



Second-hand Smoke Exposure and Psychological Distress amongst Non-Smoking Pregnant Women in Malaysia

Siti Munira Yasin^{1*}, Khairul Mizan Taib², Mohd Rodi Isa¹, Mohd Ariff Fadzil¹, Mohd Razilan Abdul Kadir² and Saiful Farik Mat Yatim²

¹Population Health and Preventive Medicine, Faculty of Medicine, Universiti Teknologi MARA (UiTM), 47000 Sungai Buloh, Selangor, Malaysia

²Faculty of Information Management, Universiti Teknologi MARA (UiTM) Puncak Perdana, 40150 Shah Alam, Selangor, Malaysia

ABSTRACT

This study aimed to examine the association between second-hand smoke (SHS) exposure and psychological distress amongst non-smoking pregnant women. A cross-sectional study was used to obtain a representative sample of non-smoking pregnant women attending health clinics (n = 661) across six states in Malaysia. The duration of SHS exposure inside and outside the house was recorded from the participants. Psychological distress was assessed via General Health Questionnaire (GHQ-12). The analyses were conducted using a logistic regression adjusted for demographic variables and other variables. Amongst non-smoking pregnant women, the prevalence of global SHS exposure and psychological distress was 80.4% and 64.2%, respectively. In the multivariate adjusted odds ratio (OR) models for psychological distress and the duration of SHS exposures, there was an OR of 1.04 (95% CI: 0.61-1.77) for individuals with SHS exposure of 1-4 hours/week, 0.44 (95% CI: 0.23-0.81) for SHS exposure of 5-14 hours/week and 0.84 (95% CI: 0.32-2.22) for exposures of >15 hours/week compared to those with no SHS exposure outside the home. Meanwhile, SHS exposure outside the house with the duration of 5-14 hours might have temporary calming effects against psychological distress. Nonetheless, more research is needed to ascertain this.

Keywords: Second hand smoker, psychological distress, pregnancy

ARTICLE INFO

Article history:

Received: 25 October 2016

Accepted: 17 March 2017

E-mail addresses:

smunira@salam.uitm.edu.my (Siti Munira Yasin),
strategist05@gmail.com (Khairul Mizan Taib),
marif022@hotmail.com (Mohd Ariff Fadzil),
rodi@salam.uitm.edu.my (Mohd Rodi Isa),
mrzilan@salam.uitm.edu.my (Mohd Razilan Abdul Kadir),
farik@salam.uitm.edu.my (Saiful Farik Mat Yatim)

*Corresponding Author

INTRODUCTION

Tobacco not only kills smokers, but it also causes a major burden to those who do not smoke. Environmental tobacco smoke (ETS) or second-hand smoke (SHS) is associated with significant health risks to humans,

including heart disease, asthma, cancer and/or respiratory illnesses. Second-hand smoke exposure comprises exhaled and side-stream smoke that is released from burning cigarettes in between inhalations. The composition of SHS changes slightly when it dilutes and interacts with ambient air and other compounds in the environment (Schramm et al., 2010). Nonetheless, regardless of how the changes occur in the environment, the composition of this mixture still contains a significant level of nicotine. The concentration of nicotine in the homes of smokers ranges from 2 to 10 $\mu\text{g}/\text{m}^3$, and there is no safe level of SHS exposure for adults (Shibuya et al., 2003).

Pregnant women are particularly vulnerable to the effects of SHS because it can have negative effects on their unborn child. Prenatal SHS exposure has been associated with risks of stillbirth, preterm delivery, low birth weight, asthma, and respiratory infections during childhood (Bachok & Salinah, 2014). Recently, increasing evidence has shown negative effects of SHS on mental health. Psychological distress has been suspected of causing reduced foetal growth and birth weight (Mehraban et al., 2013) and asthma (Turcotte-Tremblay et al., 2014) although human studies have not shown consistent results (Lukasse et al., 2014).

Psychological distress is widely used as an indicator of the mental health used in the population-based study in public health, intervention studies and clinical trials. Nonetheless, the concept is still vague for many. In terms of definition, psychological distress may be defined as a condition of emotional instability, comprised of symptoms of depression (sadness, loss of interest and a state of hopelessness) and anxiety (tensed and restlessness) (Mirowsky & Ross, 2002). The two symptoms, in addition, might be associated with somatic symptoms (e.g., insomnia, lack of energy, and headaches) which actually vary across the cultures (Kleinman, 1991; Kirmayer, 1989).

It has been suggested that there is a relationship between second-hand smoke exposures and psychological distress in adults, although further research is required (Ballbe et al., 2015; Pattanayak, Sagar, & Jain, 2012). Amongst adolescents, those with a higher duration of exposure to cigarette smoke in the home have a greater incidence of psychological distress (Padrón, Galán, & Rodríguez-Artalejo, 2012). Recently, it was reported that antenatal SHS exposure may be associated with postpartum depression (Khan et al., 2015). However, no studies have thus far evaluated the duration of SHS exposure during pregnancy and the settings that actually affect psychological distress.

In Malaysia, we have seen many advances to combat SHS since Malaysia became a signatory of the WHO Framework Convention Tobacco Control (FCTC). These advances include various campaigns (Yasin et al., 2012) and the establishment of smoke-free institutions, parks, and indoor public places. Nonetheless, we do not know how much this smoke-free law has affected smoke-free homes locally, although results have been promising in other parts of the world, where a complete smoke-free ban has been implemented (Cheng, Glantz, & Lightwood, 2011; King, Patel, & Babb, 2014). Therefore, we hope that assessing the association between mental health and SHS exposure in places not yet regulated (e.g., homes) may help enhance programmes and form future policies to combat the smoking epidemic. Accordingly, our study aims to examine the association between the duration and location of SHS exposures and its association with psychological distress amongst pregnant women.

METHOD

A cross-sectional study was conducted from January to June 2014. 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 randomly selected clinics were chosen in each state. Data collection was conducted by the researchers and a trained group of research assistants. In each clinic, the participants randomly chosen were selected by their registration number during antenatal visits on two days per week. The participants meeting the inclusion criteria included women with singleton pregnancies, without previous mental illnesses and without congenital defects. The women also needed to be able to understand and read the Malay language. The questionnaires were self-administered, and any misunderstanding in any sections was explained by the research assistants. This study was approved by the Institutional Review Board of the University and the local public health investigation board.

The questionnaire contained sociodemographic characteristics, pregnancy history, pregnancy intention, household smoking status, household smoking rules, and the General Health Questionnaire (GHQ-12). The GHQ used to measure psychological distress is widely used both locally and internationally to detect psychological distress (Afshar et al., 2015; Kutty & Sreeramareddy, 2014). However, it is just a screening tool and not a diagnostic tool. The GHQ used in this research has been validated for use in Malay (Yusoff, Rahim, & Yaacob, 2010). The GHQ comprises 12 questions that measure the general health of the population. Possible psychological distress was defined as a score of ≥ 3 points in the GHQ-12. In regard to SHS exposure, the respondents were asked how long they were in an enclosed area with tobacco smoke (1-4 hours/week, 5-14 hours/week, or >15 hours/week), both inside and outside the home.

Data entry and analyses were conducted using IBM SPSS version 21.0. Descriptive statistics (e.g., number and percentages) were also determined. A comparison of the variables using a logistic regression served as the primary analysis. A bivariate analysis by logistic regression was used to determine the association between sociodemographic characteristics and SHS exposures in and outside the home.

The association between the duration of SHS exposure with psychological distress was done by multiple logistic models for exposure originating from inside and outside the home. Dummy terms were used to model the duration of SHS exposures. Finally, 5 sequential models were to adjust for potential confounders (Models A, B, C and D). The last model was also adjusted for inside the home if the exposure examined was outside the home and vice versa.

RESULTS

A total of 661 pregnant women, majority of women were Malay, aged between 20-40 years old and in the second and third trimesters of pregnancy. Out of the total number, 532 (80.5%) who were exposed and 129 (19.5%) who were not exposed to any SHS were involved in this study. Three hundred and fifty-four (53.6%) women were exposed to SHS in the home, while 438 (66.3%) were exposed outside the home. Compared to the participants with no SHS

exposure, those exposed at home were significantly and more likely to work either part-time or had not worked at all and did not have any smoking rules at home (Table 1). The prevalence of psychological distress amongst the pregnant women was 64.2% (95% CI: 0.60-0.68).

Table 1
Prevalence of exposure to SHS inside the home and outside the home compared to no exposure

Characteristics	SHS exposure at home			SHS exposure outside the home		
	N (%)	OR (95% CI)	P value ^a	N (%)	OR (95% CI)	P value ^a
Ages, years						
<20 years	6 (60.0)	Ref		4 (40.0)	Ref	
20-30 years	197 (40.7)	0.94 (0.28-3.15)	0.98	287 (59.3)	4.87 (1.34-17.68)	0.32
31-40 years	101 (51.3)	0.98 (0.29-3.31)	0.68	96 (48.7)	1.93 (0.53-7.06)	0.52
41 and above	6 (54.5)	1.39 (0.29-6.61)	0.76	5 (45.5)	1.69 (0.35-8.22)	0.53
Ethnicity						
Malay	260 (43.4)	Ref		339 (56.6)	Ref	
Chinese	37 (52.1)	1.63 (0.92-2.89)	0.38	34 (47.9)	0.65 (0.37-1.14)	0.13
Indian	3 (37.5)	0.38 (0.09-1.48)	0.94	5 (62.5)	0.44 (0.12-1.54)	0.20
Other	32 (46.4)	0.94 (0.55-1.59)	1.14	37 (53.6)	0.68 (0.39-1.17)	0.16
Employment						
Working full-time	155 (37.4)	Ref		259 (62.6)	Ref	
Working part-time	38 (50.7)	5.61 (2.64-11.95)	<0.001	37 (49.3)	1.46 (0.69-3.04)	0.32
Not working but worked before pregnant	77 (51.7)	2.38 (1.55-3.65)	<0.001	72 (48.3)	0.63 (0.41-0.98)	0.04
Never worked before	56 (58.3)	3.10 (1.84-5.23)	<0.001	40 (41.7)	0.38 (0.24-0.63)	<0.0
Weeks of pregnancy						
1 st trimester (weeks 1-12)	79 (48.8)	Ref		83 (51.2)	Ref	
2 nd trimester (weeks 13-26)	153 (42.5)	0.70 (0.46-1.07)	0.1	207 (57.5)	1.40 (0.89-2.20)	0.14
3 rd trimester (week 27 onwards)	122 (45.2)	0.67 (0.43-1.03)	0.07	148 (54.8)	0.92 (0.59-1.45)	0.73
Spouse smoking status						
Yes	224 (49.1)	Ref	<0.001	232 (50.9)	Ref	<0.01
No	127 (38.5)	0.18 (0.13 – 0.26)		203 (61.5)	0.37 (0.26-0.53)	
Household smoking laws						
No smoking is allowed	167 (37.8)	Ref		275 (62.2)	Ref	
Only special guests are allowed to smoke	14 (58.3)	2.05 (0.89-4.72)	0.09	10 (46.7)	0.38 (0.17-0.91)	0.03
Smoking permitted in certain areas in the house	107 (53.0)	5.79 (3.63-9.23)	<0.001	95 (47.0)	1.29 (0.84-1.99)	0.24
Smoking allowed everywhere	58 (55.2)	28.25 (8.71-91.66)	<0.001	47 (44.8)	2.16 (1.09-4.29)	0.03
Psychological Distress (GHQ)						
No psychological distress	110 (43.8)	Ref		141 (56.2)	Ref	
Psychological distress	180 (43.5)	0.84 (0.59,1.18)	0.313	234 (56.5)	0.81 (0.56, 1.18)	0.267

^aLogistic regression
Abbreviation: OR = Odds Ratio
Ref = Reference

Table 2
Duration of SHS exposure and the prevalence of psychological distress in pregnant mothers

	N (%)	SHS Exposure (% (95% CI))	N (%)	Prevalence of psychological distress (% (95% CI))	P value
Exposure inside the home					
None	293 (52.1)	45.3 (41.4 to 49.1)	269 (47.9)	22.7 (19.4 to 25.9)	0.008
< 1-4 hours	227 (55.8)	35.1 (31.4 to 38.7)	180 (44.2)	43.13 (39.3 to 46.7)	
5-14 hours	91 (53.5)	14.1 (11.4 to 16.8)	79 (46.5)	20.8 (17.7 to 23.9)	
15 or more hours	36 (53.7)	5.6 (3.8 to 7.3)	31 (46.3)	13.4 (10.8 to 16.1)	
Exposure outside the home					
None	207 (53.0)	32.1 (28.4 to 35.7)	183 (47.0)	66.2 (60.5 to 71.9)	<0.0001
< 1-4 hours	254 (53.2)	39.4 (35.6 to 43.1)	223 (46.8)	60.3 (55.0 to 65.6)	
5-14 hours	135 (55.1)	20.9 (17.8 to 24.1)	110 (44.9)	68.4 (64.1 to 72.7)	
15 or more hours	49 (53.8)	7.6 (5.6 to 9.7)	42 (46.2)	63.8 (59.6 to 67.9)	

Table 2 presents the relationship between the SHS exposure and prevalence of psychological distress. There was a positive relationship between duration of exposure and the prevalence of psychological distress.

Table 3
Multivariate association between psychological distress among pregnant women by duration of exposure inside and outside home

		Duration of Exposure to SHS in the home		Duration of Exposure to SHS outside the home	
		OR (95%CI)	P value	OR (95%CI)	P value
Model A	None		Ref		Ref
	< 1-4 hours	0.90 (0.61-1.34)	0.62	1.12 (0.73-1.69)	0.62
	5-14 hours	0.68 (0.41-1.13)	0.14	0.42 (0.26-0.69)	<0.001
	15 or more hours	0.93 (0.43-2.03)	0.85	0.97 (0.48-1.99)	0.95
Model B	None		Ref		Ref
	< 1-4 hours	0.93 (0.61-1.42)	0.74	1.11 (0.70-1.75)	0.40
	5-14 hours	0.68 (0.39-1.19)	0.17	0.40 (0.24-0.67)	<0.001
	15 or more hours	0.91 (0.41-2.04)	0.82	0.87 (0.42-1.82)	0.72
Model C	None		Ref		Ref
	< 1-4 hours	1.63 (0.97-2.75)	0.06	1.11 (0.69-1.79)	0.66
	5-14 hours	1.48 (0.69-3.18)	0.31	0.42 (0.25-0.70)	0.001
	15 or more hours	1.75 (0.57-5.35)	0.33	0.79 (0.43-1.91)	0.79

Table 3 (continue)

Model D	None		Ref		Ref
	< 1-4 hours	1.39 (0.84-2.30)	0.18	1.04 (0.62-1.76)	0.58
	5-14 hours	1.26 (0.62-2.57)	0.51	0.49 (0.27-0.89)	0.02
	15 or more hours	1.45 (0.56-3.75)	0.45	1.01 (0.43-2.37)	0.98
Model E	None		Ref		Ref
	< 1-4 hours	1.64 (0.97-2.75)	0.06	1.04 (0.61-1.77)	0.88
	5-14 hours	1.48 (0.97-2.75)	0.31	0.44 (0.23-0.81)	0.01
	15 or more hours	1.75 (0.57-5.35)	0.33	0.84 (0.32-2.22)	0.72

Model A: Crude logistic regression

Model B: Adjusted for age, state, ethnicity, education level, race, employment and household income

Model C: Similar to model B with the additional adjustment for weeks of pregnancy, pregnancy planning, and spouse excitement of pregnancy

Model D: Similar to model C with the additional adjustment for spouse smoking status, household smoking laws and confidence in ability to avoid SHS exposure

Model E: Similar to model E with additional adjustment for exposure inside the home

Table 3 presents the various models, after accounting for other variables, of the relationship between psychological distress and hours of SHS exposures inside and outside the home. Exposure to SHS outside the home of between 5-14 hours showed a negative relationship with psychological distress in all adjusted models. The significance was slightly reduced in the more adjusted model. There was no significant association between hours of exposure to SHS inside the home and psychological distress.

DISCUSSION

This study found that in non-smoking pregnant women, the prevalence of global SHS exposure and exposure to SHS at home and outside the home in Malaysia remained high. There was also a positive relationship between the duration of exposure to SHS outside the home and psychological distress.

The SHS exposure is highly prevalent amongst non-smoking pregnant women in Malaysia, and this is worrying for many reasons. First, during pregnancy, passive smokers are exposed to both mainstream and side-stream smokes, which contain the same constituents that are harmful to infant neurodevelopment. Second, toxic substances remain on surfaces and in dust, and although the smokes had disappeared after a few months, and they might react with the air to produce new toxins called the “third-hand smoke”. It is suspected that during pregnancy, foetal development is highly sensitive to this exposure (Kelishadi & Poursafa, 2014).

We found that there was a direct significant association between spouse smoking status and SHS exposure at home. This finding is consistent with other research that has also shown that the most common SHS exposures in pregnant women at home come from their spouses (Eiden et al., 2011). Additionally, our study revealed that pregnant women who were exposed to SHS at home tended not to have any smoking rules at home. We also found that establishing

particular restrictions to areas allowed for smoking at home reduced the odds of SHS exposure compared to no restrictions at all. This finding is also consistent with some previous studies that reported that husbands with higher cigarette consumption and a lack of smoke-free home rules were important factors that were significantly associated with higher levels of SHS exposure both in total and at home (Yang et al., 2010). Other parts of the world have now recommended 100% smoke-free home regulations instead of partial smoke-free rules to ensure maximum protection from SHS (King et al., 2014). Hence, it is timely that Malaysia, which has a high prevalence of adult male smokers (46.4%), evaluates the issue of smoke-free homes as mandatory for all houses.

Although substantial research has been performed on the association between smoking and mental health, only a few studies have evaluated the effects of SHS and mental health (Bandiera, 2011). A recent positive relationship between SHS and psychological distress was found in the adult population in Spain (Ballbe et al., 2015). The researchers found a direct association between home SHS exposure and psychological distress. Hence, this result is in contrast with our finding of no association between the factors. Nonetheless, our results revealed that psychological distress was associated with the duration of exposure. After adjusting for confounders in the sequential multivariate model, SHS exposure between 5-14 hours outside the home appeared to have a temporary calming effect on psychological distress. This is supported by a study among young women which revealed that cigarette smoking, or exposure to nicotine, has temporary effects on reducing stress (File, Fluck, & Leahy, 2011). Nonetheless, it contrasts with that of a relationship that has been identified in SHS exposure amongst adolescents, of no such association (Padrón, Galán, & Rodríguez-Artalejo, 2012). A reason for this relationship could be the difference in the population that was studied. To our knowledge, no studies have assessed this relationship during pregnancy. Furthermore, the difference between our results and others might be related to the differences in physiological and psychological effects that occur during pregnancy. A possible mechanism would be the role of oxytocin. Recently, oxytocin has been shown to reduce the effects of tobacco withdrawal symptoms in rats (Olf et al., 2013). It has also been suggested that oxytocin, which is high during pregnancy, can exert beneficial effects on processes thought to promote social bonding and mask the effects of mental stress (Zanos et al., 2015). This effect may explain why moderate exposure to SHS is protective to some extent compared to no exposure or excessive exposure. The association between oxytocin and mental stress, however, remains vague and requires further research.

The current study is subject to some limitations which must be interpreted with caution. First, because the study design is cross-sectional, no causal relationship can be inferred between psychological distress and SHS exposure. Second, the data were self-reports; nonetheless, self-reported results have been found to be correlated with biomarkers of exposure in many other studies. Third, we did not analyse previous exposures to SHS prior to pregnancy. Smoking at work and home may have changed over time, and previous exposure during childhood and adolescence may influence mental health once the individual reaches adulthood. In addition, it would be wise to obtain the exact hours of exposure to SHS as continuous data in order to obtain the exact relationship with psychological distress in future studies. Lastly, the GHQ

used in this research only measures short-term psychological distress, and is unable to measure mental illnesses. Hence, diagnostic tools should be used to measure mental illnesses.

This study also has some strengths which include a nationally representative sample of pregnant women. To our knowledge, this investigation is the first study to explore this association in the South East Asian region, where smoking prevalence is particularly high. In addition, we had a high participation rate, and various measures that may act as confounders were taken into consideration in the study. Hence, the factor enabled us to assess the independent association between psychological distress and SHS exposure.

CONCLUSION

In non-smoking pregnant women, a 5-14 hour duration of exposure to SHS outside the home might have a negative relationship with the frequency of psychological distress. Hence, SHS exposure to both inside and outside home needs urgent attention.

ACKNOWLEDGEMENTS

This project was funded by the Fundamental Research Grant (FRGS/1/ 2015/ SKK05/UITM/03/ 1). The authors would like to thank the participants and the top health facility administrators for granting permission to conduct this study.

REFERENCES

- Afshar, H., Roohafza, H. R., Keshteli, A. H., Mazaheri, M., Feizi, A., & Adibi, P. (2015). The association of personality traits and coping styles according to stress level. *Journal of Research in Medical Sciences, 20*(4).
- Bachok, N. A., & Salinah, O. (2014). The Effect of Second-Hand Smoke Exposure during Pregnancy on the Newborn Weight in Malaysia. *The Malaysian Journal of Medical Sciences, MJMS, 21*(2), 44.
- Ballbe, M., Martinez-Sanchez, J. M., Gual, A., Martinez, C., Fu, M., Sureda, X., & Fernandez, E. (2015). Association of second-hand smoke exposure at home with psychological distress in the Spanish adult population. [Journal article]. *Addict Behav., 50*, 84-88.
- Bandiera, F. C. (2011). What are candidate biobehavioral mechanisms underlying the association between secondhand smoke exposure and mental health? *Medical Hypotheses, 77*(6), 1009-1010.
- Cheng, K.-W., Glantz, S. A., & Lightwood, J. M. (2011). Association between smokefree laws and voluntary smokefree-home rules. *American Journal of Preventive Medicine, 41*(6), 566-572.
- Eiden, R. D., Molnar, D. S., Leonard, K. E., Colder, C. R., Homish, G. G., Maiorana, N., & Connors, G. J. (2011). Sources and frequency of secondhand smoke exposure during pregnancy. [Research Support, N I H , Extramural]. *Nicotine Tob Res., 13*(8), 653-660.
- File, S. E., Fluck, E., & Leahy, A. (2001). Nicotine has calming effects on stress-induced mood changes in females, but enhances aggressive mood in males. *International Journal of Neuropsychopharmacology, 4*(4), 371-376.

- Kelishadi, R., & Poursafa, P. (2014). A review on the genetic, environmental, and lifestyle aspects of the early-life origins of cardiovascular disease. [Review]. *Curr Probl Pediatr Adolesc Health Care*, 44(3), 54-72.
- Khan, S., Arif, A. A., Laditka, J. N., & Racine, E. F. (2015). Prenatal exposure to secondhand smoke may increase the risk of postpartum depressive symptoms. [Journal article]. *J Public Health*, 14.
- King, B. A., Patel, R., & Babb, S. D. (2014). Prevalence of smokefree home rules—United States, 1992–1993 and 2010–2011. *MMWR Morb Mortal Wkly Rep*, 63(35), 765-769.
- Kirmayer, L. J. (1989). Cultural variations in the response to psychiatric disorders and psychological distress. *Social Science and Medicine*, 29, 327-339.
- Kleinman, A. (1991). *Rethinking Psychiatry. From Cultural Category to Personal Experience*. New York: The Free Press.
- Kutty, N. A., & Sreeramareddy, C. T. (2014). A cross-sectional online survey of compulsive internet use and mental health of young adults in Malaysia. *Journal of Family and Community Medicine*, 21(1), 23.
- Lukasse, M., Helbig, A., Benth, J. Š., & Eberhard-Gran, M. (2014). Antenatal maternal emotional distress and duration of pregnancy. *PloS One*, 9(7), e101682.
- Mehraban, Z., Alizadeh, L., & Narimani, M. (2013). Maternal Prenatal Pregnancy-Related Anxiety and Spontaneous Preterm Birth in Ardebil Health Centers In 2011. *Urmia Medical Journal*, 23(6), 670-675.
- Mirowsky, J., & Ross, C. E. (2002). Selecting outcomes for the sociology of mental health: Issues of measurement and dimensionality. *Journal of Health and Social Behavior*, 43, 152-170.
- Olf, M., Frijling, J. L., Kubzansky, L. D., Bradley, B., Ellenbogen, M. A., Cardoso, C., . . . , & van Zuiden, M. (2013). The role of oxytocin in social bonding, stress regulation and mental health: An update on the moderating effects of context and interindividual differences. *Psychoneuroendocrinology*, 38(9), 1883-1894. doi: <http://dx.doi.org/10.1016/j.psyneuen.2013.06.019>.
- Padrón, A., Galán, I., & Rodríguez-Artalejo, F. (2012). Second-hand smoke exposure and psychological distress in adolescents. A population-based study. *Tobacco Control*, tobaccocontrol-2012-050548.
- Pattanayak, R. D., Sagar, R., & Jain, R. (2012). Perceived health risks, attitude and readiness to quit tobacco among euthymic bipolar disorder patients in regular contact with mental health services: an exploratory study from India. *J. Ment. Health*, 21(1), 83-90.
- Schramm, S. B., Carré, V., Scheffler, J. -L., & Aubriet, F. D. R. (2010). Analysis of mainstream and sidestream cigarette smoke particulate matter by laser desorption mass spectrometry. *Analytical Chemistry*, 83(1), 133-142.
- Shibuya, K., Ciecierski, C., Guindon, E., Bettcher, D. W., Evans, D. B., & Murray, C. J. (2003). WHO Framework Convention on Tobacco Control: development of an evidence based global public health treaty. *BMJ: British Medical Journal*, 327(7407), 154.
- Turcotte-Tremblay, A. M., Lim, R., Laplante, D. P., Kobzik, L., Brunet, A., & King, S. (2014). Prenatal maternal stress predicts childhood asthma in girls: project ice storm. *Biomed Res. Int.*, 201717(10), 8.
- Yang, L., Tong, E. K., Mao, Z., & Hu, T. W. (2010). Exposure to secondhand smoke and associated factors among non-smoking pregnant women with smoking husbands in Sichuan province, China. *Acta Obstet Gynecol Scand*, 89(4), 549-557.

Siti Munira Yasin, Khairul Mizan Taib, Mohd Rodi Isa, Mohd Ariff Fadzil, Mohd Razilan Abdul Kadir and Saiful Farik Mat Yatim

- Yasin, S. M., Moy, F.-M., Retneswari, M., Isahak, M., & Koh, D. (2012). Timing and risk factors associated with relapse among smokers attempting to quit in Malaysia. *The International Journal of Tuberculosis and Lung Disease*, *16*(7), 980-985.
- Yusoff, M. S. B., Rahim, A. F. A., & Yaacob, M. J. (2010). The sensitivity, specificity and reliability of the Malay version 12-items General Health Questionnaire (GHQ-12) in detecting distressed medical students. *ASEAN Journal of Psychiatry*, *11*(1), 36-43.
- Zanos, P., Georgiou, P., Metaxas, A., Kitchen, I., Winsky-Sommerer, R., & Bailey, A. (2015). Region-specific up-regulation of oxytocin receptor binding in the brain of mice following chronic nicotine administration. *Neuroscience Letters*, *600*(0), 33-37. doi: <http://dx.doi.org/10.1016/j.neulet.2015.05.054>.