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Urban-rural disparities and determinants of stunting among children under five in Indonesia

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Abstract

Background: Stunting remains a significant public health issue in Indonesia, particularly among children under five. Various risk factors across rural and urban settings influence it. Understanding these factors is critical to designing effective interventions that support optimal child growth and development.

Purpose: To analyze the urban-rural gap and determinants of stunting in toddlers in Indonesia

Method: A cross-sectional study used secondary data from the 2021 Indonesian Nutritional Status Survey. A total of 11,715 children aged 0–59 months were included through total sampling. Independent variables examined included food insecurity, breastfeeding, maternal class participation, family planning, sanitation, drinking water access, dietary diversity, mother's education, and place of residence. Chi-square tests were used for bivariate analysis, and statistical significance was determined at $p < 0.05$.

Results: Stunting prevalence was 28.6%. Bivariate analysis revealed that food insecurity, lack of breastfeeding, low maternal education, poor sanitation, absence of family planning, non-participation in mother's classes, and rural residence were significantly associated with stunting ($p < 0.05$). Access to drinking water and dietary diversity were not significantly associated with stunting. Stunting was higher in rural areas (74.4%) than in urban areas (25.6%).

Conclusion: Socioeconomic, behavioral, and environmental factors influence stunting in children under five. Effective stunting prevention strategies should improve maternal education, access to health services, nutrition awareness, sanitation infrastructure, and rural health equity. A multisectoral, community-based approach is essential to reducing stunting and supporting healthy child development in Indonesia.

Keywords: Children Under Five; Rural and Urban; Stunting.

INTRODUCTION

Stunting, defined as impaired growth and development in children due to chronic undernutrition, remains a critical public health issue worldwide (Ministry of Health of the Republic of Indonesia, 2016). According to the Indonesian Ministry of Health, stunting is diagnosed when a child's height-for-age z-score falls below -2 standard deviations (SD), with severe stunting classified as below -3 SD (Secretariat of the Vice President, 2021). This condition disrupts physical development and metabolic function in the short term. It has profound long-term consequences, including reduced cognitive capacity, weakened immune response, and increased vulnerability to non-communicable diseases later in life. Stunting typically arises during the "golden period" — the first 1,000 days of life — and is primarily driven by inadequate nutritional intake rather than hormonal deficiencies (Teja, 2019). Alarmingly, stunting is often considered irreversible after this essential window, emphasizing the urgency of early preventive interventions. Despite ongoing efforts, stunting poses a significant challenge, especially in rural and urban populations, where socio-economic disparities and access to health and nutrition services vary widely (Nasution, Limestone, Harianja, & Girsang, 2022).

Despite a gradual decline in prevalence, stunting remains a pressing concern in Indonesia (Ministry of Health of the Republic of Indonesia, 2021). The 2020 Indonesian Nutritional Status Survey by the Ministry of Health reported that 26.9% of children under five were stunted. Although the 2021, Indonesian Nutritional Status Survey data indicates a slight improvement, the national prevalence still exceeds the World Health Organization's (WHO) threshold of 20% for public health significance (Teja, 2019). Furthermore, this reduction has yet to align with Indonesia's national target of reducing stunting to 14% by 2024, as outlined in the 2020–2024 National Medium-Term Development Plan. These figures underscore the need for intensified and targeted interventions to accelerate progress, particularly by addressing disparities across different regions and socio-economic groups.

Data from the 2021 Indonesian Nutritional Status Survey, reveals that stunting remains highly prevalent in certain Indonesian provinces, with the highest rates found in East Nusa Tenggara (37.8%), West Sulawesi (33.8%), Aceh (33.2%), West Nusa

Tenggara (31.4%), and Southeast Sulawesi (30.2%). These alarming figures concern children under five (0–59 months), a developmental window in which adequate nutrition is critical for physical growth and brain development (Health Research and Development Agency Ministry of Health of the Republic of Indonesia, 2021). Nutritional deficiencies during this stage can lead to irreversible outcomes, contributing to an estimated 2.2 million child deaths globally each year (Nasution et al., 2022). In the long term, children affected by stunting are more likely to face reduced academic and economic performance, and paradoxically, they may also be at increased risk of obesity in adulthood due to rapid weight gain following early undernutrition. These findings underscore the urgent need for region-specific, nutrition-focused interventions targeting children in their earliest years (Sserwanja, Kamara, Mutisya, Musaba, & Ziaei, 2021).

Several studies in developing countries have consistently shown that children living in urban areas tend to have better nutritional status than their rural counterparts. This disparity is primarily attributed to differences in access to essential resources such as nutritious food, healthcare services, and sanitation, which are more readily available in urban settings. Social determinants—such as parental education, income levels, and living conditions—also play a pivotal role in influencing child health outcomes (Siswati, Hookstra, & Kusnanto, 2020). Previous research in Sierra Leone found that stunting was much more common in rural areas, indicating structural weaknesses in these areas (Sserwanja et al., 2021). Similarly, another study in urban Indonesia identified key risk factors for stunting, including low birth weight, short parental stature, and poor social conditions (Siswati et al., 2020). Meanwhile, recent findings in rural Indonesia reveal that poor drinking water quality and inadequate household sanitation are strongly associated with higher stunting rates. These findings underscore the need for targeted, context-specific interventions to address environmental and socioeconomic disparities between rural and urban populations (Yunitasari, Lee, Krisnana, Lugina, Solikhah, & Aditya, 2022).

Based on the abovementioned points, this study examined the risk factors associated with stunting among children under five in Indonesia's rural and

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urban areas. Special attention is given to the five provinces with the highest recorded stunting prevalence, as identified by the 2021 SSGI. By analyzing region-specific determinants—from environmental conditions and access to healthcare to socio-demographic variables—this research seeks to provide a comprehensive understanding of the underlying causes of stunting and support the development of more targeted and effective intervention strategies.

RESEARCH METHOD

A cross-sectional design, a type of observational research that collects data simultaneously to analyze the association between various risk factors and their associated outcomes was applied. The independent variables examined included access to food (measured through indicators of food insecurity), parenting practices (such as breastfeeding behavior, participation in maternal education classes, and family planning), environmental factors (including access to safe drinking water and sanitation facilities), nutritional intake (assessed through dietary diversity), maternal education level, and place of residence (rural versus urban). The dependent variable in this study was the stunting status of children under five years. This method facilitated the identification of relationships between potential risk factors and stunting prevalence across different demographic and regional settings.

This study was carried out in five provinces in Indonesia that reported the highest stunting prevalence, namely East Nusa Tenggara, West Sulawesi, Aceh, West Nusa Tenggara, and Southeast Sulawesi. The research utilized secondary data from the 2021 Indonesian Nutritional Status Survey, compiled by the Health Research and Development Agency under the Ministry of Health. The study population consisted of children under five years of

age (0–59 months) living in the selected provinces' rural and urban areas. These provinces were chosen to enable a focused investigation into the regional disparities and contributing factors of stunting in areas most affected by the issue.

This study employed a total population sampling technique in which all members of the target population meeting the inclusion criteria were included as study participants. This study's total sample consisted of 11,715 children under five years of age from both rural and urban areas across the five selected provinces. Rural areas were defined as regions primarily engaged in agricultural activities and natural resource management, serving as local communities' residential, administrative, and service hubs. In contrast, urban areas are characterized by dominant non-agricultural economic activities, functioning as centers of settlement, government, industry, and various public services, in accordance with the 2007 Law of the Republic of Indonesia on Spatial Planning.

Explanatory statistics were utilized to recapitulate the characteristics of this study's independent and dependent variables. A chi-square test was executed to investigate the association between stunting (the dependent variable) and various independent variables, such as food access, parenting, environmental conditions, nutritional intake, maternal education, and place of residence. A p-value of less than 0.05 was assumed statistically significant, with a 95% confidence interval (CI).

This study received ethical approval from the Research Ethics Commission of the Faculty of Medicine, Universitas Trisakti, under approval number 27/KER-FK/1/2023. All data used were secondary and anonymized, ensuring confidentiality and compliance with ethical standards for human subject research.

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RESEARCH RESULTS

Table 1. Characteristics of the Respondents (N=11,715)

Variables	Results	p-value	OR	95%CI
Nutritional Status (n/%)				
Stunting	3,350/28.6			
Normal	8,365/71.4			
Food Insecurity (n/%)				
Medium-severe	1,709/14.6	0.000†	1.5	1.329-1.650
Mild	10,006/85.4			
Breastfeeding (n/%)				
No	2,810/24.0	0.000†	3.9	2.924-5.277
Yes	775/6.6			
Data unavailable	8,130/69.4			
Maternal Education class (n/%)				
No	8,602/73.4	0.001†	0.9	0.786-0.940
Yes	3,113/26.6			
Family Planning (n/%)				
No	2,109/18.0	0.016†	0.9	0.789-0.976
Yes	9,327/79.6			
Data unavailable	279/2.4			
Source of Drinking Water (n/%)				
Inadequate	8,358/71.3	0.822	1.0	0.924-1.104
Adequate	3,357/28.7			
Sanitation (n/%)				
Inadequate	2,860/24.4	0.000†	1.6	1.437-1.720
Adequate	8,855/75.6			
Dietary Diversity (n/%)				
Not diverse	3,326/28.4	0.076	1.1	0.992-1.183
Diverse	7,743/66.1			
Data unavailable	646/5.5			
Mother's Education (n/%)				
Education <9 years	3,702/31.6	0.000†	1.4	1.293-1.533
Education ≥9 years	7,768/66.3			
Data unavailable	245/2.1			
Residence (n/%)				
Rural	8,318/71.0	0.000†	1.3	1.159-1.389
Urban	3,397/29.0			

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Based on the table 1 above, 28.6% of toddlers were identified as having stunting, while 71.4% were not. A total of 14.6% of children living in households experienced moderate to severe food insecurity, while the majority (85.4%) experienced only mild food insecurity. Regarding childcare practices, breastfeeding data showed that 24% of children were not breastfed, and only 6.6% were breastfed; however, data on breastfeeding were not available for the majority (69.4%). Regarding maternal education programs, 26.6% of mothers had attended mothering classes, while 73.4% had not. A total of 79.6% reported family planning participation, while 18.0% did not participate, and 2.4% had no data.

Access to drinking water was considered adequate for 71.3% of children, while only 28.7% had access to an adequate drinking water source. In contrast, 75.6% of children had access to adequate sanitation facilities, while 24.4% lived in households with inadequate sanitation. Regarding nutritional intake, 66.1% of children reported a diverse diet, 28.4% had limited dietary diversity, and 5.5% had incomplete dietary data. Regarding maternal education, 66.3% of mothers had received at least nine years of formal education, while 31.6% had received less than nine years of education, with 2.1% of data not reported. Finally, the majority of the sample (71%) lived in rural areas, while 29% lived in urban areas.

The bivariate analysis revealed several significant associations between independent variables and stunting among children under five. Children from households with medium to intense food insecurity were significantly more potential to be stunted compared to those with mild food insecurity (OR = 1.5; 95% CI: 1.329–1.650; $p < 0.001$). Likewise, children who were not breastfed had a much higher likelihood of being stunted than those who were breastfed (OR = 3.9; 95% CI: 2.924–5.277; $p < 0.001$). Participation in maternal education classes showed a protective association; children whose mothers had attended these classes were slightly less likely to be stunted (OR = 0.9; 95% CI: 0.786–0.940; $p = 0.001$). Similarly, family planning participation was associated with a modest reduction in the odds of stunting (OR = 0.9; 95% CI: 0.789–0.976; $p = 0.016$).

Regarding environmental factors, inadequate sanitation was strongly associated with stunting (OR = 1.6; 95% CI: 1.437–1.720; $p < 0.001$), whereas the

source of drinking water did not show a statistically significant association ($p = 0.822$). Dietary diversity was not significantly related to stunting ($p = 0.076$), although children with non-diverse diets had slightly higher odds (OR = 1.1). Maternal education level also emerged as a significant factor. Children whose mothers had less than nine years of education had higher odds of stunting (OR = 1.4; 95% CI: 1.293–1.533; $p < 0.001$). Finally, place of residence was significantly associated with stunting, with children in rural areas having higher odds of stunting than those in urban areas (OR = 1.3; 95% CI: 1.159–1.389; $p < 0.001$).

DISCUSSION

The results of this study show a significant relationship between food insecurity and stunting among children under five years old ($p = 0.000$). Although most stunted children were reported to experience mild rather than moderate-to-severe food insecurity, the association indicates that even low levels of household food insecurity can adversely affect child growth. This suggests that food insecurity—regardless of its severity—may contribute to insufficient nutrient intake and poor nutritional status in children during critical periods of development.

The underlying causes may be related to the mother's knowledge and behavior related to child nutrition and household food allocation. In some cultural and socio-economic contexts, food distribution tends to follow a hierarchical pattern, where the household head is prioritized. At the same time, women and children often receive less than adequate portions (Motbainor, Worku, & Kumie, 2015). This condition, limited access to diverse food sources, and poor economic conditions can lead to chronic undernutrition (Berra, 2020; Wardani, Wulandari, & Suharmanto, 2020). On the other hand, adequate access to food and better economic status contribute significantly to fulfilling the nutritional requirements of both mothers and young children, thereby reducing the risk of stunting (Tebeje, Agitew, Mengistu, & Aychiluhm, 2022).

This finding is supported by previous research reporting a similar association ($p = 0.000$) between food insecurity and stunting in African children, where children living in households with severe food insecurity were more likely to experience stunting

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(Gassara, Lin, Deng, Zhang, Wei, & Chen, 2023). Similarly, a study in Ethiopia found that food insecurity significantly impacted the nutritional status of toddlers ($p = 0.046$), especially when compared to households with stable food availability (Tebeje et al., 2022). In this study, the proportion of children from households with moderate to severe food insecurity was 14.6%, which is still far above the target of the Indonesian government's National Medium-Term Development Plan 2020–2024 to reduce this figure to 4%. This emphasizes the importance of interventions that increase food access and economic capacity and encourage equitable food distribution and nutrition education within families, in accordance with Presidential Regulation of the Republic of Indonesia Number 18 of 2020.

The examination produced a p -value of 0.000, showing a notable association between breastfeeding and the prevalence of stunting in children under five. Exclusive breastfeeding is necessary for optimal infant growth, as breast milk contains essential nutrients such as calcium that contribute to height development. Compared to formula feeding, breastfeeding provides more efficient nutrient absorption (Campos, Vilar-Compte, & Hawkins, 2020; Lufianti, Rahmawati, & Sari, 2020). Nevertheless, many children do not accept exclusive breastfeeding due to various factors. A major contributing factor is the low educational level of mothers, which affects their understanding of the importance of breastfeeding. Additionally, economic difficulty limits access to nutritious food, reducing the quantity and quality of breast milk produced (Faizzah, Kurniawati, & Juliningrum, 2022; Harvey, Newell, & Padmadas, 2022). When mothers cannot breastfeed due to illness or circumstances like sore nipples, formula milk is used as a substitute. However, insufficient breast milk intake may result in inadequate nutritional intake, thereby impairing a child's growth (Campos et al., 2020; Faizzah et al., 2022).

A study in Mexico also found a significant association between breastfeeding and stunting ($p < 0.05$). This study emphasized that early introduction of complementary foods and unsafe drinking water can increase the risk of diarrhea, thus contributing to stunting (Campos et al., 2020). Similarly, a study in Cambodia ($p < 0.001$) supported these findings, highlighting that working mothers often struggle to meet their children's nutritional needs through

breastfeeding, potentially leading to stunted development (Harvey et al., 2022).

The results of this study indicate a statistically significant relationship between participation in mother's classes and stunting among children under five ($p = 0.001$). Mother's classes serve as intervention programs during the first 1,000 days of life and cover feeding practices, childcare, infection and disease management, nutrition improvement, and hygiene and sanitation (Sugianto, Suyasa, Weta, Lestari, Bakta, Wirjatmadi, & Januraga, 2022). These sessions are designed using participatory learning methods to enhance maternal knowledge effectively. Through active participation, mothers can better understand proper nutrition, monitor their children's growth, and recognize healthy body proportions—crucial elements in stunting prevention (Saleh, Syahrul, Hadju, Andriani, & Restika, 2021). By equipping mothers with the knowledge and practical skills to support child development, these programs play a central role in promoting healthier outcomes for children (Reifsnider, Shin, Todd, Jeong, Gallagher, & Moramarco, 2016).

Previous research in Badung Regency, Bali, also found a significant association ($p = 0.015$) between attendance at mothers' classes and reduced stunting prevalence (Sugianto et al., 2022). Similarly, research in Mexico found a significant association ($p = 0.026$), highlighting the role of mother-focused interventions in preventing stunting. According to the analysis, mothers who attended the classes were motivated to share parenting challenges, implement growth-promoting practices at home, and experiment with improved diet and parenting plans. Involving social support mechanisms in these sessions enhanced behavior change, making lifestyle improvements in family health more sustainable. These findings support the importance of mothers' classes as an evidence-based, community-level approach to reducing child stunting (Reifsnider et al., 2016).

The analysis of this study revealed a significant relationship between family planning and stunting in children under five ($p = 0.016$). Families where mothers do not use contraception or have family planning considerations will experience an increase in the number of dependents. As a result, household consumption and food expenditures rise, potentially straining resources—especially in low-income settings. In such households, children are less likely

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to receive sufficient nutrition and energy to support their rapid growth and development. Over time, the inability to meet these critical dietary needs contributes to chronic undernutrition, ultimately manifesting as stunting (Berhanu, Mekonnen, & Sisay, 2018).

Defending evidence from Saxton et al. in India underlines that appropriate birth spacing particularly declines the prevalence of stunting. Their study demonstrates that allowing at least two years between deliveries reduces the risk of malnutrition and allows mothers to rehearse exclusive breastfeeding for longer durations. This comprehensive care and nutrition period plays a crucial role in reducing the probability of severe malnutrition and developmental delays associated with stunting. Consequently, family planning interventions can strategically promote optimal child health outcomes through enhanced maternal capacity and focused caregiving.

Previous research also reported a significant association ($p = 0.0001$) between contraceptive use and stunting reduction. Their study suggested contraceptive use as a preventative measure against stunting (Abate, Kassie, Kassaw, Zemariam, & Alamaw, 2020). Similarly, in the United States, they found that the use of long-acting reversible contraceptives was significantly associated ($p < 0.05$) with a reduced risk of stunting. According to their study, family planning helps regulate birth intervals and improves household resource allocation—enabling more significant investments in child nutrition, health care, and development. These findings underscore the broader impact of family planning as a vital tool in combating child stunting globally (Flood, Petersen, Martinez, Chary, Austad, & Rohloff, 2019).

The findings from this study indicated no statistically significant association between access to drinking water sources and stunting in children under five ($p = 0.822$). This lack of significance may be attributed to the almost identical percentages of children with inadequate drinking water in the stunting (71.5%) and non-stunting (71.3%) groups—yielding only a 0.2% difference. This slight variation suggests that inadequate water access was prevalent across both groups, potentially masking any measurable impact on stunting outcomes.

Access to safe drinking water remains a vital aspect of child health and nutrition despite the

absence of a significant relationship in this analysis. Contaminated water sources, especially those polluted with *Escherichia coli* and other pathogens, can lead to repeated diarrheal infections, which impair nutrient absorption and contribute to chronic undernutrition, including stunting. Moreover, water sources around environmental contaminants raise the risk of exposure to harmful microorganisms. Even without statistical significance, the biological plausibility and public health implications warrant continued water safety awareness as part of integrated stunting prevention strategies (Ademas, Adane, Keleb, Berihun, & Tesfaw, 2021; Girma, Hussein, Norris, Genye, Tessema, Bossuyt, & Samuel, 2024).

The findings of this study are consistent with those in Ethiopia ($p = 0.695$), which also found no association between drinking water access and stunting. Their results suggest that widespread access to piped water among households may explain the lack of variation (Tebeje et al., 2022). However, conflicting evidence from Das et al. in India ($p < 0.001$) revealed a significant association between untreated drinking water and increased stunting rates. These results suggest that water quality is more important than mere availability. These mixed findings highlight the importance of context-specific evaluations and reinforce the need to improve water quality alongside nutrition-focused interventions (Das, Verma, Sahoo, & Gupta, 2022).

The outcomes of this analysis demonstrated a statistically significant association between access to sanitation and stunting in children under five ($p = 0.000$). According to the 2021, adequate sanitation includes having access to a latrine and using a goose-neck toilet, which helps prevent environmental contamination and limits the transmission of pathogens from human waste. The unavailability of latrines that fulfill health requirements will cause people to defecate indiscriminately, commonly called open defecation (Amelia, Suryani, Harokan, & Ulfah, 2022; Das et al., 2022). Open defecation remains a widespread issue in Indonesia; as of June 2023, more than 30 million people were still practicing open defecation, and according to UNICEF, nearly 25 million Indonesians lacked access to latrines in 2021. These conditions reflect ongoing sanitation challenges that can significantly affect child health and growth outcomes (Amelia et al., 2022).

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The findings of this study are supported by other international research reporting a significant association ($p = 0.001$) between the absence of household toilet facilities and increased stunting in children under five in Ethiopia. Their findings suggest that unhygienic fecal disposal leads to recurrent diarrheal infections, which impair nutrient absorption and child growth and development (Ademas et al., 2021). Similarly, a study in India found that inadequate sanitation was significantly associated with stunting ($p < 0.001$), linking it to recurrent subclinical infections from fecal bacteria that compromise nutritional status. These consistent findings across countries underscore improving sanitation infrastructure as a critical intervention for reducing stunting and promoting better child health outcomes (Das et al., 2022).

Based on the analysis, dietary diversity was not significantly associated with stunting in children under five ($p = 0.076$). Nevertheless, dietary diversity remains an essential factor to observe in child nutrition. A varied diet is critical in confirming the intake of vital macronutrients and micronutrients that support healthy growth and development (Gassara et al., 2023). Monotonous diets lacking diversity are often nutrient-poor and can contribute to chronic undernutrition and micronutrient deficiencies (Das, Fahim, Rasul, Afrin, Alam, Zaman, & Ahmed, 2023). Inadequate food variety among stunted children may reflect limited parental knowledge regarding the importance of balanced diets, particularly among mothers. Economic limitations and food insecurity also reduce access to diverse food sources in many households (Hein, Hong, Puckpinyo, & Tejavataddhana, 2019; Wantina, Rahayu, & Yuliana, 2017).

This finding is consistent in Africa, which found no significant association ($p = 0.487$) between dietary diversity and stunting, likely due to the overall adequacy of dietary diversity across households (Gassara et al., 2023). However, conflicting evidence comes from Bangladesh, which found a significant association ($p = 0.004$) between low dietary diversity and stunting. This study emphasized the role of maternal influence in shaping children's eating habits. It noted that illnesses such as diarrhea can disrupt diets and reduce dietary diversity, ultimately increasing the risk of stunting. These divergent findings suggest that dietary diversity may not always

be statistically associated with stunting, but its role in child nutrition remains biologically relevant and context-dependent (Hasan, Islam, Mubarak, Haque, Choudhury, & Ahmed, 2019).

The study displayed a statistically significant relationship between a mother's education level and stunting among children under five ($p = 0.000$). Maternal education is vital in shaping a mother's knowledge and practices related to child care, feeding, and health (Rahmah, Yani, Eriyani, & Rahayuwati, 2023; Yaya, Oladimeji, Odusina, & Bishwajit, 2022). Mothers with more elevated levels of education are generally more informed about nutritional requirements and child growth, which allows them to deliver more suitable care, seek proper healthcare services, and make healthier dietary choices for their children. In contrast, mothers with lower educational attainment may lack access to or understanding such essential knowledge, which can negatively affect their children's growth and nutrition (Salsabila, Noviyanti, & Kusudaryati, 2022).

The results of this study align with previous research in Sub-Saharan Africa ($p < 0.001$), which demonstrated a significant association between maternal education and stunting outcomes. These findings suggest that educated mothers are better able to provide optimal care for their children, including appropriate feeding practices and improved hygiene practices. Higher levels of education enable mothers to effectively access, interpret, and apply health-related information, thus improving their children's growth outcomes compared to mothers with lower education (Yaya et al., 2022). Similarly, research in Ethiopia ($p < 0.0001$) also supports this study's findings. The study emphasized that mothers with higher education levels are more likely to engage in positive health-seeking behavior, proper feeding habits, and regular antenatal and postnatal care, all of which contribute to better nutritional outcomes in children. Educated mothers were also more likely to initiate and maintain exclusive breastfeeding, further promoting healthy child development and reducing the risk of stunting (Amaha & Woldeamanuel, 2021).

In this study, 31.6% of mothers had an education level of less than nine years, indicating that a considerable part of the population still lacks access to continued education beyond elementary school. This experience underscores the need for government intervention to promote education among

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women, especially in rural and underserved areas. Aligned with the 2020–2024 National Medium-Term Development Plan goals, Indonesia's education policy supports the completion of nine years of compulsory education and is gradually moving toward universal 12-year compulsory education. Strengthening access to and quality education for girls and women is crucial for personal development and improving future generations' health and nutritional outcomes.

The study indicated a statistically meaningful association between the area of residence (rural vs. urban) and stunting in children under five ($p = 0.000$), with a higher proportion of stunting occurring in rural areas (74.4%) compared to urban areas (25.6%). Several interrelated factors may influence this disparity. Urban populations generally have better access to diverse sources of nutritional information through media channels such as television and the Internet, enabling mothers to make more informed feeding choices (Ashar, Laksono, Supadmi, Kusumawardani, Yunitawati, Purwoko, & Khairunnisa, 2024). Additionally, urban households tend to have better sanitation and access to clean drinking water. At the same time, rural areas may still experience practices such as open defecation, which increases the risk of diarrhea and subsequent malnutrition (Das et al., 2022). Furthermore, the higher economic status of many urban families allows for more consistent access to quality food, which supports better child growth and development outcomes (Lusita, Suyatno, & Rahfiludin, 2017).

These findings agree with the investigation in Ethiopia ($p = 0.0001$), which also said a higher incidence of stunting in rural areas compared to urban counterparts. The researchers explained that this urban-rural gap can be attributed to more proper access to healthcare services, immunization programs, and educational campaigns in urban settings (Abate et al., 2020). Urban mothers are more frequently exposed to health-related messages and nutrition education through various media. In addition, urban residents typically enjoy improved socioeconomic conditions, which enable them to provide better-quality diets and healthcare for their children (Widyaningsih, Mulyaningsih, Nur Rahmawati, & Adhitya, 2022).

Similarly, in Sub-Saharan Africa ($p < 0.001$), a higher prevalence of stunting was found among children in rural areas. This study highlights that rural

households often experience financial hardship and tend to have more family members, which can lead to increased food insecurity. In large families with limited resources, children are at higher risk of receiving inadequate nutrition, increasing their vulnerability to stunting. These findings collectively imply that residence is an important determinant of child nutrition and health, reflecting broader inequalities in access to resources, services, and education between rural and urban populations (Yaya et al., 2022).

CONCLUSION

Stunting is significantly linked to factors such as food insecurity, lack of breastfeeding, absence from mothering classes, poor sanitation, low maternal education, limited family planning use, and rural residence. While clean water and dietary diversity were not statistically significant, they remain important. Rural children are more vulnerable due to limited services and maternal resources. Improving maternal education, access to health interventions, and sanitation—especially in rural areas—is essential for reducing stunting through integrated, community-based efforts.

SUGGESTION

Addressing stunting requires a multisectoral approach that combines health education, food security, improved sanitation, and equitable access to health services. Interventions must be tailored to address the unique challenges of rural and urban areas to ensure that all Indonesian children have the opportunity to achieve optimal growth and development.

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