant with a smoking area and also less likely to ask for a non-smoking seat on public transport.

Discussion

This present study provides a snapshot of the attitudes and behaviours of pregnant women towards ETS exposure. The results were obtained from pregnant women across various states in Malaysia. The main rationale for choosing this pregnant population was because both they and their unborn children are vulnerable to ETS exposure, and hence, their perception may be different from the population of non-pregnant women. The results showed that among these pregnant women, only 1.4% ever smoked. This is comparable to the 1% prevalence of smoking among adult Malaysian females reported by the Global Adults Tobacco Survey of 2011 (Palipudi et al., 2015). This prevalence of smoking is relatively low compared with that of developed countries, which have a prevalence of approximately 10-20% among pregnant women (Cui et al., 2014). The low prevalence is advantageous and due to the fact that smoking is considered a taboo and cultural issue among women, especially in Muslim cultures. Nonetheless, exposure to second-hand smoke during any of the trimesters was 66.3%. This exposure is much higher than the global exposure to ETS among pregnant women. Our results were expected because nearly half of these women lived with a smoking spouse. Previous findings also showed that women with smoking husbands were more exposed to ETS at home than women with husbands who were non-smokers (Loke et al., 2000).

In this study, the majority of women had adequate knowledge about the effects of pregnancy on their child. The results indicate that they knew that smoking exposure causes detrimental health effects, i.e., asthma, allergies, low birth weight and heart attacks. Nonetheless, they have less knowledge about crib deaths and ear infections, as more than 30% were unsure or disagreed with these statements. These scores were lower than those found in another study among employed women in Jordan, in which most women scored over 70% on knowledge about ETS exposure (Gharaibeh et al., 2011).

Regarding the attitudes of the women in our study, approximately 80% of women knew all of the effects of ETS exposure on themselves, including the shortening of their lives and its harmfulness. In contrast, only 71.2% of women were worried that their unborn child would be affected by the ETS exposure. This indicates that a continued effort is urgently needed to educate pregnant women. This education can be given informally or formally during antenatal follow-up by a nurse or physician. In addition, more than half of the respondents only completed secondary school. This result is consistent with studies among pregnant women who were smokers in Iceland and the UK; it concluded that a low education status was associated with smoking and second-hand smoke exposure (Erlingsdottir et al., 2014; Orton et al., 2014). We also found that, regardless of the knowledge of these women, 26.7% of women would still allow anyone to smoke in their house and 43.8% were still unable to ask smokers to put away their cigarettes. We presume that most pregnant women felt powerless and may have lacked confidence to ask smokers to stop smoking. Although these pregnant women knew the adverse effects of ETS, they were worried about disrupting their family harmony if they asked their husbands to quit smoking in their presence (A. H. Lee, 2008). Therefore, future interventions should improve the confidence of pregnant women to enable them to prevent ETS exposure at home and at the workplace. This might also serve as a means of changing social norms in Malaysia.

Our results provide evidence that the risk of ETS exposure was approximately 1.6 times greater among those with their first pregnancy than those who had a previous pregnancy. This shows that the first pregnancy is the most vulnerable period and should be

given attention. This is supported by a study performed in China, where exposure to ETS was significantly reduced by 14% after the mother became pregnant as many fathers quit smoking when their wife became pregnant for the first time. This reduction in exposure is expected to be greater in subsequent pregnancies (Fu Chen et al.,2008). We also found that income status and the presence of previous diseases also affected women's exposure to ETS. Women in the lower income group were highly exposed compared with those in the higher income group. A systematic review of second-hand smoke exposure during pregnancy reported similar findings on income and education level, although our findings showed no significant difference in terms of age and place of residence (Zhang et al., 2015). Moreover, this is expected of families in a lower socioeconomic status in Malaysian society as they are more conservative, and women have more traditional roles.

To our knowledge, four previous studies have studied avoidance behaviour among pregnant women (Zhang et al., 2015). Our findings are consistent with those of the previous studies in terms of the behaviours of mothers. Our sample showed that 79% of women stepped away from places where there were smokers, consistent with another study that reported 74.5% (Zhang et al., 2015). Furthermore, 78% of pregnant women in our sample were not anxious about talking to their spouse or relatives while they were smoking. This is somewhat distinct from the results of Loke et al. (2000), who reported that only 39% of women walked away when their husbands smoked. In the multivariate model to evaluate the avoidance of ETS among non-pregnant women, we revealed four significant behaviours that are significantly more common among those exposed to ETS. Women in the exposed group were more likely to join their spouse in a smoking section if they would otherwise sit alone. The exposed were also significantly less likely to distance themselves when encountering someone who smoked, less likely to leave if a restaurant with a smoking area and also less likely to ask for a non-smoking seat on public transport. The results may reveal that women lack confidence in themselves and that they treat passive smoking as a social norm, especially if they are frequently exposed to ETS at home.

Although Malaysia rectified the Framework Convention for Tobacco Control in 2005, the implementation of systematic tobacco control policies was lower than expected (Rashid et al., 2014), regardless of the specific population, including pregnant women. This is possibly the result of the limited implementation of smoke-free public areas and workplaces (Siti Munira Yasin et al., 2016). Numerous interventions have been conducted in Malaysia, but the results were poorly translated. One possible reason could be that interventions that reduce tobacco smoke mainly focus on individual support (Siti Munira Yasin et al. 2011), even though family support is a strong predictor of cessation (Sun et al., 2009). Cultural factors may be another reason why cessation is particularly difficult for men, as it may be a symbol of male predominance and freedom. These cultural issues may preclude the health of women, who are expected to endure men's smoking without resistance. Hence, non-smoking pregnant women who desire harmony in their relationship may perceive their husband's smoking habit as a work-related stress reliever (A. H. Lee, 2008). These factors could serve to explain our results.

This study has some limitations that can affect the interpretation of its findings. First, the questionnaire was self-administered and self-reported; thus, it is subject to recall bias. Similarly, respondents were asked whether they knew that they had any chronic diseases or other medical conditions, and their recall might be inaccurate. Second, this was a cross-sectional study, and therefore, the associations reported have no causal relationship. Future studies may benefit from a prospective or longitudinal study, allowing them to obtain causal associations. Third, the sample characteristics were from those who attended government clinics; it excluded mothers who had antenatal follow-ups in private facilities, women who resided in shelters or who were homeless, and women who were at risk of other high-risk behaviours, such as alcohol intake. This may lead to an underestimate of the prevalence of smoking pregnant women in Malaysia.

Overall, our findings revealed that knowledge about ETS exposure failed to manifest as avoidance behaviour. Knowledge was quite good but avoidance was poor, especially among women who were frequently exposed to ETS. We recommend that future approaches should be crafted to minimize the amount of ETS exposure at home. Focussing on child health and issues due to ETS may be a powerful motivator for women because children are highly valued by society. For women with lower education, a life skill approach may be needed to enhance confidence and self-empowerment. Moreover, advocacy efforts

should target the teenage male population (especially smokers) to educate them on the hazards of ETS and its impact on family harmony and health. Lastly, Malaysia should intensify efforts to enforce, monitor and regulate more smoke-free workplaces and public facilities to reduce ETS exposure.

Conclusion

Avoidance of ETS is still lacking in our population of pregnant women. Hence, efforts to increase knowledge on ETS should be enhanced and should also include the strategies to avoid ETS.

Ethical Considerations

Ethical practices (including obtaining informed consent and avoiding plagiarism, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancy) have been completely observed by the authors.

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