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

by Jana Publication & Research

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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.

Introduction

Stunting is a chronic nutritional problem in children under five years old that is characterized by a child's body being shorter than children of the same age. According to the World Health Organization (WHO), stunting is when the Z-score value of height-for-age (TB/U) based on growth standards reaches less than -2 standard deviations [1]

Stunting in children under five needs special attention because it can cause inhibition of physical growth, mental development and health status in children. Children who are stunted are more likely to grow up to be unhealthy and poor adults. Stunting in children is also associated with increased susceptibility to disease, both infectious and non-communicable diseases as well as increased overweight and obesity[2]

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 conducted based on the methodological framework proposed by Arksey and O'Malley, refined by Tricco et al. (2018) and guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR). The aim this review is to systematically explore various Risk factors for stunting in children under five years of age. The PCC (Population, Concept, Context) framework was used to define the focus of the literature search and selection:

- Population: Children (ages 0–59 months)
- Concept: Risk factors stunting
- Context: Study focus on countries with high stunting rates

A Scoping literature search was conducted in two electronic databases: PubMed and Scopus, up to february 2, 2025. The keywords used included Boolean combinations suchas: (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).

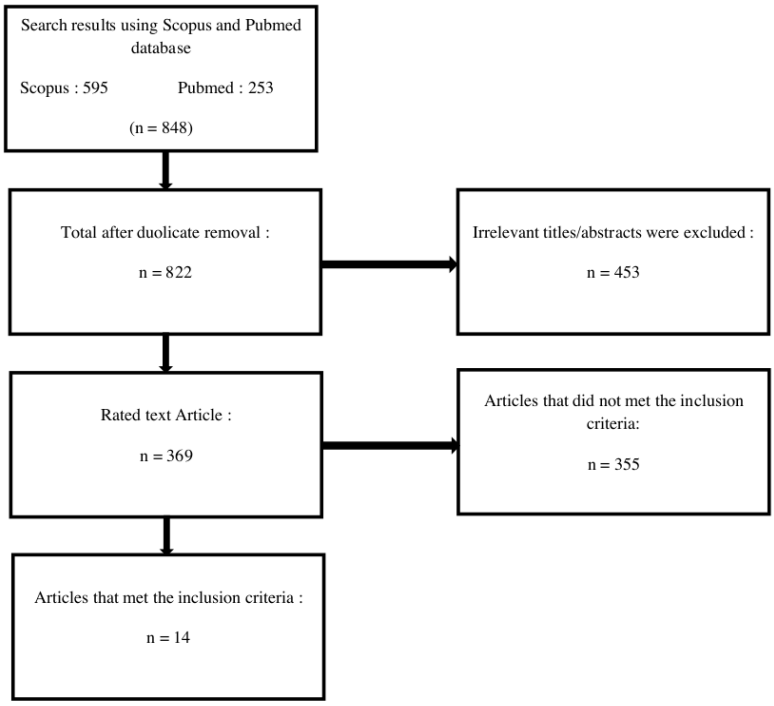

Figure 1. PRISMA-ScR flowchart for selection

Results

The literature search conducted in Scopus and PubMed resulted in a total of 848 articles. After the deduplication process, a total of 822 articles remained for title and abstract screening. Of these, 453 articles were excluded because they did not meet the inclusion criteria in terms of inappropriate study variables, or did not explicitly report the prevalence of bblr association with stunting incidence. Ultimately, 14 studies were included in the final synthesis. The study selection process is illustrated in the PRISMA Scoping Review (ScR) flowchart (Figure 1) and a summary of the characteristics and key findings of the included studies is presented in Table 1. The results of this scoping review show that stunting in children under five years of age is a complex chronic nutritional problem caused by various interacting risk factors. Based on the 14 articles analyzed, the most significant risk factor in accordance with the purpose of the scoping review on the incidence of stunting is low birth weight (LBW), children with LBW have a higher chance of experiencing stunted growth than children born with 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]

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	4.770 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, 35.3% to 39.6%)	Stunting has a significant association with low birth weight <2500gr with p value <0.001, 95% CI 44.2 (36.8-51.8)
Mistry et al.,	Bangladesh	Cross-	children	Child	The	Low birth weight also

2019[11]		sectional	aged 0-23 months	characteristics (birth weight history), mother characteristics and household characteristics	prevalence of stunting aged 0-59 months is 15.42%. Prevalence increases with age	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 control in 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%.	hildren 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	hild (birth weight and length) and mother	The valence of stunting	Birth weight showed a PR value of 7.3 (95%CI: 3,774-

			months	characteristics	reached 35.7%	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 valence 18.35% of 28,716 children under 5 ye 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

Several studies have consistently shown that LBW a significant risk factor for stunting. LBW infants are more likely to be stunted than normal birth weight infants. The scoping review fou that Bangladesh, a country in South Asia, has a high prevalence of children under 5 years of ag who are underweight, underweight, and stunted.(8)For example, in the case of severe malnutrition, mo than 0.3 million children under 5 years of age live in the country, which is one of the ding positions among other Asian countries [18]

This study showed that children with low birth weight were more likely t be stunted than normal children. This result was associated with low birth weight. Conversely, higher birth weight protects children from stunting.Low birth weight, usually caused by Intrauterine Growth Restriction (IUGR) during pregnancy, has been identified as one of the risk factors for stun g in lower middle-income countries. for stunting in lower-middle-income countries[3]

LBW and stunting have long-term impacts on cognitive and physical development. Children born LBW and stunted are more likely to have poorer cognitive outcomes, lower school a evement, and increased behavioral problems. The sociation between LBW and stunting also extends to an increased risk of chronic diseases later in life, such as diabetes and hypertension. Effective interventions to reduce stunting should focus on improving maternal health and nutrition, ensuring adequate antenatal care, and promoting 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 incid ce 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 d heavier than their non-breastfed counterparts.longer and heavier than infants who were not exclusively breastfed[18] It can be explained t t the immune system of a growing child has some immune deficiencies that make the child susceptible to i ection. children are susceptible to infections. The immune substances contained in in breast milk help strengthen the innate mmune 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.

hics 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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