Early Childhood Health-Protective Behavior Against Environmental Tobacco Smoke Exposure in Households

Bertakalswa Hermawati1,2, Sofwan Indarjo3, Farah Azizah Mukti3, Hauna Anja Ramadhanty4, Fitriana Dwi Rahayu5

1,2,3,4,5Public Health Department, Universitas Negeri Semarang, Indonesia

Abstract

Children who live in agricultural, coastal, and industrial areas are at risk of experiencing diseases due to their exposure to environmental tobacco smoke because a lot of smokers live in these areas. The objective of this study is to determine the differences in health-protective behavior of parents who have children in the geographical residence. The study used a quantitative approach, cross-sectional design, and purposive sampling. There are 175 parents with children under five years who live in coastal, agricultural, and industrial areas in Semarang, Central Java, Indonesia. Data collection was performed using a questionnaire. The dependent variable was the health-protective behavior of parents with children against exposure to cigarette smoke, while the independent variable was the geographical residence. The one-way ANOVA test was used to measure differences in the health-protective behavior of parents living in these areas. The results showed that there was no difference in the parental health-protective behavior in an agricultural, coastal, and industrial region (p=0.091, p>0.05). In conclusion, the respondents exhibit health-protective behavior that does not fully control exposure to environmental tobacco smoke.

INTRODUCTION

Environmental tobacco smoke is when family members or visitors at home expose children to smoke. Findings have shown that it varies, from 27.6% in Africa, 34.3% in South East Asia, 50.6% in the West Pacific, and above 77.8% in Europe (Faber et al., 2019, Hwang et al., 2012). Several studies reported that parents who smoke at home correlate significantly with nicotine levels in urine, hair, blood, and saliva on their children (Wilson et al., 2016; Desouky et al., 2016, Christie et al., 2012, Moon et al., 2018). The Behavioral Risk Factor Surveillance System 2000 collects data from 20 countries and showed that 20–40% of homes in the United States contribute to tobacco exposure for nonsmokers (Kuhn et al., 2019).

In Indonesia, children living in agricultural, coastal, and industrial areas are easily exposed to environmental tobacco smoke, because it is the largest smoker in the region. The 2013 findings by the Ministry of Research and Development Agency stated that the highest number of smokers in the employment status were fishermen, farmers, and laborers. They live in the coastal, agricultural, and industrial areas. The results of the Basic Health Research showed that the prevalence of smokers in the home when with house members in the province of Central Java increased to 85%. It can be estimated that eight smokers died because of active smokers and one passive smoker. From the calculation of this ra-
tio, at least 25,000 deaths in Indonesia occurred due to tobacco smoke from other people (Indonesian Health Ministry, 2013).

There are several diseases caused by tobacco smoke that can be experienced by children. Studies revealed that children as passive smokers can experience acute respiratory diseases such as asthma, pneumonia, bronchitis, middle ear problems, coughing, and shortness of breath (Gupta et al., 2002, Faber et al., 2019, Comhair et al., 2011) and damage child brain function (Yolton et al., 2005). This is because the ability of children to breathe faster and deeper than adults, the immune system has not well developed and immature metabolism so that it is sensitive to such exposure (Hwang et al., 2012).

Thus, the role of parents is obliged to develop protective behavior on children's health at the households. This is because households are the basis for the formation of healthy behavior. Healthy behavior is an activity that is directed to protect and improve health (He et al., 2016). Health research results show that 40% of diseases are a result of human behavior (Yin et al., 2013). Health protective behavior towards environmental tobacco smoke includes directly or indirectly. Direct exposure to second-hand smoke is tobacco smoke that is directly inhaled by people around smokers. Besides, exposure to indirect tobacco smoke (Third Hand Smoke) is tobacco smoke that remains on the surface and in the dust for a long time after smoking activity, reacts with oxidants and other compounds to form secondary pollutants, and is re-emitted as a gas and/or resuspension. These particles are dangerous and return to the air so they can be inhaled (Isniyati & Affandi, 2018). This contamination is absorbed deeper into materials such as hair, clothing, carpets, furniture, and walls (Drehmer et al., 2017).

There are many factors of health-protective behavior namely risk perceptions, knowledge, and passive smoking (Rosen & Kostjukovsky, 2015) safety, social security, education, food security, income, ecological environment, sustainable resources, social justice (Ping et al., 2018) and personality (Kern & Friedman, 2011). Income level differences have an association with health and mortality. The tendency of low-income level groups to adopt unhealthy behaviors than high-income level groups. Income level disparities in health behavior involve more than freely chosen lifestyles (Pampel et al., 2010). Most observational studies find that education is positively associated with health. Education is a larger predictor of mortality today than in the past. However, education has been hypothesized to increase one's ability to cope with negative shocks and uncertainty. Education is associated with better mental health and higher rates of health-protective behaviors. The study found that people with low education with low or no income tend to have lower life satisfaction and higher potential for smoking and drinking daily. However, this negative effect was essentially smaller in those with higher education (Cutler et al., 2015).

Based on the description above, this study's objective is to determine the level of health-protective behavior in parents of young children and whether there are differences in health-protective behaviors of parents with children under five years in coastal, industrial and agricultural areas and whether education levels and income levels influence the health-protective behavior of the parents with children under five years.

METHODS

The variables in this study are health-protective behavior, geographical residence, education level, and income level. This study used a quantitative approach. The population in this study was 271 parents of young children attending school in several kindergartens in coastal, agricultural and industrial areas in Semarang, Central Java Indonesia. The coastal areas in this study are the Tambak Lorok district, the agricultural area is the Gunung Pati district, the industrial area is the Mijen district. The sampling method used was the purposive sampling technique. The inclusion criteria in this study were parents with children under five years old. The exclusion criteria in this study were parents with children under five years old who did not live in coastal areas, agriculture, and industrial area. In this study, 175 respondents obtained 62% of fathers and 38% mothers. There were 62 respondents in industrial areas, 62 in agricultural areas, and 62 in coastal areas.

The instrument in this study was a self-administered questionnaire consisting of 28 question items that had been tested for validity and reliability, covering three aspects related to health-protective behavior by parents to children: health care, avoidance behavior at risk, avoidance of harmful substances. Empiric validity and internal reliability were the types in this study. A self-administered questionnaire was designed on a 5-point Likert scale to collect the data that is never, rarely, sometimes, often, and always. Data were analyzed using the median statistical test to measure the level of health-protective behavior of parents with children under five years, the one
RESULTS AND DISCUSSIONS

The highest education level of respondents is middle to high as many as 129 (74%). Besides, the highest income level of respondents, namely middle and high as many as 95 (54%) (see on Table 1).

Based on the median value, the health-protective behavior of early childhood parents, a median score was obtained, with the result that 90 (51%) respondents behaved good, 85 (49%) respondents still behave poorly.

The results of the analysis test with the Independent Sample Test shows that the level of education does not significantly affect health-protective behavior with a p-value of 0.132 (p> 0.05) and the level of income did not significantly affect the health-protective behavior with a p-value of 0.632 (p> 0.05) (see on Table 2).

The house is the main source of exposure to tobacco smoke in children. Early childhood who live with smokers spends the most time at home. Therefore it tends to be more vulnerable than older age to these environmental health threats (Dai & Chan, 2020). Health risks in children are associated with exposure to tobacco smoke (Kairouz et al., 2015). Several studies showed that there is a correlation between smoking exposure in children with adult smokers, both parents, other family members, and visitors who smoke at home (Dai & Chan, 2020, Wilson et al., 2016, Matt, 2018).

Therefore, it is recognized that parents are responsible for implementing health-protective behaviors in children. Health protective behavior against the dangers of exposure to secondhand smoke is control over the risk of secondhand smoke exposure. Unfortunately, not all behaviors of parents have led to health-protective. The findings in this study indicate that the behaviors of parental health-protective for early childhood are less than 50% therefore it can be interpreted that parental behavior has not fully protected early childhood health in terms of children's health, risk avoidance behavior, and substance avoidance behavior that is dangerous. Health protective behavior that is mainly not fully implemented is the behavior of protecting children's personal health such as the behavior of parents who do not change children's clothes or bathe children after being exposed to tobacco smoke, and parents also do not change clothes or clean themselves after being exposed to tobacco smoke before interacting with the child. This inadequate behavior can be caused by a low understanding of how to pro-

Table 1. Respondents characteristics

| Characteristics          | n  | Percentage |
|-------------------------|----|------------|
| Education Level         |    |            |
| Low                     | 46 | 26%        |
| Middle to High          | 129| 74%        |
| Income Level            |    |            |
| Middle Low              | 80 | 46%        |
| Middle High             | 95 | 54%        |
| Geographical Residence  |    |            |
| Coastal                 | 51 | 30%        |
| Agriculture             | 62 | 35%        |
| Industrial              | 62 | 35%        |

Note: Low education: Junior High School and below. Middle to High: Senior High School and above. Income level based on Regional Minimum Wages at Semarang. Middle Low: Less than IDR 2,500.000. Middle High: More than IDR 2,500.000.

Table 2. Health Protective Behavior Level Status among parents with children under five years

| Characteristics            | n  | Percentage |
|----------------------------|----|------------|
| Health protective behavior |    |            |
| - Good                     | 90 | 51%        |
| - Poor                     | 85 | 49%        |
tect health against the dangers of exposure to tobacco smoke which results in low behavior control and inadequate attitudes in the protection of children's health (Waterworth et al., 2015). This can be caused by a lack of knowledge, incomplete and confusing information received by individuals. If individuals are less exposed to information stating that there are negative consequences of tobacco smoke exposure to early childhood, individuals become less aware and encourage their motivation to change behavior by expectations (Kelly & Barker, 2016). Besides, resistance to health messages due to long-held beliefs that exposure to tobacco smoke is not harmful, perceptions that exposure to tobacco smoke is a low risk on children, and limited opportunities to obtain information contribute to the formation of health-protective behaviors (Kairouz et al., 2015, Abdel-Ghany, 2014).

Thus it can be underlined that health literacy that forms parents' health-protective behavior for children's health. Health literacy is a person's ability to obtain, process, and understands the information needed to make the right decision about his health. Health literacy is a relatively new concept that has gained significant interest during the current period. Knowledge and behavior related to health literacy become an important and significant element in the behavior of everyday health protective in the elderly (He et al., 2016).

In addition to health literacy, socio-cultural adaptation factors that cause parents to tend to be permissive to the behavior of family members or visitors who smoke at home. Socio-cultural adaptation to health is a behavior shared by family members to overcome health problems based on information learned from others or personal experiences in dealing with physical and social situations. Several studies suggest that the role of interpersonal support in adapting to new behavior also plays a role in the formation of behavior (Ping et al., 2018) and social pressure from the family also contributes to weak support in protecting tobacco smoke exposure at home (Hwang et al., 2012). Negative reactions from other people such as being seen as hypocrites and the inconvenience to reprimand and negotiate which can have an impact on relationships with family members and friends, complaints of family members against restrictions on rules, lack of support from partners, dilemmas between parenting and the comfort to smoke inside a home are several factors related to the weakness of support in health-protective behavior (Shaw et al., 2012). This characteristic is common in suburban areas in Indonesia and is in line with the results of this study found that parents of young children in coastal, agricultural, and industrial areas have similarities in health-protective behavior. There are behavioral similarities in protecting early childhood health against direct (Second Hand Smoke) and indirect (Third Hand Smoke) exposure to smoke that is influenced by social support and pressure. Health protective behavior is effective if social support is high and social pressure is low. Conversely, health-protective behaviors become less effective because of low support and high social pressure. Meanwhile, controlling the spread of the dangers of exposure to tobacco smoke at home is a strategic step to avoid direct exposure (Second Hand Smoke) and indirect exposure (Third Hand Smoke) because both of these are risk factors for diseases caused by smoking in early childhood (Kuehni & Barben, 2015).

The study also found that education level

Table 3. The relation between variables and health-protective behavior

| Variables       | Health Protective Behavior | n  | Percentage | p     |
|-----------------|----------------------------|----|------------|-------|
| Education Level | Low                        | 46 | 26%        | 0.132 |
|                 | Middle                     | 129| 74%        |       |
|                 | High                       |    |            |       |
| Income level    | Low                        | 80 | 46%        | 0.632 |
|                 | High                       | 95 | 54%        |       |

Table 4. The relation between region variable and health-protective behavior

| Treatment      | Sum of Squares | df  | Mean Square | F     | Sig  |
|----------------|----------------|-----|-------------|-------|------|
| Intergroup     | 1255.226       | 2   | 627.613     | 2.425 | 0.091|
| Within-group   | 44512.202      | 172 | 258.792     |       |      |
| Total          | 4576.429       | 174 |             |       |      |

Note The data analyzed by the One Way Anova test. Statistically significant p≤0.05
and current income level do not affect health-protective behavior among parents of early childhood. It means differences in education level and income level have a similarity of health-protective behavior, both in positive and negative health-protective behavior. It can be possible that the other factors affect health behavior such as risk perceptions, knowledge, safety, social security (Rosen & Kostjukovsky, 2015), social justice, ecological environment (socio-cultural) (Ping et al., 2018), and personality (Kern & Friedman, 2011).

CONCLUSION
Based on the findings, it can be concluded that respondents exhibit health-protective behavior that has not fully controlled environmental tobacco smoke. There is no difference in health-protective behavior towards environmental tobacco smoke in agricultural, industrial, and coastal areas in parents with young children. The level of education does not significantly affect health-protective behavior and the level of income does not significantly affect health-protective behavior. Furthermore, efforts to form a positive attitude towards the establishment of a smoke free home is by promoting health promotion of the dangers of exposure to tobacco smoke in the household management.

ACKNOWLEDGMENTS
This work was supported by Budget Implementation List (Daftar Isian Pelaksanaan Anggaran/ DIPA), Sports Science Faculty, Universitas Negeri Semarang [grant number 13.13.5/UN37/PPK.4.6/2019].

REFERENCES
Abdel-Ghany, M. M. M. 2014. Readiness for Change, Change Beliefs and Resistance to Change of Extension Personnel in the New Valley Governorate about Mobile Extension. Annals of Agricultural Sciences Journal, 59: 297–303. Faculty of Agriculture, Ain Shams University. https://doi.org/10.1016/j.aos.2014.11.019

Christie, L. M. et al. 2012. Factors Influencing Exposure to Secondhand Smoke in Preschool Children Living with Smoking Mothers. Nicotine and Tobacco Research Journal, 14: 1435–1444. https://doi.org/10.1093/ntr/nts074

Comhair, S. A. A. et al. 2011. Detrimental Effects of Environmental Tobacco Smoke in Relation to Asthma Severity. Plos One Journal, 6: 1–8. https://doi.org/10.1371/journal.pone.0018574

Cutler, D., Huang, W. & Lieras-Muney, A. 2015. When Does Education Matter? The Protective Effect of Education for Cohorts Graduating in Bad Times. Social Science and Medicine Journal, 127: 63–73. https://doi/10.1016/j.physbeh.2017.03.040

Dai, S. & Chan, K. C. 2020. Associations of Household Environmental Tobacco Smoke Exposure with Respiratory Symptoms and Utilisation of Medical Services in Healthy Young Children in Hong Kong. Tobacco Induced Diseases, 18: 1–13. https://doi/10.18332/tid/114461

Dreher, J. E., Walters, B.H., Nabi-Burza, E., & Winickoff, J.P. 2017. Guidance for the Clinical Management of Thirdhand Smoke Exposure in the Child Health Care Setting. Journal of Clinical Outcomes Management, 4: 551–559. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5716630/

Desouky, D.E.S., Elnemr, G., Alnawy, A., & Taha, A.A. 2016. The Relation between Exposure to Environmental Tobacco Smoke and the Quantity of Cotinine in the Urine of School Children in Taif City, Saudi Arabia. Asian Pacific Journal of Cancer Prevention, 17: 139–145. https://doi.org/10.7314/APJCP.2016.17.1.139

Faber, T., Mizani, M.A., Syeikh, A., Mackenbach, J.P., Reiss, I.K., Been, J.V. 2019. Investigating the Effect of England’s Smoke-free Private Vehicle Regulation on Changes in Tobacco Smoke Exposure and Respiratory Disease in Children: a Quasi-experimental Study. The Lancet Public Health, 4 (12): 607-617. https://doi.org/10.1016/S2468-2667(19)30175-6

Gupta, D., Aggarwal, A.N., & Jindal, S.K. 2002. Pulmonary Effects of Passive Smoking: the Indian Experience. Tobacco Induced Diseases, 1 (2): 129–136. https://doi.org/10.1186/1617-9625-1-2-129

He, Z. et al. 2016. Factors Influencing Health Knowledge and Behaviors among the Elderly in Rural China. International Journal of Environmental Research and Public Health Article, 13: 1–16. https://doi.org/10.3390/ijerph13100975

Hwang, S-H., Hwang, J.H., Moon, J.S., & Lee, D-H. 2012. Environmental Tobacco Smoke and Children’s Health. Korean Journal of Pediatrics, 55 (2): 35–41. https://doi.org/10.3345/kjp.2012.55.2.35

Indonesian Health Ministry. 2013. Perilaku Merokok Masyarakat Indonesia, Pasut Data dan Informasi Kesehatan Republik Indonesia. Available at: https://www.kemkes.go.id/download.php?file=download/pusdatin/infodatin/infodatin-hari-tanpa-tembakau-sedunia.pdf

Isniyati, H. & Affandi, M. D. 2018. Air Stripping as an Effective Carbon Monoxide (CO) Adsorption Model on Cigarette Smoke. Unnes Journal of Public Health, 7 (2): 78–83. https://doi.org/10.15294/unjes.v7i2.17856

Kairouz, S., Lasnier, B., Mihaylova, T., Montreuil, A., & Cohen, J.E. 2015. Smoking Restrictions in Homes After Implementation of a Smoking Ban in Public Places. Nicotine and Tobacco Research Journal, 17 (1): 41–47. https://doi.org/10.1093/ntu/ntu125
Kelly, M. P. & Barker, M. 2016. Europe PMC Funders Group Why is Changing Health-Related Behaviour so Difficult?. Public Health Journal, 136: 109–116. https://doi.org/10.1016/j.puhe.2016.03.030

Kern, M. L. & Friedman, H. S. 2011. Personality and Pathways of Influence on Physical Health. Social and Personality Psychology Compass, 5 (1): 76–87. https://doi.org/10.1111/j.1751-9904.2010.00331.x

Kuehni, C. E. & Barben, J. 2015. Protecting Children from Second-hand Smoke. European Respiratory Journal, 46: 601–603. https://doi.org/10.1183/13993003.00883-2015

Kuhn, E.J., Walker, G.S., Whiley, H., Wright, J., & Ross, K.E. 2019. Household Contamination with Methamphetamine: Knowledge and Uncertainties. International Journal of Environmental Research and Public Health, 16 (23): 1–15. https://doi.org/10.3390/ijerph16234676

Matt, G.E., et al. 2018. A Casino goes Smoke Free: a Longitudinal Study of Secondhand and Thirdhand Smoke Pollution and Exposure. Tobacco Control: 27 (6): 643-649. http://dx.doi.org/10.1136/tobaccocontrol-2017-054052

Moon, J. H., Kong, M. H. & Kim, H. J. 2018. Effect of Secondhand Smoking, Determined by Urinary Cotinine Level on Bone Health. International Journal of Preventive Medicine, 8 (14): 1–5. https://doi.org/10.4103/ijpvm.IJPVM

Pampel, F. C., Krueger, P. M. & Denney, J. T. 2010. Socioeconomic Disparities in Health Behaviors Fred. Annual Review of Sociology, 36: 349–370. https://doi.org/10.1146/annurev.soc.012809.102529

Ping, W., Cao, W., Tan, H., Guo, C., Dou, Z., & Yang, J. 2018. Health Protective Behavior Scale : Development and Psychometric Evaluation. Plos One Journal, 13: 1–12. https://doi.org/10.1371/journal.pone.0190390

Rosen, L. & Kostjukovsky, I. 2015. Parental Risk Perceptions of Child Exposure to Tobacco Smoke. BMC Public Health, 15 (1): 1–11. https://doi.org/10.1186/s12889-015-1434-x

Shaw, A., et al. 2012. Reducing Children's Exposure to Second Hand Smoke in the Home. Scotland: ASH Scotland. https://www.ashscotland.org.uk/media/197686/lit%20review%20final%20update%2081112.pdf

Waterworth, P., Pescud, M., Braham, R., Dimmock, J., & Rosenberg, M. 2015. Factors Influencing the Health Behaviour of Indigenous Australians : Perspectives from Support People. Plos One Journal, 10: 1–17. https://doi.org/10.1371/journal.pone.0142323

Wilson, I. et al. 2016. REFRESH-Reducing Families’ Exposure to Secondhand Smoke in the Home: a Feasibility Study. Tobacco Control, 22: 1–10. https://doi.org/10.1136/tobaccocontrol-2011-050212

Yin, Z., et al. 2013. Status and Determinants of Health Behavior Knowledge among the Elderly in China : a Community-based Cross-sectional Study. BMC Public Health Journal, 13: 1–10. https://doi.org/10.1186/1471-2458-13-710

Yolton, K., Dietrich, P., Auinger, D., Lanphear, B.P., & Hornung, R. 2005. Exposure to Environmental Tobacco Smoke and Cognitive Abilities among U.S. Children and Adolescents. Environmental Health Perspective, 113: 98–103. https://doi.org/10.1289/ehp.7210