

# Risk Factors for Stunting in Children Aged 24 – 60 Months in Cilegon City

Juliawita Andrieni<sup>1\*</sup>, Syahrizal<sup>2</sup>

<sup>1,2</sup>Department of Epidemiology, Faculty of Public Health, Universitas Indonesia

\*Email: juliawita31@gmail.com

## Keywords

*stunting, LBW, nutritional status*

## ABSTRACT

*Stunting is a disturbance of growth and development in children due to chronic malnutrition and recurrent infections. Child stunting can occur within the first 1000 days after conception and is related to many factors, namely context factors and causative factors. This study wanted to find out the causal factors for stunting in Cilegon City by using e-PPGBM data for August 2022 in the age group 0-60 months. The study was conducted using a case-control design. The inclusion criteria were children aged 24 -60 months with complete data. The research sample consisted of 819 subjects, with 273 stunted subjects and 546 non-stunted subjects. In multivariate analysis it was found that LBW (Low Birth Weight) has a risk of stunting 3.24 times compared to normal birth weight and undernourished status has a risk of 2.04 times stunting than good nutrition at 95% CI aOR with p value <0.001. The risk factors for gender, LBL (Low Birth Length), vitamin A status and exclusive breastfeeding were not related to stunting in this study.*

## INTRODUCTION

Stunting is one of the malnutrition problems in Indonesia. Malnutrition can occur in the womb and the initial period after birth which will then appear at the age of 2 years (Ministry of Health of the Republic of Indonesia, 2018). Stunting is a disorder of growth and development of children due to chronic malnutrition and recurrent infections calculated using Anthropometric Standards of length/height according to age of children aged 0-60 months with Z-Score values between -3 SD to -2SD (Presidential Regulation of the Republic of Indonesia Number 72 of 2021. (2021). Accelerated Decline Stunting, 2021; Standard Child Anthropometry. 12. Regulation of the Minister of Health of the Republic of Indonesia Number 2 of 2020., 2020)

Child stunting can occur within the first 1000 days after conception and is associated with many factors (Organization, 2018). Stunting in children whose initial context the problem comes from the community or nation level such as political economy, agriculture and food systems, water, sanitation and environment, health services, social and cultural and education. Problems at this stage of society further affect household conditions which have a direct influence on the incidence of stunting in children. The causal factors of the household are maternal factors, adequate parenting, inadequate breastfeeding, inadequate complementary feeding, poor food quality, food and water safety and infection (Organization, 2023).

From previous studies, it was seen that the chances of stunting increased significantly in male toddlers (Wicaksono & Harsanti, 2020). Infants born weighing under 2.5 kg are at risk of stunting in premature infants (Prendergast & Humphrey, 2014). Research in Surabaya found that toddlers who

did not get exclusive breastfeeding in the first 6 months experienced more stunting than those who received exclusive breastfeeding (Ni'mah & Nadhiroh, 2015).

This study aims to determine the risk factors for stunting in children aged 24-60 months in Cilegon City. The results of this study are expected to provide an overview of the greatest risk factors for stunting. Limited data causes this study to only use variables found in children, namely gender, birth length, birth weight, current nutritional status, exclusive breastfeeding status, and vitamin A administration status against stunting. Another factor that was not used in this study would be the weakness of this study.

## METHODS

This research uses a case-control study design. The study population is children aged 24-60 months who have been recorded on the e-PPGBM Cilegon city. The sample size in this study was 273 children who had been detected stunting as a case group and 546 children who were not detected stunting as a control group. Child data was taken from the e-PPGBM of Cilegon city in August 2022 in the group of children aged 0-60 months. The inclusion criteria are children aged 24-60 months with complete data. Data is collected using questionnaires to collect variables to be studied and other supporting variables.

E-PPGBM (electronic-Community Based Nutrition Recording and Reporting) is the recording of individual data and weighing results at Posyandu and processing the data into nutritional status. The data contained in e-PPGBM are the nutritional status of children and toddlers, age, gender, MCH reports, toddler development and NCD acceptance.

Data is displayed descriptively and analytically. Descriptive data will provide the proportion of variables studied in stunting and non-stunting groups. Analytical data will provide information on the relationship of each variable to stunting using the odds ratio (OR) measure. Multivariate analysis using logistic regression produces aOR. Data analysis in this study used the STATA application.

## RESULTS

The study was conducted on 819 subjects consisting of 273 subjects detected stunting at the age of 24-60 months and 546 subjects detected stunting at the age of 24-60 months. The number of stunting subjects included in this study amounted to 53.74% of the total stunting at the age of 24-60 months in the e-PPGBM data for August 2022 in Cilegon City.

**Table 1. Risk Factor Odds Ratio Analysis (OR CI 95%) for Stunting in Children Aged 24 – 60 Months in Cilegon City in 2023**

Risk Factors	Stunting		No Stunting		OR (CI 95%)	<i>p value</i>
	N	%	N	%		
Gender					1,04 (0,77 – 1,4)	0,8044
- Woman	126	46,15	257	47,07		
- Man	147	53,85	289	52,93		
Status LBW					3,24 (1,92-5,53)	0,000
- Normal	231	84,62	517	94,69		
- LBW	42	15,38	29	5,31		
Status LBL					0 (0-1,92)	0,1563
- Normal	273	100	542	99,27		
- LBL	0	0	4	0,73		
Nutritional Status					2,04 (1,37-3,02)	0,0002
- Good Nutrition	210	76,92	476	87,18		
- Undernutrition	63	23,08	70	12,82		
Status Vitamin A					0 (0-0,69)	0,02
- Get	273	100	535	97,99		
- Not Getting	0	0	11	2,01		
Exclusive breastfeeding status					0,95 (0,53-1,68)	0,8549
- 6 months	252	92,31	502	91,94		
- < 6 months	21	7,69	44	8,06		

In Table.1, it was found that stunting was more common in men, namely 53.85% while women 46.15%. In the analysis of the relationship between sex and stunting, insignificant results were obtained with OR 1.04 (CI 95%: 0.77 – 1.4), but these results did not mean statistically because the p value (0.8) >  $\alpha$  (0.05). Children who experience low birth weight are likely to be stunted 3.24 times than those born normally with an OR value of 3.24 (CI 95%: 1.92 – 5.53) with a p value of <0.001. The relationship between PBLR status and vitamin A status on stunting could not be seen in this study because there was 1 empty cell. The relationship between nutritional status and stunting was obtained that children with nutrition were approximately 2.04 times more likely to be stunted than children with good nutrition (OR 2.04 at 95% CI 1.37-3.02) with a p value of 0.02. The relationship between exclusive breastfeeding and stunting was not significant in this study where the OR value was 0.95 (CI 95%: 0.53 – 1.68) and this result was not statistically meaningful with a p value of 0.85.

**Table 2. Risk Factor Analysis of Adjusted Odds Ratio (aOR CI 95%) of Stunting in Children Aged 24 – 60 Months in Cilegon City in 2023**

	OR (CI 95%)	<i>p</i>	aOR (CI 95%)	<i>p</i>
<b>Gender</b>				
- Woman	1,00		1,00	
- Man	1,04 (0,77-1,4)	0,8044	1,04 (0,78-1,39)	0,857
<b>Status LBW</b>				
- Normal	1,00		1,00	
- LBW	3,24 (1,92-5,53)	0,000	3,24 (1,97-5,33)	<0,001
<b>Status LBL</b>				
- Normal	1,00			
- LBL	0 (0-1,91)	0,1563		
<b>Nutritional Status</b>				
- Good Nutrition	1,00		1,00	
- Undernutrition	2,04 (1,37-3,02)	0,0002	2,04 (1,4-2,97)	<0,001
<b>Status Vitamin A</b>				
- Get	1,00			
- Not Getting	0 (0-0,69)	0,0182		
<b>Exclusive breastfeeding status</b>				
- 6 months	0,95 (0,53-1,68)	0,8549	0,95 (0,55-1,63)	0,855
- < 6 months				

In Table 2 it can be seen that the difference between OR and aOR on each variable is not more than 10% so it can be concluded that there are no variables that are confounding on risk factors for stunting. The variables LBW and nutritional status had a strong relationship to stunting with aOR of 3.24 (95% CI 1.97-5.33) and 2.04 (95% CI 1.4-2.97), respectively, these results were statistically meaningful with p values of <0.001.

## Discussion

This study provides results that not all variables are strongly related to stunting, only LBW and nutritional status variables are strongly related to stunting while sex variables, LBL Vitamin A and exclusive breastfeeding have a weak relationship to stunting. These results may differ in other regions according to the conditions of the community.

The relationship between sex and stunting in the study was not strong enough with aOR 1.04 may be influenced by the *chance* factor seen from the magnitude of the aOR interval (0.77 – 1.39), the addition of samples in this study may be able to provide more precise results. In several previous studies in Maluku Province, it was found that men have a greater potential to experience

stunting than women (Agho et al., 2009). The study has the same results as a study in Bogor that men have 1.35 times the chance of stunting compared to women (Hikmahrachim et al., 2020). Research in Nigeria also concluded that there is a strong relationship between sex and stunting where men are more likely to be stunted (Akombi et al., 2017).

LBW and LBL are early markers of stunting, where the body experiences growth and development obstacles in the womb. One of the causes of LBW and LBL is the nutritional status of pregnant women (Andina & Achadi, 2021). The growth and development of the fetus in the womb is influenced by maternal intake. The pregnancy period is an important part of the first 1000 days period, it takes 6 pregnancy checks to pay attention to the health of the mother and fetus so as to avoid anemia and chronic lack of energy (SEZ) which results in low birthweight (Manggala et al., 2018). Research in Bali showed that stunting increased 7.29 times in children born weighing under 2500gr and stunting increased 9.92 times in children born with a body length of less than 48 cm (Candra, 2020). In this study, it was seen that stunting increased 3.2 times more severely in low birth weight compared to those without low birthweight. The relationship between PBLR and stunting was not seen in this study. Research in Surabaya gave slightly different results where there was no relationship between LBW and stunting but there was a relationship between LBL and stunting with OR 4.09 (Ni'mah & Nadhiroh, 2015).

Nutrient intake is a risk factor for stunting because nutrients are needed for growth (Candra, 2020) There is a strong relationship between nutritional status and stunting in this study. Stunting is 2 times greater in children with less nutrition than in children with good nutrition. Research conducted by Hikmahrachim gave similar results where undernutrition status increased the risk of stunting by 1.74 times (Hikmahrachim et al., 2020).

The nutritional content of breast milk depends on the mother's daily consumption. Mothers need to be healthy with enough nutrients and drink water to maintain the quality of breast milk. Breast milk is given exclusively until the first 6 months and after that complementary foods are needed because nutrients from breast milk alone are no longer enough for the growth and development of children (Andina et al., 2021) During exclusive breastfeeding, it is important to know whether the baby has received enough milk, which can be seen by gaining weight as much as 2 times the birth weight in infants aged 5 months (Soetjningsih, 1997). In this study there was no strong relationship between exclusive breastfeeding and stunting (aOR 0.95) but this result was not statistically meaningful (p- value 0.8549). It is suspected that there is an influence of *chance* on the results, seen by the magnitude of interval confidence that passes zero (95% CI 0.55 – 1.63). The same conclusion is also found in other studies where there is no relationship between exclusive breastfeeding and stunting and this conclusion is also influenced by *chance* factors (Hikmahrachim et al., 2020). Different results can be seen from a study in Bali where children who do not get exclusive breastfeeding are at risk of stunting 6.56 times. Research in Nigeria and Nepal saw an increase in stunting in breastfed children older than 12 months, where these results were influenced by culture, timing of initiation of complementary feeding and food quality, economic status and maternal education (Tiwari et al., 2014).

This research was conducted using secondary data derived from e-PPGBM which is recording and reporting from Posyandu. People who do not use Posyandu service facilities are not recorded and unreported so that this study experiences *coverage bias* where there will be an eligible population not included in the research subject.

## CONCLUSION

Stunting occurs due to the interaction of many factors. This study only used sex variables, low weight, LBL, nutritional status, exclusive breastfeeding and vitamin A as risk factors for stunting. Factors related to stunting in this study are LBW and nutritional status, while sex factors, LBL, vitamin A and exclusive breastfeeding are not related to stunting. Interventions for stunting prevention can be done by improving nutrition in pregnant women and it takes 6 pregnancy checks to pay attention to the health of the mother and fetus so that later give birth to babies who are not low weight and have good nutritional status.

This research still affects chance. Many other factors directly or indirectly related to stunting were not included in this study, which could affect the results. Further research is needed with better methods and using a larger number of samples and more variables.

## REFERENCES

- Agho, K. E., Inder, K. J., Bowe, S. J., Jacobs, J., & Dibley, M. J. (2009). Prevalence and risk factors for stunting and severe stunting among under-fives in North Maluku province of Indonesia. *BMC Pediatrics*, *9*(1), 1–10.
- Akombi, B. J., Agho, K. E., Hall, J. J., Merom, D., Astell-Burt, T., & Renzaho, A. M. N. (2017). Stunting and severe stunting among children under-5 years in Nigeria: A multilevel analysis. *BMC Pediatrics*, *17*, 1–16.
- Andina, E., & Achadi, E. L. (2021). Fulfilment of minimum acceptable diet (MAD), short birth length and family income level are associated with stunting in children aged 6-23 months in Central Jakarta. *Malaysian Journal of Nutrition*, *27*(2).
- Andina, E., Madinar, M., & Achadi, E. L. (2021). Fulfilment of Minimum Acceptable Diet as Dominant Factor in Wasting in Children Aged 6–23 Months in Central Jakarta, Indonesia, 2019. *Indonesian Journal of Public Health Nutrition*, *1*(2).
- Candra, A. (2020). Patofisiologi stunting. *Journal of Nutrition and Health*, *8*(2).
- Hikmahrachim, H. G., Rohsiswatmo, R., & Ronoatmodjo, S. (2020). Efek ASI Eksklusif terhadap Stunting pada Anak Usia 6-59 bulan di Kabupaten Bogor tahun 2019. *Jurnal Epidemiologi Kesehatan Indonesia*, *3*(2).
- Manggala, A. K., Kenwa, K. W. M., Kenwa, M. M. L., Jaya, A. A. G. D. P., & Sawitri, A. A. S. (2018). Risk factors of stunting in children aged 24-59 months. *Paediatrica Indonesiana*, *58*(5), 205–212.
- Ministry of Health of the Republic of Indonesia, (2018).
- Ní'mah, K., & Nadhiroh, S. R. (2015). Faktor yang berhubungan dengan kejadian stunting pada balita. *Media Gizi Indonesia*, *10*(1), 13–19.
- Organization, W. H. (2018). *Reducing stunting in children: equity considerations for achieving the Global Nutrition Targets 2025*. World Health Organization.
- Organization, W. H. (2023). *World health statistics 2023: monitoring health for the SDGs, sustainable development goals*. World Health Organization.
- Prendergast, A. J., & Humphrey, J. H. (2014). The stunting syndrome in developing countries. *Paediatrics and International Child Health*, *34*(4), 250–265.
- Presidential Regulation of the Republic of Indonesia Number 72 of 2021. (2021). Accelerated Decline Stunting, Pub. L. No. 72 (2021).
- Standard Child Anthropometry. 12. Regulation of the Minister of Health of the Republic of Indonesia Number 2 of 2020., Pub. L. No. 2 (2020).
- Soetjningsih, D. (1997). ASI: Petunjukuntuk Tenaga Kesehatan. *Egc1997*.
- Tiwari, R., Ausman, L. M., & Agho, K. E. (2014). Determinants of stunting and severe stunting among under-fives: evidence from the 2011 Nepal Demographic and Health Survey. *BMC Pediatrics*, *14*, 1–15.
- Wicaksono, F., & Harsanti, T. (2020). Determinants of stunted children in Indonesia: A multilevel analysis at the individual, household, and community levels. *Kesmas: Jurnal Kesehatan Masyarakat Nasional (National Public Health Journal)*, *15*(1), 48–53.