



RESEARCH ARTICLE

RISK FACTORS FOR STUNTING IN CHILDREN UNDER FIVE YEARS OF AGE :A SCOPING REVIEW

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Abstract

Stunting in children under five is a chronic nutritional problem that has a long-term impact on growth, development and productivity. Risk factors such as low birth weight (LBW), maternal education, economic status, and sanitation play an important role in stunting. This scoping review aims to map the scientific evidence on risk factors for stunting in children under five years of age, with a focus on the contribution of LBW. The review was conducted following PRISMA guidelines through searches in the Scopus and PubMed databases. Keywords used included "stunting", "children under 5 years", and "risk factors". Inclusion criteria included English-language articles, published between 2015 and 2025, available in full-text, and discussing risk factors for stunting. Of the 848 articles, 14 were analyzed further. The prevalence of stunting in the studies ranged from 5.6% to 47.9%. LBW was the factor most consistently associated with stunting, with a 1.79 to 9-fold increased risk. Other factors such as low maternal education, incomplete immunization, and poor sanitation conditions also contribute. Stunting is influenced by biological, social, and environmental factors. LBW is a major determinant, and stunting prevention requires a multi-sectoral approach that includes improved mother-child nutrition, education, and sanitation.

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Introduction:-

Stunting is a persistent nutritional issue in children under five years of age, marked by a child's height being less than that of peers the same age. The World Health Organization (WHO) defines stunting as a condition where the Z-score for height-for-age (TB/U) falls below -2 standard deviations when measured against growth standards[1].

Stunting in children below five requires urgent focus as it can hinder physical growth, mental development, and overall health in youngsters. Kids who experience stunting are more prone to become unhealthy and impoverished adults. Stunting in children is linked to a higher vulnerability to diseases, including both infectious and non-communicable illnesses, along with a greater likelihood of being overweight and obesity[2].

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One of the risk factors affecting the incidence of stunting in children under five is a history of low birth weight (LBW). As a result, the growth of LBW babies will be disrupted, if this situation continues with inadequate feeding, frequent infections, and poor health care can cause stunting[3]This scoping review aims to identify scientific evidence on low birth weight as a determinant of stunting, and to inform the extent to which a history of low birth weight affects stunting risk..

Methods:-

This scoping review was performed following the methodological framework suggested by Arksey and O'Malley, enhanced by Tricco et al. (2018), and directed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR). This review aims to systematically examine different risk factors for stunting in children younger than five years old. The PCC (Population, Concept, Context) framework was utilized to determine the emphasis of the literature search and selection: Population: Children (ages 0–59 months), Concept: Risk factors for stunting, Context: Research concentrating on nations with elevated stunting rates.

A Scoping literature search was conducted in two electronic databases: PubMed and Scopus, up to february2, 2025. The keywords used included Boolean combinationssuchas:(stunting at birth OR children under 5 years OR 0-59 month AND risk factors OR determinants OR predictors)The search was conducted in English and aimed to capture articles relevant to the topic of Stunting risk factors in children.

Inclusion and Exclusion Criteria

Inclusion criteria:

Primary studies (quantitative, qualitative, or mixed methods) that explore Stunting risk factors in children, Articles published in peer-reviewed journals, Studies involving children as the primary participants (ages 0-59 months), Articles published between 2016-2025.

Exclusion criteria:

Studies focusing exclusively on adult populations, Review articles, meta-analyses, commentaries, editorials, or opinion pieces, experiment studies, animal studies or studies without primary data.

The selection process consisted of three stages: (1) title and abstract screening, (2) full-text review, and (3) resolution of discrepancies by a third reviewer in cases of disagreement. All selected articles were exported to reference management software to avoid duplication.

Data Extraction and Synthesis

The extracted data were analyzed thematically to categorize risk factors based on common determinants, such as maternal factors, child-related factors, household and environmental factors, and healthcare access.

Key findings related to the association between risk factors and stunting incidence in children

The extracted data were then thematically analyzed to identify common patterns and categorize the various risk factors.

The findings were presented in narrative synthesis and tabular format to provide a comprehensive overview of the existing evidence and This scoping review follows the PRISMA-ScR.(Figure 1).

Figure 1. PRISMA-ScR flowchart for selection

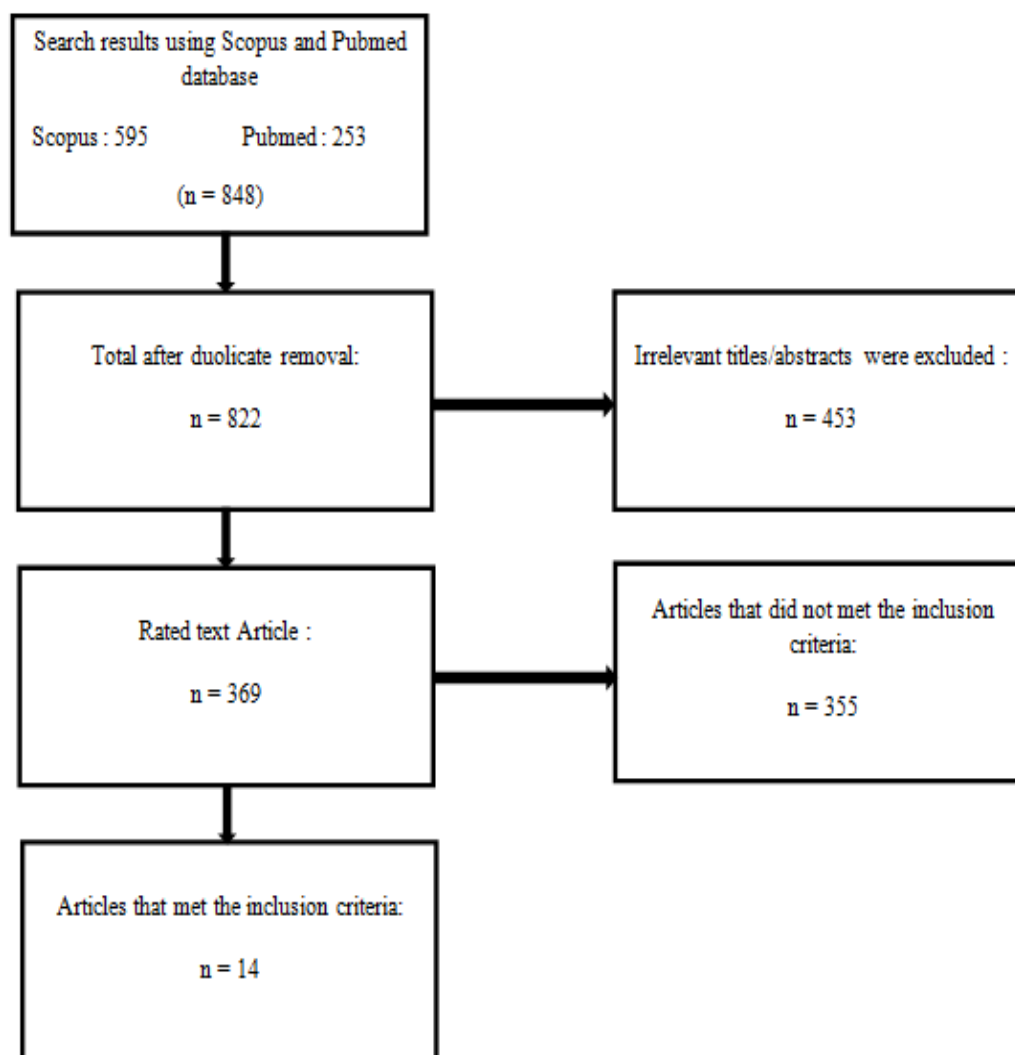


Figure 1:- PRISMA flowchart for selection

Results:-

The literature review performed in Scopus and PubMed yielded a total of 848 articles. Following the deduplication process, 822 articles were left for screening of titles and abstracts. Out of these, 453 articles were eliminated as they failed to satisfy the inclusion criteria due to unsuitable study variables or did not clearly present the prevalence of the bblr association with stunting incidence. In the end, the final synthesis included 14 studies. The PRISMA Scoping Review (ScR) flowchart (Figure 1) depicts the study selection process, while Table 1 summarizes the characteristics and main findings of the selected studies. The findings from this scoping review indicate that stunting in children younger than five is a multifaceted, ongoing nutritional issue resulting from multiple interrelated risk factors. According to the 14 articles examined, the primary risk factor related to the aims of the scoping review on stunting incidence is low birth weight (LBW), as children with LBW are more likely to face stunted growth compared to those born at normal weight. This finding is reinforced by several studies showing that LBW increases the risk of stunting with varying odds ratios and linear regression. The relationship between birth weight and stunting in children can be explained by the child's increased susceptibility to infection and increased risk of complications of sleep apnea, jaundice, anemia[4] The prevalence of stunting I the reviewd studies showed considerable variation, suggesting differences between regions or countries where the studies were conducted. In developing countries the slowdown in body length growth often starts at 3 months of age[5]

Tabel 1:- Results of Included Studies

Author	Country/Study Location	Study Design	Population/ Sample	Risk Factors Assessed	Prevalence of Stunting	Key Findings
Pallangyo et al., 2025[6]	Tanzania	Cross-sectional	2.158 children aged 0-23 months	Child (birth weight and length) and mother characteristics	The prevalence of the three dimensions of malnutrition (stunting, wasting and underweight) was 1.62%.	The relative risk ratio of experiencing all three forms of malnutrition (stunting, underweight and wasting simultaneously) is reduced by a factor of 0.211 for low birth weight children.
Islam et al., 2025[7]	Bangladesh	Coss-Sectional	43.946 children under the age of <60 months	Child (birth weight and length) and mother characteristics	Reduction of CFM prevalence in 2019 to 18.56% (95%CI: 18.07-19.07; n=4,281)	Children with small birth size had increased odds of CFM (aOR=2.32, 95% CI: 2.06-2.61 p<0.001) and SFM (aOR=1.42, 95% CI: 1.24-1.62 p<0.001).
Obasohan et al., 2024[8]	Nigeria	Cross-sectional	7.770 children aged 6-59 months	Child (birth weight and length) mother characteristics and households	The prevalence of stunting was 38% with 95% CI (709-10,481).	Children born with a small birth size (AOR = 1.79, 95% CI: 1.45-2.26), have a 26% and 79% increased chance of developing malnutrition, respectively.
Yong et al., 2023[9]	Malaysia	Kohort	4.570 children aged 0-24 months	Maternal sociodemographics, Child characteristics (LBW and Premature)	The prevalence of stunting at birth was 6.5% and at 24 months 5.6%, but the highest prevalence of stunting occurred between 1 and 21 months of age, 11.1-16.3%.	The birth status of LAZ scores around 41.6% of children with low birth weight prematurely experienced stunting while those with normal birth weight prematurely were not stunted around 70.6%.
Correa, 2022[10]	Angola	Cross-sectional	16.302 households	Child (birth weight and length) mother characteristics and households	The prevalence of stunting was 37.4% (95% CI,	Stunting has a significant association with low birth weight <2500gr with p

					35.3% to 39.6%)	value <0.001, 95% CI 44.2 (36.8-51.8)
Mistry et al., 2019[11]	Bangladesh	Cross-sectional	children aged 0-23 months	Child characteristics (birth weight history), mother characteristics and household characteristics	The prevalence of stunting aged 0-59 months is 15.42%. Prevalence increases with age	Low birth weight also has a 50% higher risk of stunting than non-low birth weight.
Bornee et al., 2025[12]	Bangladesh	Cross-sectional	8.759 anchildren under five years	Characteristics of children, parents, households, environmental factors and contextual factors	The prevalence of stunting is 13.7% of children under five years old	Children born with low birth weight have a higher likelihood of malnutrition (AORr: 2.16 with 95% CI: 1.29-3.59).
Sanin et al., 2018	Bangladesh	Kohort	265 newborns	Low birth weight <- 2,500gr,	Prevalence of stunting 47.9% at 24 months of age	The prevalence of LBW was 28.7% and girls were 2-fold more likely (OR = 2.3; 95% CI 1.32-4.0) to experience low birth weight.
Titaley et al., 2019[14]	Indonesia	Cross-sectional	24.657 children 0-2 years old	Household and housing characteristics, mother and father characteristics, child characteristics and stunting status	The prevalence of stunting shows that 24,657 children <2 years old, 33.7%.	The chance of stunting in children with birth weight <2500grams is 2.55 times greater to experience stunting.
Sutarto et al., 2023s	Indonesia	Cases-control	247 cases dan 247 controlin toddlers 2-3 years of age	hild (birth weight and length) and mother characteristics	Prevalence was not mentioned in the form of a single percentage but the study mentioned that the prevalence of stunting in Way Kanan in 2018 exceeded 20%.	The results of multivariate regression analysis showed that the most influential variable information was birth weight, OR=9.
Hafid et al., 2024[16]	Indonesia	Cross-sectional	516 children aged 0-23 months	hild (birth weight and length) and mother characteristics	The prevalence of stunting among 516 children was 20.5%.	Children who had low birth weight had a significantly higher frequency of stunting at 39.7%.

Pratiwi, 2020[15]	Indonesia	Cross-sectional	1.377 children aged 6-60 months	hild (birth weight and length) and mother characteristics	The prevalence of stunting reached 35.7%	Birth weight showed a PR value of 7.3 (95%CI: 3,774-14,238), i.e. low birth weight has a 7.3 times higher risk of stunting.
Ayu et al., 2024[5]	Indonesia	Cross-sectional	100 children under 5 years old	hild (birth weight and length) and mother characteristics	Stunting prevalence 18.35% of 28,716 children under 5 years old	Low birth weight less than 2500grams (OR 4.94 with 95% CI 1.30-18.80) had a 4.94 times higher risk of stunting
Arulmohi et al., 2017[17]	Indonesia	Cross-sectional	3.134 children under 2 years old	hild (birth weight and length) and mother characteristics	The prevalence of stunting in children under 2 years of age is 22.0%.	Children with low birth weight were 1.97 times more likely to be stunted with a 95% CI of 1.90-2.03.

Discussion:-

Numerous studies have consistently demonstrated that LBW is a major risk factor for stunting. LBW infants have a higher likelihood of being stunted compared to infants with normal birth weight. The scoping review revealed that Bangladesh, located in South Asia, has a significant rate of underweight and stunted children under the age of 5. In the case of severe malnutrition, over 0.3 million children under the age of 5 reside in the country, ranking it among the highest in comparison to other Asian nations[18].

This research indicated that children with low birth weight had a higher likelihood of being stunted compared to those with normal weight. This outcome was linked to low birth weight. In contrast, greater birth weight helps shield children from stunting. Low birth weight, often resulting from Intrauterine Growth Restriction (IUGR) during gestation, is recognized as a risk factor for stunting in lower-middle-income nations[3].

LBW and stunting affect cognitive and physical development over the long term. Children who are born with low birth weight and are stunted tend to experience worse cognitive outcomes, reduced academic performance, and higher rates of behavioral issues. The link between LBW and stunting also relates to a higher likelihood of chronic conditions in later life, including diabetes and hypertension. Successful strategies to decrease stunting must prioritize enhancing maternal health and nutrition, providing sufficient antenatal care, and encouraging exclusive breastfeeding[19]. Community-based strategies, including education and empowerment programs targeting mothers, can significantly reduce stunting rates. Addressing environmental factors such as sanitation and reducing exposure to pollutants such as cigarette smoke is also important.

Maternal health and nutrition play an important role in determining birth weight and subsequent stunting. Poor maternal nutrition, low maternal height, and inadequate antenatal care are associated with a high incidence of LBW and stunting[19]

Optimal breastfeeding can reduce the risk of of stunting in children.17 Furthermore, research in Malawi also showed that infants under 6 months of age who were exclusively breastfed tended to have a longer exclusively breastfed tend to be longer and heavier than their non-breastfed counterparts.longer and heavier than infants who were not exclusively breastfed[18]It can be explained that the immune system of a growing child has some immune deficiencies that make the child susceptible to infection. children are susceptible to infections. The immune substances contained in in breast milk help strengthen the innate immune system in the child so that the child avoids diarrhea or other infectious diseases. other infectious diseases that have been identified as one of the main risk factors for stunting. of the main causes of stunting[17]

Methodologically, variations in study design and sample size suggest that the results obtained may be influenced by the research approach used. Cross-sectional studies tend to describe momentary statistical relationships, whereas cohort studies are able to explain stronger causal relationships. Although most studies used the WHO standards for stunting measurement (Z -score < -2 SD for TB/U), there were differences in the way data were collected and risk factors were measured.

Ethics Approval

Not applicable.

Availability of Data and Materials

Not applicable.

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Author Contribution

All authors actively contributed to all stages of the research and the writing of this article. KYS conducted the literature search, data extraction, and thematic analysis. FA and HS provided scientific supervision, reviewed the extracted findings, and contributed to the writing and editing of the manuscript. All authors read and approved the final manuscript.

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References:-

- [1] D. Nasution, D. S. Nurdianti, and E. Huriyati, “Berat badan lahirrendah (BBLR) dengankejadian stunting pada anakusia 6-24 bulan,” *J. Gizi Klin. Indones.*, vol. 11, no. 1, p. 31, 2014, doi: 10.22146/ijcn.18881.
- [2] B. G. Nainggolan and M. Sitompul, “Nainggolan, B. G., &Sitompul, M. (2019). Hubunganberat badan lahirrendah (BBLR) dengankejadian stunting pada anakusia 1-3 tahun. *Nutrix Journal*, 3(1), 36-41.” pp. 36–41, 2019.
- [3] F. Abbas, R. Kumar, T. Mahmood, and R. Somrongsong, “Impact of children born with low birth weight on stunting and wasting in Sindh province of Pakistan: a propensity score matching approach,” *Sci. Rep.*, vol. 11, no. 1, pp. 1–10, 2021, doi: 10.1038/s41598-021-98924-7.
- [4] W. Kresnawati, P. J. Pandie, and R. Rohsiswatmo, “Very low birth weight infant outcomes in a resource-limited setting: a five-year follow-up study,” *Front. Pediatr.*, vol. 13, no. May, pp. 1–8, 2025, doi: 10.3389/fped.2025.1581033.
- [5] M. S. Ayu, M. Rahmadhani, D. Pangestuti, and F. Ibarra, “IDENTIFYING RISK FACTORS FOR STUNTING AMONG UNDER-FIVE INDONESIAN CHILDREN,” *J. Ilm. IlmuTerap. Univ. Jambi*, vol. 8, no. 2, pp. 794–803, 2024, doi: 10.22437/jiituj.v8i2.34450.
- [6] E. E. Pallangyo, O. J. Kimaro, N. R. Mwalupani, G. S. George, D. Katana, and A. S. Msengwa, “Cross-sectional analysis of risk factors associated with the coexistence of three undernutrition indicators among children aged 0–23 months in Tanzania,” *BMC Nutr.*, vol. 11, no. 1, 2025, doi: 10.1186/s40795-024-00980-5.
- [7] M. R. Islam, M. F. Al Fidah, M. M. Rahman, T. Ahmed, and S. Nuzhat, Coexisting forms of malnutrition among under-5 children in Bangladesh: Results from 2012-13 and 2019 Multiple Indicator Cluster Surveys. 2025. doi: 10.1017/S1368980025000448.
- [8] P. E. Obasohan, S. J. Walters, R. Jacques, and K. Khatab, “Socio-economic, demographic, and contextual predictors of malnutrition among children aged 6–59 months in Nigeria,” *BMC Nutr.*, vol. 10, no. 1, 2024, doi: 10.1186/s40795-023-00813-x.
- [9] H. Y. Yong, Z. M. Shariff, and C. Y. Wong, “Growth patterns of urban Malaysian children under 24 months of age in Selangor, Malaysia,” *Malays. J. Nutr.*, vol. 29, no. 1, pp. 1–15, 2023, doi: 10.31246/mjn-2021-0103.

- [10] P. R. Correa, "Factors associated with stunting among children 0 to 59 months of age in Angola: A cross-sectional study using the 2015–2016 Demographic and Health Survey," *PLOS Glob. Public Heal.*, vol. 2, no. 12, 2022, doi: 10.1371/journal.pgph.0000983.
- [11] S. K. Mistry et al., "Individual, maternal- and household-level factors associated with stunting among children aged 0-23 months in Bangladesh," *Public Health Nutr.*, vol. 22, no. 1, pp. 85–94, 2019, doi: 10.1017/S1368980018002926.
- [12] F. A. Bornee, M. R. K. Chowdhury, B. N. Siddiquea, B. Billah, F. Akter, and M. N. Karim, "Exploring under-five child malnutrition in Bangladesh: analysis using the Extended Composite Index of Anthropometric Failure (ECIAF)," *Public Health Nutr.*, vol. 28, no. 1, 2025, doi: 10.1017/S1368980025000138.
- [13] K. I. Sanin et al., "Micronutrient adequacy is poor, but not associated with stunting between 12-24 months of age: A cohort study findings from a slum area of Bangladesh," *PLoS One*, vol. 13, no. 3, 2018, doi: 10.1371/journal.pone.0195072.
- [14] C. R. Titaley, I. Ariawan, D. Hapsari, A. Muasyaroh, and M. J. Dibley, "Determinants of the stunting of children under two years old in Indonesia: A multilevel analysis of the 2013 Indonesia basic health survey," *Nutrients*, vol. 11, no. 5, 2019, doi: 10.3390/nu11051106.
- [15] A. Pratiwi, "Jurnal kesehatan masyarakat khatulistiwa," *J. Kesehat. Masy.*, vol. 8, no. 1, pp. 30–39, 2020.
- [16] F. Hafid, N. Nasrul, A. Amsal, K. Ramadhan, T. Taufiqurahman, and S. Sariman, "Low Birth Weight , Child Gender , Number of Children , and Maternal Education as Risk Factors for Stunting in Palu City - Indonesia Berat Lahir Rendah , Jenis Kelamin Anak , Jumlah Anak dan Pendidikan Ibu," vol. 8, no. 2, pp. 75–84, 2024, doi: 10.20473/amnt.v8i2SP.2024.75.
- [17] M. Arulmohi, V. Vinayagamoorthy, and D. A. R., "Physical Violence Against Doctors: A Content Analysis from Online Indian Newspapers," *Indian J. Community Med.*, vol. 42, no. 1, pp. 147–50, 2017, doi: 10.4103/ijcm.IJCM.
- [18] S. S. Halli, R. A. Biradar, and J. B. Prasad, "Low Birth Weight, the Differentiating Risk Factor for Stunting among Preschool Children in India," *Int. J. Environ. Res. Public Health*, vol. 19, no. 7, 2022, doi: 10.3390/ijerph19073751.
- [19] D. C. Clark, "Association of Dairy Protein Intake During Pregnancy with Birth Weight," *Food Nutr. Bull.*, vol. 39, no. 2_suppl, pp. S54–S59, 2018, doi: 10.1177/0379572118775824.