KESANS: International Journal of Health and Science
2808-7178 / 2808-7380
http://kesans.rifainstitute.com/index.php/kesans/index

The Relationship of Children and Family Characteristics to Stunting Incidents: Population Demographic Study in Kalinyamat Kulon Subdistrict, Tegal City

[1]Karina Shasri Anastasya*, [2]Hindiyati Nuriah, [3]Machrumnizar Machrumnizar, [4]Mulia Rahmansyah, [5]Yuliana

[1] Department of Nutrition, Faculty of Medicine, Universitas Trisakti, Indonesia*; email: karina.shasri@trisakti.ac.id

[2] Department of Occupational Medicine, Faculty of Medicine, Universitas Trisakti, Indonesia; email: Hindiyati.nuriah@trisakti.ac.id

[3] Department of Parasitology, Faculty of Medicine, Universitas Trisakti, Indonesia; email: machrumnizar_md@trisakti.ac.id

[4] Department of Radiology, Faculty of Medicine, Universitas Trisakti, Indonesia; email: mulia.rahmansyah@trisakti.ac.id

[5] Department of Parasitology, Faculty of Medicine, Universitas Trisakti, Indonesia; email: dr.yuliana@trisakti.ac.id

*Corresponding

Article Information
Submitted: **27 August 2026**
Accepted: **18 October 2026**
Publish: **29 October 2026**

Keyword: Stunting; Child Characteristics; Parent Characteristics;

Copyright holder: Karina Shasri Anastasya, Hindiyati Nuriah, Machrumnizar Machrumnizar, Mulia Rahmansyah, Yuliana

Year: 2026

This is an open access article under the CC BY-SA license.

Abstract

Introduction: *Stunting is associated with multiple child, parental, and household factors.* ***Objective:*** *This study assessed their bivariate associations with stunting status in Kalinyamat Kulon, Tegal City.* ***Methods:*** *This analytical observational cross-sectional comparison included 18 stunted and 18 non-stunted children younger than five years, recruited consecutively. Data were collected through maternal interviews and child anthropometry and analyzed using t tests, Mann–Whitney U, chi-square, and Fisher's exact tests.* ***Results and Discussion:*** *Stunting status was associated with non-hospitalized illness frequency ($p = .011$), inadequate child nutrition (OR = 5.20; 95% CI [1.25, 21.57]; $p = .019$), maternal education ($p = .025$), occupation ($p = .010$), height ($p < .001$), salary ($p = .040$), third-trimester nutritional inadequacy (OR = 10.0; 95% CI [1.75, 56.93]; $p = .005$), paternal age ($p = .023$), and paternal height ($p = .011$).* ***Conclusion:*** *Child nutrition and illness, maternal socioeconomic and prenatal characteristics, and paternal age and height showed bivariate associations with stunting. Causal inferences are limited by the small cross-sectional sample.*

How to Cite: **Karina Shasri Anastasya, Hindiyati Nuriah, Machrumnizar Machrumnizar, Mulia Rahmansyah, Yuliana/The Relationship of Children and Family Characteristics to Stunting Incidents: Population Demographic Study in Kalinyamat Kulon Subdistrict, Tegal City/Vol. 6, No. 1, 2026**
DOI: https://doi.org/10.54543/kesans.v6i1.731
e-ISSN/p-ISSN: **2808-7178 / 2808-7380**
Published by: **CV. Rifainstitut/KESANS: International Journal of Health and Science**

Introduction

Stunting is defined as a height-for-age z-score below-2 standard deviations of the WHO Child Growth Standards and reflects impaired linear growth associated with cumulative nutritional, infectious, and environmental exposures (Leroy & Frongillo, 2019). Beyond anthropometric status, stunting may indicate sustained constraints on child health and development. Stunting remains a public health concern in Indonesia. National Riskesdas estimates reported a prevalence of 37.2% in 2013 and 30.8% in 2018. Although national estimates describe the scale of the problem, they cannot explain how child-level exposures and maternal, paternal, and household characteristics jointly relate to stunting in a specific community.

Previous studies have linked childhood infections, dietary intake, parental education, socioeconomic conditions, and parental characteristics with impaired linear growth (Beal et al., 2018; Mahudeh et al., 2023; Mahfouz et al., 2022; Soekatri et al., 2020). However, evidence is often discussed by isolated risk-factor categories, leaving the relative patterns of child, maternal, and paternal characteristics within the same local population insufficiently described. In particular, paternal age and height and maternal nutritional adequacy during late pregnancy warrant consideration alongside maternal education and household resources. A conceptual framework distinguishes proximal child-level pathways (dietary adequacy and illness, potentially affecting nutrient availability and utilization), prenatal pathways (maternal nutritional adequacy during the third trimester), intergenerational pathways (maternal and paternal height, reflecting genetic potential and accumulated life-course conditions), and distal social pathways (parental education, occupation, and income, potentially shaping access to food, care, and health services). These pathways may overlap; consequently, bivariate associations cannot establish independent effects or causal mediation.

This study aimed to examine bivariate associations between child characteristics, maternal and paternal characteristics, and stunting status among children younger than five years in Kalinyamat Kulon Subdistrict, Tegal City.

Method

This was an analytical observational, cross-sectional comparison of children classified as stunted and non-stunted, conducted in Kalinyamat Kulon, Tegal City, from September to October 2023. The sample was assembled with consecutive sampling and comprised two equal-sized groups (18 stunted and 18 non-stunted children). Because group numbers were fixed in the analyzed sample, the study evaluates associations with stunting status rather than estimating population prevalence or incidence. All participating mothers provided informed consent.

Study Population

Consecutive sampling yielded 36 mother–child pairs: 18 children with stunting and 18 without stunting, all younger than five years, in Kalinyamat Kulon, Tegal City. Eligible participants were mothers primarily responsible for child care who consented to participate. Stunting was defined using height-for-age anthropometry below −2 SD. The original eligibility description refers to a history of stunting diagnosis; whether classification was independently confirmed at enrollment should be clarified from the study records.

The stated inclusion criteria were child stunting classification for the stunted group, primary care provided by the mother, and consent to participate; refusal to participate was an exclusion criterion. The original protocol does not provide separate detailed eligibility criteria for the non-stunted comparison group, which should be confirmed before submission.

Data Collection

Primary data were obtained through interviews with mothers and anthropometric measurements of children. Child characteristics included gestational age, number of illnesses without hospitalization and with hospitalization during the preceding six months, and nutritional adequacy. Family variables included parental age, education, occupation, height, salary, histories of stunting and low birth weight, and maternal nutritional adequacy during the third trimester. The source manuscript does not specify the instruments or thresholds used to classify nutritional adequacy; these should be documented from the original study protocol.

Statistical Analysis

Continuous variables were summarized using means and standard deviations and/or medians and ranges; categorical variables were summarized using counts and percentages. The analysis compared the stunted and non-stunted groups. No multivariable adjustment was reported. Bivariate analyses used independent-samples t tests, Mann–Whitney U tests, chi-square tests, or Fisher's exact tests, as appropriate to the variable and cell counts. A two-sided p value $< .05$ was considered statistically significant. Odds ratios (ORs) and 95% confidence intervals (CIs) were reported for selected categorical comparisons. Given the small sample and multiple comparisons, estimates should be interpreted cautiously.

Result and Discussion

1. Result

An assessment was carried out from 18 mothers with stunted children and 18 mothers with non-stunting children age < 5 years old in the Kalinyamat Kulon Village, Tegal City so that the following results were obtained

Table 1
Child Characteristics

Variable	Stunting (n=18)		Non-Stunting (n=18)		*p*	OR CI 95%
	n (%)	Mean ± SD; Median (min-max)	n (%)	Mean ± SD; Median (min-max)		
Gestational age, weeks	-	38.06±1.92; 37.5(36-41)	-	39.22 ± 1.39; 39(37-42)	0.052‡	-
Number of non-inpatient illnesses (last 6 months)		-		-	**0.011**¥	-
• 0	4 (22.2)		13 (72.2)			
• 1	4 (22.2)		0 (0)			
• 2	6 (33.3)		4 (22.2)			
• 3	3 (16.7)		1 (5.6)			
• >3	1 (5.6)		0 (0)			
Number of inpatient illnesses (last 6 months)		-		-	0.630§	0.62 (0.09-4.27)
• 0	15 (83.3)		16 (88.9)			
• 1	3 (16.7)		2 (11.1)			
Child nutritional adequacy		-		-	**0.019**§	5.20 (1.25-21.57)
• Inadequate	12 (66.7)		5 (27.8)			
• Adequate	6 (33.3)		13 (72.2)			

‡Mann Whitney U; §Chi-square; ¥Fischer exact; significant p<0.05

Analysis of children's characteristics found that there was a relationship between the number of non-hospitalized illnesses (p=0.011) and the child's nutritional adequacy (p=0.019) on the incidence of stunting. Children with stunting had a significantly higher number of non-hospitalized illnesses than non-stunting children. Children who experience inadequate nutrition have a 5.2x (OR 5.2; CI95% 1.25-21.57) higher risk of experiencing stunting compared to children with adequate nutrition.

Table 2
Family Characteristics

Variable	Stunting (n=18)		Non-Stunting (n=18)		*p*	OR CI 95%
	n (%)	Mean ± SD; Median (min-max)	n (%)	Mean ± SD; Median (min-max)		
Mother						
Age, years	-	32.22 ± 6.56; 32.50 (21-44)	-	33.61 ± 3.43; 34.00 (28-38)	0.432†	-
Education		-		-	**0.025¥**	-
• Elementary school	8 (44.4)		1 (5.6)			
• Junior high school	3 (16.7)		5 (27.8)			
• Senior high school	7 (38.9)		12 (66.7)			
Occupation		-		-	**0.010¥**	-
• Housewife	13 (72.2)		9 (50.0)			
• Private sector	1 (5.6)		8 (44.4)			
• Merchant	3 (16.7)		0 (0)			
• Laborer	1 (5.6)		1 (5.6)			
Height, cm	-	153.78 ± 7.84; 155.00 (140-165)	-	162.50 ± 2.57; 162.50 (160-165)	**<0.001‡**	-
Salary, million	-	0.29 ± 0.53; 0.00 (0-2)	-	0.94 ± 0.99; 0.50 (0-2)	**0.040‡**	-
History of stunting		-		-	1.000¥	-
• Yes	1 (5.6)		0 (0)			
• No	17 (94.4)		18 (100.0)			
History of LBW		-		-	1.000¥	-
• Yes	0 (0)		0 (0)			
• No	18 (100)		18 (100)			
Maternal nutritional adequacy during the third trimester of pregnancy		-		-	**0.005§**	10.0 (1.75-56.93)
• Inadequate	16 (88.9)		8 (44.4)			
• Adequate	2 (11.1)		10 (55.6)			
Father						
Age, years	-	35.44 ± 6.66 34.00 (23-46)	-	39.78 ± 3.84 40.50 (32-46)	**0.023†**	-
Education		-		-	0.328¥	-
• Elementary school	4 (22.2)		2 (11.1)			
• Junior high school	6 (33.3)		3 (16.7)			
• Senior high school	8 (44.4)		13 (72.2)			
Occupation		-		-	0.102¥	-
• Private sector	6 (33.3)		12 (66.7)			
• Merchant	9 (50)		3 (16.7)			
• Laborer	2 (11.1)		1 (5.6)			

Variable	Stunting (n=18)		Non-Stunting (n=18)		*p*	OR CI 95%
	n (%)	Mean ± SD; Median (min-max)	n (%)	Mean ± SD; Median (min-max)		
• State-owned enterprises	1 (5.6)		1 (5.6)			
• Self-employed	0 (0)		1 (5.6)			
Height, cm	-	164.94 ± 7.47 165 (155-185)	-	170.17 ± 3.46 170 (165-178)	**0.011**†	-
Salary, million	-	2.04 ± 1.08 2.00 (0-5)	-	2.44 ± 0.90 2.00 (1-5)	0.082‡	-
History of stunting		-		-	0.486¥	-
• Yes	2 (11.1)		0 (0)			
• No	16 (88.9)		18 (100)			
History of LBW		-		-	1.000¥	-
• Yes	0 (0)		0 (0)			
• No	18 (100)		18 (100)			

†Independent T-test; ‡Mann Whitney U; §Chi-square; ¥Fischer exact; significant p<0.05

Analysis of maternal characteristics showed that there was a significant relationship between education level (p=0.025), occupation (p=0.010), height (p<0.001), salary (p=0.040) and nutritional adequacy during the third trimester of pregnancy (p=0.005) on the incidence of stunting in children. In children with stunting, there was a significantly lower level of maternal education, maternal employment which was dominated by housewives, lower maternal height, lower salary and inadequate maternal nutrition during the third trimester of pregnancy. Analysis of father's characteristics showed that there was a significant relationship between age (p=0.023) and height (p=0.011) on the incidence of stunting in children. In children with stunting, the father's age was significantly younger, and the father's height was lower.

2. Discussion

Child characteristics. Children with stunting had a different distribution of non-hospitalized illness episodes over the preceding six months (p = .011) and more frequently had inadequate nutritional intake (66.7% vs. 27.8%; OR = 5.20, 95% CI [1.25, 21.57]; p = .019). These findings are consistent with reports linking infectious illness and dietary inadequacy to linear growth impairment (Mahudeh et al., 2023; Nurbawena et al., 2021; Mahfouz et al., 2022). Repeated illness may suppress appetite, impair absorption, and increase metabolic demand, while inadequate dietary intake may reduce resistance to infection. These reciprocal processes support integrated nutritional and infection-prevention services. Nevertheless, illness histories were reported retrospectively, and cross-sectional data cannot determine whether illness preceded growth faltering.

Maternal characteristics: stature and prenatal nutrition. Maternal height differed substantially between groups (153.78 ± 7.84 vs. 162.50 ± 2.57 cm; p < .001). Inadequate maternal nutrition during the third trimester was reported in 88.9% of mothers in the stunting group versus 44.4% in the comparison group (OR = 10.0, 95% CI [1.75, 56.93]; p = .005). Maternal stature may reflect inherited growth potential and cumulative nutritional and environmental exposures across the life course; prenatal nutritional adequacy may influence fetal growth and subsequent child growth trajectories. These

associations justify attention to adolescent and preconception nutrition as well as antenatal care. However, third-trimester intake was recalled after pregnancy, potentially introducing recall bias, and the wide CI signals substantial imprecision.

Paternal characteristics and intergenerational growth. Fathers of stunted children were younger on average (35.44 ± 6.66 vs. 39.78 ± 3.84 years; p = .023) and shorter (164.94 ± 7.47 vs. 170.17 ± 3.46 cm; p = .011). Paternal height, like maternal height, may capture both inherited stature and earlier-life deprivation. Thus, the associations of both parents' heights with child stunting suggest an intergenerational dimension, but neither height should be interpreted as a direct causal exposure without adjustment for child age, sex, socioeconomic conditions, and other determinants. The paternal-age finding may also reflect unmeasured differences in family resources or timing of parenthood; its mechanism cannot be established here.

Socioeconomic and maternal social characteristics. Maternal education (p = .025), occupation (p = .010), and salary (p = .040) were associated with stunting status. These findings are broadly compatible with evidence connecting maternal education and socioeconomic resources to child growth (Kiik & Nuwa, 2021; Azizah et al., 2022; Beal et al., 2018; Soekatri et al., 2020). Education may affect access to health information and decision-making, while income can shape food security and access to services. Importantly, being a housewife should not itself be considered biologically harmful; occupation categories may proxy for household circumstances, and maternal salary alone is not equivalent to total household income. Confounding and reverse causation cannot be excluded.

Non-significant findings. Gestational age (p = .052), number of hospitalized illnesses (p = .630), maternal age (p = .432), maternal history of stunting (p = 1.000), paternal education (p = .328), occupation (p = .102), salary (p = .082), and history of stunting (p = .486) were not statistically associated with stunting status. Recorded low-birth-weight history was absent in both groups of parents and therefore provides no useful between-group contrast. A non-significant result should not be interpreted as proof of no association, especially with only 18 children per group.

Study implications and limitations. Findings favor a family-centered approach combining childhood nutrition and infection prevention with antenatal nutrition, parental growth history, and socioeconomic assessment. This was a small, single-community, consecutively sampled study with a fixed number of stunted and non-stunted participants. All analyses were bivariate, with no control for potential confounders and no temporal ordering of exposure and outcome. Recall bias, nutritional classification uncertainty, multiple testing, and wide confidence intervals limit causal interpretation and generalizability. Larger longitudinal studies with standardized dietary measures and multivariable models are needed.

Conclusion

In this sample of 36 children, stunting status was associated in bivariate analyses with the number of non-hospitalized illnesses and inadequate child nutritional intake; maternal education, occupation, height, and salary; inadequate maternal nutritional intake during the third trimester; and paternal age and height. The associations involving both parents' heights may reflect intergenerational influences. These findings support comprehensive child and family assessment, but the small cross-sectional sample and lack of adjusted analyses preclude causal conclusions or identification of independent predictors.

Reference

Abuya, B. A., Onsomu, E. O., Kimani, J. K., & Moore, D. (2011). Influence of maternal education on child immunization and stunting in Kenya. *Maternal and Child Health Journal*, 15(8), 1389–1399. https://doi.org/10.1007/s10995-010-0670-z

Azizah, A. M., Nurmala, I., & Devy, S. R. (2022). Meta analisis: Pengaruh tingkat pendidikan ibu terhadap kejadian stunting pada anak balita. *Amerta Nutrition*, 6(4), 369–375. https://doi.org/10.20473/amnt.v7i4.2022.369-375

Beal, T., Tumilowicz, A., Sutrisna, A., Izwardy, D., & Neufeld, L. M. (2018). A review of child stunting determinants in Indonesia. *Maternal & Child Nutrition*, 14(4). https://doi.org/10.1111/mcn.12617

Farooq, M. U., Rafique, M. Z., & Shah, M. A. R. (2019). The effects of mother education and intervening mechanisms on rural-urban child stunting: Evidence from Pakistan. *Revista Pan-Amazônica de Saúde*, 10. https://doi.org/10.5123/S2176-6223201900044

Hidayat, M. S., & Pinatih, G. N. I. (2017). Prevalensi stunting pada balita di wilayah kerja Puskesmas Sidemen Karangasem. *E-Jurnal Medika Udayana*, 6(7), 1–5.

Husnaniyah, D., Yulyanti, D., & Rudiansyah, R. (2020). Hubungan tingkat pendidikan ibu dengan kejadian stunting. *The Indonesian Journal of Health Science*, 12(1), 57–64. https://doi.org/10.32528/ijhs.v12i1.4857

Khan, S., Zaheer, S., & Safdar, N. F. (2019). Determinants of stunting, underweight and wasting among children <5 years of age: Evidence from 2012–2013 Pakistan demographic and health survey. *BMC Public Health*, 19, 358. https://doi.org/10.1186/s12889-019-6688-2

Kiik, S. M., & Nuwa, M. S. (2021). Maternal factors in stunting among vulnerable children. *Jurnal Keperawatan Indonesia*, 24(2), 82–89. https://doi.org/10.7454/jki.v24i2.1306

Leroy, J. L., & Frongillo, E. A. (2019). Perspective: What does stunting really mean? A critical review of the evidence. *Advances in Nutrition*, 10(2), 196–204. https://doi.org/10.1093/advances/nmy101

Mahfouz, E. M., Mohammed, E. S., Alkilany, S. F., & Abdel Rahman, T. A. (2022). The relationship between dietary intake and stunting among pre-school children in Upper Egypt. *Public Health Nutrition*, 25(8), 2179–2187. https://doi.org/10.1017/S136898002100389X

Mahudeh, M., Rohmah, N., & Adriani, S. W. (2023). Correlation between history of infectious disease with stunting in toddler. *Journal of Nursing Science Update*, 10(2), 193–200. https://doi.org/10.21776/ub.jik.2022.010.02.15

Mkhize, M., & Sibanda, M. (2020). A review of selected studies on the factors associated with the nutrition status of children under the age of five years in South Africa. *International Journal of Environmental Research and Public Health*, 17(21), 7973. https://doi.org/10.3390/ijerph17217973

Mochtar, N., & Ali, N. M. (2021). Hubungan pola makan, riwayat penyakit infeksi, tinggi badan orang tua dan sumber air minum dengan kejadian stunting pada balita 24–59 bulan di wilayah kerja Puskesmas Kalumpang, Kota Ternate. *Hospital Majapahit*, 13(1), 11–20. https://doi.org/10.5281/zenodo.4558409

Nurbawena, H., Utomo, M. T., & Yunitasari, E. (2021). Hubungan riwayat sakit dengan kejadian stunting pada balita. *Indonesian Midwifery and Health Sciences Journal*, 3(3), 213–225. https://doi.org/10.20473/imhsj.v3i3.2019.213-225

Putri, M. G., Irawan, R., & Mukono, I. S. (2021). The relationship of vitamin A supplementation, giving immunization, and history of infection disease with the stunting of children aged 24–59 months in Puskesmas Mulyorejo, Surabaya. *Media Gizi Kesmas*, 10(1), 72–79. https://doi.org/10.20473/mgk.v10i1.2021.72-79

Rahma, I. M., & Mutalazimah, M. (2022). Correlation between family income and stunting among toddlers in Indonesia: A critical review. *In Proceedings of the International Conference on Health and Well-Being* (ICHWB 2021) (pp. 78–86).

Soekatri, M. Y. E., Sandjaja, S., & Syauqy, A. (2020). Stunting was associated with reported morbidity, parental education and socioeconomic status in 0.5–12-year-old Indonesian children. *International Journal of Environmental Research and Public Health*, 17(17), 6204. https://doi.org/10.3390/ijerph17176204

Suryanegara, W., & Reviani, N. (2019). The relationship between risk factors and stunting incidence in Desa Cilembu Kecamatan Pamulihan, Kabupaten Sumedang Provinsi Jawa Barat on September 2019. *Solid State Technology*, 63(5), 5341–5356.

Utami, R. A., Setiawan, A., & Fitriyani, P. (2019). Identifying causal risk factors for stunting in children under five years of age in South Jakarta, Indonesia. *Enfermería Clínica*, 29, 606–611. https://doi.org/10.1016/j.enfcli.2019.04.093

Yanti, L. C., Hatijar, H., & Hardiyanti, S. (2022). Counseling on preventing stunting starting from the family by improving nutrition and sanitation and complete immunization in Lanto Jaya Village, Poso Regency. *Mattawang: Jurnal Pengabdian Masyarakat*, 3(1), 65–69. https://doi.org/10.35877/454RI.mattawang812