

3.2.4 Nicotine in the hair

Hair nicotine levels among children were significantly higher than for women ($p=0.038$). By comparison, levels of hair nicotine in children of smoking households were higher than in those living in non-smoking households and also higher than in women residing in smoking households. Hair nicotine levels in

women residing in houses with one smoker were higher than those in women who lived in non-smoking households. Only one woman and three children had levels of hair nicotine below the limit of detection (0.17 ng/mg) (Figure 3). There was no statistically significant difference between rural and urban findings.

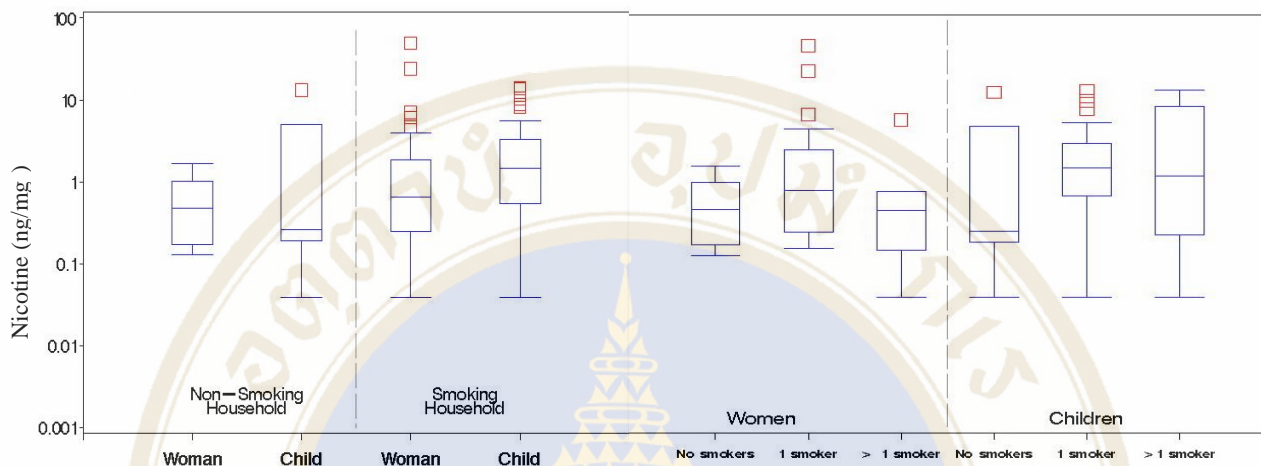


Figure 3. Range of hair nicotine results for women and children, and in smoking versus non-smoking households

Our findings show that the children living with smokers have higher levels of hair nicotine compared to those adults living with non-smokers. The presence of hair nicotine can be explained only by their exposure to SHS. This biomarker has the advantages of detecting prolonged exposure, with each centimeter of hair length representing one month of exposure (Kintz, 1992; Al-Delaimy, 2002). Moreover, these children, who lived with smokers, had greater hair nicotine levels compared to the women who were living with smokers as well. The difference was found to be statistically significant with a p -value of 0.038. This may be attributed to a number of factors including lower Body Mass Index (BMI), nicotine uptake, and metabolic differences between children and women. (Benowitz, 1999; Wipfli et al., 2008). As expected, women living in smoking households had higher levels of hair nicotine than those living in non-smoking households. However, an analysis of the results from the nicotine monitors showed no relation with the number of smokers in the household and the level of nicotine in the air. This may have been due to monitor placement since 13 of the smoking households were below the level of detection. Hence, the difference of air nicotine levels in non-smoking households and households with at least one smoker were not found to be statistically significant ($p=0.31$).

The variation in the results could be due to a number of confounders. The results show that both women and children living in houses where smoking was permitted had substantial levels of hair nicotine. However, the air nicotine monitors did not record a high enough level to reach the level of detection, in either urban or rural environments. The level of nicotine in the air varies with the number of smokers, intensity of

smoking, rate of exchange between the indoor and outdoor air, and the use of air-cleaning devices (Repace, 1985; Lee, 2012). However, no data was collected on the use of air-cleaning devices which are not common in Thai households. The type of housing and the construction material of the houses could have played a role in the exchange of indoor and outdoor air. About 55% of the houses were made of wood, 40% in rural and 15% in urban settings, which may have allowed for better ventilation than brick or stone houses (Seong et al., 2010). Many households kept windows and doors open so smoke could rapidly disperse by natural ventilation. Furthermore, the women and children might have been exposed to SHS outside their homes. Only 22.7% of the workplaces of women had no smoking policy. This might have led to the hair nicotine findings for women. Children could have also been exposed to SHS outside their homes. A father who carries a child while smoking outside the house can expose him or her to SHS (IARC, 2004; Charoenca et al., 2013).

The major limitation of this study was that it was designed to collect limited situational and SHS data with a small sample of Thai households. Thus, results presented are based on descriptive results from a questionnaire and the analysis from two SHS measures that are related to long-term SHS exposures as in households. Variables considered for association come from smoking households and the environmental and metabolic measures of SHS over long periods, as in households (not real time exposure measures which are monitored over minutes and hours). Although more complex analysis needs to be done, we present these important initial results to show the way for further investigation.

A recent qualitative systematic review of barriers to smoke-free housing notes the complexity of household smoking behavior and that many “practical, social, cultural and personal issues” of households must be considered. (Passey et al., 2016). Our findings provide initial information of variables and methods that could be important in future investigations leading to interventions for smoke-free homes. For example, investigating which smokers in a household are most important to high exposure levels in the home, and how hair nicotine might be used in future studies given the problems with undetectable levels from passive samplers in Thai households are considerations that arise from our results.

4. CONCLUSIONS

This study shows exposure to SHS is very high in smoking households in Thailand (81% of adults smoke indoors) resulting in high levels of hair nicotine in women and children. Although outside air quality is often better in rural settings, there was no statistically significant difference in indoor SHS exposure between urban and rural settings. The route of exposure, whether indoors or outdoors, needs to be monitored closely in order to make the right regulatory and economic policies to minimize exposure to SHS, especially for women and children. These exposures are known to contribute to immediate, short-term effects and cancer and other diseases later in life. Further, biomarker studies should be undertaken to investigate these relationships. Because childhood SHS exposures leading to disease have not received sufficient attention, studies highlighting the economic burden of childhood SHS as completed in other countries are needed to bring greater attention to action for smoke-free homes in Thailand (Wendy, 2014).

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