

論文の内容の要旨

論文題目 An association and mechanisms between parental socioeconomic status and second hand smoke exposure among young children
-the mediating effect of parental socio-psychological factors-
(親の社会経済的要因と乳幼児の受動喫煙との関連とそのメカニズム
—親の心理社会的要因の媒介効果の検討—)

氏名 齋藤 順子

Introduction: Exposure to secondhand smoke (SHS) is one of the major causes of premature death and disease among children. Globally, 40% of children are regularly exposed to SHS, and they are more heavily exposed than any other age-group. Along with increasing tobacco control policies, SHS exposure among children has been significantly reduced in developed countries including Japan. However, the level of SHS exposure in children differs by parental socioeconomic status (SES). Children in lower SES group are more likely to have smoking parents, and less likely to have complete home smoking bans compared to those in higher SES groups. Moreover, the magnitude of absolute inequalities might differ by parental indoor smoking behaviors (only father, only mother, or both parents smoke indoors). Furthermore, few studies examined changes of socioeconomic inequalities in SHS exposure among young children over time. SHS inequalities among children are inferred in Japan as well, but no evidence exists regarding temporal changes of inequalities.

Evidence is also lacking on the mechanisms between parental SES and SHS exposure among children. While several barriers and motivators have been revealed among low-SES parents to protect children from SHS exposure in the literatures, no study tested the hypothesized model about the mechanisms linking SES and indoor smoking behaviors among smoking parents. I developed my hypothesized model based on the previously developed framework and empirical research findings regarding SES and smoking behavior. I hypothesized that social norms of smoking and knowledge about children's SHS exposure mediate the association between SES and indoor smoking behavior among smoking parents. Understanding these mechanisms will strongly contribute to developing effective policies and interventions for children who are most likely to be exposed to SHS, that is, children with low-SES smoking parents.

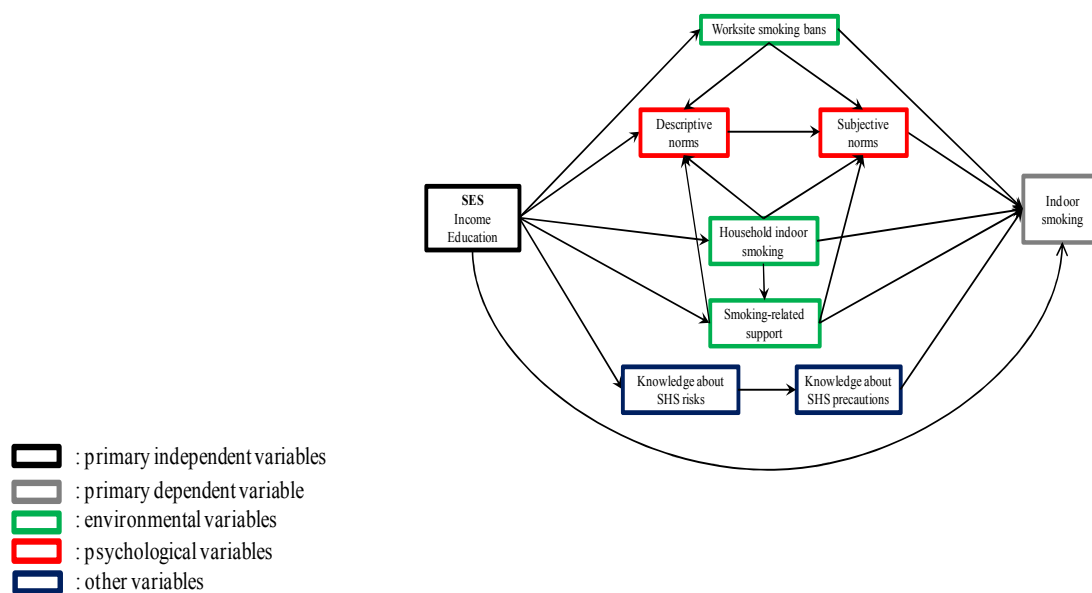
Objectives: This doctoral thesis is composed of two studies to address the three objectives as follows:

1. To examine the magnitude of socioeconomic inequalities in SHS exposure among infants in Japan. (Study 1)
2. To examine changes in the magnitude of socioeconomic inequalities in SHS exposure among infants from 2001 to 2010 in Japan. (Study 1)
3. To test the hypothetical model of the pathways between SES and indoor smoking behaviors among parents living with young children in Japan. (Study 2)

Methods: Study 1 applied a repeated cross-sectional design using national survey data from the Longitudinal Survey of Newborns in the 21st Century. This large panel study has two cohorts (infants born in 2001 or 2010), and I used baseline data of both cohorts. I restricted study participants to infants whose parents lived together at baseline, and included 41,833 (78.1% of the initial cohort) and 32,120 (73.4% of the initial cohort) participants for the first and second cohorts, respectively. For measures, I used parental indoor smoking behavior as a measurement of SHS exposure in infants, and used income (four categories of equivalent household income per capita) and education (four categories based on combined parental education level) as SES indicators. In statistical analyses, I calculated the prevalence of SHS exposure in infants based on SES, and the inequality indices using both absolute (the rate difference and slope index of inequality [SII]) and relative indices (odds ratio [OR] and relative index of inequality [RII]). I also calculated the prevalence and the magnitude of inequalities (SII and RII) based on income level by parental indoor smoking behavior (only father, only mother, or both parents smoke indoors).

Study 2 applied a cross-sectional design using self-administered online questionnaire. The study participants were smokers who are living with at least one own child under 6 years old in the same house. Among the approximately 2,000,000 members of the online survey company, I recruited individuals who fulfilled the following inclusion criteria: (1) aged 20 to 59 for fathers and 20 to 49 for mothers, (2) current smokers, and (3) living together with his or her own children under 6 years old. I measured SES indicators (education and income) as a primary independent variable and parental indoor smoking behavior as an outcome variable. I applied structural equation modeling approach to test the hypothesized model (Figure 1). Both two studies were approved by the Research Ethics Committee of the Graduate School of Medicine at The University of Tokyo, Japan.

Figure 1. Hypothesized model of the pathways between SES and indoor smoking behavior



Results: In Study 1, the overall prevalence of infants exposed to SHS decreased from 36.8% in 2001 to 14.4% in 2010. Income and educational inequalities in SHS exposure in infants existed in both years. For instance, The SII based on income was 31.75 (95% confidence interval [CI], 30.09 to 33.41) in 2001 and 20.04 (95%CI, 18.67 to 21.41) in 2010. The RII increased from 0.87 (95% CI, 0.82 to 0.91) to 1.47 (95% CI, 1.37 to 1.56) based on income and from 1.22 (95% CI, 1.17 to 1.26) to 2.09 (95% CI, 2.00 to 2.17) based on education. Having only a father who smoked indoors was a major contributor to absolute income inequality in infants' SHS exposure in 2010.

In Study 2, the prevalence of smoking mothers who smoke indoors (63.7%) was much higher than fathers (35.8%). Both education year and household equivalent income were significantly lower among mothers who smoke compared to fathers who smoke. All the four proposed final models (education and income model by gender) showed acceptable model fit. The models indicated that social norms of smoking mediated the pathways between SES and indoor smoking behavior among fathers who smoke, and knowledge about children's SHS exposure mediated the pathways among parents who smoke. In the same pathway models, social norms of smoking were positively associated with household indoor smoking and negatively associated with worksite smoking bans.

Discussion and Conclusions: The Study1 (Chapter 2) provided new evidence about the remaining inequalities in infants' SHS exposure from 2001 to 2010 in Japan, with increased relative magnitude. Furthermore, only father smoking indoors was a major source of SHS exposure in infants and a major contributor to absolute income inequality in SHS exposure in infants in 2010. Study2 (Chapter 3) showed that low-SES smoking fathers had higher descriptive and subjective norms of smoking and low-SES smoking parents had less knowledge about the risks of and precautions to avoid children's SHS exposure, and these variables were significantly associated with their indoor smoking behaviors. Furthermore, social norms of smoking were positively associated with household indoor smoking and negatively associated with worksite smoking bans.

The changes in inequalities in infants' SHS exposure over time in this study are consistent with reports from the USA and England. The increase in relative inequalities could result from more barriers to stopping (indoor) smoking in low-SES parents than in high-SES parents. Those barriers would include a greater tendency for nicotine dependence, which is a strong predictor for failure to quit smoking, conflict between coping and caring, and influence of relationships with families and friends. The findings of Study 1 highlighted potential role of non-smoking mothers with smoking partner in low-SES groups. Mothers tend to be more motivated to protect children from SHS exposure and have many contacts with health professionals than fathers. Most of smoking fathers live with non-smoking partner in Japan. However, interventions for parental smoking cessation mainly focus on smoking parents, non-smoking mothers might receive less knowledge and support for protecting children from SHS exposure compared to smoking mothers, even if their partners smoke. Thus, encouraging non-smoking mothers in low-SES groups to support their partners to change their smoking behaviors could narrow the inequalities in parental indoor smoking behaviors.

The findings of Study 2 showed that descriptive and subjective norms of smoking mediated the pathways between SES and indoor smoking behavior among fathers. Previous studies also support this finding, but this study extended the evidence for social norms as a mediator between SES and indoor smoking behavior among smoking parents. For smoking fathers, the desire to be seen by family and friends to act in acceptable way in their social context would promote or inhibit to smoke inside the house. Contrary to my hypothesis, social norms of smoking did not mediate the pathways among mothers who smoke. One possible explanation for this finding is that participants in this study (current smoking mothers) might already be resistant to social pressure to quit smoking because they are a minority group in Japan. Thus, they might not care whether or not their family or friends accept their smoking behavior when they smoke indoors. Rather, low-SES mothers might perceive that smoking at home is a necessary daily habit that brings them emotional relief.

Knowledge about SHS exposure among children also mediated the relationship between SES and indoor smoking behavior. The knowledge does not necessarily predict behavior change for their own health, but it might do so in the case of their children's health. In Japan, the concept of smoke-free homes has not been disseminated well, and smoking under the kitchen extractor fan is common in households with children. Thus, many low-SES parents might mistakenly believe that such a partial smoking ban is effective. While most parents implement their own way to protect their children from health risks, different levels of accurate knowledge across social classes may generate an unequal distribution in indoor smoking behavior. Thus, to narrow the inequalities in parental indoor smoking behavior, it would be effective to improve knowledge about effective precautions as well as the risks of SHS exposure among low-SES parents who smoke.

Both two studies have strengths and limitations. The strengths are applying the regression based indices of inequalities (SII and RII) in Study 1, which are advantageous when comparing groups with different population sizes; and applying the SEM approach to test the hypothesized models in Study 2, which allows to simultaneously test two or more relationships among variables in the same model. The limitations include a proxy measurement of SHS exposure in infants, a lack of intensity of smoking in the household, and self-report measurement of infants' SHS exposure in Study 1; and limited generalizability due to convenience sampling, and exclusion of single parent and teenage parents, a lack of causality due to cross-sectional design, and possibility of omitted mediating variables in the final models in Study 2.

In conclusion, the inequalities in infants' SHS exposure existed and increased in relative terms from 2001 to 2010 in Japan. Furthermore, the pathway between SES and indoor smoking behavior was mediated by social norms of smoking among fathers who smoke, and knowledge about children's SHS exposure among parents who smoke. In the same pathway models, social norms of smoking were positively associated with household indoor smoking and negatively associated with worksite smoking bans. Discouraging pro-smoking norms and improving knowledge about children's SHS exposure would provide clear opportunities for low-SES smoking parents to reduce their indoor smoking behaviors, and would, thus, lead to reducing inequalities in children's SHS exposure.