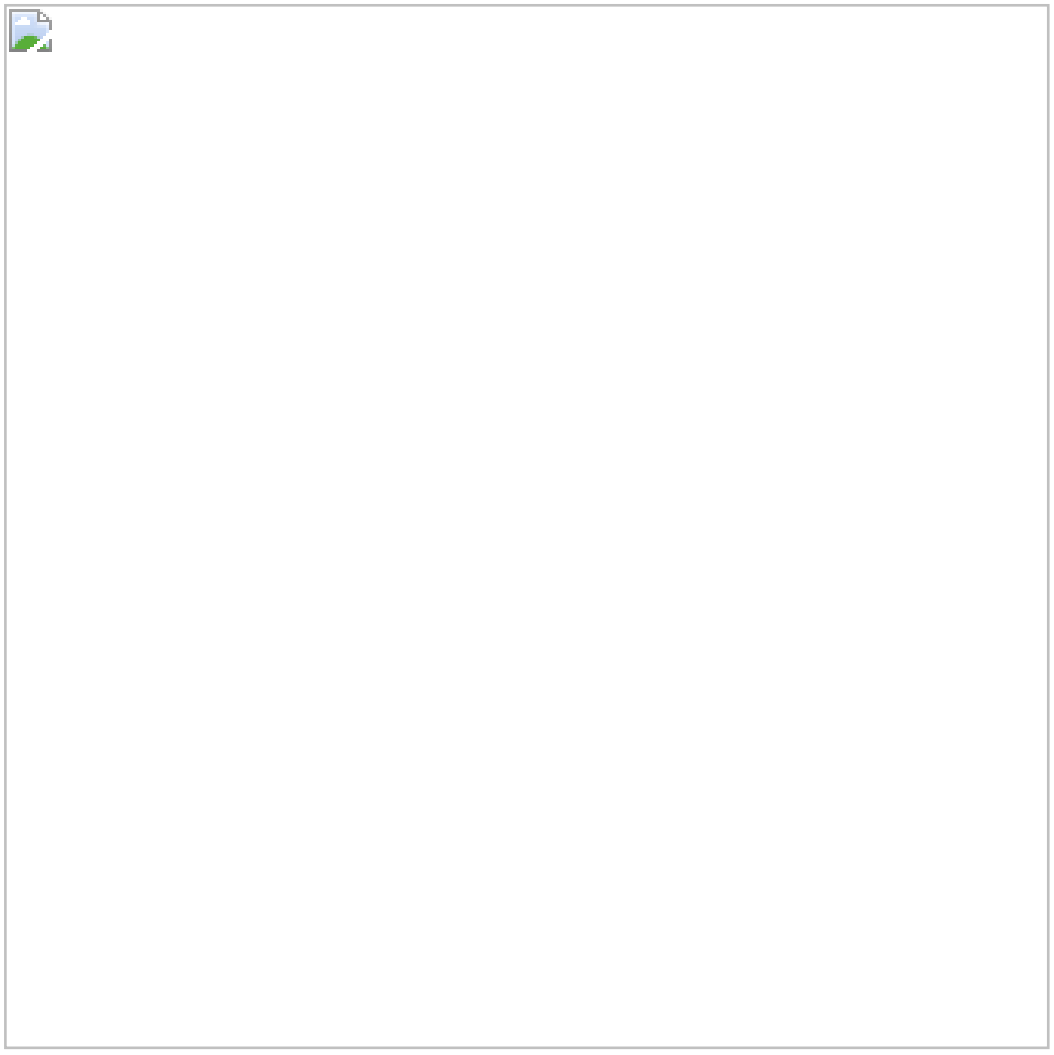

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Source: Environmental Health Insights, 17(1)

Published By: SAGE Publishing

URL: https://doi.org/10.1177/11786302231185210

Cigarette Smoke Exposure and Stunting Among Under-five Children in Rural and Poor Families in Indonesia

Environmental Health Insights
Volume 17: 1–7

DOI: 10.1177/11786302231185210

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ABSTRACT: Cigarette smoke exposure in mothers and children is highly prevalent in Asia, especially among rural and poor families. Secondhand smoke exposure might affect the nutritional status of children. Despite the emerging double burden of malnutrition and the very high prevalence of smoking in Indonesia, few studies have examined the effects of parental smoking on children's nutritional status. This study aims to measure the relationship between family smoking behavior and the occurrence of stunting in children under 5 years. This cross-sectional study used a purposive sampling technique, with 221 households with children aged 0 to 59 months from poor areas in Indonesia. Exposure to cigarette smoke is assessed using The Secondhand Smoke Exposure Scale questionnaire. The outcome measured is child stunting (height-for-age *Z*-score). The prevalence of stunting was estimated at 145 (65.6%). Children living with smoking parents were counted for 157 (71%), and most smoking exposure comes from fathers 147 (67.4%). The predictors of stunting in children under 5 years were a smoker father with (AOR 1.8; 95% CI 1.281-4.641), both parents are smokers increasing the risk of stunting with (COR 3.591; 95% CI 1.67-3.77), being exposed of smoke for more than 3 hours a day increase the risk of stunted children (COR 2.05; 95% CI 1.214-3.629), and using traditional cigarette or kretek expand the risk of stunting (AOR 3.19; 95% CI 1.139-67.785). The findings demonstrate the negative impact of parental smoking on children's growth, reinforcing the importance of reducing smoking prevalence by imposing a smoke-free home policy in the stunting prevention strategy.

KEYWORDS: Children, smoke exposure, stunting, rural area, poor families

RECEIVED: April 17, 2023. **ACCEPTED:** June 13, 2023.

TYPE: Original Research

FUNDING: The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by Indonesia Tobacco Control Research Network 2022 (ITCRN 2022) by the Center for Sharia Economics and Business at Indonesia University and John Hopkins University, USA. The study sponsor did not influence the study's design, data analysis, interpretation of results, or the decision to submit the manuscript for publication.

DECLARATION OF CONFLICTING INTERESTS: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Background

More than 8 million people die from tobacco-related causes yearly; 7 million of these fatalities are due to direct tobacco use, while around 1 million are from non-smokers exposed to secondhand smoke. Additionally, over 80% of the 1.3 billion tobacco smokers worldwide reside in low- and middle-income nations.[1] The market for tobacco products has steadily migrated from high-income to low-income nations, where the public is generally less aware of the health dangers of tobacco use and where anti-smoking laws are laxer.[2,3]

Furthermore, tobacco use, or smoking, is a major health problem in Indonesia. It is reported by the Ministry of Health approximately 85.4% of active smokers smoke at home with family members, and more than 57% in a household have at least one smoker,[4] thus directly increasing cigarette smoke exposure to both mother and child. Numerous research has focused on the relationship between smoking and adverse outcomes such as cancer, respiratory, and cardiovascular disease[5]; however, the problem of smoking and its relationship to malnutrition and poverty have not been well characterized. Tobacco use may adversely affect malnutrition, especially among impoverished families in developing countries.[6]

Moreover, stunting has now been identified as a major global health priority.[7] Reducing child stunting is the first of the 6 goals of the Global Nutrition Goals for 2025 and a vital indicator of the Zero Hunger Sustainable Development Goals 2. The prevalence of child stunting in Indonesia has remained high over the past decade, at around 29% to 30% nationwide.[8] Although numerous research on the causes of stunting is usually reported to be associated with nutritional factors; however, some studies have started to find that other factors, such as exposure to cigarette smoke, might cause stunted children, and those studies are still limited. The previous study was conducted with small sample size and among the general population.[6,9] More comprehensive research on the causes of stunting is needed to provide appropriate information to the public in determining efforts to promote health prevention of stunting and reduce the prevalence of paternal smokers and cigarette smoke exposure in mothers and children. Therefore, this study aimed to analyze the relationship between cigarette smoke exposure and stunting among children 0 to 59 months.

Methods

This quantitative study used a cross-sectional approach conducted in rural and slum villages, in Enrekang City, South Sulawesi Province, Indonesia, in July to December 2022. The villages are particular locations (called locus stunting by the Ministry of Health, Republic Indonesia), indicating a high

prevalence of stunting. Two villages in Enrekang reported a high prevalence of stunting and smokers, namely Latimojong Village, Buntu Batu District and Puserren Village. A total of 403 children were in these 2 villages. A total of 221 households with children 0 to 59 months of age participated by purposive sampling method. Based on the method, the sample with an estimated population of 403 children can be calculated as follows:

$$n = \frac{N}{1 + N(e)^2}$$

The researcher anticipates the dropout by adding 10% (e) of the total sample so that the minimum sample size is 80 children. In this study, 221 children exceeded the minimum sample. The inclusion criteria were families with children aged 0 to 59 months, living in the study area for a minimum of 2 years, having a health record book for mothers' and children's health, and parents willing to participate in this study. Children with a history of chronic cancer and nephrotic syndrome were excluded from the study.

The outcome variable in this study was stunting in children aged 0 to 59 months, while the explanatory variable was exposure to cigarette smoke. Exposure to cigarette smoke was assessed by the questionnaire from the modified Secondhand Smoke Exposure Scale (SHSES). This questionnaire was used in some studies, and the validity and reliability have tested in 30 households with .935 of Cronbach's Alpha.[10] The SHSES questionnaire consisted of a history of child exposure and the smoking characteristics of parents. The intended cigarette smoke exposure is a cigarette made from tobacco.

Furthermore, the anthropometric data assessment was done by calculating *Z*-scores and processed by the WHO's Anthro program to assess *Z*-scores. *Z*-score was assessed HAZ (height based on age) by trained professionals. The questionnaire also comprised parental identity, history of childbirth, family income, and history of infection. Secondary research data were obtained from maternal and child health books. Data was retrieved by conducting home visits following the time contract with the family.

The statistical tests used were Chi-Square, binary, or multinominal logistic regression for Crude Odds Ratio (COR) and multivariate logistic regression analysis to analyze Adjusted Odds Ratio (AOR) using SPSS 24.0. The results were validated by the expert in the Nutrition Program at the public health center (PHC) in the study area. The Ethics Committee of Universitas Muslim Indonesia and YW-UMI Hospital conducted the ethical review with No. register; UMI012210581.

Results

The prevalence of stunting in children aged 0 to 59 months was estimated to occur in 145 (65.6%) children. Of all families, 80.5% live in poor and low income. Children living with smoking parents were counted for 157 (71%). The majority (147, 67.4%) of smoking exposure comes from the father and 54 (24.4%) from other relatives such as old brothers or neighbors. Children with prolonged exposure to cigarette smoke for more than 3 hours per day were counted for 210 (95%). Of all, 137 (62%) children get exposed to cigarettes inside the house, and most (134, 60.6%) smokers use filter cigarettes (Table 1).

Table 2 shows the relationship between exposure to cigarette smoke and stunting in children 0 to 59 months in rural and poor families in Indonesia. Family income, age, and the mother's body mass index were independent predictors for stunting in children under 5 years.

Table 3 describes the results of the logistic regression test (binary/multinominal and multivariate analysis) to find out the crude and adjusted odds ratio of smoking exposure toward stunting in under-five children. The predictors of stunting in children under 5 years were a smoker father with (AOR 1.8; 95% CI 1.281-4.641, $P < .001$), both parents are smokers increasing the risk of stunting with (COR 3.591; 95% CI 1.67-3.77, $P < .001$), being exposed of smoke for more than 3 hours a day increase the risk of stunted children (COR 2.05; 95% CI 1.214-3.629, $P < .001$), and using traditional cigarette or kretek expand the risk of stunting (AOR 3.19; 95% CI 1.139-67.785, $P < .001$).

Discussion

Characteristics of children and families related to stunting

The present study shows that the high prevalence of children living with smoking parents and paternal smoking is most of the smoking exposure, followed by relatives such as old brothers or neighbors. In addition, most children live with prolonged exposure to cigarette smoke, more than 3 hours per day inside the house. A recent study in Pakistan also found that 21.6% of children are exposed to parents who smoke, including 7% with mothers who smoke and 16.3% with fathers who smoke. This prevalence is higher in rural areas.[11]

A high prevalence of smoking may contribute to an increase in stunting prevalence. This is because cigarettes or other tobacco products may account for many household expenditures among low-income families.[6,12] Smoking exacerbates the effects of poverty, as expenditures for tobacco may divert household income from food, clothing, housing, health, and education. The amount of money spent on tobacco is especially problematic in low-income countries.[12] Regarding nutrition, intake based on research using Indonesian cross-sectional household-level nationwide data of the 2018 National Socio-Economic Survey (SUSENAS) reported that cigarette consumption decreases household protein and energy intake. Additionally, a statistically significant correlation was found between a household's cigarette consumption and per capita protein intake.[13] Furthermore, exposure to smoke during early childhood can lead to respiratory infections, such as pneumonia, and other respiratory conditions, impair growth and development. The delicate particulate matter (PM2.5) and other

Table 1. Characteristics of households with the stunted child among rural and poor families in Indonesia.

VARIABLE	TOTAL
	N (%)
Stunting	
Yes	145 (65.6)
No	76 (34.4)
Exposure to cigarette smoke	
Smoker father	
Yes	149 (67.4)
No	72 (32.6)
Others smoker	
Father/mother	157 (71.0)
Uncle/aunty	6 (2.7)
Grandfather/grandmother	4 (1.8)
Others	54 (24.4)
Duration of exposure	
<3 h per day	210 (95.0)
⩾3 h per day	11 (5.0)
Smoking inside house	
Yes	137 (62.0)
No	84 (38.0)
Kinds of cigarettes	
Kretek/Traditional	81 (36.6)
Filter cigarette	134 (60.6)
Electric/vape	1 (0.5)
Non-filter cigarettes	5 (2.3)
Family characteristics	
Family income	
⩽2 million rupiah (low-income)	178 (80.5)
>2 million rupiahs (above-standard-income)	43(19.5)
Having health insurance (BPJS)	
Yes	180 (81.4)
No	41 (18.6)
Individual factors	
Sex	
Male	108 (48.9)
Female	113 (51.1)
Age of children (months)	
⩽12	28 (12.7)
13-24	65 (29.4)
25-36	58 (26.2)
>37	70 (31.7)
Maternal factors	
Mothers age at pregnancy	
No at-risk (20-30)	63 (28.5)
At risk (<20 y or >35)	158 (71.5)
Mother's BMI	
Normal	38 (17.2)
No' normal (malnutrition/obese)	183 (82.8)
Mother's height	
⩾155 cm	79 (35.7)
<155 cm	142 (64.3)
History of anemia	
⩾11 g/dl	198 (89.6)
<11 g/dl	23 (10.4)
History of abortus	
Yes	34 (15.4)
No	187 (84.6)
History of infectious disease	
Yes	11 (5.0)
No	210 (95.0)

toxic pollutants released from burning solid fuels can irritate the respiratory system and cause inflammation, leading to respiratory infections and chronic respiratory conditions. Children exposed to smoke from indoor air pollution may have increased rates of respiratory symptoms, decreased lung function, and a higher risk of developing pneumonia, which can contribute to stunting.[14,15]

Cigarette smoke exposure and increased risks of stunting

This present study shows that, in poor rural households in Indonesia, paternal smoking was associated with an increased risk of stunting in children. The risk was increasing when both

Table 2. The relationship between exposure to cigarette smoke and stunting in children 0 to 59 months in rural and poor families in Indonesia.

VARIABLE	STUNTING		TOTAL	*P*-VALUE
	YES (%)	NO (%)	F (%)	
Exposure to cigarette smoke				
Smoker father				
Yes	95 (65.5)	54 (71.1)	149 (67.4)	.446
No	50 (34.5)	22 (28.9)	72 (32.6)	
Others smoker				
Father/mother	98 (67.8)	59 (77.6)	157 (71)	.22
Uncle/aunty	4 (2.8)	2 (2.6)	6 (2.7)	
Grandfather/grandmother	1 (0.7)	3 (3.9)	4 (1.8)	
Others	42 (29)	12 (15.8)	54 (24.4)	
Duration				
⩾3 h per day	139 (95.9)	71 (93.4)	210 (95.0)	.428
<3 h per day	6 (4.1)	5 (6.6)	11 (5.0)	
Smoking inside house				
Yes	87 (60)	50 (65.8)	137 (62)	.821
No	58 (40)	26 (34.3)	84 (38)	
Kinds of cigarettes				
Kretek/Traditional	57 (39.3)	24 (31.6)	81 (36.6)	.665
Electric/vape	1 (0.7)	0 (0)	1 (0.5)	
Filter cigarette	86 (59.3)	48 (63.2)	134 (60.6)	
Non-filter cigarettes	1 (0.7)	4 (5.3)	5 (2.3)	
Family characteristics				
Family income				
⩽2 million rupiah (above standards income)	117 (80.7)	61 (80.3)	178 (80.5)	.005*
>2 million rupiahs (low-income)	28 (19.3)	15 (19.7)	43(19.5)	
Having health insurance				
Yes	118 (81.4)	62 (81.5)	180 (81.4)	.716
No	27 (18.6)	14 (18.4)	41 (18.6)	
Individual factors				
Sex				
Male	70 (48.3)	38 (50)	108 (48.9)	.808
Female	75 (51.7)	38 (50)	113 (51.1)	
Age (months)				
⩽12	12 (8.3)	16 (21.1)	28 (12.7	.031*
13-24	42 (29)	23 (30.3)	65 (29.4)	

(Continued)

Table 2. (Continued)

VARIABLE	STUNTING		TOTAL	*P*-VALUE
	YES (%)	NO (%)	F (%)	
25-36	39 (26.9)	19 (25.0)	58 (26.2)	
>37	52 (35.9′	18 (23.7)	70 (31.7)	
Maternal factors				
Mother's age at pregnancy				
No at-risk (20-30)	42 (29)	21 (27.6)	63 (28.5)	.79
At risk (<20 y or >35)	103 (71.0)	55 (72.4)	158 (71.5)	
Mother's BMI				
Normal	20 (13.8)	18 (23.7)	38 (17.2)	.028*
Not normal (malnutrition/obese)	125 (86.2)	58 (76.3)	183 (82.8)	
Mother's height				
⩾155 cm	50 (34.5)	29 (38.2)	79 (35.7)	.101
<155 cm	95 (65.5)	47 (61.8)	142 (64.3)	
History of anemia				
⩾11 g/dl	134 (92.4)	64 (84.2)	198 (89.6)	.058
<11 g/dl	11 (7.6)	12 (15.8)	23 (10.4)	
History of abortus				
Yes	23 (15.9)	11 (14.5)	34 (15.4)	.066
No	122 (84.1)	65 (85.5)	187 (84.6)	
History of infectious disease				
Yes	8 (5.5)	3 (3.9)	11 (5)	.234
No	137 (94.5)	73 (96.1)	210 (95)	

parents were smokers. Similar findings are also reported in a national representative study using balanced panel data from the Indonesia Family Life Survey (IFLS) that children whose father has moderate or high smoking intensity tend to have a higher probability of stunting by 3.47% points.[16] These findings also reported in another study that children exposed to smoking by their parents are more likely to be stunted, especially when the mother smokes.[11]

Another study in Indonesia also found that paternal smoking was most strongly associated with stunting. This may be due to the more chronic effect of a lower-quality diet in households where the father was a smoker.[9] This might be related to the proportion of weekly per capita household expenditures on quality foods such as eggs, fish, fruits, and vegetables were reduced in households where the father was a smoker.[12,13] The present study is consistent with observations from Bangladesh that in low-income families where the father smoked, a large proportion of weekly income was spent on tobacco, diverting money that might be spent on food.[6] These findings also corroborate findings from the National Family Health Survey II in India of 92.486 households in which household tobacco use increased the risk of malnutrition among children.[17] Another explanation may relate to inhaling the parent's cigarette smoke directly affecting the child's growth and development. Tobacco smoke affects the absorption of nutrients in children, affecting their growth and development.[18]

Furthermore, this study found that exposure to smoke for more than 3 hours a day increases the risk of stunted children. Using traditional cigarettes or kretek expands the risk of stunting. Another study conducted in Surakarta on 123 children stated that the duration of exposure to cigarette smoke had a significant relationship in stunted children aged 25 to 59 months. Exposure to cigarette smoke for more than 3 hours per day increases the incidence of stunting by 10316 times. Most stunted children in this study had smoking fathers with a smoking history of more than 3 years and a frequency of

Table 3. Multivariate models for smoking exposure and other risk factors for stunted children among rural and poor families in Indonesia.

VARIABLE	COR (95% CI)	AOR (95% CI)
Exposure to cigarette smoke		
Smoker father		
Yes	1.29 (0.71-2.36)	1.8 (1.281-4.641)*
Others smoker		
Father/mother	3.59 (1.672-3.773)*	1.06 (0.111-11.365)
Uncle/aunty	1.3 (0.911-1.599)	1.75 (0.917-6.770)
Grandfather/grandmother	1.5 (0.192-3.508)	1.43 (0.174-11.756)
others	1.23 (0.679-1.788)	1.56 (0.204-3.030)
Duration		
⩾3 h per day	1.61 (0.181-2.078)	2.05 (1.214-3.629)*
Smoking inside house		
Yes	1.282 (0.719-2.287)	1.41 (0.323-6.174)
Kinds of cigarettes		
Kretek/Traditional	9.8 (1.031-93.182)*	3.19 (1.139-67.785)*
Electric/vape	8 (0.658-97.311)	0.28 (0.021-3.394)
Filter cigarette	1.00	1.00
Non-filter cigarettes	7.1 (0779-65.968)	1.76 (0.469-6.174)
Family characteristics		
Family income		
⩽2 million rupiah (above standard income)	1.028 (0.511-2.068)	1.895 (0.384-2.083)
Having health insurance		
Yes	0.98 (0.483-2.107)	1.118 (0.468-4.064)
Individual factors		
Sex		
Male	0.933 (0.536-1.626)	0.885(0.471-2.668)
Age (months)		
⩽12	1.00	1.00
13-24	0.260 (0.103-0.652)	2.751 (0.117-6.770)
25-36	0.632 (0.302-1.323)	1.431 (0.174-11.756)
>37	0.711 (0.330-1.530)	3.559 (0.204-62.030)
Maternal factors		
Mother's age at pregnancy		
No at-risk (20-30)	0.984 (0.717-1.351)	1.083 (0.755-1.553)
Mother's body mass index		
Normal	0.940 (0.955-3.951)	2.090 (0.925-4.722)
Mother's height		
⩾155 cm	0.172 (0.659-2.085)	0.811 (0.409-1.607)
History of anemia		
⩾11 g/dl	0.438 (0.183-1.046)	0.265 (0.192-1.762)
History of abortus		
Yes	1.114 (0.511-2.429)	1.158 (0.224-2.686)
History of infectious disease		
Yes	1.421 (0.366-5.519)	1.635 (0.374-7.152)

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; COR, crude odds ratio; ref, reference category.
*P-value <.001.

smoking more than 3 times a day.[9] The habit of smoking for most people in Indonesia is still considered normal behavior and is part of social life and lifestyle. Most active smokers in rural areas ignore the risks and dangers of exposure to cigarette smoke to themselves and others.[19]

Based on the findings of this study, it suggests the urgency of imposing and implementing a smoke-free policy at the house. In addition, reducing paternal smoking at home can significantly decrease the level of secondhand smoke in the indoor environment, leading to improved air quality and a healthier living environment. This can have important implications for vulnerable populations such as infants, young children, and pregnant women.[20]

Conclusion

This study concludes that the high prevalence of children in rural and poor families living with smoking parents and paternal smokers is the majority of smoking exposure. In addition, most children lived with extended exposure to cigarette smoke, more than 3 hours per day inside the house. The independent predictors of stunting in children under 5 years were a smoker father, exposure to smoke for more than 3 hours a day and using traditional cigarettes or kretek. Significant tobacco control policies should be promoted and implemented to reduce the potential long-term impact of maternal or paternal smoking on the future generation.

Acknowledgement

We extend our most excellent thanks to the Enrekang District government (District and Village/Kelurahan) Enrekang District Health Office, the head of the Community Health Center, and Enrekeng community leaders.

Authors' Contributions

NM, RAY, and ARR conceived the idea of the study and were responsible for the design of the study. NM, ARR, NM, NH, and AA were responsible for the data collection. RAY and AQ were responsible for analyzing the data and producing the tables and graphs. RAY, AQ, and NM provided input into the data analysis and interpretation. RAY made the first complete paper draft, then circulated repeatedly to NM, ARR, NM, NH, AQ, and AA for critical revisions. All authors approved the final version of the manuscript.

Availability of Data and Material

All data generated or analyzed during this study are included in this published article and its supplementary information files, available from the corresponding author on reasonable request.

Consent for Publication

Not applicable.

Ethical Standards Disclosure

This study was conducted according to the guidelines in the Declaration of Helsinki. All procedures involved in this research study participants were approved by the Ethics Committee of Universitas Muslim Indonesia and YW-UMI Hospital with No. register; UMI012210581. In addition, written informed consent was gained from all subjects.

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Supplemental Material

Supplemental material for this article is available online.

REFERENCES

1. World Health Organization. Key Fact: Tobacco. 2022. Accessed January 6, 2023. https://www.who.int/news-room/fact-sheets/detail/tobacco
2. Gilmore AB, Fooks G, Drope J, Bialous SA, Jackson RR. Exposing and addressing tobacco industry conduct in low-income and middle-income countries. *J Lancet*. 2015;385:1029-1043.
3. Lee JG, Henriksen L, Rose SW, Moreland-Russell S, Ribisl KM. A systematic review of neighborhood disparities in point-of-sale tobacco marketing. *Am J Public Health*. 2015;105:e8-e18.
4. Ministry of Health Republic of Indonesia. Cigarettes kill five million people every year. 2023. https://kemkes.go.id/article/view/447/rokok-membunuh-lima-juta-orang-setiap-tahun.html
5. Huttunen R, Heikkinen T, Syrjänen J. Smoking and the outcome of infection. *J Intern Med*. 2011;269:258-269.
6. Semba RD, Kalm LM, de Pee S, Ricks MO, Sari M, Bloem MW. Paternal smoking is associated with increased risk of child malnutrition among poor urban families in Indonesia. *Public Health Nutr*. 2007;10:7-15.
7. de Onis M, Branca F. Childhood stunting: a global perspective. *Matern Child Nutr*. 2016;12:12-26.
8. Ministry of Health Republic of Indonesia. Result of National Basic Health Reaserch (RISKESDAS). 2018;53.
9. Astuti DD, Handayani TW, Astuti DP. Cigarette smoke exposure and increased risks of stunting among under-five children. *Clin Epidemiol Glob Health*. 2020;8:943-948.
10. Shah S, Kanaan M, Huque R, et al. Secondhand smoke exposure in primary school children: a survey in Dhaka, Bangladesh. *Nicotine Tob Res*. 2019;21:416-423.
11. Nayab D, Kishwar S, Siddique O. Parental Tobacco Smoking and Child Malnutrition [Working Paper]. PIDE, 2022. Accessed January 20, 2022. https://www.tobacconomics.org/research/parental-tobacco-smoking-and-child-malnutrition/
12. Husain MJ, Datta BK, Virk-Baker MK, Parascandola M, Khondker BH. The crowding-out effect of tobacco expenditure on household spending patterns in Bangladesh. *PLoS One*. 2018;13:e0205120.
13. Djutaharta T, Wiyono NH, Monica Y, Ahsan A, Kusuma D, Amalia N. Cigarette consumption and nutrient intake in Indonesia: study of cigarette-consuming households. *Asian Pac J Cancer Prev*. 2022;23:1325-1330.
14. Bălă G-P, Râjnoveanu R-M, Tudorache E, Motișan R, Oancea C. Air pollution exposure-the (in)visible risk factor for respiratory diseases. *Environ Sci Pollut Res*. 2021;28:19615-19628.
15. Ferrante G, Simoni M, Cibella F, et al. Third-hand smoke exposure and health hazards in children. *Monaldi Arch Chest Dis*. 2013;79:38-43.
16. Bella A, Dartanto T, Nurshadrina DS, et al. Do parental smoking behaviors affect children's thinness, stunting, and overweight status in Indonesia? Evidence from a large-scale longitudinal survey. *J Fam Econ Issues*. 2022;1-13.
17. Khan N, Mozumdar A, Kaur S. Determinants of low birth weight in India: an investigation from the National Family Health Survey. *Am J Human Biol*. 2020;32:e23355.
18. Florescu A, Ferrence R, Einarson T, Selby P, Soldin O, Koren G. Methods for quantification of exposure to cigarette smoking and environmental tobacco smoke: focus on developmental toxicology. *Ther Drug Monit*. 2009;31:14-30.
19. Hartono RK, Hamid SA, Hafizurrachman M. Do the number of cigarettes smokes per day contribute to the incident of malignant cancer? *Asian Pac J Cancer Prev*. 2019;20:1403-1408.
20. Centers for Disease Control and Prevention. General information about secondhand smoke. 2021. Accessed December 20, 2022. Https://Www.Cdc.Gov/Tobacco/Secondhand-Smoke/about.Html?CDC_AA_refVal=https%3A%2F%2Fwww.Cdc.Gov%2Ftobacco%2Fdata_statistics%2Ffact_sheets%2Fsecondhand_smoke%2Fgeneral_facts%2Findex.Htm.