

Family Determinants of Stunting in Indonesia: A Systematic Review

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Abstract-- *Malnutrition is a problem experienced by every country in the world, including Indonesia. The present study aimed to analyze family factors associated with stunting in Indonesia. Five databases (Scopus, Science Direct, EBSCO, ProQuest, and PubMed) were explored to find relevant articles published from 2015 to 2020. The Boolean search used "factor", "stunting", "parent" and "Indonesia" in the title, abstract, or keywords. Inclusion criteria were: original article in English; the source from journals; research sites in the Indonesia region; families with children < 5 years; and available in full text. This systematic review used PRISMA guidelines. The determinants were analyzed based on the WHO conceptual framework for stunting. We identified 541 articles, and 15 were considered relevant for this systematic review. The main research design for these 15 journals was cross-sectional. This review shows that stunting in Indonesia is still very high. Family factors related to stunting in Indonesia include low caregiver education, low household welfare, poor nutrition during pregnancy, poor sanitation, and inadequate water supply, a father who smokes, a young mother and poor parenting. The results of the study form the basis for developing family centered-care for stunting.*

Keywords--- *Child Growth; Family Factors; Stunting; Toddlers*

I. INTRODUCTION

Malnutrition is a problem experienced by every country in the world, including Indonesia. Nutrition is a determinant in the success of children's growth and development. Indonesia is one of the countries with three nutritional burdens: wasting, obesity, and stunting [1]. Stunting is a condition of a toddler's length or height being shorter than children according to their age and measured with a TB/U z score, -2 SD based on the WHO standard [2]. Stunting is caused due to chronic malnutrition that has occurred since 1.000 first day of life. Stunting is a world problem that needs to be addressed because it is related to the welfare of children. A stunting reduction of 40% is one of the six goals in the 2025 Global Nutrition Targets [3] and key indicators in the second Sustainable Development Goal of Zero Hunger [4]. The prevalence of stunting in the world in 2018 decreased from 22.2% to 21.9%. The prevalence of stunting in Asia reached 81.7 million with South Asia having the highest prevalence (57.9%) followed by Southeast Asia at 14.4% [5]. Indonesia ranks second after Timor Leste in Southeast Asia [6]. The incidence of stunting in Indonesia in 2018 had increased from the previous 29.6% to 30.8% [2]. The incidence of stunting in Indonesia is still above the WHO standard which is 20% where the standard set is below 20% [7].

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Stunting is associated with chronic malnutrition and poor development that is influenced by poor maternal nutrition during pregnancy and chronic nutrition-related illness during childhood [8]. Stunting is caused by various factors such as the number of children under five years living in the household when there are three or more, a lack of antenatal care visits, babies born weighing <2500 grams and low socioeconomic status [9]. In addition, stunting is also caused by limited antenatal and postnatal care services, lack of household/family access to nutritious food, lack of access to clean water and sanitation as well as poor parenting practices [1]. Berhe's [10] research results state that stunting in children aged 6 to 24 months is caused by maternal education, maternal height being less than 150cm, low maternal BMI, low birth weight, number of children under five in the tang and recurrent diarrhea. Utami's [11] research results state that family knowledge about nutritional care, parental education, unemployed family heads, and household income affect stunting in children under five years old.

Stunting in toddlers has long-term and short-term effects. The short-term impacts are increased morbidity and mortality, not optimal cognitive, motoric, and verbal development in children, and increased health costs. The long-term effects of stunting are shorter posture than in general, an increased risk of obesity and other diseases, reproductive health problems, lack of optimal capacity and learning performance as well as non-optimal productivity and work capacity [12]. According to Rahayu [13], stunting can cause psychomotor problems, fine motor skill difficulties, and neurosensory integration. Stunting can reduce labor market productivity and inhibit the rate of economic growth, resulting in an 11% loss in Gross Domestic Products and a 20% reduction in adult worker income. Stunting also contributes to socioeconomic inequalities that cause intergenerational poverty and reduced lifetime income [1]. This study aimed to analyze family factors associated with stunting in Indonesia.

II. METHODS

- Databases Searched and Keywords

The data for this study were collected *uses PRISMA guidelines*. We used the WHO conceptual framework on stunting to review the available literature and identify the determinants of stunting in Indonesia, especially family factors. WHO categorizes the direct causes of stunting in children into 2 areas, based on the cause and context. The categories of causes consist of housing and family factors (maternal factors and home environment), inadequate complementary feeding (poor quality foods, inadequate practices, food, and water safety), breastfeeding (inadequate practices), and infections (clinical and subclinical infection). Context categories consist of political economy, health and healthcare, education, society and culture, agriculture and food systems, water, sanitation, and environment. The causes and contextual factors of the WHO work agreement are based on global data, so we analyzed the literature to understand family factors in Indonesia and add them to the most interesting sub-elements.

The keywords that we used to search the databases were "Factor", "Stunting", "Parent", and "Indonesia". We were looking on major academic databases including Scopus, Science Direct, PubMed, EBSCO, and ProQuest. The initial keywords used to search for previous studies through Scopus and Ebsco were "factor OR cause"; "stunting OR growth disorder"; "parent OR mother OR father"; and "Indonesia". Initial keywords to search for previous studies through PubMed, Science Direct and ProQuest were "factor OR cause"; "stunting"; "parent OR mother"; and "Indonesia".

- Search Outcome

We limited the literature search period to 2015 to 2020 and included only original articles in English, from journals, research sites in the Indonesia region, on families with children < 5 years, and those for which the full text was available. The initial process involved collecting relevant studies by determining the keywords related to the topic and purpose of this research. The exclusion criteria were secondary data, article review, article conference and stunting factor in children age more than five years (Figure 1).

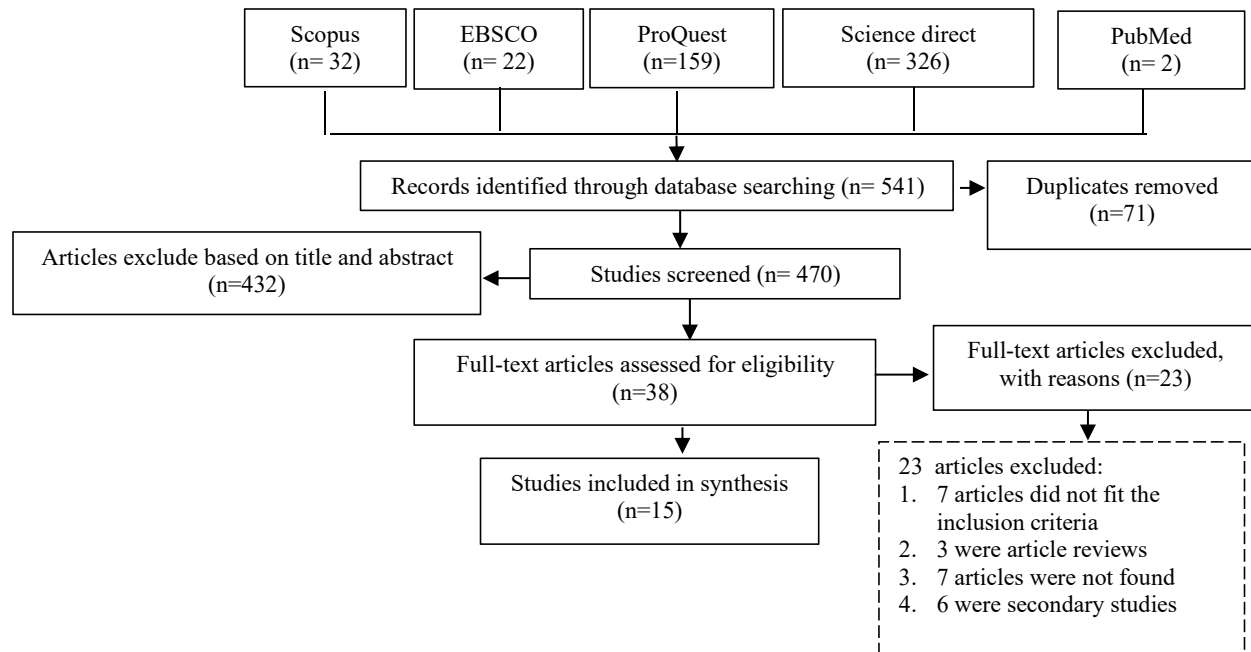


Figure 1. Article selection process using PRISMA

III. RESULTS

- General Factors and Type of Studies

Based on 15 articles that were analyzed (Table 1), the most common type of study was cross-sectional with 11 articles (73.33%). The most common family factors found were low caregiver education (46.67%) and household wealth (40%). Other family factors based on the WHO conceptual framework consisted of poor nutrition during pregnancy (8.33%), inadequate sanitation and water supply (26.67%), paternal smoking (8.33%), mother's age (13.33 %) and parenting (20%).

Table 1. General characteristics of selected studies (n = 15)

Categories	N	%
Year of Publication		
2016	1	8.33
2017	1	8.33
2018	5	33.33
2019	7	46.67
2020	1	8.33
Type of Study		
Cross-sectional	11	73.33
Case-control	1	8.33
Cohort	1	8.33
Longitudinal	1	8.33

Categories	N	%
Ethnography	1	8.33
Household and Family Factors		
Poor nutrition during pregnancy	1	8.33
Inadequate sanitation and water supply	4	26.67
Food insecurity	2	13.33
Low caregiver education	7	46.67
Household wealth	6	40
Paternal smoking	1	8.33
Mother's age	2	13.33
Parenting	3	20

IV. DISCUSSION

Family factors related to stunting are low caregiver education, low household welfare, poor nutrition during pregnancy, poor sanitation, and inadequate water supply, a father who smokes, a young mother and poor parenting. Stunting is associated with chronic malnutrition and poor development that is influenced by maternal malnutrition during pregnancy [8]. Nutrition during pregnancy requires a balance between quality and amount of intake to optimize the growth and development of the fetus and reduce the risk of maternal morbidity [14]. Maternal malnutrition is a major contributor to fetal growth disorders, infant morbidity and mortality, and stunting [15]. Healthy and balanced food choices during pregnancy can help lead to better health for babies [16]. Inadequate nutrition with excessive calorie intake and lack of micronutrients during pregnancy can affect the growth of future generations [17]. They can be damaged because the traditions and culture passed down from generation to generation can have a positive or negative impact on mothers and babies. Food and taboo behaviors in pregnant women occur from generation to generation. Taboo food is an interference factor that can cause malnutrition in pregnant women which will later have an impact on nutritional deficiencies in infants causing stunting. Therefore, healthcare providers must provide information that is appropriate by providing scientific evidence about the taboos that are still held by pregnant women to increase maternal awareness of the risk of malnutrition during pregnancy and breastfeeding [18], [19].

Maternal age is considered high risk if <20 years or > 35 years during pregnancy because it can indirectly affect the nutritional status of children under five and can be related to the incidence of stunting. Marriage of women at the age of <20 years shows that the level of education is low [20], [21]. Rahman's [22] research shows that a mother's knowledge is a factor underlying a mother's behavior in terms of providing food for children. Mothers with good knowledge will be more selective in choosing food for children. Mothers with education for less than 9 years are 2.6 times more likely to have children with decreased linear growth than mothers with more than 9 years of education [23]. Based on the results of Barati's [24] research, 60% of mothers provide supplementary food for breastfeeding too early due to a lack of knowledge about nutritional parenting, the economic situation and the influence of the community (family and health workers). Poor parenting is involved in 51.1% of stunting events. A mothers' participation in decisions about what food to cook is also a risk factor for stunting [25]. Stunting is related to eating and pressure to eat. Parents who restrict food for children often experience tension and stress due to the rejection of food. Good parenting can provide support to mothers both physically and psychologically to reduce tension and stress and enhance the role of mothers in feeding practices [26]. Krisnana's [27] research states that the diet in stunted children is related to health workers, posyandu cadres and parental income. Besides that, smoking is also a family factor that causes stunting. Astuti's [28] research states that fathers who smoke near children can increase the risk of stunting. Exposure to cigarette smoke >3 hours per day increases the risk of stunting by 10,316 times if this happens continuously during the first 1,000 days of life and increases nicotine in the children's body. Therefore, good parenting needs to be applied by parents in order to reduce the risk of stunting in children.

Household income is the family factor that most influences the incidence of stunting in children under 5 years. Families with lower income than the minimum wage are 6,625 times more likely to have children with stunting. Families with the highest wealth quintile have twice the chance of having stunted children compared to families with the highest wealth quintile [25], [29]. Socioeconomic inequality is related to the parent's work and income. Fathers who do not work increase the risk of stunting in children by 1,045 times compared to working fathers. Parental income is related to the risk of multiple nutrition burdens which is related to the risk of food insecurity. Households with food insecurity risk having stunting children. The food security system is very important to prevent the double burden of malnutrition [30]. Poor water and sanitation in households can increase the risk of stunting in children under 2 years as much as 4.6 times compared to households that have good sanitation [20]. Some families do not have household toilets and use public toilets for their daily sanitation. A large number of child deaths due to malnutrition could be prevented by improving water access and sanitation [31]. When access to good sanitation is more than 80%, it can reduce mortality and the incidence of stunting in children [32], [33].

V. CONCLUSION

Family determinants related to stunting are low caregiver education, low household welfare, poor nutrition during pregnancy, poor sanitation, and inadequate water supply, a father who smokes, a young mother and poor parenting. Improvements in these family factors can reduce the risk of stunting in children. The results of the study form the basis for developing family centered-care for stunting.

CONFLICT OF IINTEREST

No conflict of interest has been declared.

ACKNOWLEDGMENT

The authors of this study would to thank to Faculty of Nursing, University Airlangga, for providing the opportunity to present this study.

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VI. APPENDIX

Table 2. Summary of selected studies

No	Title, Author, Year	Method	Result
1	The Analysis of Risk Factors Associated with nutritional status of toddler in Posyandu of Beringin Village, Alalak sub-District, Barito Kuala District (Rahman et al., 2018)	➤ D: cross-sectional design ➤ S: 98 respondents ➤ V: risk factors & nutritional status of children ➤ I: questionnaire ➤ A: chi square and Fisher exact test for bivariate; logistic regression test for multivariate	The results showed that there was a relationship between maternal nutritional knowledge and feeding practices with the nutritional status of children.
2	Is There Any Relationship between Feeding Practices for Children Under Two Years of Age (6–23 Months) and Stunting? (Febriana and Nurhaeni, 2019)	➤ D: cross-sectional design ➤ S: 143 respondent ➤ V: infant & young child feeding practices (aged 6–23 months) and stunting ➤ I: questionnaire ➤ A: Mann–Whitney test, Kolmogorov–Smirnov test, chi-square test	There is a relationship between maternal and child characteristics, such as maternal age, maternal employment status, maternal educational level, low birthweight less than 2,500 g, sanitation and health behaviors, and household income with stunting.
3	Identifying causal risk factors for stunting in children under five years of age in South Jakarta, Indonesia (Utami et al., 2019)	➤ D: cross-sectional approach ➤ S: 192 samples ➤ V: family characteristics, nutritional parenting, and stunting ➤ I: questionnaire ➤ A: independent <i>t</i>-test, chi-square, and multiple logistic regression	Socioeconomic factors, especially household income, are the factors that are most responsible for influencing the incidence of stunting in children under five.
4	Factors influencing promotive behaviours in mothers of Indonesian children with avoidant restrictive food intake disorder (Prasetyo et al., 2019)	➤ D: cross-sectional descriptive survey ➤ S: 245 mothers ➤ V: predictors of promotive behaviors in mother with avoidant restrictive food intake disorder ➤ I: questionnaire ➤ A: independent <i>t</i>-test, MannWhitney U test, one-way analysis of variance, KruskalWallis, and multiple linear regression	The number of children and mutual parenting in interacting with children were key factors that influenced promotive behaviors in mothers of children with ARFID.
5	Cigarette smoke exposure and increased risks of stunting among under-five children (Astuti et al., 2020)	➤ D: cross-sectional study ➤ S: 123 children ➤ V: cigarette smoke exposure and stunting ➤ I: The Secondhand Smoke Exposure Scale questionnaire ➤ A: Chi-Square, Fisher's Exact Test	There is a relationship of stunting with length of cigarette smoke exposure water source, hygiene, exclusive breastfeeding, history of pregnancy disorders, and recurrent respiratory infections. Logistic regression analysis showed that the length of smoking increases the risk of stunting and the most influential variable was recurrent respiratory infections.
6	Determinants of stunting in Indonesian children: evidence from a cross-sectional survey indicating a prominent role for the water, sanitation and hygiene sector in stunting reduction (Torlesse et al., 2016)	➤ D: cross-sectional survey ➤ S: 1366 children ➤ V: determinants of stunting ➤ I: questionnaire, interview ➤ A: multiple logistic regression, odds ratio	The risk factors for severe stunting included male sex, older child age, lower wealth quintile, sanitary facilities, household water, no antenatal care in a health facility, and mother's participation in decisions on what food was cooked in the household.
7	Breastfeeding and complementary feeding practices among children living in a rice surplus area, Central Java, Indonesia (Barati et al., 2018)	➤ D: cross-sectional survey ➤ S: 384 mothers ➤ V: breastfeeding & complementary feeding practices ➤ I: interview, questionnaire, focus group discussions ➤ A: ANOVA, multiple <i>t</i>-tests, χ^2 test of independence, Spearman correlation, Binary logistic regression	10.9 % of the children were exclusively breastfed for six months. 60 % of the mothers practiced supplementary feeding in addition to breastfeeding and started complementary feeding too early. Duration of exclusive breastfeeding practice and child's age at onset of complementary feeding were positively correlated.
8	Feeding Patterns of Children with Stunting Based on WHO (World Health Organization) Determinant Factors of	➤ D: cross-sectional study ➤ S: 136 respondents ➤ V: knowledge, attitude, personal reference, and income; and feeding patterns ➤ I: Infant and Young Child Feeding (IYCF)	There were relationships between health workers and posyandu cadres, and income with feeding patterns. It can be concluded that the feeding patterns in children with stunting could be influenced by health workers, posyandu

	Behaviours Approach (Krisnana et al., 2019)	➤ questionnaire A: ordinal regression	cadres and parent's income. Income was the most influential factor with the pattern of feeding.
9	Determinants of Stunting among Children in Urban Families in Palu, Indonesia (Rahman et al., 2017)	➤ D: case-control ➤ S: case group 36 children & the control group 108 children ➤ V: Nutritional status, family income, Exclusive breast feeding, Immunizations, Environmental sanitation, and maternal age during pregnancy ➤ I: questionnaire, measuring ➤ A: Chi-square tests	The determinants of stunting were family income, exclusive breast feeding, immunization status, environmental sanitation and maternal age during pregnancy. The multivariate analysis results showed that family income was the highest risk factor for stunting. Exclusive breast feeding, environmental sanitation and maternal age during pregnancy were associated with the same risk of stunting.
10	Association between parental socio demographic factors and declined linear growth of young children in Jakarta (Gunardi et al., 2017)	➤ D: cohort-prospective ➤ S: 160 children ➤ V: socio-demographic factors and subjects' linear growth ➤ I: questionnaires, interview, measurement ➤ A: Chi-square or Fisher test	Maternal education duration less than 9 years showed a statistically significant association with declined linear growth in children. Mothers with an education duration less than 9 years was the determining socio-demographic risk factor that contributed to the declined linear growth in children less than 2 years of age.
11	Pressure to eat is the most determinant factor of stunting in children under 5 years of age in Kerinci region, Indonesia (Dranesia et al., 2019).	➤ D: cross-sectional ➤ S: 290 children ➤ V: determining factors of the stunting ➤ I: Child Feeding Questionnaire (CFQ), Child Eating Behavior Questionnaire (CEBQ), observations, anthropometrics ➤ A: chi-square, Mann-Whitney, logistic regression	Factors related to the incidence of stunting in children under five were gender, history of exclusive breastfeeding, economic status, eating restrictions, and pressure to eat.
12	Maternal and environmental risk for faltered growth in the first 5 years for Tanjungsari children in West Java, Indonesia (Sofiatin et al., 2019)	➤ D: longitudinal study ➤ S: 175 randomly sampled ➤ V: stunting, gender, mother's age, mother's education, last birth interval, midupper arm circumference, infant's birth weight, breastfeeding practice, source of drinking water, protein containing complementary feeding practice ➤ I: measurement ➤ A: Spearman's rho test and Generalized estimating equations (GEE) analyses	The Tanjungsari study identifies several determinants of shortness including ones which are sociodemographic (location, age, gender), birth weight and length, environmental (the water supply), and maternal literacy.
13	Household Food Insecurity as a Predictor of Stunted Children and Overweight/Obese Mothers (SCOWT) in Urban Indonesia (Mahmudiono et al., 2018)	➤ D: cross-sectional survey ➤ S: 685 household ➤ V: food security, socioeconomic status and demographic characteristic ➤ I: Interview based on Indonesian Basic Health Research Questionnaire/IBHRQ and Household Food Insecurity Access Scale (HFIAS) ➤ A:	The household food insecurity access scale (HFIAS) category significantly correlated with child stunting and SCOWT.
14	Food Taboos and Codes of Conduct for Pregnant Women at Mount Sindoro, Wonosobo District, Central Java, Indonesia (Triratnawati, 2019)	➤ D: ethnographic study ➤ S: 21 informants ➤ V: food and conduct taboos for pregnant women ➤ I: interview and observation ➤ A: manually using selecting, extracting, attaching and similarity of the theme	Food and conduct taboos for pregnant women are passed from generation to generation. Violation of such taboos and codes of conduct are believed to negatively affect the labor process. The well-established traditions and local culture, as well as the fear of labor complications, influences pregnant women to obey these taboos and codes of conduct.
15	Comparison of maternal nutrition literacy, dietary diversity, and food security among households with and without double burden of malnutrition in Surabaya, Indonesia (Mahmudiono et al., 2018)	➤ D: cross-sectional ➤ S: 685 children ➤ V: stunted child and overweight/obese mother, nutrition literacy, dietary diversity, food security ➤ I: questionnaires ➤ A: Kruskal Wallis test with posthoc analysis with Bonferroni	Households with a double burden of malnutrition have relatively lower nutrition literacy, dietary diversity, and food security.