A Cross-sectional Study: How is The Relationship Between Social Determinants of Family Dimensions and Stunted Toddlers?

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ABSTRACT

Background: *In East Java, the prevalence of stunting in toddlers exceeds the national average of 32.8%, while in Sampang Regency it reaches 47.9%. Stunting poses a significant challenge by hindering economic growth, exacerbating poverty, and widening socio-economic disparities. The research aims to analyze the relationship between family characteristics and the incidence of stunting in toddlers in Sampang, Madura.*

Method: *This quantitative study employed a cross-sectional design in Sampang Regency. A total of 384 toddlers and their mothers participated as the research sample. The research variables included parental characteristics, anthropometric measurements of maternal height, and maternal knowledge status. Statistical analysis was conducted using the Pearson correlation inference test.*

Result: *The test results showed that family social status had no significant influence on stunting among toddlers. However, maternal height significantly influenced the incidence of stunting, with a P-value of 0.030. These findings highlight the importance of addressing maternal height as a determinant of toddler stunting. Thus, intervention needs to be given to adolescent girls to prevent toddler stunting. Such interventions could include health education programs focused on improving adolescent nutritional status to increase growth. Efforts should prioritize adolescent girls before menarche to optimize height development and reduce the future stunting risk of their offspring.*

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INTRODUCTION

Indonesia continues to face a serious challenge with stunting among children under five years old (toddlers). The 2018 Basic Health Research (Riskesdas) showed that the national prevalence of stunting in toddlers was 30.8%.(1) In East Java, this prevalence is even higher, reaching 32.8%(2), while in Sampang Regency, it has escalated to 47.9%.(3) This prevalence exceeds the World Health Organization (WHO) threshold for a very high prevalence category, set as 30%.(4) Alarmingly, this elevated prevalence has persisted for over 25 years, disproportionately affecting families with low socio-economic conditions and those living in rural areas.(5)

The high prevalence of stunting reflects significant growth and developmental disorders among children in Indonesia, posing long-term risks to human capital. Studies have shown that stunted toddlers often experience suboptimal cognitive development, with IQ levels approximately 11 points lower than normal children. Stunting is also associated with reduced arm muscle composition (6), impairing motor development (7), physical growth, and neurocognitive function.(8) Stunted children are more susceptible to disease, and in adulthood, will likely face reduced productivity levels.(9)(10) Ultimately, these factors inhibit economic growth, increase poverty, and widen socioeconomic inequality.

The government has various nutrition programs, both specific and sensitive, to prevent and overcome the problem of stunting in toddlers such as promoting exclusive breastfeeding, providing macro and micro nutritional supplements, providing iron tablets for pregnant women, and non-cash food assistance. However, limited budgets constrain program coverage. In addition, socio-economic and cultural factors contribute

to regional disparities in both the prevalence of stunting and the effectiveness of intervention programs. This research aims to analyze the relationship between family characteristics and the incidence of stunting in toddlers in Sampang, Madura.

METHOD

This quantitative study employed a cross-sectional design And was conducted over 28 months from February 2020-June 2022, in Sampang Regency, located on Madura Island, East Java, Indonesia. The research sample was 384 mothers with children under five years old. The research variables include parental characteristics of stunted toddlers (father's age, mother's age, parental education length, and number of family members), anthropometric measurements of maternal height, and maternal knowledge status. Maternal knowledge was categorized as poor (score <60), sufficient (60-80), and good (>80). Stunting and non-stunting among toddlers were determined based on previously collected height and age data by enumerators. Additional variables, such as parental education, age, and maternal nutrition knowledge (assessed using a nutritional knowledge questionnaire), were collected from the mothers.

Data collection was carried out by trained enumerators under the supervision of researchers. Most enumerators were Madurese. To facilitate effective communication with respondents, interviews were conducted in Madurese and Indonesian. The data were collected through structured interviews using questionnaires and anthropometric measurements.

The data analysis process consisted of data preparation, editing, and cleaning. Data preparation involved building a structured file for data entry. Discrepancies between questionnaire responses and data entry files were resolved during the editing phase. Data cleaning was applied to address any extreme data points. Quantitative data were processed and analyzed using the IBM SPSS Statistics program version 22. Inferential statistical analysis was conducted using the Pearson correlation test. Ethical approval for this study was granted by the Health Research Ethics Commission of the Faculty of Nursing, Airlangga University (Ethical Clearance Number 1901-KEPK dated February 5, 2020).

RESULT AND DISCUSSION

Table 1 describes the characteristics of respondents, including parental age, length of education, and number of family members. The sample size for the anthropometric data and maternal knowledge was 369, as 15 toddlers were under the care of their grandmothers and were excluded from this analysis. The study involved 384 families, divided into 2 categories: families with stunted children and families with normal children. The analysis revealed no significant difference in parental age, educational length, and the number of family members between the two groups. However, the length of education among parents in families with normal children (father 7.7 years; mother 7.5 years) was slightly higher compared to families with stunted children (father 7.5 years; mother 7.4 years).

Table 2 shows that 12.5% of mothers were classified as having short stature. The proportion of mothers with short stature was notably higher in families with stunted children (17.7%) compared to those with normal children (9.2%). The majority of mothers demonstrated good foundational knowledge regarding nutrition and child development. For instance, most mothers were aware that nutritious food supports child growth, milk is useful for bone growth, iodine in salt is useful for children's intelligence, and a declining child weight may indicate an early sign of malnutrition. In addition, most mothers also know that children born less than 2.5 kg are categorized as LBW babies. On the other hand, more in-depth nutritional knowledge such as food sources of animal protein and iron is still not widely known by mothers.

Table 1. Characteristics of parents of stunted and normal toddlers

Characteristics	Stunting (n=149)	Normal (n=235)	Total (n=384)
Age (year)			
Father	31.3 ± 6.7	31.7 ± 6.7	31.5± 6.7
Mother	28.4 ± 5.8	28.4 ± 6	28.4 ± 5.9
Length of Education (years)			
Father	7.5 ± 3.1	7.7 ± 3.5	7.6 ± 3.4
Mother	7.4 ± 2.5	7.5 ± 3.1	7.4 ± 2.9
Number of Family Members (people)	4 ± 1	4.1 ± 1.2	4.1 ± 1.1

Table 2. Height status and maternal knowledge of nutrition and child development

Maternal anthropometry	Stunting (n=141)	Normal (n=228)	Total (n=369)
Maternal height			
Short (<145 cm)	25 (17.7)	21 (9.2)	46 (12.5)
Normal (≥145 cm)	116 (82.3)	207 (90.8)	323 (87.5)
Average ± SD	149.7 ± 5.1	150.8 ± 4.8	150.3 ± 4.9
Maternal knowledge of nutrition and child development			
Poor (score <60)	31 (20.8)	44 (18.7)	75 (19.5)
Sufficient (score 60-80)	106 (71.1)	173 (73.6)	279 (72.7)
Good (score >80)	12 (8.1)	18 (7.7)	30 (7.8)
Average ± SD score	65.8 ± 12.4	67 ± 11.8	66.5 ± 12.1

Table 3. Household socio-demographic correlation with stunting

Variables	p	r
Family social		
Father's age	0.460	0.038
Mother's age	0.605	0.027
Father's education period	0.932	-0.004
Mother's education period	0.829	0.011
Number of family members (persons)	0.393	0.044
Mother's characteristics		
Mother's height	0.030	0.113
Level of knowledge of nutrition and child development	0.129	0.078

The Pearson correlation analysis presented in Table 3 shows that the socio-demographic characteristics of the family are not significantly related to stunting with a P value> 0.05. This lack of significance may be attributed to the homogeneity of the socio-economic characteristics among families with stunted and normal children in the study area. The average age of the father in both groups is 31 years, while the average age of mothers is 28 years. Similarly, the average length of parental education is 7 years, equivalent to the first grade of junior high school. The average number of family members is four for both groups. Parental and maternal age were also not significantly related to stunting with a P value> 0.05. The current age of the mother can be a reflection of the mother's age during pregnancy. The average age of mothers with stunted and normal children is 28 years. The range of maternal age during pregnancy 20-35 years is an age with a low risk of pregnancy complications. This aligns with a previous study by Rahmawati et al., which showed that the mother's age during pregnancy below 20 or above 35 can increase the risk of stunting in children. The study identified maternal height as a significant factor related to stunting, with a P-value of 0.030. This finding underscores the critical role of maternal physical health in child development.

Education is one of several socio-economic factors that influence child growth and development.(11) Previous research has demonstrated that parental education, especially maternal education, is significantly related to the problem of stunting nutrition.(12) The results study showed a correlation between education and nutritional knowledge.(13) Education plays a role in improving a person's quality of life, thus the higher the mother's education, the better the child's nutritional status.

Poor maternal nutrition and health further contribute to stunted child growth and development. Specifically, this includes the nutritional status and health of the mother before, during, and after pregnancy which directly affects fetal growth and early childhood development. Other factors that also contribute to child stunting are low maternal height (short), short birth intervals, and teenage pregnancy that disrupts the availability of nutrients for the fetus (there is competition between the need for nutrients for ongoing maternal growth and the needs of the fetus).(14) A global study across 54 low- to middle-income countries found that maternal height was inversely associated with child mortality, underweight, and stunting during infancy and early childhood.(15)

This study found different results from previous studies, which stated that the level of parental education, especially mothers, was associated with stunting.(16,17) Education level can be related to nutritional knowledge or childcare behavior practices.(18,19) Low levels of

nutritional knowledge and parental education can increase the risk of stunting.(17)

Semba et al.'s study in Indonesia and Bangladesh showed that higher parental education levels can be a supporting factor in reducing the risk of stunting through good parenting behavior. High levels of education are associated with good parenting behavior, including consumption of vitamin A supplements, complete immunization, better sanitation, and use of iodized salt. (18,20)

In this study, the number of family members did not show a significant relationship with stunting. Both groups, families of stunted and normal children, had an average household size of four members. However, a previous study by Wicaksono et al. showed an increase in the risk of stunting along with an increase in the number of family members.(21) The study by Titalley et al. added that the increase in the risk of stunting mainly occurred in the number of family members of 5-7 people or those who had more than 3 toddlers in one house.(22)

Maternal characteristics, specifically the mother's height and knowledge of nutrition and child development, emerged as important factors in this study. The mother's height is positively related to stunting (HAZ). Shorter mothers, tend to have children with lower HAZ z scores. The average height of mothers of normal children was higher than that of mothers of stunted children. This indicates the occurrence of intergenerational undernutrition. These results are in line with other studies that show a relationship between short maternal height and the incidence of child stunting.(17,23)

However, maternal knowledge of nutrition and child development was not significantly related to stunting in this study. Table 3 shows that the score of knowledge of nutrition and child development of mothers in the group of normal children was slightly higher than that of stunted children, but not statistically significant. This finding aligns with other research that mothers' knowledge does not relate to stunting.(24,25) This may be due to the same level of maternal education in both stunted and normal children. Further analysis showed a positive relationship between the mother's length of education and her nutritional knowledge score ($p = 0.002$; $r = 0.159$). In addition, the results of further analysis also showed that information about *Pemberian Makan Bayi dan Anak* (PMBA) was significantly related to stunting ($p = 0.034$). This can be important information to focus more on nutritional education on PMBA. Feeding infants and children, especially the transition from breastfeeding to complementary feeding, represents a critical period for increasing the stunting prevalence. The results of this study are in line with other studies that found that the risk of stunting in children aged 12-23 months was 1.54-2.32 times higher than in children aged <12 months.(22) Suboptimal growth can be related to poor feeding practices, poor transition from breastfeeding to complementary foods, low diet quality, and poor environmental sanitation and hygiene.(17,25)

The results of this study underscore the significant relationship between maternal height and stunting in toddlers. Thus, it can initiate the government to develop a health program and public health policy for adolescent girls related to height for preventive measures. Such programs could focus on raising awareness about the importance of maintaining good nutritional status during adolescence. In addition to providing blood supplements to adolescents, a national program can also be added to the program to increase the height of adolescent girls to reduce the risk of having stunted toddlers in the future. However, this study has certain limitations. The scope of the variables studied is limited. Other sociodemographic variables need to be considered, such as family income factors, history of toddler illness, or nutritional status of the toddler's mother. These factors could provide a more holistic understanding of the determinants of stunting and further refine intervention strategies.

CONCLUSION

There is no statistically significant relationship between household socio-demographic characteristics (father's age, mother's age, father's education, mother's education, number of family members, and family expenditure) and stunting (HAZ score). However, increasing the length of parental education can have a positive impact on increasing parental nutrition and health knowledge and good parenting behavior. On the other hand, increasing food expenditure can affect the diversity of children's food consumption. Maternal height is positively related to (stunting) children's HAZ score. The shorter mothers tend to have shorter children. This condition illustrates the importance of paying attention to nutritional status throughout the life cycle to break the cycle of intergenerational malnutrition. Although the study found no significant association between maternal nutritional knowledge is not significantly related to stunting. However, information about PMBA from health workers is related to child stunting. This can be important information so that nutritional education is more focused on the topic of PMBA, especially the transition from breastfeeding to complementary feeding which is one of the critical points for increasing stunting prevalence. The study recommends interventions that can be in the form of health education to improve the nutritional status of adolescents to increase the height of adolescent girls, particularly before menarche. Such interventions could be integrated into existing programs, such as the provision of

iron tablets to adolescent girls or integration into the adolescent posyandu (integrated health post) program to maximize their effectiveness.

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Conflict of Interest

The authors declare no conflict of interest.

REFERENCES

1. Kemenkes R. Direktorat Jenderal Bina Gizi dan Kesehatan Ibu dan Anak. Pedoman Pelayanan Kel Berencana Pasca Persalinan di Fasilitas Kesehat. 2014;
2. Kemenkes RI. Panduan Manajemen Terintegrasi Suplementasi Vitamin A. Jakarta Kemenkes RI. 2016;
3. Kemenkes RI. Pedoman umum pengelolaan posyandu. Jakarta Kemenkes RI. 2011;54.
4. de Onis M, Branca F. Childhood stunting: a global perspective. Matern Child Nutr. 2016 May;12 Suppl 1(Suppl 1):12–26.
5. Kemenkes RI. Tabel Komposisi Pangan Indonesia (TKPI). Direktorat Jenderal Kesehat Masy Direktorat Gizi Masy. 2017;
6. Ina FA, Azisah NN, Alim A, Kadir E. Factors of stunting in toddlers (Analytical Study in the Work Area of the Tena Teke Health Center, Southwest Sumba, NTT). J Publ Kesehat Masy Indones [Internet]. 2023 Apr 29;10(1). Available from: https://ppjp.ulm.ac.id/journal/index.php/JPKMI/article/view/15346
7. Sudfeld CR, Charles McCoy D, Danaei G, Fink G, Ezzati M, Andrews KG, et al. Linear growth and child development in low-and middle-income countries: a meta-analysis. Pediatrics. 2015;135(5):e1266–75.
8. de Onis M, Branca F. Childhood stunting: A global perspective. Matern Child Nutr. 2016;12:12–26.
9. Hoddinott J, Alderman H, Behrman JR, Haddad L, Horton S. The economic rationale for investing in stunting reduction. Matern Child Nutr. 2013 Sep;9 Suppl 2(Suppl 2):69–82.
10. FAO, IFAD, UNICEF, WFP, WHO. The State Of Food Security And Nutrition In The World 2020. Transforming Food Systems For Affordable Healthy Diets. The State of Food Security and Nutrition in the World 2020. 2020. 20–315 p.
11. Hardiansyah Supriasa. Ilmu Gizi Teori dan Aplikasi. Jakarta: Penerbit Buku Kedokteran EGC; 2017.
12. Budiawan B. Hubungan Tingkat Pendidikan Ibu Dan Pemberian Asi Eksklusif Dengan Kejadian Stunting Pada Balita Di Provinsi Sulawesi Selatan Tahun 2015. Media Gizi Pangan. 2018;25(1):25–32.
13. Madanijah S. Model Pendidikan "GI-PSISEHAT" bagi Ibu serta Dampaknya terhadap Perilaku Ibu, Lingkungan Pembelajaran, Konsumsi Pangan, dan Status Gizi Anak Usia Dini [Disertasi]. Bogor Inst Pertan Bogor. 2003;
14. WHO GS. Global status report on noncommunicable diseases 2010. 2014;
15. Özaltin E, Hill K, Subramanian S V. Association of maternal stature with offspring mortality, underweight, and stunting in low-to middle-income countries. Jama. 2010;303(15):1507–16.
16. Purwanti R, Nurfita D. Review literatur: analisis determinan sosio demografi kejadian stunting pada balita di berbagai negara berkembang. Bul Penelit Kesehat. 2019;47(3):153–64.
17. Beal T, Tumilowicz A, Sutrisna A, Izwardy D, Neufeld LM. A review of child stunting determinants in Indonesia. Matern Child Nutr. 2018;14(4):1–10.
18. Semba RD, Moench-Pfanner R, Sun K, De Pee S, Akhter N, Rah JH, et al. Consumption of micronutrient-fortified milk and noodles is associated with lower risk of stunting in preschool-aged children in Indonesia. Food Nutr Bull. 2011;32(4):347–53.
19. Beal T, Le DT, Trinh TH, Burra DD, Huynh T, Duong TT, et al. Child stunting is associated with child, maternal, and environmental factors in Vietnam. Matern Child Nutr. 2019 Oct;15(4):e12826.
20. Semba RD, Shardell M, Ashour FAS, Moaddel R, Trehan I, Maleta KM, et al. Child stunting is associated with low circulating essential amino acids. EBioMedicine. 2016;6:246–52.
21. Wicaksono F, Harsanti T. Determinants of Stunted Children in Indonesia: A Multilevel Analysis at the Individual, Household, and Community Levels. Kesmas Natl Public Heal J. 2020;15(1).
22. Titaley CR, Ariawan I, Hapsari D, Muasyaroh A. Determinants of the stunting of children in Indonesia : A multilevel analysis of the 2013 Indonesia Basic Health Survey. Nutrients. 2013;11:1160.
23. Semba RD, de Pee S, Sun K, Sari M, Akhter N, Bloem MW. Effect of parental formal education on risk of child stunting in Indonesia and Bangladesh: a cross-sectional study. Lancet. 2008;371(9609):322–8.
24. Triatmaja D, Lestari K, Setiabudiawan B. Effect of stunting education counseling with booklet media on parental knowledge and attitude as an effort to overcome stunting. 2023;
25. Sosseh SAL, Barrow A, Lu ZJ. Cultural beliefs, attitudes and perceptions of lactating mothers on exclusive breastfeeding in The Gambia: an

ethnographic study. BMC Womens Health. 2023;23(1):18.