

INFORMASI ARTIKEL

Received: November, 19, 2025

Revised: Desember, 19, 2025

Available online: Desember, 20, 2025

at: <https://e-jurnal.iphorr.com/index.php/mchc>

The role of prematurity as a risk factor for stunting and its interaction with birth anthropometry in infants and toddlers

Syariena*¹, Irma Ika Sari², Arindiah Puspo Windari²

Murung Raya Midwifery Academy

Maluku Husada College of Health Sciences

Corresponding author: *Email: syariena@akbidmurungraya.ac.id

Abstract

Background: Stunting remains a major public health issue, particularly in developing countries, and is strongly influenced by conditions during pregnancy and early life. Prematurity and birth anthropometry, such as low birth weight and short birth length, are believed to be key determinants that increase the risk of growth failure in infants and toddlers.

Purpose: to analyze the role of prematurity as a risk factor for stunting and examine its interaction with birth anthropometry among infants and toddlers.

Method: This analytic observational study employed a case-control design involving 78 children aged 24–59 months, consisting of 39 stunted and 39 non-stunted children selected through total sampling. Data on birth history and nutritional status were collected, and stunting was determined using height-for-age z-scores (HAZ). Data analysis included chi-square tests for bivariate associations and logistic regression for multivariate analysis and interaction testing.

Results: Among all respondents, 28.2% were born prematurely and 24.4% had low birth weight. Prematurity showed a significant relationship with stunting ($p = 0.002$), with premature children having a 3.12-fold higher risk of stunting. Multivariate analysis confirmed prematurity as a significant predictor ($OR = 4.71$; $p = 0.004$), while low birth weight also contributed significantly ($OR = 2.97$; $p = 0.018$). The interaction between prematurity and low birth weight demonstrated the strongest effect ($OR = 5.48$; $p = 0.010$), indicating that children with both risk factors have the highest likelihood of stunting.

Conclusion: Prematurity and low birth weight are significant risk factors for stunting, and their interaction substantially increases the risk of growth failure. Strengthening maternal care, preventing premature births, and optimizing neonatal management for at-risk infants are essential strategies to reduce stunting prevalence.

Keywords: Birth Anthropometry; Low Birth Weight; Prematurity; Stunting; Toddler.

INTRODUCTION

Stunting remains one of the world's biggest public health problems, particularly in developing countries. Globally, approximately 22–29% of children under five are stunted, with Asia contributing more than half of the global stunting burden (Islam, Ibrahim, Wang, Wu, & Qin, 2025). Indonesia is one of the countries with a high prevalence of stunting in Southeast Asia, although it has shown a downward trend in recent years. Data from the Indonesian Nutritional Status

Survey shows that the national stunting prevalence decreased from 30.8% in 2018 to 21.6% in 2022, but this figure remains above the maximum limit of 20% set by the WHO as a moderate level (Andriani, Arsyi, Sutrisno, Waits, & Rahmawati, 2025). This decline is a positive development, but still requires serious attention, especially because stunting has long-term impacts on children's cognitive, physical, and future productivity. The main factors influencing stunting in

The role of prematurity as a risk factor for stunting and its interaction with birth anthropometry in infants and toddlers

Indonesia include feeding practices, economic status, maternal education, access to sanitation, and nutritional interventions in the first 1,000 days of life (Huriah & Nurjannah, 2020).

Prematurity is a significant risk factor for stunting. An estimated 13 million babies are born prematurely each year worldwide, and this number tends to increase, particularly in lower-middle-income countries. Indonesia ranks fifth in the world for the highest number of preterm births, with an estimated 675.700 to 900.000 cases per year (Kresnawati, Pandie, & Rohsiswatmo, 2025). Premature babies generally experience various physiological limitations, such as low birth weight and growth disorders, which can hinder optimal growth and increase susceptibility to stunting in infancy and childhood (Thahir, Li, Holmes, & Gordon, 2023). Studies in Indonesia show that preterm birth significantly increases the risk of stunting in early childhood, making prematurity prevention and improving neonatal care crucial for reducing stunting rates (Sartika, Khoirunnisa, Meiyetrian, Ermayani, Pramesthi, & Nur Ananda, 2021).

Birth anthropometry, such as birth weight and birth length, is an important indicator of fetal health. The WHO estimates that approximately 20.5 million babies, or 14.6% of all births worldwide, are low birth weight (LBW) (Choudhary, Kumar, Sinha, Shaikh, Mazumder, Taneja, & Bhandari, 2022). In Indonesia, the prevalence of LBW varies between 6.2% and 11.7% depending on the region and year of the survey. Infants with LBW or a lower than standard birth length are at higher risk of growth retardation and stunting, especially if accompanied by prematurity (Ekoriano, Widiyanto, Muthmainnah, Devi, Cahyono, Nafsi, & Widodo, 2025). Studies in Indonesia show that LBW is a dominant predictor of stunting in early childhood, and low birth length also significantly contributes to the risk of stunting and other nutritional problems (Meliati, Rahfiludin, Kartini, & Jati, 2025).

Research shows that premature and low birth weight (LBW) infants have a 2–4 times higher risk of stunting compared to full-term infants with normal birth weight. Premature infants generally have low fat and glycogen reserves, immaturity of the digestive organs, and are more susceptible to infection, so the combination of these factors can lead to growth

disorders in early life (Cuestas & Rizzotti, 2025). However, several studies also report that some premature and low birth weight infants can achieve catch-up growth in the first 12–24 months of life, although the success rate varies depending on factors such as birth anthropometric status, nutrition, and the presence of neonatal complications. Therefore, the relationship between prematurity, LBW, and stunting needs to be studied more deeply by considering modifying factors such as birth anthropometry and early nutritional interventions (Li, Wen, Jiang, & Cui, 2025).

Indonesia faces the dual challenge of high preterm birth rates and a high proportion of babies with low birth weight, particularly in areas with limited access to maternal health services. This situation is exacerbated by the high prevalence of anemia among pregnant women, which in some areas reaches over 60%. Furthermore, suboptimal antenatal care coverage, particularly in rural areas, contributes to the high risk of preterm birth and low birth weight (LBW) babies (Sartika et al., 2021). Factors such as low maternal education, low economic status, and limited health facilities and personnel also exacerbate the situation (Safitri, Fauziningtyas, Indarwati, Efendi, & McKenna, 2022). The combination of these issues increases the likelihood of prematurity and low birth weight co-occurring, ultimately increasing the burden of stunting among infants and toddlers in Indonesia (Kresnawati et al., 2025).

Maternal factors such as pre-pregnancy nutritional status, high-risk gestational age, and infectious diseases during pregnancy significantly contribute to the incidence of prematurity and low birth weight (LBW). Chronic Energy Deficiency (CED) in pregnant women has been shown to increase the risk of fetal growth restriction and stunting in children, with several studies in Indonesia indicating CED as a dominant factor associated with stunting in infants and toddlers (Nafisa, Saptanto, Ratnaningrum, & Prihardini, 2025). Data also show that approximately 23% of pregnant women experience CED, which is closely associated with the risk of low birth weight and stunted growth (Asna & Syah, 2023). Furthermore, closely spaced pregnancies, low socioeconomic status, insufficient iron intake, and inadequate frequency of antenatal visits also increase the likelihood of premature birth or low birth weight, which

Syariena^{*1}, Irma Ika Sari², Arindiah Puspo Windari²

Murung Raya Midwifery Academy
Maluku Husada College of Health Sciences
Corresponding author: Yunani. *Email: syariana@akbidmurungraya.ac.id

The role of prematurity as a risk factor for stunting and its interaction with birth anthropometry in infants and toddlers

can trigger stunting from an early age (Quamme & Iversen, 2022).

In premature infants, meeting postnatal nutritional needs is key to achieving optimal growth. However, the nutritional challenges faced by premature infants are far greater than those faced by full-term infants, as organ immaturity leads to difficulty sucking effectively, impaired nutrient absorption, and higher calorie and protein requirements. Many premature infants experience nutritional and growth deficits, particularly during the NICU stay and transition to enteral feeding, resulting in failure to achieve expected growth targets. This condition is exacerbated by the risk of complications such as feeding intolerance, necrotizing enterocolitis, and infection, which can hinder nutritional intake (Bala, McGrattan, Valentine, & Jadcherla, 2024). Consequently, premature infants are highly susceptible to stunting, especially if nutritional deficiencies occur during the critical first 1,000 days of life (HPK), which impacts long-term physical growth and neurocognitive development (Alanazi, Altawili, Khayyal, Alahmari, Alhakami, Alshehri, & Khayyal, 2024).

Understanding the interaction between prematurity and birth anthropometry is crucial because these two conditions often occur together and can have a compounding effect on the risk of stunting. Premature infants with low birth weight (LBW) or small-for-gestational-age (SGA) have slower growth rates and tend to take longer to achieve catch-up growth, thus increasing the risk of stunting and long-term developmental disorders (Cha et al., 2025). Conversely, premature infants with normal birth size or appropriate-for-gestational-age (AGA) generally have better growth opportunities, although they still require close monitoring (Cha, Kang, Na, Ryu, Choi, & Kim, 2025). A previous study also showed that the combination of prematurity and SGA confers the highest risk of stunting compared to either factor alone (Thahir et al. (2023).

Although there has been extensive research on prematurity and stunting, studies on how the two interact remain relatively limited. Most previous studies tend to analyze the relationship between prematurity and birth anthropometric status separately, without considering the combined effects of the two (Svefors, Sysoev, Ekstrom, Persson,

Arifeen, Naved, & Selling, 2019). However, evidence suggests that infants born prematurely with suboptimal birth anthropometry, such as low birth weight (LBW) or small-for-gestational-age (SGA), have a significantly higher risk of stunting than infants with either condition alone (Jamaluddine, Sharara, Helou, El Rashidi, Safadi, El-Helou, & Campbell, 2023).

RESEARCH METHOD

This study used an observational analytical design with a case-control approach to identify the role of prematurity as a risk factor for stunting and its interaction with birth anthropometry in toddlers. The study was conducted in Danau Usung Village from August to November 2025. This design was chosen because it could compare exposure to prematurity between stunted and non-stunted toddlers, thus facilitating the identification of causal relationships more efficiently. The study location was selected based on the high prevalence of stunting and the availability of complete birth data, which supports the analysis of early life risk factors.

The study population was all toddlers aged 24–59 months who resided in the study area. The sample was obtained through a total sampling technique based on inclusion and exclusion criteria, resulting in 78 toddlers who met the requirements. The sample consisted of 39 stunted toddlers as the case group and 39 non-stunted toddlers as the control group. The independent variable in this study was prematurity, while birth anthropometry, including low birth weight (LBW) and short birth length, acted as moderating variables. The dependent variable was stunting status, determined based on the height-for-age z-score (HAZ) indicator according to WHO standards.

Data analysis was conducted in three stages. Univariate analysis was used to present the frequency distribution and proportion of each research variable. Bivariate analysis was conducted using the chi-square test to assess the relationship between prematurity, birth anthropometry, and stunting incidence. Furthermore, multivariate analysis using logistic regression was conducted to determine the effect of prematurity on stunting after controlling for confounding variables, and to test the interaction between prematurity and birth anthropometry. The results of the analysis are presented in the form of odds ratios (OR), 95% intervals, and p-values with a significance level of $\alpha = 0.05$.

Syariena^{*1}, Irma Ika Sari², Arindiah Puspo Windari²

Murung Raya Midwifery Academy
Maluku Husada College of Health Sciences
Corresponding author: Yunani. *Email: syariena@akbidmurungraya.ac.id

The role of prematurity as a risk factor for stunting and its interaction with birth anthropometry in infants and toddlers

RESEARCH RESULTS

Table 1. Characteristics Respondent (N=78)

Variable	Results	p-value	OR
Age (Mean±SD) (Range) (Month)	(40.53±10.713) (24-59)		
24-35	28/35.9		
36-47	26/33.3		
48-59	24/30.8		
Gender (n/%)			
Male	43/55.1		
Female	35/44.9		
Prematurity Status (n/%)		0.002	3.12
Premature	22/28.2		
Not premature	56/71.8		
LBW (n/%)			
Yes	19/24.4		
No	59/75.6		

Table 1 shows that the mean age and standard deviation of respondents are (40.53±10.713) with an age range of (24-59). The majority of respondents are male, namely 43 (55.1%), with the majority of prematurity status being not premature, namely 56 (71.8%), and the majority being no LBW, namely 59 respondents (75.6%). The chi-square test yielded a p-value of 0.002, indicating a significant association between prematurity and stunting. The OR value of 3.12 indicates that premature toddlers have more than three times the risk of stunting compared to toddlers born at term (Table 2).

Table 2. Multivariate Logistic Regression Results

Variables	B	p-value	OR	CI 95%
Prematurity	1.55	0.004	4.71	1.64–9.88
LBW	1.09	0.018	2.97	1.18–7.02
Prematurity × LBW Interaction	1.70	0.010	5.48	1.51–12.33

The results of the multivariate logistic regression analysis showed that prematurity had a significant effect on stunting with a p value = 0.004 and OR = 4.71, meaning premature toddlers had almost five times higher risk of becoming stunted. Low birth weight (LBW) was also shown to be significant (p = 0.018, OR = 2.97) as a risk factor. The interaction between prematurity and LBW had a much greater effect, with a p value = 0.010 and OR = 5.48, indicating that toddlers born prematurely and with LBW had more than five times the risk of experiencing stunting compared to toddlers who did not have this combination of risk factors.

Syariena^{*1}, Irma Ika Sari², Arindiah Puspo Windari²

Murung Raya Midwifery Academy
Maluku Husada College of Health Sciences
Corresponding author: Yunani. *Email: syariena@akbidmurungraya.ac.id

DISCUSSION

The results showed that the characteristics of the respondents in this study were quite diverse, both in terms of gender, age of the toddler, and birth history. Although most toddlers were born full-term and had normal birth weight, the proportion of premature and low-birth-weight babies, reaching 28.2% and 24.4%, respectively, remains a group that requires attention because they pose a biological risk of growth disorders. According to child development theory, linear growth disorders generally begin during the prenatal period, when maternal conditions, the environment, and fetal health interact in a complex manner. Various studies have shown that factors such as maternal nutritional status before and during pregnancy, maternal height, anemia, infections, and socioeconomic and environmental conditions significantly influence fetal growth and the risk of stunting in children (Ratnawati, Kartasurya, Kartini, & Noe, 2025).

The finding that prematurity is significantly associated with stunting reinforces the theory of early life origins of health and disease, which states that disturbances in early life, including during pregnancy, can affect long-term growth and health. In this study, 15 of 22 premature toddlers experienced stunting, indicating that most premature infants are unable to achieve optimal growth at 24–59 months of age. These findings align with previous research showing that premature babies are at greater risk of linear growth retardation. This is primarily due to organ immaturity and low energy reserves from birth, making premature babies more susceptible to complications that can have long-term impacts on their growth (Jasper, Cho, Breheny, Bao, Dagle, & Ryckman, 2021).

Prematurity causes immaturity in various body systems, including the digestive, respiratory, thermoregulatory, and immune systems. This immaturity impacts the postnatal nutrient absorption process, thus increasing the risk of growth deficits in premature infants. An underdeveloped digestive system limits the ability to digest and absorb nutrients, while an immature immune system makes infants more susceptible to infections and other complications (Martinez & Perez, 2024). This condition potentially explains the study's OR of 3.12,

indicating that premature infants have a more than threefold increased risk of stunting.

In addition to prematurity, birth anthropometrics, such as low birth weight (LBW), have also been shown to influence the incidence of stunting. In this study, LBW had a significant effect (OR 2.97), in line with various previous studies that stated that babies with low birth weight have a greater chance of experiencing growth retardation until toddlerhood. Even confirmed that LBW (low birth weight) has been shown to contribute significantly to the high rate of stunting globally. Research shows that children born with LBW have a 2 to almost 7 times higher risk of stunting than children with normal birth weight, because they begin life with less energy reserves, muscle tissue, and bone mass (Vats, Walia, Saxena, Sachdeva, & Gupta, 2024).

The interaction between prematurity and low birth weight (LBW) was a key finding in this study. The analysis showed that toddlers born prematurely and with low birth weight (LBW) had the highest risk of stunting, with an OR of 5.48. This finding indicates a synergistic effect, where the combination of two high-risk biological factors has a significantly greater impact than either alone. Fetal development theory explains that prematurity often occurs in conjunction with intrauterine growth restriction (IUGR), resulting in premature babies being small for their gestational age. The combination of organ unpreparedness due to prematurity and inadequate growth during pregnancy impairs a child's ability to catch up on growth after birth. This condition increases the risk of short- and long-term morbidity, including impaired cognitive, physical, and metabolic development, due to suboptimal organ adaptation and nutritional needs (Jamaluddine et al., 2023).

These findings align with research in various Asian and African countries showing that premature and/or low birth weight (LBW) infants are two to five times more likely to be stunted at two years of age than full-term infants (Putri, Salsabilla, & Saputra, 2021; Vats et al., 2024). In fact, a meta-analysis confirmed that the combination of prematurity and low birth weight is the strongest predictor of stunting in developing countries, with the risk of stunting increasing more than fourfold in the group of SGA preterm infants compared to full-term infants of normal size

Syariana^{*1}, Irma Ika Sari², Arindiah Puspo Windari²

Murung Raya Midwifery Academy
Maluku Husada College of Health Sciences
Corresponding author: Yunani. *Email: syariana@akbidmurungraya.ac.id

The role of prematurity as a risk factor for stunting and its interaction with birth anthropometry in infants and toddlers

(ChristianLee, Angel, Adair, Arifeen, Ashorn, & Black, 2013).

Although biological factors such as prematurity and low birth weight (LBW) significantly contribute to the risk of stunting, numerous studies have shown that stunting is also significantly influenced by socioeconomic factors, inadequate nutritional intake, a history of recurrent infectious diseases, and suboptimal parenting practices. Factors such as low parental education, low family economic status, limited access to clean water and sanitation, and a lack of dietary diversity in the household have been shown to increase the risk of stunting in children, even in those born full-term and with normal birth weight. Furthermore, recurrent infections and a lack of basic immunizations also worsen children's nutritional status and growth (Mulyani, Khairinisa, Khatib, & Chaerunisaa, 2025).

However, premature and low birth weight (LBW) infants remain the most vulnerable. Growth retardation in premature infants typically lasts longer because they require a longer period to achieve catch-up growth. The literature indicates that only around 60–90% of premature infants achieve catch-up growth within the first two years of life, with rates varying by group and region. Successful catch-up growth is strongly influenced by adequate nutrition, developmental stimulation, and freedom from recurrent infections. Breastfeeding, optimal nutrition, and regular growth monitoring have been shown to play a crucial role in supporting optimal growth in premature infants (Vizzari, Morniroli, Tiraferri, Macchi, Gangi, Consales, & Gianni, 2023). When environmental conditions are unfavorable, the opportunity for catch-up growth becomes even smaller, as seen in the results of this study.

These findings emphasize that stunting interventions cannot begin when a child already exhibits growth retardation. Efforts must begin during pregnancy by ensuring maternal health, preventing delivery complications, and providing optimal neonatal care for premature infants. Several studies in developing countries have shown that improving the quality of antenatal care, maternal nutritional supplementation, and intensive growth monitoring in premature infants can significantly reduce the risk of stunting in toddlers. Interventions such as iron and folic acid supplementation during pregnancy, nutrition

education, maternal weight monitoring, and nutritional counseling have been shown to be effective in reducing stunting prevalence and improving child growth, both in Indonesia and other developing countries (Limijadi & Devi, 2024; Vaivada, Akseer, Akseer, Somaskandan, Stefopoulos, & Bhutta, 2020).

This study strengthens the evidence that prematurity and low birth weight (LBW) are major risk factors for stunting, especially when they occur together. Their interaction creates greater vulnerability to growth impairment, making them a key focus of stunting prevention strategies. These findings not only contribute to scientific understanding of the biological mechanisms of stunting but also provide policy implications that maternal and neonatal health interventions are key to the success of programs to accelerate stunting reduction.

CONCLUSION

Prematurity and low birth weight (LBW) are significant risk factors for stunting in toddlers, and the interaction between the two results in a significantly increased risk, making premature and LBW infants the most vulnerable group to growth failure. These findings emphasize the importance of preventive measures during pregnancy through maternal health monitoring, prevention of pregnancy complications, and optimization of neonatal care for at-risk infants. For future researchers, it is recommended to conduct longitudinal studies that can monitor child development from birth to toddlerhood, add confounding variables such as parenting patterns, infections, and socioeconomic status, and expand the study locations to obtain a more comprehensive and relevant picture of risk for public health policy.

REFERENCES

- Alanazi, M., Altawili, M. A., Khayyal, A. I., Alahmari, A. S., Alhakami, A. A., Alshehri, A. M. A., & Khayyal S, A. (2024). Impact of early nutrition interventions on the growth and development of preterm infants: a narrative review. *Cureus*, 16(2).
- Andriani, H., Arsyi, M., Sutrisno, A. E., Waits, A., & Rahmawati, N. D. (2025). Projecting the impact of a national strategy to accelerate stunting prevention in East Nusa Tenggara, Indonesia,

Syariena^{*1}, Irma Ika Sari², Arindiah Puspo Windari²

Murung Raya Midwifery Academy
Maluku Husada College of Health Sciences
Corresponding author: Yunani. *Email: syariena@akbidmurungraya.ac.id

The role of prematurity as a risk factor for stunting and its interaction with birth anthropometry in infants and toddlers

- using the Lives Saved Tool. *Narra J*, 5(1), e1462.
- Asna, A. F., & Syah, M. N. H. (2023). Chronic energy malnutrition in mothers associated with stunting. *Jurnal Gizi dan Dietetik Indonesia (Indonesian Journal of Nutrition and Dietetics)*, 11(2), 77-84.
- Bala, F. E., McGrattan, K. E., Valentine, C. J., & Jadcherla, S. R. (2024). A narrative review of strategies to optimize nutrition, feeding, and growth among preterm-born infants: implications for practice. *Advances in Nutrition*, 15(11), 100305.
- Cha, J. H., Kang, E., Na, J. Y., Ryu, S., Choi, Y. J., & Kim, J. H. (2025). Growth Trajectories of Children Born Preterm and Full-Term with Low Birth Weight to Preschool Ages: A Nationwide Study. *The Journal of Clinical Endocrinology & Metabolism*, 110(2), e283-e293.
- Choudhary, T. S., Kumar, M., Sinha, B., Shaikh, S., Mazumder, S., Taneja, S., & Bhandari, N. (2022). Anthropometric indicators as predictors of mortality in early life among low birthweight Indian infants. *Frontiers in Nutrition*, 9, 884207.
- Christian, P., Lee, S. E., Angel, M. D., Adair, L. S., Arifeen, S. E., Ashorn, P., & Black, R. E. (2013). Risk of childhood undernutrition related to small-for-gestational age and preterm birth in low-and middle-income countries. *International journal of epidemiology*, 42(5), 1340-1355.
- Cuestas, E., & Rizzotti, A. (2024). Recent advances in understanding pathophysiology of non-nutritional stunting in very preterm infants. *Clinical and Experimental Pediatrics*, 68(4), 287.
- Ekoriano, M., Widiyanto, A., Muthmainnah, M., Devi, Y. P., Cahyono, B. E., Nafsi, I., & Widodo, T. (2025). Profile and factors associated with low birth weight in Indonesia: A national data survey. *Rural and Remote Health*, 25(1), 1-9.
- Huriah, T., & Nurjannah, N. (2020). Risk factors of stunting in developing countries: A scoping review. *Open Access Macedonian Journal of Medical Sciences*, 8(F), 155-160.
- Islam, B., Ibrahim, T. I., Wang, T., Wu, M., & Qin, J. (2025). Current trends in household food insecurity, dietary diversity, and stunting among children under five in Asia: a systematic review. *Journal of Global Health*, 15, 04049.
- Jamaluddine, Z., Sharara, E., Helou, V., El Rashidi, N., Safadi, G., El-Helou, N., & Campbell, O. M. (2023). Effects of size at birth on health, growth and developmental outcomes in children up to age 18: an umbrella review. *Archives of Disease in Childhood*, 108(12), 956-969.
- Jasper, E. A., Cho, H., Breheny, P. J., Bao, W., Dagle, J. M., & Ryckman, K. K. (2021). Perinatal determinants of growth trajectories in children born preterm. *PLoS One*, 16(1), e0245387.
- Kresnawati, W., Pandie, P. J., & Rohsiswatmo, R. (2025). Very low birth weight infant outcomes in a resource-limited setting: a five-year follow-up study. *Frontiers in Pediatrics*, 13, 1581033.
- Li, Y., Wen, J., Jiang, Q., & Cui, H. (2025). Different Catch-Up Growth Patterns in Very Preterm and Small for Gestational Age Infants. *Clinical Pediatrics*, 64(6), 780-790.
- Limijadi, E. K. S., & Devi, K. S. (2024). Impact of nutritional interventions and antenatal care on stunting in Indonesia: A systematic review. In *RSF Conference Series: Business, Management and Social Sciences (Vol. 4, No. 1, p. 228)*. Research Synergy Foundation.
- Martinez, E. A. P., & Perez, G. K. K. (2024). Risk Factors and Complications in Premature and Low Birth Weight Newborns. Retrieved from: <https://www.stephypublishers.com/tnhcr/pdf/TNH-CR.MS.ID.000532.pdf>
- Meliati, L., Rahfiludin, M. Z., Kartini, A., & Jati, S. P. (2025). Determinants of malnutrition in children aged 6-36 months. *AcTion: Aceh Nutrition Journal*, 10(2), 311.

Syariena^{*1}, Irma Ika Sari², Arindiah Puspo Windari²

Murung Raya Midwifery Academy
Maluku Husada College of Health Sciences
Corresponding author: Yunani. *Email: syariena@akbidmurungraya.ac.id

DOI: 10.56922/mchc.v4i9.2024

The role of prematurity as a risk factor for stunting and its interaction with birth anthropometry in infants and toddlers

- Mulyani, A. T., Khairinisa, M. A., Khatib, A., & Chaerunisaa, A. Y. (2025). Understanding Stunting: Impact, Causes, and Strategy to Accelerate Stunting Reduction—A Narrative Review. *Nutrients*, 17(9), 1493.
- Nafisa, T. H., Saptanto, A., Ratnaningrum, K., & Prihardini, O. R. (2025). Chronic Energy Deficiency in Pregnancy is An Influential Factor in the Occurrence of Stunting in Toddlers. *Jurnal Ilmu Kedokteran (Journal of Medical Science)*, 19(1), 35-43.
- Putri, T. A., Salsabilla, D. A., & Saputra, R. K. (2021). The effect of low birth weight on stunting in children under five: a meta analysis.
- Quamme, S. H., & Iversen, P. O. (2022). Prevalence of child stunting in Sub-Saharan Africa and its risk factors. *Clinical Nutrition Open Science*, 42, 49-61.
- Ratnawati, R., Kartasurya, F. M. I., Kartini, A., & Noe, E. R. (2025). Prenatal Risk Factors for Stunting in Children aged 12-24 Months in Central Java, Indonesia. *Bangladesh Journal of Medical Science*, 24(2), 579-588.
- Safitri, H. O., Fauziningtyas, R., Indarwati, R., Efendi, F., & McKenna, L. (2022). Determinant factors of low birth weight in Indonesia: Findings from the 2017 Indonesian demographic and health survey. *Journal of Pediatric Nursing*, 63, e102-e106.
- Sartika, A. N., Khoirunnisa, M., Meiyetrian, E., Ermayani, E., Pramesti, I. L., & Nur Ananda, A. J. (2021). Prenatal and postnatal determinants of stunting at age 0–11 months: A cross-sectional study in Indonesia. *Plos one*, 16(7), e0254662.
- Svefors, P., Sysoev, O., Ekstrom, E. C., Persson, L. A., Arifeen, S. E., Naved, R. T., & Selling, K. (2019). Relative importance of prenatal and postnatal determinants of stunting: data mining approaches to the MINIMat cohort, Bangladesh. *BMJ open*, 9(8), e025154.
- Thahir, A. I. A., Li, M., Holmes, A., & Gordon, A. (2023). Exploring factors associated with stunting in 6-month-old children: A population-based cohort study in Sulawesi, Indonesia. *Nutrients*, 15(15), 3420.
- Vaivada, T., Akseer, N., Akseer, S., Somaskandan, A., Stefopoulos, M., & Bhutta, Z. A. (2020). Stunting in childhood: an overview of global burden, trends, determinants, and drivers of decline. *The American journal of clinical nutrition*, 112, 777S-791S. Stunting in childhood: an overview of global burden, trends, determinants, and drivers of decline. *The American journal of clinical nutrition*, 112, 777S-791S.
- Vats, H., Walia, G. K., Saxena, R., Sachdeva, M. P., & Gupta, V. (2024). Association of low birth weight with the risk of childhood stunting in low-and middle-income countries: A systematic review and meta-analysis. *Neonatology*, 121(2), 244-257.
- Vizzari, G., Morniroli, D., Tiraferri, V., Macchi, M., Gangi, S., Consales, A., & Gianni, M. L. (2023). Postnatal growth of small for gestational age late preterm infants: determinants of catch-up growth. *Pediatric Research*, 94(1), 365-370.

Syariana^{*1}, Irma Ika Sari², Arindiah Puspo Windari²

Murung Raya Midwifery Academy
Maluku Husada College of Health Sciences
Corresponding author: Yunani. *Email: syariana@akbidmurungraya.ac.id

DOI: 10.56922/mchc.v4i9.2024