Pancasakti Journal of Public Health Science and Research
Vol. 5, No. 3 September 2025: Page. 363–369
Doi: 10.47650/pjphsr.v5i3.2030
ISSN (Online): 2777-1296
OJS: http://journal.unpacti.ac.id/index.php/pjphsr

Prevalence and Risk of Nutritional Problems among Toddlers in Balikpapan, Indonesia: A Cross-sectional Study

Tanti Asrianti*, Siswanto, Irfansyah Baharuddin Pakki, Khumairotul Zahroh Al Ahmadi, Akhmad Dzikri
Faculty of Public Health, Mulawarman University, Samarinda, Indonesia

***Correspondence Address:** tantiasrianti@fkm.unmul.ac.id

Article Info

Article History
Received: Jul 03, 2025
Revised: Aug 21, 2025
Accepted: Aug 27, 2025

Keywords:
Toddlers, stunting, malnutrition, undernutrition, public health

ABSTRACT

Nutritional challenges during early childhood remain a pressing global concern that significantly influence a country's Human Development Index. This study aimed to assess the prevalence and risk of undernutrition-related health problems among toddlers in Balikpapan City, East Kalimantan Province. Using a descriptive-analytic design with a cross-sectional approach, data were collected from four integrated community health post (Posyandu) located across three sub-districts. The study population comprised toddlers attending Posyandu in West Balikpapan, Central Balikpapan, and South Balikpapan. A purposive sampling technique was applied based on predefined criteria, yielding a sample size of 78 toddlers. Findings revealed that from 78 toddlers, 11,5% toddlers were at risk of malnutrition, 20,5% toddlers were at risk of undernutrition, and 2,6% toddlers were at risk of stunting. These findings highlight the urgent need for targeted preventive interventions to address undernutrition risks in early childhood and offer valuable evidence to support regional health policy development. Prenatal interventions, including maternal supplementation and antenatal care are crucial. Exclusive breastfeeding remains essential but should be supported by broader strategies addressing complementary feeding and maternal conditions. Longitudinal studies are recommended to establish causal pathways.

INTRODUCTION

Malnutrition in early childhood, especially among toddlers, continues to pose a significant public health challenge globally. Nutritional adequacy during the first 1.000 days of life, from conception to a child's second birthday, is widely recognized as a critical period for ensuring optimal physical growth and cognitive development. During this window, children are particularly vulnerable to various forms of undernutrition, including stunting (low height-for-age), wasting (low weight-for-height), and micronutrient deficiencies, which can result in long-term developmental impairments (UNICEF, 2024).

According to the World Health Organization (WHO), an estimated 144 million children under the age of five were stunting, 47 million wasting, and 38,9 million overweight in 2020, reflecting the global burden of both undernutrition and overweight. These numbers increased slightly in 2022, with approximately 149 million children under five experiencing stunting, 45

million experiencing wasting, and 37 million living with overweight or obesity. Of particular concern, nearly half of all deaths among children under five are associated with undernutrition, most of which occur in low- and middle-income countries (WHO, 2024).

Multiple interrelated factors contribute to child malnutrition, including inadequate maternal nutrition during pregnancy, low birth weight, inappropriate infant and young child feeding practices, and recurrent infections. Exclusive breastfeeding during the first six months of life is among the most effective strategies to prevent early malnutrition. Breast milk provides complete nutrition, enhances immune protection, and lowers the risk of infections in infants. In addition to feeding practices, birth weight is a strong predictor of a child's future nutritional status. Low birth weight (LBW) infants are more likely to suffer from stunting, wasting, and other forms of undernutrition during childhood (Titaley et al., 2021) This highlights the importance of improving prenatal care and maternal nutrition to ensure healthy birth outcomes.

Despite various global and national initiative, malnutrition remains a major burden in low- and middle-income countries. Efforts have focused on strengthening maternal and child health services, promoting optimal breastfeeding and complementary feeding practices, and improving community-based nutrition education. However, disparities persist, particularly in developing countries, which continue to bear a disproportionate share of the global malnutrition burden (Victora et al., 2021; UNICEF, 2023).

In Indonesia, the prevalence of stunting among children under five was reported at 21,6% in 2022, indicating a decrease from previous years but still above the national target of 14% by 2024 (Kementerian Kesehatan RI, 2023). East Kalimantan Province reported a stunting prevalence of 23,9% in 2022, which is higher than the national average while Balikpapan City experienced an increase from 17,6% in 2021 to 19,6% in 2022 (Nashiri & Lukman, 2024). Although these figures highlight the persistence of child undernutrition, there is limited evidence on the specific risk factors influencing toddlers' nutritional status in Indonesian urban contexts. Previous studies have mainly focused on rural areas, leaving a gap in understanding how socioeconomic disparities, dietary transitions, and access to health services contribute to undernutrition in cities. Therefore, this study aims to identify the prevalence and risk of undernutrition among toddlers in Balikpapan, providing evidence to inform targeted local interventions.

METHODS

The research was conducted in Balikpapan City, located in East Kalimantan Province, Indonesia. Data collection was carried out in October 2023 across four Posyandu (integrated health services post) situated in three sub-districts: West Balikpapan, Central Balikpapan, and South Balikpapan. The study population consisted of all toddlers who visited these selected Posyandu during the data collection period.

A purposive sampling technique was used to select participants based on predefined inclusion criteria, such as age 12-59 months, attendance at the Posyandu, and parental consent to participate in the study. Exclusion criteria included toddlers with incomplete anthropometric records. The sample size was determined using the Slovin formula with a 10% margin of error based on the average monthly attendance records of toddlers at the selected

Posyandu, yielding a minimum of 72 respondents. A total of 78 toddlers met the criteria and were included in the final sample.

Data collection involved both primary and secondary data sources. Primary data were obtained through structured interviews with caregivers using structured survey instrument. The survey included questions related to child demographic characteristics, feeding practices, and health history. Secondary data were gathered from Posyandu records and maternal and child health books. Anthropometric measurements were also obtained to assess nutritional status, including weight-for height, height-for-age, and weight-for-age indicators, which were then interpreted using WHO Child Growth Standards.

Data analysis was conducted using SPSS version 24. A descriptive statistical analysis was carried out to identify the prevalence of undernutrition, including underweight, wasting, and stunting. The results were presented in the form of frequencies and percentages.

All respondents were informed about the purpose of the study and provided verbal consent before participating. Participation was strictly voluntary and confidentially was assured. All data were collected anonymously and used solely for research purposes.

RESULTS

The sample comprised 78 toddlers, with a near-even gender distribution (51% female). Regarding maternal education history, 47,44% of the respondents had attained senior high school education, whereas 2,56% had no formal education or had not completed elementary school (Table 1).

Table 1. Distribution of mother's educational background

Mother's educational background	n	%
Did not attend school/ did not complete primary school	2	2,56
Primary school/ equivalent	9	11,54
Junior high school/ equivalent	17	21,79
Senior high school/ equivalent	37	47,44
Diploma/ bachelor's degree	13	16,67

Source: Primary Data, 2023

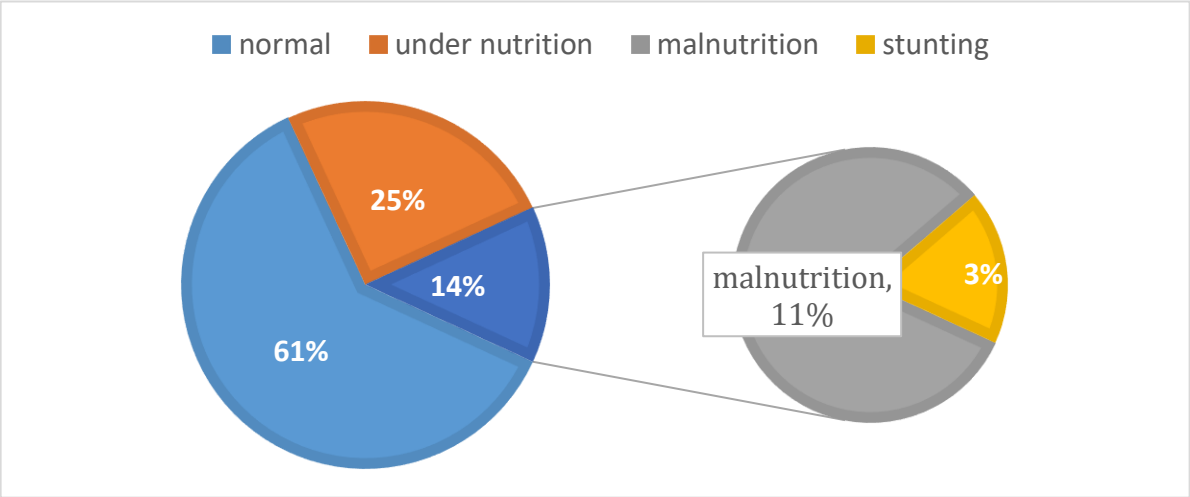

Figure 1. Risk of nutritional problems

Among 78 toddlers included in this study, 39% were identified as being at risk of nutritional problems. Specifically, 25% were classified as undernourished, 11% exhibited sign of malnutrition, and 3% were at risk of stunting (figure 1). Among toddlers born with low birth weight, a greater proportion exhibited nutritional problems compare to those with normal birth weight. These findings indicate that toddlers with a history of low birth weight are more likely to experience both malnutrition and undernutrition.

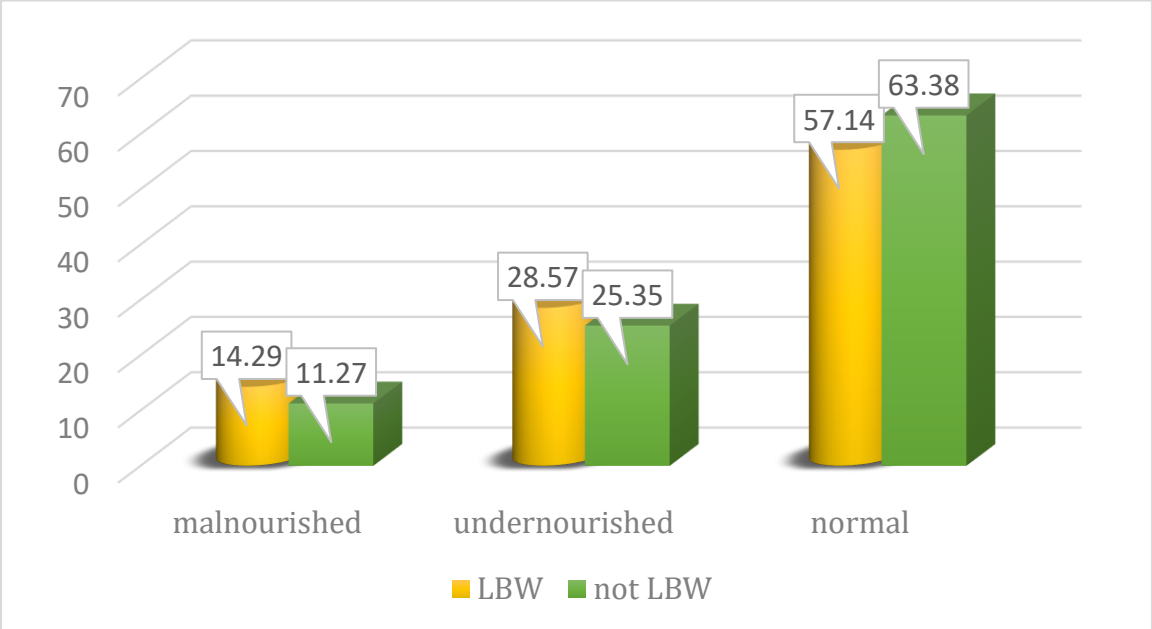

Figure 2. Birth weight history with the risk of nutritional problems

Figure 3 presents the exclusive breastfeeding history of toddlers in relation to their nutritional status. While the proportion of toddlers with normal nutritional status was higher in the exclusively breastfed group, a slight increase in undernutrition was also observed in this group.

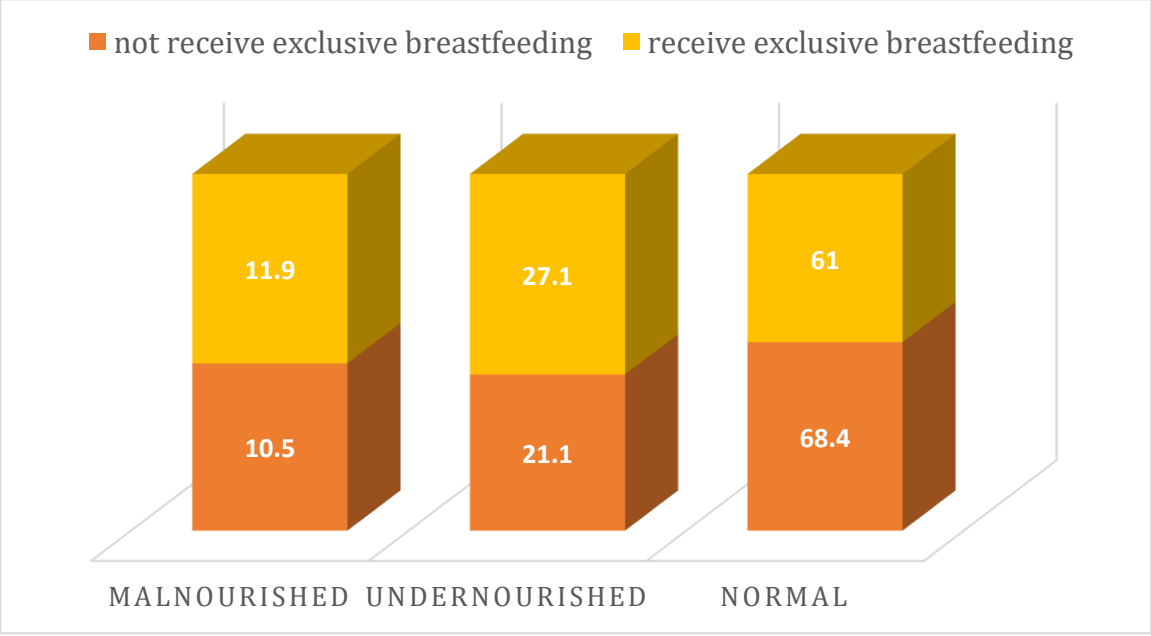

Figure 3. Exclusive breastfeeding history with the risk of nutritional problems

DISCUSSION

This study found that undernutrition indicators such as stunting, wasting, and underweight were present among toddlers in Balikpapan, with a higher prevalence observed in children with a history of low birth weight. Our findings are consistent with previous studies reporting that low birth weight is a significant risk factors for poor nutritional outcomes. Research result by Aryastami et al (2017), which identified low birth weight as the most dominant predictor of stunting among children aged 12-13 months. Our data show that low birth weight toddlers experience slightly higher rates of undernutrition (28.57% vs. 25.35%) than toddlers with normal weight. Although the differences appear modest, they are consistent with findings from recent studies indicating that low birth weight is a risk factor for adverse nutritional outcomes. For example, The Indian Demographic and Health Survey Data (2019-2021) reported that low birth weight has a significant contribution to undernutrition with 14,8% of stunting, 10,4% of wasting, and 9,6% of underweight cases (Jana et al., 2023). Recent systematic review also reported a pooled odds ratio of 2.32 for stunting among children born with low birth weight in low- and middle-income countries (Vats et al., 2024). These findings support our conclusion that low birth weight is a key factor contributing to nutritional issues in toddlers.

Inadequate fetal nutrition induces metabolic adaptations that increase susceptibility to undernutrition, infections, and chronic diseases later in life. Low birth weight commonly resulting from maternal undernutrition, prenatal infections, or prematurity, leads to neonates with limited nutritional reserves and weakened immunity, placing them at greater risk for nutritional problems throughout early childhood (Upadhyay et al, 2019; Mustakim et al, 2022; Radaelli et al., 2023). Addressing low birth weight is crucial in combating early childhood undernutrition. Effective interventions must begin during the prenatal period and extend beyond postnatal feeding strategies. This includes maternal nutritional supplementation and antenatal care programs aimed at improving maternal and fetal health outcomes.

Meta-analysis of 33 studies across developing countries found that exclusive breastfeeding significantly reduces the risk of overall undernutrition (OR=0.82; 95%CI, 0.68-0.99) and stunting (OR=0.773; 95% CI, 0.55-0.95) in children under five (Mardani et al, 2022). Furthermore, a 2019 meta-analysis (13 observational studies) reported that exclusive breastfeeding can protects against wasting, with OR= 0.42 (cross-sectional), OR=0.38 (case-control), and OR=0.75 (cohort) (Wijiwinarsih et al, 2019). These findings establish exclusive breastfeeding as a critical nutritive and protective intervention in early life. In our study, although the exclusive breastfeeding group showed a higher proportion of children with normal nutritional status, we observed a marginal yet paradoxical increase in undernutrition compared to non-exclusive breastfeeding peers. This divergence suggests the presence of residual confounding factors such as variability in breastmilk composition, timing and quality of complementary feeding (MPASI), and maternal socioeconomic status that may modulate the efficacy of exclusive breastfeeding in our setting.

This study is subject to several limitations. First, its cross-sectional design precludes the establishment of causal relationships between the examined variables. Although associations were identified, temporal patterns and the direction of effects cannot be determined within this study design. Future longitudinal research is warranted to elucidate these relationships and

capture developmental trajectories over time. Second, Potential confounding variables, such as maternal education level, household sanitation, and complementary feeding practices, may have influenced the observed nutritional outcomes. This limitation is particularly relevant considering our findings indicating mild undernutrition even among exclusively breastfeed children. This suggests the need for a more nuanced analysis that accounts for breastfeeding duration, quality, and the timing and adequacy of complementary feeding.

CONCLUSION

This study confirms that low birth weight is a key risk factor for undernutrition and stunting in early childhood, likely due to reduced immunity and limited nutrient reserves. Although exclusive breastfeeding has shown protective effects in previous studies, our findings suggest that its impact may be influences by factors such as maternal health, breastfeeding quality, and socioeconomic condition.

To address early childhood undernutrition effectively, interventions should begin prenatally, focusing on maternal nutrition, antenatal care, and early detection of at-risk births. Breastfeeding promotion must be supported by complementary strategies, including education on feeding strategy. Longitudinal research is needed to clarify causal pathways and long-term influence of early-life factor on child nutrition, supporting more integrated and context-specific approaches to malnutrition prevention.

REFERENCES

Aryastami, N.K., Shankar, A., Kusumawardani, N. et al. Low birth weight was the most dominant predictor associated with stunting among children aged 12–23 months in Indonesia. BMC Nutr 3, 16 (2017). https://doi.org/10.1186/s40795-017-0130-x

Jana, A., Dey, D. & Ghosh, R. Contribution of low birth weight to childhood undernutrition in India: evidence from the national family health survey 2019–2021. BMC Public Health 23, 1336 (2023). https://doi.org/10.1186/s12889-023-16160-2

Kementerian Kesehatan RI (2023). Angka Stunting tahun 2022 turun menjadi 21,6 persen [online] available from https://www.badankebijakan.kemkes.go.id/angka-stunting-tahun-2022-turun-menjadi-216-persen/

Mardani, R. A. D., Wu, W. R., Nhi, V. T., & Huang, H. C. (2022). Association of breastfeeding with undernutrition among children under 5 years of age in developing countries: A systematic review and meta-analysis. Journal of nursing scholarship: an official publication of Sigma Theta Tau International Honor Society of Nursing, 54(6), 692–703. https://doi.org/10.1111/jnu.12799

Mustakim, M. R. D., Irwanto, Irawan, R., Irmawati, M., & Setyoboedi, B. (2022). Impact of Stunting on Development of Children between 1-3 Years of Age. Ethiopian journal of health sciences, 32(3), 569–578. https://doi.org/10.4314/ejhs.v32i3.13

Nashiri, M. F., & Lukman, A. I. (2024). Upaya Pemerintah dalam Mengatasi Stunting di Kelurahan Karang Rejo Kota Balikpapan. eJournal Pembangunan Sosial, 12 (2): 168-179. Available from http://ejournal.ps.fisip-unmul.ac.id/site/wp-content/uploads/2024/06/Upaya%20Pemerintah%20Mengatasi%20Stunting%20di%20Kelurahan%20Karang%20Rejo%20(Fahran)%20(06-27-24-01-40-46).pdf

Radaelli, G., Leal-Conceição, E., Kalil Neto, F., Taurisano, M. R. G., Majolo, F., Bruzzo, F. T. K., Booij, L., & Nunes, M. L.. (2023). Motor and cognitive outcomes of neonates with low birth weight in Brazil: a systematic review and meta-analysis. Arquivos De Neuro-psiquiatria, 81(2), 186–200. https://doi.org/10.1055/s-0042-1758866

Titaley CR, Ariawan I, Hapsari D, Muasyaroh A, Dibley MJ. Determinants of the Stunting of Children Under Two Years Old in Indonesia: A Multilevel Analysis of the 2013 Indonesia Basic Health Survey. Nutrients. 2019 May 18;11(5):1106. https://doi.org/10.3390%2Fnu11051106

UNICEF (2023). UNICEF-WHO-The World Bank: Joint Child Malnutrition Estimates (JME) – Levels and Trends – 2023 edition. Available from https://data.unicef.org/resources/jme-report-2023/

UNICEF (2024). Nutrition. [online] Available from https://www.unicef.org/nutrition

Upadhyay, R.P., Naik, G., Choudhary, T.S. et al. Cognitive and motor outcomes in children born low birth weight: a systematic review and meta-analysis of studies from South Asia. BMC Pediatr 19, 35 (2019). https://doi.org/10.1186/s12887-019-1408-8

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. https://doi.org/10.1159/000532006

Victora, C. G., Christian, P., Vidaletti, L. P., Gatica-Domínguez, G., Menon, P., Black, R. E. (2021). Revisiting maternal and child undernutrition in low-income and middle-income countries: variable progress towards an unfinished agenda. The Lancet, Volume 397, Issue 10282, Pages 1388-1399, ISSN 0140-6736. https://doi.org/10.1016/S0140-6736(21)00394-9

WHO (2024). Malnutrition. [online] Available from https://www.who.int/news-room/fact-sheets/detail/malnutrition

Wijiwinarsih, A., Susilawati, T. N., & Murti, B. (2019). The Effect of Exclusive Breastfeeding on Wasting in Children Under Five: A Meta-Analysis Study. Journal of Maternal and Child Health, 4(2), 87–96. Retrieved from https://thejmch.com/index.php/thejmch/article/view/169