ANALYSIS OF THE EFFECT OF MOTHER, TODDLER, AND ENVIRONMENTAL FACTORS ON THE INCIDENCE OF STUNTING IN THE BALONGSARI VILLAGE OF MOJOKERTO CITY IN 2025

Eny Dwi Rokhmatu Laily [1], Sulis Diana[2], Dhonna Anggreni [3]
STIKES Majapahit Mojokerto
Corresponding Email: diana.sulis6@gmail.com

ABSTRACT

Background: Stunting is a chronic nutritional problem in Indonesia that affects height, cognitive and motor development, and the risk of chronic diseases. This study aims to analyze the influence of maternal, toddler, and environmental factors on the incidence of stunting in toddlers in Balongsari Village, Mojokerto City in 2025

Method: This study is a cross-sectional analytical observational study of 84 mothers and toddlers selected using proportionate stratified random sampling. Data were collected through questionnaires, interviews, secondary data, and anthropometry, then analyzed using chi-square tests and SEM.

Results: The results of the study showed that most mothers were of normal nutritional status (60.7%), aged 20–34 years (61.9%), had good knowledge about breastfeeding (56%), and had a normal birth interval of 2–4 years (67.9%). Among infants, the majority had a history of occasional infections (65.5%), complete immunization (52.4%), and an ideal birth spacing (66.7%). Environmental factors were dominated by lack of access to clean water (52.4%), poor sanitation (51.2%), availability of health services (71.4%), and unhygienic environments (52.4%). Exclusive breastfeeding for 6 months was 54.8%, and most toddlers were not stunted (69%).

The analysis shows that the significant variables for stunting are maternal nutritional status (p=0.000; PR=23.500), knowledge (p=0.000; PR=8.039), maternal age during pregnancy (p=0.001; PR=0.185), birth spacing (p=0.000; PR=6.836), parity (p=0.001; PR=0.187), history of infection (p=0.000; PR=9.614), immunization (p=0.000; PR=12.222), sanitation (p=0.000; PR=9.690), access to clean water (p=0.000; PR=13.508), access to health facilities (p=0.000; PR=13.762), and exclusive breastfeeding (p=0.000; PR=14.438). The non-significant variable was birth spacing (p=0.182; PR=0.491). SEM indicated that maternal, infant, and environmental factors were influential, with maternal factors being the most dominant

Conclusion: Stunting in toddlers is influenced by factors related to the mother, the toddler, the environment, and exclusive breastfeeding. Prevention efforts should focus on educating mothers about nutrition, promoting exclusive breastfeeding, immunizing toddlers, and improving sanitation and access to clean water

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Keywords

Stunting, Exclusive Breastfeeding, Mother Education, Sanitation, Toddlers.

Contact Correspondent Author
Nama : Sulis Diana
Nomor Handphone /WA : 082234209942

Email Author
1 Sulis Diana – diana.sulis6@gmail.com

INTRODUCTION

The impact of stunting not only affects children's height, but also influences cognitive development, motor skills, and increases the risk of chronic diseases in the future. Nearly one-third of Indonesian children experience growth disorders due to poor nutrition and repeated infections, which occur mainly during the first 1,000 days of life. The main causes of stunting include poor maternal nutrition, inadequate diet, poor sanitation, and lack of psychosocial stimulation in children. Maternal factors, which include nutritional knowledge, maternal nutritional status during pregnancy, and maternal height, play an important role in determining the risk of stunting in children, optimal exclusive breastfeeding, improvement of sanitation and home environmental hygiene, and increased access to health services. Research objective: To analyze the influence of maternal factors, toddler factors, and environmental factors on the incidence of stunting in toddlers in Balongsari Village, Mojokerto City in 2025.

METHOD

This study is a cross-sectional analytical observational study of 84 mothers and toddlers selected using proportionate stratified random sampling. Population: all pairs of mothers and toddlers aged 24–59 months, totaling 84. The sample consisted of toddlers aged 24–59 months with complete data on the variables and parental/guardian consent to participate in the study at the Gedongan Community Health Center, totaling 84 toddlers. There were 42 stunted toddlers and 42 non-stunted toddlers (controls). Independent variables: Mother Factors (Nutritional status during pregnancy, Knowledge about breastfeeding, Age, Inter-pregnancy interval, Parity), Toddler Factors (History of illness, Immunization status), Intermediate variables: Exclusive breastfeeding, Dependent variable: Incidence of stunting in toddlers. Data were collected through questionnaires, interviews, secondary data, and anthropometry, then analyzed using chi-square tests and SEM.

RESULTS

1. Maternal factors

Table 4. 3 Maternal Factors Affecting Stunting Incidence in Balongsari Village, Mojokerto City

No	Maternal factors		
1.	**Maternal nutritional status**	**frequency (f)**	**Percentage (%)**
	a. Normal	51	60,7
	b. less	33	39,3
2.	**Mother's Age During Pregnancy**		
	a. Too young <20 years old	32	38,1
	b. Safe age 20–34 years old	52	61,9
	c. Too old >34 years old		
3.	**Knowledge about Exclusive Breastfeeding**		

	a. Good	47	56
	b. Fair	37	44
	c. Poor	-	-
4.	**Pregnancy Spacing**		
	a. Normal (2-4 years)	57	67,9
	bRisk (<2 years/>4 years)	37	32,1
5.	**Parity**		
	a. Primi : 1	20	23,8
	b. Multi > 1	64	76,2
Number		**84**	**100**

b. Toddler Factors

Table 4. 4 Factors Affecting Stunting Incidence Among Toddlers in Balongsari Village, Mojokerto City

No	**Infant Factors**		
1.	**History of Infectious Diseases**	**frequency (f)**	**Percentage (%)**
	a. No (not sick/3 months)	-	-
	b. Occasionally (1-2 times/3 months)	55	65,5
	c. Frequently (>3 times/3 months)	29	34,5
2.	**Immunization Status**		
	a. Complete	44	52,4
	b. Not complete	20	47,6
3	**Birth spacing**		
	a. Very close <2 years	-	-
	b. Ideal (2-3 years)	56	66,7
	c. Far >3 years	28	33,3
Number		**84**	**100**

c. Environmental Factors

Table 4. 5 Environmental Factors Affecting Stunting Incidence in Balongsari Village, Mojokerto City

No	**Environmental Factors**		
1.	**Access to Clean Water**	**frequency (f)**	**Percentage (%)**
	a. Yes (clean water)	40	47,6
	b. No	44	52,4
2.	**Sanitation**		
	a. good	41	48,8
	b. Not so good	43	51,2
3.	**Access to Health Services**		
	a. Yes	60	71,4
	b. No	24	28,6

4.	**Hygiene**		
	a. Yes	40	47,6
	b. No	44	52,4
Number		**84**	**100**

d. Exclusive breastfeeding

Table 4. 6 Exclusive Breastfeeding Among Toddlers in Balongsari Village, Mojokerto City

No.	Exclusive breastfeeding	Frequency (f)	Percentage (%)
1.	Yes (for 6 full months)	46	54,8
2.	No (<6 months)	38	45,2
Number		96	100

e. Incidence of stunting

Table 4. 7 Incidence of Stunting in Toddlers in Balongsari Village, Mojokerto City

No.	Incidence of stunting	Frequency (f)	Percentage (%)
1.	Not stunted	58	69
2.	Stunting	26	31
Jumlah		84	100

2. Analisis uji hubungan faktor ibu (status gizi ibu selama kehamilan, pengetahuan gizi ibu, usia ibu saat hamil, jarak kehamilan, dan paritas) terhadap kejadian stunting pada balita

Table 4. 8 Analysis of the relationship between maternal factors (maternal nutritional status during pregnancy, maternal nutritional knowledge, maternal age during pregnancy, birth spacing, and parity) and the incidence of stunting in toddlers in Balongsari Village, Mojokerto City in 2025

No.	Maternal Factors		Incidence of stunting				Total		P *value*	PR (95%CI)
			Not stunted		Stunting					
			f	%	f	%	f	%		
1	Maternal nutritional status	Normal	47	92,2	4	7,8	51	100	0,000	23,500 (6,724-82,136)
		Risk	11	33,3	22	66,7	33	100		
2	Mother's knowledge	Good	41	87,2	6	12,8	47	100	0,000	8,039 (2,748-23,515)
		Pair	17	45,9	20	54,1	37	100		
		Poor	-	-	-	-	-	-		
3	Mother's age during pregnancy	Too young	15	46,9	17	53,1	32	100	0,001	0,185
		Safe age	43	82,7	9	17,3	52	100		

		Too old	-	-	-	-	-	-		(0,068-0,502)
4	Pregnancy spacing	Normal (2-4 years)	47	82,5	10	17,5	57	100	0,000	6,836 (2,447-19,096)
		Risk <2 years/>4 years	11	40,7	16	59,3	27	100		
5	Parity	Primi : 1	8	40	12	60	20	100	0,001	0,187(0,064-0,546)
		Multi > 1	50	78,1	14	21,9	64	100		

3. Analysis of factors affecting toddlers (history of infectious diseases, immunization status, and spacing between children) on the incidence of stunting in toddlers

Table 4. 9 Factor analysis of toddlers (history of infectious diseases, immunization status, and birth spacing) on the incidence of stunting in toddlers in Balongsari Village, Mojokerto City in 2025.

No.	Infant Factors		Incidence of stunting				Total		P *value*	PR (95%CI)
			Not stunted		Stunting					
			f	%	f	%	f	%		
1	History of infectious diseases	None	-	-	-	-	-	-	0,000	9,614 (3,329-27,761)
		Occasionally: 1-2 times/3 months	47	85,5	8	14,5	55	100		
		Frequently: >3 times/3 months	11	37,9	18	62,1	29	100		
2	Immunization status	Complete	40	90,9	6	12,8	44	100	0,000	12,222 (3,674-40,654)
		Incomplete	18	45	22	55	40	100		
3	Birth Spacing	Very close: <2 years	-	-	-	-	-	-	0,182	0,491 (0,171-1,410)
		Ideal: 2-3 years	36	64,3	20	35,7	56	100		
		Far: >3 years	22	78,6	6	9,7	28	100		

4. Analysis of the relationship between environmental factors (sanitation, clean water, and distance to health facilities) and the incidence of stunting in toddlers

Table 4. 10 Analysis of the relationship between environmental factors (sanitation, clean water, and distance to health facilities) and the incidence of stunting in toddlers in Balongsari Village, Mojokerto City in 2025

No.	Faktor Lingkungan		Incidence of stunting				Total		P *value*	PR (95%CI)
			Not stunted		Stunting					
			f	%	f	%	f	%		
1	Sanitation	Good	37	90,2	4	12,7	41	100	0,000	9,690 (2,941-31,929)
		Poor	21	48,8	22	51,2	42	100		
2	Access to clean water	Yes	37	92,5	3	7,5	40	100	0,000	13,508 (3,620-50,410)
		No	21	47,7	23	52,3	44	100		
3	Access to health services	Yes	51	85	9	15	60	100	0,000	13,762 (4,446-42,602)
		No	7	29,2	17	70,8	24	100		

5. Analysis of the relationship between exclusive breastfeeding and stunting in toddlers

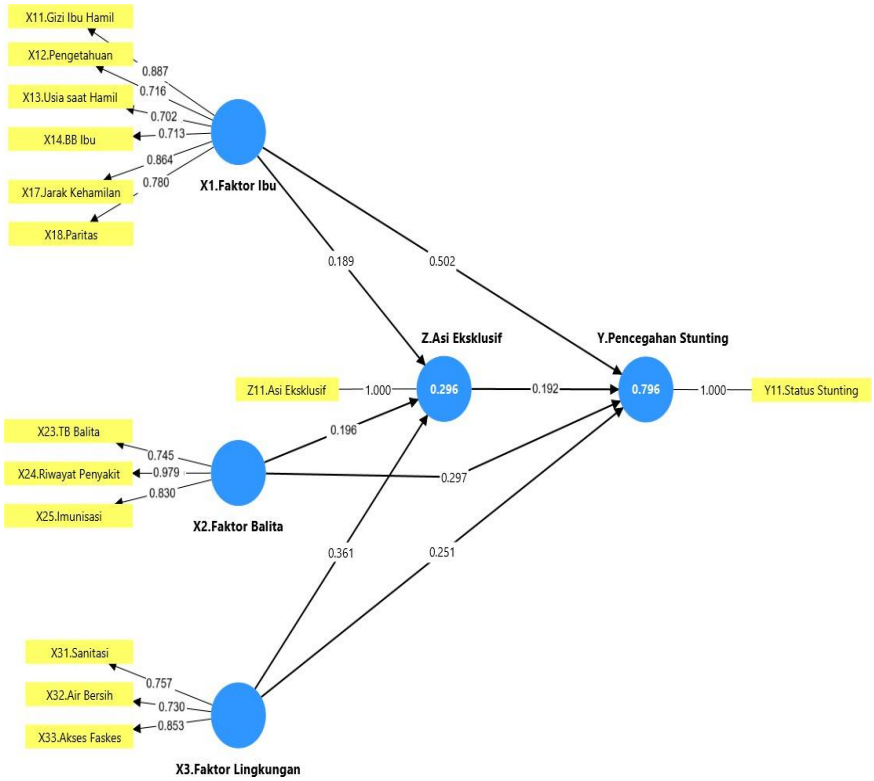
Table 4. 11 Analysis of the relationship between exclusive breastfeeding and stunting in toddlers in Balongsari Village, Mojokerto City in 2025

No.	Exclusive breastfeeding	Incidence of stunting				Total		*P value*	PR (95%C1)
		Not stunted		Stunting					
		f	%	f	%	f	%		
1	Yes	42	91,3	4	8,7	46	100	0,000	14,438 (4,301-48,465)
2	No	16	42,1	22	57,9	38	100		

Table 4. 12 Results of t-statistics tests and conclusions of research hypothesis tests

No.	Type of Relationship	Relationship Path	Influence Coefficient	t-statistics	P-value	Conclusion
1.1	Direct	X1. Maternal Factors -> Y. Prevention of Stunting	0.502	7.367	0.000	Significant
1.2	Indirect	X1. Maternal Factors -> Z. Exclusive Breastfeeding -> Y. Prevention of Stunting	0.036	2.436	0.015	Significant
1	Total	X1. Maternal Factors -> Y. Prevention of Stunting	0.539	8.348	0.000	Significant

2.1	Direct	X2.Toddler Factors -> Y.Stunting Prevention	0.297	4.032	0.000	Significant
2.2	Indirect	X2.Toddler Factors -> Z.Breastfeeding Exclusively -> Y.Stunting Prevention	0.038	2.569	0.010	Significant
2	Total	X2.Toddler Factors -> Y.Stunting Prevention	0.334	4.621	0.000	Significant
3.1	Direct	X3. Environmental Factors -> Y. Prevention of Stunting	0.251	2.916	0.004	Significant
3.2	Indirect	X3. Environmental Factors -> Z. Exclusive Breastfeeding -> Y. Prevention of Stunting	0.069	2.353	0.019	Significant
3	Total	X3. Environmental Factors -> Y. Prevention of Stunting	0.320	4.122	0.000	Significant
4	Direct	X1. Mother Factor -> Z. Breastfeeding Exclusive	0.189	2.646	0.008	Significant
5	Direct	X2. Toddler Factor -> Z. Breastfeeding Exclusive	0.196	2.764	0.006	Significant
6	Direct	X3. Environmental Factor -> Z. Breastfeeding Exclusive	0.361	2.517	0.012	Significant
7	Direct	Z.Asi Eksklusif -> Y.Pencegahan Stunting	0.192	2.447	0.014	Significant



B. Pembahasan

1. Maternal factors

There is a correlation between maternal nutritional status and stunting in toddlers. Mothers with risky nutritional status are 23,500 times more likely to have children who experience stunting compared to mothers with normal nutritional status. Pregnant women whose nutritional status during pregnancy is normal have an LILA >23.5 cm.

There is a correlation between mothers' knowledge and stunting in toddlers. Mothers with moderate knowledge are 8.039 times more likely to have children who experience stunting compared to mothers who have good knowledge. Mothers with low nutritional knowledge have a higher chance of their children experiencing stunting. A study found that mothers with low nutritional knowledge are 2.7 times more likely to have children who experience stunting than mothers with high knowledge (p=0.027). Good knowledge among mothers about food types and nutritional adequacy.

The mother's age during pregnancy also affects the risk of stunting in children. Mothers who become pregnant at too young or too old an age have a higher risk of experiencing pregnancy complications, which can affect fetal growth. According to research by Ganchimeg et al. (2014), pregnancies that are too close together (less than two years apart) can prevent mothers from having enough time to recover their nutritional status after giving birth, which can affect the nutrition of their next child. Short intervals between pregnancies also put mothers at risk of malnutrition.

There is a correlation between pregnancy spacing and stunting in toddlers, with a p-value of 0.000 < 0.05 and a prevalence ratio of 6.836 (95% CI = 2.447 – 19.096), which means that mothers with risky pregnancy spacing (<2 years or >4 years) are at risk. The ideal birth spacing is between 2–4 years, as also recommended by the National Family Planning Coordination Board (BKKBN). Birth spacing that is too short (<2 years) does not allow sufficient time for mothers to recover physically.

2. Infant Factors

There is a correlation between a history of infectious diseases and the incidence of stunting in toddlers. Toddlers with a history of frequent infectious diseases are 9.614 times more likely to experience stunting compared to toddlers with a history of infectious diseases. A history of infection affects the incidence of stunting, with a 9.614 times greater chance of experiencing stunting in Mojokerto Regency.

There is a correlation between immunization status and stunting in toddlers. Toddlers with incomplete immunization are 12.222 times more likely to experience stunting than toddlers who have received complete immunization. Children who do not receive complete immunization have a higher percentage of stunting (22.54%) than children who receive complete immunization (13.82%). Children with incomplete immunization status are 1.78 times more likely to experience stunting than children with complete immunization.

Infants with non-ideal birth spacing are 0.491 times more likely to experience stunting compared to those with ideal birth spacing, but this difference is not statistically significant.

3. **Environmental Factors**

Sanitation plays a very significant role in the incidence of stunting in Balongsari Village, Mojokerto City. The high prevalence ratio indicates that improving sanitation is a priority measure that must be taken by the local government to reduce stunting rates.

There is a correlation between access to clean water and stunting in toddlers. Toddlers from families with inadequate access to clean water are 13.508 times more likely to experience stunting than toddlers from families with adequate access to clean water. The high prevalence ratio in this study indicates that access to clean water is an important factor in preventing stunting in Balongsari Village, Mojokerto City.

4. **Exclusive Breastfeeding**

There is a correlation between exclusive breastfeeding and stunting in toddlers. Toddlers who are not exclusively breastfed are 14.438 times more likely to experience stunting than toddlers who are exclusively breastfed. Exclusive breastfeeding for the first six months is a key strategy in preventing stunting because it provides optimal nutrition and immune protection for babies.

Coefficient of influence 0.038, indirect influence relationship, moderate The results of the analysis of environmental factors on stunting with exclusive breastfeeding as a moderator have a p-value of 0.019 with a coefficient of influence of 0.069, an indirect influence relationship.

CONCLUSION

1. There is a correlation between maternal nutritional status and stunting in toddlers.
2. There is a correlation between maternal knowledge and stunting in toddlers.
3. There is a correlation between pregnancy spacing and stunting in toddlers.
4. There is a correlation between parity and stunting in toddlers.
5. There is a correlation between history of infectious diseases and stunting in toddlers.
6. There is a relationship between immunization status and stunting in toddlers.
7. There is no relationship between birth spacing and stunting in toddlers.
8. There is a relationship between sanitation and stunting in toddlers.
9. There is a relationship between access to clean water and stunting in toddlers.
10. There is a relationship between access to health services and stunting in toddlers.
11. There is a correlation between exclusive breastfeeding and stunting in toddlers.
12. In a joint test, the contribution of exogenous variables, namely mother, toddler, environment, and exclusive breastfeeding, was 79.6%. The remaining 20.4% was explained by other variables.

DAFTAR PUSTAKA

Notoatmodjo, S., 2010. Promosi Kesehatan dan Perilaku Kesehatan. Jakarta: Rineka Cipta.

Rosenstock, I.M., 1974. *The Health Belief Model and Preventive Health Behavior. [Book chapter]. New York: Academic Press.*

Bronfenbrenner, U., 1979. *The Ecology of Human Development: Experiments by Nature and Design. Cambridge, MA: Harvard University Press.*

Masturoh, E., 2018. Metodologi Penelitian Kesehatan. Yogyakarta: Pustaka Pelajar.

Handayani, S., Kapota, D., and Oktavianto, N., 2019. Hubungan Status ASI Eksklusif dengan Stunting pada Balita. Jurnal Kesehatan Masyarakat, 14(2),pp. 123-130.

Uliyanti, D., Kusuma, Y., and Hasanah, U., 2017. Pengaruh Pengetahuan Gizi Ibu terhadap Kejadian Stunting di Kalimantan Barat. Jurnal Gizi dan Pangan, 12(1), pp. 45-52.

Dewi, S., Wijayanti, L., and Sari, M., 2021. *Exclusive Breast Milk as Effort to Prevent Stunting*. Jurnal Kesehatan Anak, 10(3), pp. 89-96.

Kusumawati, A., Sutanto, H., and Rahmawati, F., 2015. Hubungan Sanitasi Lingkungan Rumah dengan Kejadian Stunting di Kabupaten X. Jurnal Epidemiologi, 9(1), pp. 15-22.

Madzorera, I., Lander, R., and Karki, S., 2020. *Maternal Dietary Diversity and Birth Outcomes: A Cohort Study. Nutritional Epidemiology*, 25(4), pp. 305- 313.

Syeda, S., Ahmed, N., and Khan, T., 2021. *Breastfeeding Duration and Stunting Risk in South Asia. International Journal of Child Health*, 15(1), pp. 20- 27.

Giugliani, E.R., Victora, C.G., and de Oliveira, L.A., 2015. *Impact of Exclusive Breastfeeding on Child Growth and Morbidity: Systematic Review. Pediatric Nutrition Journal*, 8(2), pp. 75-85.

Akombi, B.J., Agho, K.E., Merom, D., Renzaho, A.M., and Hall, J.J., 2017. *Stunting and Wasting in Children Under Five in Sub-Saharan Africa. Public Health Nutrition*, 20(2), pp. 312-320.

Rathaur, V.K., Kumar, A., and Singh, J., 2018. *Breastfeeding Practices and Nutritional Status in Children Under Five Years. Indian Journal of Pediatrics*, 85(9), pp. 764-770.

Victora, C.G., Bahl, R., Barros, A.J., França, G.V., Horton, S., Krasevec, J., Murch, S., Sankar, M.J., Walker, N., and Rollins, N.C., 2016. *Breastfeeding in the 21st Century: Epidemiology, Mechanisms, and Lifelong Effect. The Lancet*, 387(10017), pp. 475-490.

Titaley, C.R., Ariawan, I., Hapsari, D.P., Muasyaroh, A., and Dibley, M.J., 2019. Determinants of Stunting in Indonesia: *A Path Analysis Approach. Asia Pacific Journal of Clinical Nutrition*, 28(4), pp. 734-742.

Kementerian Kesehatan Republik Indonesia, 2019. Riset Kesehatan Dasar (Riskesdas) 2018. Jakarta: Kementerian Kesehatan RI.

Kementerian Kesehatan Republik Indonesia, 2018. Survei Demografi dan Kesehatan Indonesia (SDKI) 2017. Jakarta: Kementerian Kesehatan RI.

Badan Perencanaan Pembangunan Nasional (BAPPENAS), 2018. Strategi Nasional Percepatan Pencegahan Stunting. Jakarta: BAPPENAS.

Dinas Kesehatan Kota Mojokerto, 2023. Laporan Situasi Kesehatan Kota Mojokerto Tahun 2023. Mojokerto: Dinas Kesehatan.

World Health Organization (WHO), 2013. Improving Water, Sanitation and Hygiene to Reduce Diarrhea. Geneva: WHO.

World Health Organization (WHO), 2015. *Stunting in Children: Definition and Impact. Geneva: WHO*.

World Health Organization (WHO), 2018. *Infant and Young Child Feeding: Model Chapter for Textbooks. Geneva: WHO.*

UNICEF, 2019. Strategi Percepatan Penurunan Stunting. New York: UNICEF.