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RISK FACTOR OF STUNTING AMONG TODDLER: A SYSTEMATIC REVIEW

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Abstract

Background: *Linear growth serves as a crucial measure of children's well-being and reflects disparities in human development. Many children globally fail to achieve their growth potential due to health issues, inadequate nourishment, and poor care, leading to physical and cognitive impairments. The prevalence of stunting often goes unnoticed in communities where short stature is common, partly due to limited evaluations of linear growth in healthcare. However, initiatives like Scaling Up Nutrition and global nutrition targets have brought attention to stunting's significance. Stunting has short and long-term health implications, including cognitive impairment and reduced earnings. Addressing it requires improvements in nutrition, education, healthcare, poverty reduction, and women's status. Indonesia's high stunting rates result from multifaceted factors like inadequate parenting practices, limited healthcare access, and food scarcity. Based on this background, the authors conducted a comprehensive review to identify stunting risk factors in toddlers, aiming to develop effective interventions to reduce its occurrence.*

Purpose*: To better understand risk factors related to stunting in toddlers and later able to formulate a comprehensive intervention strategy aimed at diminishing the occurrence of stunting among toddlers.*

Method*: By adhering to the guidelines outlined in the 2020 Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA), the researcher of this study ensured its alignment with the necessary standards. This was carried out to guarantee the accuracy of the conclusions drawn from the investigation. Result: We compiled 12 articles from Google Schoolar and 2 articles from Elsevier. Ultimately, we included 6 articles that met the criteria.*

Conclusion: *These studies collectively emphasize the multifaceted nature of childhood stunting, with factors spanning parental education, nutrition, breastfeeding practices, sanitation, urban-rural disparities, and family structures playing significant roles. The findings highlight the need for comprehensive strategies that encompass education, nutrition, and healthcare to effectively combat the prevalence of stunting and ensure the healthy growth and development of children, especially toddlers.*

Keywords: *children, risk factor, stunting, toddler*

INTRODUCTION

Linear growth stands out as the most comprehensive measure of children's overall well-being and serves as an accurate gauge of disparities in human development. This unfortunate reality is evident in the countless children worldwide who not only fall short of realizing their linear growth potential due to insufficient health conditions, inadequate nourishment, and insufficient care, but also endure enduring physical and cognitive impairments linked with hindered growth.[1]

The prevalence of stunting frequently goes unnoticed in communities where short stature is so prevalent that it is deemed typical. The challenge of visually identifying stunted children and the scarcity of routine evaluations of linear growth within primary healthcare services contribute to the delayed recognition of the extent of this concealed issue. Nevertheless, after years of neglect, stunting has now emerged as a critical global health concern and is the central focus of prominent initiatives like Scaling Up Nutrition, the Zero Hunger Challenge, and the Nutrition for Growth Summit. Stunting is also integral to the six global nutrition targets for 2025, which were endorsed by the World Health Assembly in 2014, and it has been recommended as a key indicator for the post-2015 development agenda.[2]

The surge in international attention is due to a heightened recognition of the significance of stunting as a substantial public health dilemma. It impacts a substantial number of children worldwide, consequently it carries severe short-term and long-term health and functional ramifications, including impaired cognition and educational attainment, reduced adult earnings, and diminished productivity. Addressing stunting demands enhancements in food and nutrition security, education, WASH (water, sanitation, and hygiene interventions), healthcare, poverty alleviation, and women's status. The high prevalence of stunting in Indonesia can be attributed to various interconnected factors, given that stunting's root causes are multifaceted. These factors include inadequate parenting practices, restricted availability of healthcare services, notably antenatal care (ANC) for pregnant women's health, limited access to nourishing food within families, and a scarcity of clean water resources.[3]

Considering the information provided earlier about the background and stunting causes, the authors carried out a thorough review to explore and summarize the risk factors for stunting in toddlers. The ultimate goal is to formulate a comprehensive intervention strategy aimed at diminishing the occurrence of stunting among toddlers.

METHODS

Protocol

By adhering to the guidelines outlined in the 2020 Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA), the researcher of this study ensured its alignment with the necessary standards. This was carried out to guarantee the accuracy of the conclusions drawn from the investigation.

Criteria for Eligibility

For the purpose of this systematic review, the writers compare and evaluate written articles related to risk factors of stunting in toddlers, specifically. Throughout the entirety of this writing, the main objective is to consistently highlight the significance of the risk factors that have been identified.

For researchers to participate in the study, they were required to accomplish the following conditions: The paper should be written in English and should focus on determining the risk factors of stunting in toddlers. Published article of related studies must be required to meet these following conditions, in order to be included: The papers under study encompass those published after 2018 but prior to the timeframe deemed relevant by this systematic review. Studies falling into categories such as editorials, submissions lacking a DOI, already published review articles, and entries essentially mirroring already-published journal papers were not permitted as examples.

Search Strategy

We used "risk factor of stunting in toddlers"; "stunting in toddlers"; "toddlers"; "risk factor of stunting"; "stunting"; "children" and "risk factor" as keywords. The search for studies to be included in the systematic review was carried out from August, 24th 2023 using the PubMed, Elsevier, and Google Scholar databases by inputting the keywords: (("stunting"[MeSH Subheading] OR "stunting"[All Fields] OR "stunting"[All Fields]) AND ("toddler"[All Fields] OR "toddlers"[All Fields]) AND ("risk, factor"[MeSH Terms] OR ("risk"[All Fields] AND "stunting"[All Fields]) OR "risk stunting"[All Fields] OR ("toddlers"[All Fields] AND "children"[All Fields])) AND ((y_10[Filter]) AND (clinicaltrial[Filter])) used in searching the literature.

Data retrieval

Upon reviewing the abstracts and titles of each study, the authors conducted an assessment to ascertain the fulfillment of the inclusion criteria. Subsequently, the authors made choices regarding the prior research they aimed to incorporate as references in their article, and accordingly, they selected those studies. Upon evaluating multiple diverse studies that consistently indicated a shared trend, this overarching observation was made. Notably, all submissions were required to be composed in English and were expected to be original and previously unpublished.

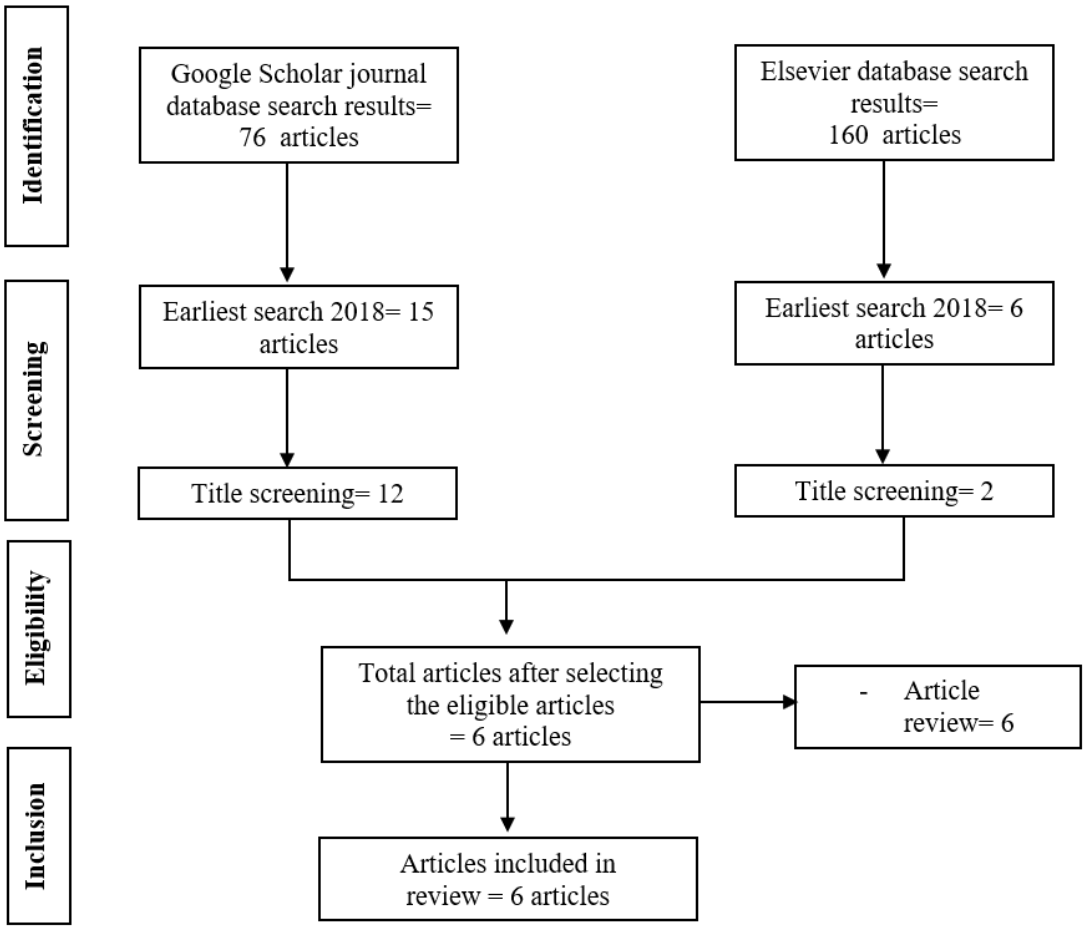

Figure 1. Article search flowchart

The systematic review exclusively considered papers that met all the specified inclusion criteria. This focused approach narrowed down the results to those directly relevant to the search. Conclusions from studies failing to meet our criteria were disregarded. Subsequently, the research findings underwent meticulous analysis. Through the conducted inquiry for this study's objectives, various information facets were revealed, including names, authors, publication dates, geographical locations, study methodologies, and parameters.

Quality Assessment and Data Synthesis

Each author independently examined the research aligned with the title and abstract of the publication to decide which studies warranted deeper exploration. The subsequent phase involves appraising all eligible articles based on predetermined review criteria. Subsequently, we will decide on the articles to be incorporated in the review based on the revealed findings. These criteria streamline the selection process for further assessment of papers. The conducted preliminary investigations and the specific attributes that rendered certain studies suitable for inclusion in the review are being discussed in this context.

RESULT

In Noor et al.[4] (2022) cross-sectional study on children under 5 sampled from the 2018 Baseline Health Research in South Kalimantan, bivariate analysis was conducted. Among 1218 children under 5, the study indicated that both working fathers and mothers might raise stunting risk, yet this connection lacked statistical significance (OR: 1.076; 95%CI: 0.778–1.489 for mothers and OR: 2.747; 95% CI: 0.635–11.885 for fathers). In contrast, significant associations emerged between parental education ($p < 0.001$ for mothers and $p = 0.002$ for fathers) and child stunting. Completion of high school by parents lowered stunting odds. Stunting risks were similar among urban/rural residents and households with <4/>4 members. Infants born in healthcare facilities faced lower stunting risk (OR = 0.788; 95% CI: 0.539–1.153), but overall, maternal health service utilization wasn't significantly linked to stunting risk. Toddler age significantly impacted stunting ($p < 0.001$), peaking at 24–35 months and declining at 36–60 months. Low birth weight status substantially affected stunting ($p = 0.05$), doubling risk for <2500 g infants. Exclusive breastfeeding history correlated with stunting ($p = 0.008$), though risk persisted. Underweight children under 5 had 7.119 times higher stunting risk.

Puspitasari et al.[5] (2020) in cross sectional study presented a total sample of respondents 109 children. 61.5% of children aged 1 to 5 years were in the normal category, while the rest (38.5%) were in the stunting category.. Socioeconomic characteristics showed that the majority of the mothers (57.8%) had lower education and as many as 77.1% mothers were a homemaker. In terms of family size, the majority of the families (63.3%) were the realization of NKKBS (Norma Keluarga Kecil Bahagia dan Sejahtera/ Prosperous and Happy Small Family) (≤4 persons). The distribution of month family income was classified according to the minimum wage of Tuban Regency. More than half of the families (51.4%)

had income below the minimum wage.Regarding the immunization history, only 2 infants whose basic immunization history was incomplete. The basic vaccine missing was BCG vaccine.

Characteristics of feeding practices showed that the majority of the mothers (66.1%) gave their children exclusive breastfeeding. In terms of complementary feeding, gave their children exclusive breastfeeding. In terms of complementary foods, the majority of the mothers (89.9%) had adequately served complementary foods. In general, mothers provided complementary foods in the form of instant milk porridge or homemade porridge mixed with vegetable soup and side dishes. The majority of the infants (61.5%) were breastfed until the age of ≥2 years. In terms of fish consumption, 68.8% infants were already given fish in adequate portion which was ≥19 grams/day. Furthermore, only 2 infants had eaten ampo (snack made from pure clay) in tiny portion. Ampo snack was given when the children were left with their grandmothers. In multivariate analysis, short maternal height (OR= 9.85; 95% CI= 1.05 to 92.19; p= 0.045), short paternal height (OR= 1.17; 95% CI= 49.18; p= 0.034), low dietary diversity (OR= 4.94; 95% CI= 1.06 to 22.97; p= 0.042), and low fish consumption (OR= 3.52; 95% CI= 1.12 to 11.08; p= 0.031) increased the risk of stunting in children.[5]

Gani et al.[6] (2019) in cross sectional study involving 285 children indicated that a majority of the children were male (54.7%), aged over 2 years (51.6%), and 46.3% received non-exclusive breastfeeding. The majority of households had access to clean water (94.4%), while a smaller proportion had access to sanitary latrines (28.4%). Approximately 33% of mothers had a mid-upper arm circumference (MUAC) of less than 23.5 cm. Variables such as children's age (P = 0.006), exclusive breastfeeding (P = 0.000), chronic energy malnutrition (P=), and latrine availability (P = 0.043) were found to be related to stunting. Conversely, variables like sex and availability of clean water did not show a significant relationship. Supporting data reaffirmed the significant impact of exclusive breastfeeding, latrine facility availability within the family, and sex, yielding odds ratios (OR) of 15.059 (95% CI 8.030---28.240), 2.695 (95% CI 1364---5.324), and 2.695 (95% CI 1364---5.324) respectively. Notably, exclusive breastfeeding emerged as the most substantial risk factor for stunting.

Wicaksono and Harsanti's [7](2020) study examined a total of 76,165 children aged 0 to 4 years from 66,917 households across 33 provinces. Among them, approximately 36.7% of the children were found to be stunted. Various factors were identified as important risk factors influencing childhood stunting across different levels. Boys had higher odds of stunting (aOR = 1.11; 95% CI: 1.06-1.15) compared to girls. Children living in slum areas exhibited increased odds of stunting (aOR = 1.09; 95% CI: 1.04-1.15) compared to those in non-slum areas. Children with mothers and fathers who graduated from senior high school or higher had lower odds of stunting (aOR = 0.87; 95% CI: 0.83 – 0.91 for both). The likelihood of stunting decreased as household wealth increased, with the lowest odds among children in the richest households. The risk of stunting rose with an increasing number of household members (aOR = 1.03; 95% CI: 1.02 – 1.04). Children in urban areas had a 15% lower likelihood of stunting than those in rural areas (aOR = 0.85; 95% CI: 0.81 – 0.89). Additionally, residing in a province with higher GDP per capita was associated with reduced odds of stunting (aOR = 0.89; 95% CI: 0.79 – 1.00). Lastly, living in a province with a higher ratio of professional health workers per 1,000 population aged 0-4 was linked to decreased odds of stunting (aOR = 0.99; 95% CI: 0.99 – 1.00) compared to provinces with a lower ratio of such health workers.

This study identified a significant stunting prevalence of 36.7% within the sampled population, underscoring the urgent need to address childhood undernutrition in Indonesia. Critical risk factors contributing to childhood undernutrition include a child's sex, parental education (mother and father), household wealth, urban or rural residence, presence of slum areas, and household size. Remarkably, community-level variables—like GDP per capita and the ratio of professional health workers per 1,000 population aged 0 - 4 years—demonstrated independent effects on childhood undernutrition that surpassed the impact of individual and household-level factors. Interestingly, the study unveiled that vaccination status bore no significant impact on childhood undernutrition, potentially due to the proxy's limitation in capturing comprehensive vaccination data. [7]

A cross-sectional study from Suratri et al.[8] (2023) with 1643 children under five involved as research respondents consisted of 838 males and 805 females. The majority of respondents were in the age group of 48–59 months (23.07%). Of the total 1643 respondents, 636 children under five (38.71%) experienced stunting. Some children had received a supplementary feeding program (30.07%) from the local health post. Children under five who received monitoring and development programs at the integrated health care center, represented as many as 1345 people (81.86%). Moreover, the mothers of children under five years with low education were 865 (52.65%), while the mothers who worked were 1080 (65.73%). Most children under five years (n = 7174, 71.46%) lived in rural areas, with the majority of children having the most difficult access to healthcare facilities (n = 1128, 68.66%).

Bivariate test results from the study prove the relationship between the independent and dependent variables. Based on age group, children aged 12–23 months, 24–35 months, and 36–47 months were significantly associated with stunting (p-value < 0.05). The lower the age group of children under five, the more likely they were to be at risk of stunting. According to education level, mothers with low education were significantly associated with stunting in children under five (OR = 1.72, 95% CI: 1.31–2.25; p-value < 0.05). In terms of place of residence, children living in rural areas are significantly associated with stunting (OR = 1.47, 95% CI: 1.1–1.99; p-value < 0.05). However, the variables of the child's sex, receiving supplemental feeding, mother's age, mother's occupation, monitoring and development of children, and access to healthcare facilities were not significantly associated with the prevalence of stunting in children under five (p-value ≤0.05).[8]

This study found three variables—the child's age, mother's education, and child's place of residence, significantly related to the incidence of stunting in children under five, with a p-value of 0.05. Children aged 24–35 months were 2.08 times more likely to experience stunting than children aged 0–11 months (OR = 2.08, 95% CI: 1.12–3.86). Mothers with low education had a 1.57 times risk of having stunted children compared to mothers with higher education (OR = 1.57, 95%

CI: 1.18–2.08). Moreover, mothers who lived in rural areas were at higher risk of having stunted children by 1.39 times compared to mothers who lived in urban areas (OR = 1.39, 95% CI: 1.01–1.91). [8]

The study observed comparable proportions of male and female children. The research findings indicated no discernible connection between a child's sex and the occurrence of stunting among children under five (OR = 0.98; 95% CI: 0.74–1.29). This outcome aligns with prior research results that indicated a lack of association between age and stunting incidence in children [29–32]. Boys exhibited a slightly higher stunting prevalence (37.8%) compared to girls (37.3%).[8] This observation concurred with a study by Utami RA et al.[9], which reported lower stunting prevalence in girls (37.8%) compared to boys (48.8%). Studies also indicated that gender disparities in stunting prevalence were generally insignificant for most age groups. For instance, a study by Zhang et al.[10] highlighted a lack of gender-based disparity in stunting risk between boys and girls. Another possibility is that boys may face stunting due to their heightened vulnerability to infections and diseases that disrupt normal growth.

The primary factor driving stunting in this study was a child's age. Notably, the highest stunting prevalence occurred in the 12–23 months age group (45.2%). Analyzing ages within the 12–59 months limit revealed an increased risk of stunting as children's ages decreased. However, the risk was lower for children aged 0–11 months. This finding mirrored research results in South Africa, which indicated a higher likelihood of stunting among children aged 12–23 months compared to those aged 11 months.[11]. However, inadequate complementary feeding practices during the transition from exclusive breastfeeding can exacerbate stunting prevalence among children under five in this region.[12] Lack of appropriate complementary foods during this period can impede growth, leading to insufficient linear growth due to increased nutritional demands. Additionally, older children are exposed to more illnesses, unsanitary environments, and inadequate diets that may hinder their growth.[13]

A total of 200 participants were enrolled in Fatima et al.[14] (2020) cross sectional study, with 110 (55%) being males and 90 (45%) females. Among them, 116 (58%) resided in urban areas. Joint family systems included 105 (52.5%) participants. Fathers' educational attainment indicated that only 32 (16%) had completed graduation or post-graduation. Similar percentages were observed for maternal education, with higher education seen in just 27 (13.5%) cases. Drinking water sources were government-based for only 106 (53%) households. The mean income was estimated at Rs. 20,300. 123±13,759.96.

Among the children, 116 (58%) had received complete vaccination, while 79 (39.5%) had an incomplete vaccination status, and 5 (2.5%) had never received any vaccinations. Breastfeeding history was noted in 166 (83%) of the children, often supplemented by bottle feeding in 161 (80.5%) cases. Exclusive breastfeeding was practiced by only 19.5% of the participants. Around 22.5% of the mothers believed their feeding practices were inadequate for their children. Most participants adhered to three meals per day, with an average of 2.99±1.109 meals consumed. [14]

The mean height was recorded as 78.88 ± 19.258 cm. The researchers employed WHO reference curves to evaluate stunting status. Upon conducting significance tests, the results indicated a strong association between stunting and male gender (p=0.047), joint family systems (p=0.049), maternal education (p=0.031), incomplete vaccination status (p=0.003), and history of bottle feeding (p=0.037). [14]

Author	Origin	Method	Sample Size	Result
Noor et al.[4], 2022	South Kalimantan, Indonesia.	analytic observational method with a cross-sectional design	The population of this study was 1218 children aged 0–59 months who were included as the 2018 Baseline Health Research sample in South Kalimantan Province.	There is a relationship between mother's education level (p = 0.001), father's education (p = 0.002), toddler age (p < 0.001), low birth weight (p = 0.05), exclusive breastfeeding (p = 0.008), and underweight (p = 0.000) with stunting. The data were continued with the Logistics Regression test and the dominant variables related to stunting were underweight (p < 0.001 with OR 18,241), under-five age (p < 0.001, with OR value for ages 24–35 months 9511), and premature birth (p = 0.027 with an OR of 2187).
Puspitasari et al.[5], 2020.	Wire Primary Health Care, Tuban Regenc, Indonesia.	This was a cross-sectional study. A sample of	109 mothers with children aged 1 to 5 years was selected by a proportional random sampling.	Short maternal height (OR= 9.85; 95% CI= 1.05 to 92.19; p= 0.045), short paternal height (OR= 1.17; 95% CI= 49.18; p= 0.034), low dietary diversity (OR= 4.94; 95% CI= 1.06 to 22.97; p= 0.042), and low fish consumption (OR= 3.52; 95% CI= 1.12 to 11.08; p= 0.031) increased the risk of stunting in children.
Gani et al.[6],2019.	Jaya Bakti Village, Pagimana sub-district, Banggai Regency, Central Sulawesi Province. Indonesia	Cross-sectional study.	285 children <5 years.	The results showed that age, exclusive breastfeeding, MUAC, the availability of family latrine were significantly related with the incidence of stunting (P < 0.05). Furthermore, the results of multivariate analysis showed that the risk factors that most affected stunting were non-exclusive breastfeeding (OR =

				15.059; 95% CI 8.030---28.240), poor family latrine (OR = 2.695; 95% CI 1.364---5.324) and age (OR = 2.527; 95% CI 1.382---4.62).
Wicaksono and Harsanti[7],2020.	Indonesia	descriptive cross-sectional survey	76,165 children aged under 5 years were included in this study.	The prevalence of stunting in the sample population was 36.7%. The odds of stunting increased significantly among the under-five boys, children living in slum area, and the increase of household member (aOR = 1.11, 95 %CI: 1.06–1.15; 1.09, 95%CI: 1.04–1.15; and 1.03, 95%CI: 1.02–1.04 respectively). The odds of stunting decreased significantly among children whose parents more educated (aOR = 0.87, 95 %CI: 0.83–0.91 and 0.87, 95%CI: 0.83–0.9, respectively), who live in urban area, in a province with higher Gross Domestic Product (GDP) per capita, and in a province with higher ratio of professional health worker per 1,000 population aged 0-4 years (aOR = 0.85, 95%CI: 0.81–0.89; 0.89; 95%CI: 0.79–1.00; and 0.99; 95%CI: 0.99–1.00, respectively).
Suratri et al. [8],2023.	Nusa Tenggara Timur	cross-sectional design	Secondary data from the 2018 RISKESDAS—a nationally representative cross-sectional survey conducted in 34 provinces in Indonesia from April to May 2018.	There was a significant relationship between age group variables for younger children (aged 12–23, 24–35, and 36–47 months), mothers with low education, and children living in rural areas with the incidence of stunting in children (p-value < 0.05). The dominant factors that caused stunting in this study were the children's age of 24–35 months (OR = 2.08, 95% CI: 1.12–3.86), mothers with low education (OR = 1.57, 95% CI: 1.18–2.08), and children living in rural areas (OR = 1.39, 95% CI: 1.01–1.91). The highest prevalence of stunting was in the group of children aged 12–23 months (45.2%).
Fatima et al., (2020)14	tertiary care hospital of Lahore.	An Analytical cross-sectional study	Two hundred children of ages under five years coming to outdoor for treatment of minor ailments were included after informed consent from their parents.	Out of 200 children screened in OPD, 42 (21.0%) were found to be stunted. The total percentage of stunting in male children was 28 (66.6%) and in female children were 14 (33.3%). Stunting was significantly associate with male gender (p=0.047), joint family system (p=0.049), low literacy level in mothers (p=0.031), unvaccinated status (p=0.003) and history of bottle feeding (p=0.037).

DISCUSSION

Through meticulous examination of the included studies' abstracts and titles, each author independently assessed their alignment with the research's focus before deciding which studies warranted further exploration. This initial screening narrowed down the articles to be evaluated based on predetermined criteria for inclusion in the review. Subsequently, the selected articles underwent thorough evaluation to determine their relevance and appropriateness for inclusion in the review. This selection process was guided by the criteria established for the study. Specifically, the authors focused on factors such as fathers' employment and education, mothers' education, place of delivery, toddler's age, low birth weight, exclusive breastfeeding, premature birth, and wasting as potential candidates for multivariate analysis to construct a suitable model for analysis.

In recent studies conducted across different regions of Indonesia, various factors influencing childhood stunting have been investigated, shedding light on the complex interplay of determinants. Noor et al. (2022)[4] explored the relationship between stunting and factors such as parental education, toddler age, birth weight, exclusive breastfeeding, and underweight, emphasizing their significant associations. Puspitasari et al. [5] (2020) identified short maternal and paternal heights, low dietary diversity, and inadequate fish consumption as risk factors for stunting, underlining the importance of nutrition in growth. Gani et al. [6] (2019) revealed that non-exclusive breastfeeding, poor family latrine facilities, and age were the dominant contributors to stunting, emphasizing the role of sanitation and breastfeeding practices. Wicaksono and

Harsanti[7] (2020) conducted a comprehensive survey involving a large sample of children under five, highlighting the impact of various factors, including parental education, urban living, GDP per capita, and healthcare worker ratios, on stunting prevalence. Suratri et al.[8] (2023) delved into the age-specific relationship between stunting and education levels of mothers, alongside the influence of rural living, showcasing the need for tailored interventions. Finally, Fatima et al.[14](2020) identified male gender, joint family setups, low maternal literacy, unvaccinated status, and bottle feeding history as factors significantly linked to stunting, emphasizing the role of family dynamics and healthcare practices.

The research findings revealed that, although no significant association was observed between the sex of children under five and stunting, male toddlers exhibited a slightly higher prevalence of stunting. This observation aligned with Setyawati's [16] study, which indicated a higher occurrence of stunting among boys than girls. This trend could be attributed to boys' more rapid and diverse gross motor development, demanding increased energy. The findings were further substantiated by Ghaida et al.' in Gani's[6] research, which reported a 1.2 times higher risk of stunting among boys, possibly due to caregiving patterns in households. This study's results underscored the substantial correlation between exclusive breastfeeding in children under 5 and the incidence of stunting. Preventative interventions aimed at proper nutrition for pregnant and lactating mothers, followed by exclusive breastfeeding for 6 months and continued for 24 months, were emphasized to combat stunting and wasting. Children who were exclusively breastfed exhibited better growth outcomes.

The research also identified that male children faced a higher likelihood of stunting compared to females, aligned with prior studies. This disparity was attributed to the assumption that male children tend to be more physically active, thereby expending more energy that could otherwise contribute to growth. Similarly, maternal education emerged as a significant factor, inversely correlated with childhood stunting. Educated mothers exhibited better nutritional knowledge and practices, positively impacting child health. The study also revealed a connection between the father's education level and household wealth with reduced stunting risk, highlighting socioeconomic implications. Larger household sizes were found to elevate stunting risk, indicating the strain on available resources.

In terms of supplementary feeding, though it was not directly linked to stunting in this study (p-value = 0.272), previous research demonstrated its impact in similar contexts. However, a recent meta-analysis provided varied evidence regarding nutrient supplementation's effect on children's growth. Rural residence emerged as another significant factor, with mothers residing in rural areas facing a higher risk of stunting due to economic and educational disparities.

On the contrary, certain factors like the child's sex, supplementary feeding, mothers' age, occupation, and access to healthcare facilities did not exhibit significant relationships with stunting in East Nusa Tenggara province, according to this study. Nonetheless, a national-level review indicated that factors like nonexclusive breastfeeding, low household socioeconomic status, early births, short birth lengths, and maternal height and education contribute to child stunting in Indonesia. Interventions like milk supplementation for at-risk children were highlighted, although addressing complex issues like nutrient requirements, morbidity rates, and socioeconomic disadvantages remained challenging. Monitoring and development programs at healthcare centers did not directly correlate with stunting incidence, emphasizing the need for comprehensive multi-sectoral interventions. Overall, the study demonstrated the intricate interplay of various factors contributing to childhood stunting and highlighted the complexity of addressing this issue effectively.

CONCLUSION

These studies collectively emphasize the multifaceted nature of childhood stunting, with factors spanning parental education, nutrition, breastfeeding practices, sanitation, urban-rural disparities, and family structures playing significant roles. The findings highlight the need for comprehensive strategies that encompass education, nutrition, and healthcare to effectively combat the prevalence of stunting and ensure the healthy growth and development of children, especially toddlers.

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