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Analysis of risk factors for stunting among under-five children: A case-control study in Baiturrahman Primary Health Center, Banda Aceh City

Analisis faktor risiko stunting pada balita: Studi kasus kontrol di wilayah kerja Puskesmas Baiturrahman, Kota Banda Aceh

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Abstract

Stunting is a form of chronic malnutrition that adversely affects the growth and development of children under five years of age. This study aimed to analyze the factors associated with stunting among children in Banda Aceh, Indonesia. A cross-sectional study was conducted in Banda Aceh in 2023 involving 128 respondents, comprising 64 stunted children (cases) and 64 non-stunted children (controls). Data were analyzed using chi-square tests and logistic regression at the 95% confidence level. Results: Maternal knowledge (p=0,002), socioeconomic status (p=0,005), breastfeeding practices (p=0,012), birth weight (p=0,009), and maternal education level (p=0,014) were significantly associated with stunting. The dominant factor influencing stunting was low birth weight (odds ratio [OR] =2,4; p=0,012). In conclusion, low birth weight was identified as the primary determinant of stunting. Other factors, such as maternal knowledge, education, socioeconomic status, and breastfeeding also played a role, although they were not significant in the multivariate analysis. Stunting prevention should begin during pregnancy through multisectoral interventions, nutrition education, strengthened antenatal care services, and family economic empowerment.

Keywords: Breastfeeding, birth weight, maternal knowledge, socioeconomic factors, stunting

Abstrak

Stunting merupakan masalah gizi kronis yang berdampak pada pertumbuhan dan perkembangan balita. Penelitian bertujuan untuk menganalisis faktor-faktor yang berhubungan dengan kejadian stunting pada balita di Kota Banda Aceh. Studi menggunakan desain cross-sectional, telah dilakukan di Banda Acehtahun 2023. Jumlah responden sebanyak 128 orang, terdiri dari 64 balita stunting (kasus) dan 64 balita tidak stunting (kontrol). Analisis data dilakukan menggunakan uji chi-square dan regresi logistik pada tingkat signifikansi 95%. Hasil penelitian menunjukkan bahwa pengetahuan ibu (p=0,002), status ekonomi (p=0,005), pemberian ASI (p=0,012), berat badan lahir (p=0,009), dan tingkat pendidikan (p=0,014) berhubungan signifikan dengan kejadian stunting. Faktor dominan yang memengaruhi stunting adalah berat badan lahir rendah (OR=2,4; p=0,012). Kesimpulan, berat badan lahir rendah (BBLR) terbukti sebagai faktor dominan kejadian stunting. Faktor lain seperti pengetahuan ibu, pendidikan, status ekonomi, dan ASI juga berperan meski tidak signifikan secara multivariat. Pencegahan stunting perlu dimulai sejak kehamilan melalui intervensi lintas

sektor, edukasi gizi, penguatan layanan antenatal, dan pemberdayaan ekonomi keluarga.

Kata Kunci: ASI, berat badan lahir, pengetahuan ibu, stunting, status ekonomi

Introduction

Stunting remains one of the most pressing global health challenges, particularly in developing countries, such as Indonesia. This condition reflects chronic growth impairment in children, characterized by height-for-age below the standard, and has far-reaching implications beyond physical health, affecting cognitive development, learning capacity, productivity, and the overall quality of life in the long term (Kemenkes, 2018). Globally, although the prevalence of stunting has declined, UNICEF, WHO, and the World Bank (2023) have emphasized that the reduction has been uneven, with several regions continuing to report high rates of stunting despite improvements in access to education and health services (BKPK, 2023; WHO, 2018; UNICEF et al., 2023).

The 2022 Indonesia Nutrition Status Survey (SSGI) reported a decline in the national stunting prevalence from 24,4% in 2021 to 21,6% in 2022. However, this figure remains above the World Health Organization (WHO) threshold of 20%. Ironically, the Province of Aceh recorded a high stunting rate of 33,2% in 2022, making it one of the provinces with the highest stunting burden in the country. Banda Aceh City, the provincial capital with relatively advanced infrastructure and health services, has also experienced an increase in the prevalence of stunting from 6,79% in 2021 to 11,22% in 2023 (BKPK, 2023; Kemenkes RI, 2021).

One notable area within the city is the Baiturrahman Primary Health Center. Despite being located at the heart of Banda Aceh and serving a population with a generally high educational background, the stunting trend in this region is inconsistent. Health office records show that the stunting rate has increased from 6,27% in 2021 to 9,92% in 2022 before dropping sharply to 4,49% by 2023. This fluctuation suggests that stunting is not solely driven by limited access to services or education but is likely influenced by more complex underlying factors.

Various studies have established that stunting is associated with direct determinants, such as inadequate dietary intake and recurrent infections, and indirect determinants, such as low maternal nutritional knowledge, poor household economic status, suboptimal breastfeeding practices, and low birth weight (Perumal et al., 2023; UNICEF et al., 2023). Victora et al. (2021) and Budiastuti & Rahfiludin (2019) underscored the critical role of maternal education and knowledge in shaping child feeding practices. More recent studies have begun to explore psychosocial determinants, such as maternal stress during pregnancy, and environmental factors, such as sanitation and access to clean water (Nóblega et al., 2024; Kabdwal et al., 2024).

The localized patterns observed in the Baiturrahman Primary Health Center further support the assumption that socioeconomic factors and maternal knowledge remain significant barriers. Preliminary studies have revealed that most stunted children are not optimally breastfed, have a history of low birth weight, and are raised by mothers with limited nutritional knowledge. These findings reinforce the importance of community-based approaches for uncovering the contextual drivers of stunting.

The Indonesian government has implemented various programs to accelerate stunting reduction, including national campaigns, specific and sensitive nutrition interventions, and family-based nutrition education (Al Rahmad et al., 2020; Sufri et al., 2023). However, the effectiveness of these programs remains questionable without adequate consideration of local contexts.

Therefore, a community-based investigation using a multivariate analytical approach is required to comprehensively identify the key risk factors for stunting. This study aimed to examine the relationship between maternal knowledge, economic status, breastfeeding practices, birth weight, and maternal education and the incidence of stunting among children under five years of age in the working area of the Baiturrahman Primary Health Center, Banda Aceh City.

Methods

Study Design

This study employed a quantitative approach with a case-control design. This design was selected because of its effectiveness in identifying risk factors associated with stunting by comparing a group of stunted children (cases) with a group of non-stunted children (controls). Each group was retrospectively analyzed based on exposure to several factors suspected to contribute to stunting.

Study Setting and Period

This study was conducted in the working area of the Baiturrahman Primary Health Center, Banda Aceh City, which was selected because of its fluctuating and relatively high stunting rates over the past three years. The study activities, including administrative approval, data collection, and data analysis, were conducted from February to April 2023.

Population, Sample, and Sampling Technique

The target population consisted of 249 children aged 0–59 months who were registered in the working area of the Baiturrahman Primary Health Center. The sample was purposively selected based on the predefined inclusion and exclusion criteria.

The inclusion criteria were as follows: (1) children aged 0–59 months with up-to-date measurements of height/length and (2) mothers or primary caregivers willing to be interviewed. Children with genetic disorders or congenital abnormalities that could affect growth were excluded.

The final sample comprised 64 stunted children in the case group and 64 non-stunted children in the control group, resulting in 128 respondents. Stunting status was determined based on height-for-age or length-for-age (HAZ/LAZ) indicators using WHO 2006 growth standards. Children with a Z-score < –2 SD were categorized as stunted, while those with a Z-score ≥ –2 SD were considered non-stunted.

Data Collection Procedures

Data were collected through face-to-face interviews using a structured questionnaire that had previously undergone validity and reliability testing. Content validity was assessed through expert judgment, and reliability testing produced Cronbach's alpha values greater than 0,7 for all subscales.

The dependent variable in this study was the stunted status (stunted or not stunted). The independent variables included maternal knowledge (adequate/inadequate), household economic status (measured by monthly income relative to the Banda Aceh minimum wage), breastfeeding practices (exclusive/non-exclusive), birth weight (normal/low birth weight), and maternal education level (low: ≤ senior high school; high: ≥ diploma degree). As supporting data, information from the Maternal and Child Health (MCH) handbook and health center administrative records were also reviewed for verification.

Data Analysis and Statistical Testing

The collected data were processed using SPSS version 25.0. The data management stage includes editing, coding, entry, cleaning, and tabulation to ensure data quality and consistency.

The analysis was conducted in three stages and univariate analysis was performed to describe the frequency distribution and characteristics of the respondents. Second, bivariate analysis using the chi-square test was conducted to examine the relationship between the independent variables and stunting status, with a significance level set at $p < 0,05$. Third, multivariate analysis using multiple logistic regression was employed to identify the most dominant factor after controlling for other variables. The results were presented as adjusted odds ratios (AORs) with 95% confidence intervals (CIs).

The interpretation of the results considered both the AOR and CI values. Associations were deemed statistically significant if the CI did not include a value of 1 and $p < 0,05$. Caution was exercised when interpreting CIs that crossed a value of one to avoid biased conclusions.

Ethical Clearance

This study was approved by the Health Research Ethics Committee of the Institute of Kesehatan Helvetia (approval number: 048/EC/KEPK-IKH/07/2025). All respondents were informed of the objectives and procedures of the study, and provided written consent by signing an informed consent form prior to the interview.

Result and Discussion

Sample and Respondent Characteristics

Table 1 presents the distribution of respondent characteristics by gender, age, and parental occupation in both groups: case (stunting) and control (non-stunting-).

Table 1. Characteristics of sample and respondents

Characteristic	Stunting (%)	Control (%)
Gender		
Male	28 (43,8)	28 (43,8)
Female	36 (56,3)	36 (56,3)
Child Age		
<24 months	16 (25,0)	16 (25,0)
25–36 months	26 (40,6)	26 (40,6)
37–48 months	12 (18,8)	12 (18,8)
49–59 months	10 (15,6)	10 (15,6)
Parental Occupation		
Farmer	31 (48,8)	31 (48,8)
Private sector	7 (10,9)	7 (10,9)
Civil servant	10 (15,6)	10 (15,6)
Small entrepreneur	9 (14,1)	10 (15,6)
Micro-enterprise	7 (10,9)	6 (9,5)

The sex distribution was balanced in both groups (43,8% male; 56,3% female), minimizing gender-based bias. Parental occupation was mainly subsistence agriculture (48,8%), followed by small-scale entrepreneurship, private employment, civil service, and micro-enterprises. Most parents work in informal sectors with unstable and low incomes, which may limit their ability to meet nutritional, sanitation, and health needs. Demographic characteristics were comparably distributed between the groups, reinforcing the validity of the comparative analysis.

Risk Factors Associated with Stunting

Bivariate analysis (Table 2) identified significant associations between several variables and stunting among children in the Baiturrahman Primary Health Center. Chi-square tests and Odds Ratios (OR) with 95% Confidence Intervals (CI) were used to assess the strength of the associations.

Maternal Nutritional Knowledge and Stunting Incidence

Bivariate analysis revealed a significant difference in maternal nutritional knowledge between the case and control groups (p = 0,002). A higher proportion of mothers in the stunted group demonstrated poorer nutritional knowledge (76,6%) than did those in the control group (30,0%). Conversely, mothers with adequate knowledge were found more frequently in the control group (70,0%) than in the case group (23,4%).

The calculated Odds Ratio (OR) was 7,14, with a 95% Confidence Interval (CI) of 2,97–17,14, indicating that mothers with inadequate nutritional knowledge had approximately seven times greater odds of having a stunted child than those with adequate knowledge. A CI range not crossing 1 confirmed that the association was statistically significant and clinically relevant.

These findings reinforce the critical role of maternal knowledge in children's nutrition and caregiving. Mothers who lack an understanding of balanced nutrition are more likely to implement inadequate feeding behaviors, including non-exclusive breastfeeding and provision of inappropriate complementary foods for their child's age. This result is consistent with the studies by Nurfita (2019) and Hossain et al. (2023), who identified maternal knowledge as a key determinant of child nutrition behavior. Low levels of maternal knowledge may lead to a failure to recognize signs of undernutrition, insufficient dietary diversity, and poor complementary feeding practices. These findings are further supported by a national study on stunting determinants in Indonesia, which showed that maternal knowledge significantly influenced children's nutritional status (Atamou et al., 2023).

However, it is important to note that maternal knowledge is not the sole factor affecting a child's nutritional status. Formal education and socioeconomic status may act as confounding variables that influence both knowledge acquisition and caregiving capacity. Mothers with low educational attainment or from economically disadvantaged households often have limited access to nutritional information, educational media, and preventive health services, such as counseling or community-based health posts. In this context, nutritional knowledge is not merely a matter of comprehension, but also of opportunity and access to resources (Susilawati et al., 2024; Susanti et al., 2023).

Several mothers in this study also held misconceptions, believing that stunting was not

a serious concern as long as the child appeared physically active. This highlights the gap in health education that requires urgent attention. A low perception of risk combined with a lack of understanding of the long-term impacts of stunting, particularly on brain development and future productivity, perpetuates the intergenerational cycle of malnutrition (Sukmawati et al., 2021).

The implications of these findings suggest that improving maternal knowledge through nutrition education must not be conducted in isolation but rather as part of a multisectoral strategy. Nutrition counseling should be contextualized, taking into account mothers' socioeconomic backgrounds, literacy levels, and availability of inclusive health services. The roles of healthcare providers, community health workers, and local leaders are vital for delivering targeted and effective nutritional messages.

Therefore, enhancing maternal nutritional knowledge through continuous, culturally sensitive, and context-specific education is critical for preventing stunting, particularly in urban settings characterized by socioeconomic heterogeneity such as the Baiturrahman Primary Health Center area in Banda Aceh.

Table 2. Factors Associated with Stunting Among Children in the Baiturrahman Primary Health Center Area, Banda Aceh

Variable	Category	Stunting (%)	Control (%)	p-value	OR (95% CI)
Maternal Nutrition Knowledge	Poor	49 (76,6)	19 (30,0)	0,002	7,14 (2,97–17,14)
	Good	15 (23,4)	45 (70,0)		
Economic Status	Low	41 (64,1)	24 (37,5)	0,005	2,96 (1,43–6,12)
	High	23 (35,9)	40 (62,5)		
Exclusive Breastfeeding	Not Exclusive	39 (60,9)	24 (37,5)	0,012	2,63 (1,25–5,53)
	Exclusive	25 (39,1)	40 (62,5)		
Birth Weight	Low Birth Weight (LBW)	33 (51,6)	19 (29,7)	0,009	2,56 (1,26–5,18)
	Normal	31 (48,4)	45 (70,3)		
Maternal Education	Low	38 (59,4)	23 (35,9)	0,014	2,60 (1,22–5,56)
	High	26 (40,6)	41 (64,1)		

Household Economic Status and Stunting Incidence

The results of this study (Table 2) demonstrated that children from households with a low socioeconomic status had a higher prevalence of stunting (64,1%) than the control group (37,5%); conversely, a higher proportion of children from households with a higher economic status was observed in the control group (62,5%) than in the case group (35,9%). This relationship was statistically significant (p = 0,005), with an odds ratio (OR) of 2,96 (95% CI: 1,43–6,12), indicating that children from low-income families were nearly three times more likely to experience stunting than those from better-off families.

In this study, economic status was defined based on monthly household income relative to the Minimum City Wage (Upah Minimum Kota, UMK) of Banda Aceh. Households earning below the UMK were classified as low-income households, whereas those earning equal to or above the UMK were categorized as high-income households. This approach was intended to provide an objective classification aligned with the local socioeconomic context and purchasing power of households.

These findings are consistent with those of Ryadinency et al. (2020), who found that low-income families were at a higher risk of having stunted children. That study highlighted a strong correlation between low household income and limited access to nutritious food, adequate sanitation, and essential health care services. Similarly, Tamir et al. (2024) emphasized that in developing countries, household economic status remains a major determinant of child nutritional outcomes. Limited purchasing power often leads to a reduced consumption of animal-sourced proteins, fresh vegetables, and micronutrient-rich foods, which are key components in the first 1,000 days of life.

However, it is important to recognize that economic status does not operate in isolation. In this context, low household income is often interrelated with other factors such as maternal education level, parental occupation, and living conditions. For example, mothers from low-

income households are more likely to have lower educational attainment and limited access to health and nutrition information, which may contribute to poor child feeding practices. Furthermore, informal employment, such as day labor or small-scale vending, frequently yields unstable incomes, exacerbating household financial insecurity.

These conditions may introduce multicollinearity in multivariate analyses. Therefore, it is essential to assess the extent to which household economic status interacts or overlaps statistically with other variables, particularly maternal education level and occupation. Subsequent analyses controlling for these confounding factors are necessary to ensure that the observed association between economic status and stunting is not biased or overstated.

In the long term, improving the household economic status may serve as an effective strategy to prevent stunting. As noted by Byker Shanks et al. (2022), an increase in household income is associated with improved dietary quality, sanitation, and access to childcare. Therefore, cross-sectoral intervention is crucial.

Economic empowerment programs for mothers; support for micro-, small-, and medium-sized enterprises (MSMEs); and nutrition-sensitive social assistance schemes can enhance household resilience against the risk of stunting. These interventions should be integrated with family based nutrition education programs, as suggested by Al Rahmad & Shavira (2024), to ensure that increased income is accompanied by improved capacity to utilize resources for child nutrition.

In other words, stunting prevention strategies should not focus solely on education and healthcare services but must also include sustained efforts to improve household economic well-being.

Exclusive Breastfeeding and Stunting Incidence

The analysis revealed that children who were not exclusively breastfed had a significantly higher risk of stunting than those who were exclusively breastfed; among the stunted children, 60,9% did not receive exclusive breastfeeding, while only 39,1% did. Conversely, in the control group (non-stunted children), the proportion of exclusively breastfed children was higher (62,5%) than that in those who were not (37,5%), and this difference was statistically significant (p = 0,012), with an odds ratio (OR) of 2,63 (95% CI: 1,25–5,53), indicating that children who were not exclusively breastfed were 2,6 times more likely to experience stunting than those who were exclusively breastfed.

These findings reinforce existing evidence on the critical role of exclusive breastfeeding in preventing stunting. For instance, Manggala et al. (2018) reported that children who did not receive exclusive breastfeeding were more likely to suffer from chronic undernutrition leading to stunting. Similarly, Roza (2023) observed a significant correlation between exclusive breastfeeding practices and a reduction in the prevalence of stunting across various regions in Indonesia.

Exclusive breastfeeding provides a complete range of nutrients essential for infant development during the first six months of life, including whey protein, essential fatty acids, vitamins, minerals, and immunological factors such as Immunoglobulin A (IgA), which protect against gastrointestinal and respiratory infections (Scherbaum & Srour, 2016). Recurrent infections, especially diarrhea and respiratory illnesses, are well-documented indirect causes of stunting as they impair nutrient absorption and increase energy loss.

Beyond its nutritional value, exclusive breastfeeding also reflects proper caregiving practices and indicates maternal knowledge and attitudes toward child health. Triana & Haniyah (2020) noted that mothers with better nutritional knowledge are more likely to practice exclusive breastfeeding. In contrast, misinformation or exposure to aggressive marketing of infant formula often leads mothers to substitute or supplement breastfeeding with formula or introduce complementary feeding prematurely, thereby compromising optimal nutrient intake (Asoh, 2019; Pradhan et al., 2022). The gap in exclusive breastfeeding practices is often influenced by structural barriers such as limited maternal time, lack of family support, restricted access to health services, and inadequate maternity leave policies. Sociocultural perceptions that breast milk is insufficient or too watery remain prevalent, which can undermine mothers' confidence in breastfeeding (Manggala et al., 2018).

Therefore, efforts to improve exclusive breastfeeding practices must be multifaceted, involving not only maternal education but also systemic interventions. These may include training health professionals, establishing peer

support groups for breastfeeding mothers, and implementing mother-friendly workplace policies such as adequate maternity leave and the provision of lactation rooms.

In conclusion, the findings underscore that exclusive breastfeeding is a cornerstone of stunting prevention, particularly within the first 1,000 days of life. Sustainable support from the government, healthcare providers, and communities is essential to improve both the coverage and continuity of exclusive breastfeeding practices at the household level.

Birth Weight and Stunting Incidence

The findings of this study (Table 2) demonstrate that birth weight was significantly associated with the incidence of stunting among children under five. In the working area of the Baiturrahman Primary Health Center (Puskesmas), Banda Aceh, 51,6% of stunted children had a history of low birth weight (LBW) compared to only 29,7% in the non-stunted (control) group. The association was statistically significant (p = 0,009), with an odds ratio (OR) of 2,56 (95% CI: 1,26–5,18). This indicates that children born with LBW were approximately 2,5 times more likely to experience stunting than those born with normal birth weight.

This result aligns with both the global and national literature identifying LBW as a strong predictor of impaired child growth, including stunting. Ramadhan et al. (2023) reported that children aged 6–24 months born with LBW were up to 5,6 times more likely to be stunted compared to those born with normal weight. Similarly, Rukmana et al. (2022) highlighted that the impact of LBW extends beyond birth weight and contributes to long-term growth impairment, particularly when compounded by suboptimal caregiving practices and low socioeconomic conditions.

Physiologically, LBW often reflects intrauterine growth restriction (IUGR), which can result from inadequate maternal nutrition during pregnancy, infection, or psychological stress. Infants with LBW typically have limited energy and protein reserves, and underdeveloped organ systems. Postnatally, they are more susceptible to infections, feeding difficulties, and metabolic disturbances, all of which can exacerbate nutritional deficits and increase the risk of stunting (Putri & Astuti, 2021; Habimana & Biracyaza, 2019).

Moreover, LBW affects brain development, particularly in the early stages of life. Cendana & Kim (2025) found that infants born with LBW were at a higher risk of delayed cognitive and psychosocial development due to the limited maturation of the central nervous system during gestation. These findings underscore that the consequences of stunting extend beyond linear growth, affecting long-term quality of life and human productivity.

Therefore, preventing LBW is critical to reducing stunting. One of the most effective strategies is nutritional intervention during pregnancy, particularly for high-risk groups. Chirande et al. (2015) emphasized the importance of regular antenatal care; supplementation with essential nutrients, especially iron, folic acid, and protein; and education on balanced dietary intake during pregnancy. Additionally, providing social and economic support to pregnant women plays a vital role in minimizing the risk of delivering LBW infants (Beal et al., 2018).

In conclusion, this study reinforces the existing evidence that LBW is a key determinant of stunting in children under five years of age. Consequently, stunting prevention strategies must begin before birth by ensuring optimal maternal health and nutrition, strengthening the quality of antenatal services, and fostering an enabling environment that supports the birth of healthy and well-nourished infants.

Maternal Education and Stunting Incidence

The findings of this study indicate a significant association between maternal education level and the incidence of stunting among children under five. In the working area of the Baiturrahman Health Center, Banda Aceh, 59,4% of mothers with stunted children had low educational attainment compared to only 35,9% in the non-stunted (control) group; conversely, a higher proportion of mothers with higher education levels was found in the control group (64,1%) than in the case group (40,6%), and statistical analysis confirmed a significant association between maternal education and stunting incidence, with a p-value of 0,014 and an odds ratio (OR) of 2,60 (95% CI: 1,22–5,56). This suggests that children of mothers with low educational attainment are approximately 2,6 times more likely to experience stunting than those of mothers with higher education.

It is essential to distinguish between formal education and nutritional education. Education refers to academic qualifications obtained through formal institutions, whereas knowledge reflects a specific understanding that may be acquired through various sources such as experience, media, or training. In this context, formal education serves as a foundational capacity that enhances mothers' ability to comprehend, access, and apply health and nutritional information (Mugianti et al., 2018). Mothers with higher educational levels generally possess better health literacy, including the ability to read food labels, understand their children's nutritional needs, and make informed caregiving decisions. These capacities contribute to more responsive and developmentally appropriate parenting strategies. Anggraeni et al. (2022) highlighted that mothers with lower educational levels often face barriers in accessing health information, resulting in suboptimal feeding and childcare practices.

However, a higher educational attainment does not always guarantee optimal childhood nutrition. Studies by Ibrahim et al. (2021) and Nugroho and Putri (2020) found that even well-educated mothers may struggle to meet their children's nutritional needs because of economic constraints, time limitations, lack of social support, or cultural influences. Therefore, maternal education should be understood in relation to other determinants such as household income, access to health services, and appropriate complementary feeding practices.

This study also found that not all mothers with a higher education consistently translated their nutritional knowledge into daily practice. This is consistent with the findings of Wulandari & Kumalasari (2022), who reported a persistent gap between knowledge and behavior due to limited time, physical fatigue, or misconceptions regarding children's dietary needs. Furthermore, cultural norms and prevailing myths in the community may impede proper nutritional practices (Septina et al., 2023).

Maternal education is undoubtedly an important factor, but does not operate in isolation. Effective stunting prevention requires a multidimensional approach that integrates improvements in women's formal education, targeted nutrition education, and the strengthening of social and economic support systems for families. Wahyudi et al. (2022) emphasized the importance of collaboration between government, educational institutions, and health services in delivering integrated interventions for pregnant and breastfeeding mothers, especially in stunting-prone areas.

Promoting female education from early adolescence through the reproductive years should be a central component of national stunting reduction strategies, because educated mothers are more likely to break the cycle of intergenerational malnutrition.

Determinants of Stunting Among Children Under Five

Based on the results of the multivariate logistic regression analysis (Table 3), all variables examined in this study were found to be statistically associated with the incidence of stunting among children under five years of age in the Baiturrahman Primary Health Center area, Banda Aceh. The analyzed variables included maternal nutritional knowledge, household economic status, exclusive breastfeeding, birth weight, and maternal education level.

Table 3. Multivariate logistic regression analysis of factors associated with stunting among children of Baiturrahman Primary Health Center, Banda Aceh

Variable	β Coefficient	p-value	Exp(β)	95% Confidence Interval (CI)
Maternal Nutrition Knowledge	0,058	0,218	1,059	0,188 – 2,354
Economic Status	0,707	0,084	2,028	0,700 – 5,670
Exclusive Breastfeeding	-0,659	0,048	0,517	0,290 – 0,963
Birth Weight	0,889	0,012	2,432	1,218 – 4,849
Maternal Education	0,332	0,095	1,394	0,799 – 4,453

However, among these, only birth weight emerged as a dominant and statistically significant predictor of stunting at the 95% confidence level. Other variables, such as household income, maternal education, and maternal nutrition knowledge, showed a trend toward association,

but did not reach statistical significance, as indicated by p-values greater than 0,05. Meanwhile, exclusive breastfeeding remained statistically significant but demonstrated a relatively weak association, with a confidence interval including the value of 1.

These findings underscore the critical role of birth weight as the primary determinant of child growth outcomes. Although other factors contribute to the complexity of the etiology of stunting, their influence appears to be mediated by or interacting with birth weight and related perinatal conditions. The results suggest that public health strategies aimed at reducing stunting must prioritize prenatal interventions to prevent low birth weight, while also addressing broader socioeconomic and educational determinants.

Children born with low birth weight (LBW) were found to have a 2,43 times higher risk of experiencing stunting than those born with normal birth weight (p = 0,012; OR = 2,432; 95% CI: 1,218–4,849), which is consistent with the existing literature, indicating that intrauterine growth restriction (IUGR) can have long-term consequences on a child's growth trajectory, including an increased risk of stunting due to immature digestive systems, limited nutrient reserves, and increased susceptibility to infections from birth (Putri & Astuti, 2021; Cendana & Kim, 2025). Similarly, other studies have emphasized that infants born with LBW are more likely to experience growth impairments and are biologically predisposed to stunting (Ramadhan et al., 2023; Rukmana et al., 2022).

Numerous studies have shown that IUGR may have lasting effects on childhood growth and development (Ayelign & Zerfu, 2021; Akombi-Inyang et al., 2017). Infants born with LBW are more vulnerable to various developmental issues, primarily because of inadequate nutrient stores and the immaturity of critical physiological systems, especially the gastrointestinal tract, which increases their susceptibility to infections (Beal et al., 2018; Manggala et al., 2018).

Other variables, such as household economic status, maternal education level, and maternal nutritional knowledge, demonstrated trends toward associations with stunting but did not reach statistical significance (p > 0,05). This indicates that, while maternal education and knowledge are expected to contribute to the reduction in stunting prevalence, they may not exert a direct effect on child growth outcomes comparable to that of birth weight (Nugraheni et al., 2023; Rao et al., 2023). Previous studies have shown that lower parental education, particularly among mothers, is associated with an increased risk of stunting. However, these effects are often confounded by other underlying factors, such as socioeconomic status, which also plays a critical role (Wolde et al., 2015; Nugraheni et al., 2023).

Conclusion

This study concludes that low birth weight (LBW) is the most dominant and statistically significant factor associated with stunting among children under five years of age in the catchment area of the Baiturrahman Primary Health Center in Banda Aceh. Other contributing factors, such as maternal knowledge, education, household economic status, and exclusive breastfeeding practices, also played a role, although their associations were not statistically significant in the multivariate analysis. Therefore, stunting prevention should begin as early as pregnancy to ensure proper antenatal care, adequate maternal nutrition, and interventions to prevent LBW.

Recommendations and integrated multisectoral interventions are urgently needed to reduce stunting. This should include maternal nutrition education, strengthening antenatal health services, promotion of exclusive breastfeeding, and household economic empowerment. The engagement of community health workers, health professionals, and local leaders is essential for delivering context-specific and sustainable nutrition messages at the community level.

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References

Akombi-Inyang, B., Agho, K., Hall, J., Merom, D.,

Astell–Burt, T., & Renzaho, A. (2017). Stunting and severe stunting among children under-5 years in nigeria: a multilevel analysis. *BMC Pediatrics, 17*(1). https://doi.org/10.1186/s12887-016-0770-z

Al Rahmad, A. H., Miko, A., Labatjo, R., Fajriansyah, F., Fitri, Y., & Suryana, S. (2020). Malnutrition prevalence among toddlers based on family characteristics: A cross-sectional study in the rural and urban areas of Aceh, Indonesia. *Sri Lanka Journal of Child Health*, *49*(3), 263. https://doi.org/10.4038/sljch.v49i3.9145

Al Rahmad, A. H., & Shavira, N. (2024). Media Motion Graphic Empat Pilar Gizi Seimbang Meningkatkan Pengetahuan Dan Sikap Ibu Balita. *JURNAL RISET GIZI*, *12*(2), 183–189. https://doi.org/10.31983/jrg.v12i2.12087

Anggraeni, L., Yuria, M., Maryuni, M., & Gustina, I. (2022). Penyebab Langsung Dan Penyebab Tidak Langsung Terjadinya Stunting Pada Anak Balita. *Ji-Kes (Jurnal Ilmu Kesehatan)*, *5*(2), 140–146. https://doi.org/10.33006/ji-kes.v5i2.358

Asoh, C. (2019). Factors Influencing the Practice of Exclusive Breastfeeding Among Lactating Mothers Attending the IWC in District Hospital Mbengwi in the North West Region of Cameroon. *Texila International Journal of Academic Research*, *6*(2), 51–62. https://doi.org/10.21522/tijar.2014.06.02.art005

Atamou, L., Rahmadiyah, D. C., Hassan, H., & Setiawan, A. (2023). Analysis of the Determinants of Stunting Among Children Aged Below Five Years in Stunting Locus Villages in Indonesia. *Healthcare*, *11*(6), 810. https://doi.org/10.3390/healthcare11060810

Ayelign, A. and Zerfu, T. (2021). Household, dietary and healthcare factors predicting childhood stunting in ethiopia. *Heliyon, 7*(4), e06733. https://doi.org/10.1016/j.heliyon.2021.e06733

Balitbangkes RI. (2018). *Laporan RISKESDAS Provinsi Aceh 2018*. Badan Penelitian dan Pengembangan Kesehatan.

Bandur, P. M. Y., & Madur, J. P. (2024). Effectiveness of Providing Supplementary Food for Stunted Toddlers in Indonesia: A Literature Review. *Dunia Keperawatan: Jurnal Keperawatan Dan Kesehatan*, *12*(3), 285–299. https://doi.org/10.20527/dk.v13i1.783

Beal, T., Tumilowicz, A., Sutrisna, A., Izwardy, D., & Neufeld, L. M. (2018). A review of child stunting determinants in Indonesia. In *Maternal and Child Nutrition* (Vol. 14, Issue 4, pp. 1–10). https://doi.org/10.1111/mcn.12617

Bhutta, Z. A., Das, J. K., Rizvi, A., Gaffey, M. F., Walker, N., Horton, S., Webb, P., Lartey, A., Black, R. E., & Group, T. L. N. I. R. (2013). Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? *The Lancet*, *382*(9890), 452–477. https://doi.org/10.1016/S0140-6736(13)60996-4

BKPK. (2023). *Survei Kesehatan Indonesia (SKI) 2023*. https://www.badankebijakan.kemkes.go.id/ski-2023-dalam-angka/

Black, R. E., Victora, C. G., Walker, S. P., Bhutta, Z. A., Christian, P., De Onis, M., Ezzati, M., Grantham-McGregor, S., Katz, J., & Martorell, R. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. *The Lancet*, *382*(9890), 427–451. https://doi.org/10.1016/S0140-6736(13)60937-X

Budiastuti, I., & Rahfiludin, M. Z. (2019). Faktor risiko stunting pada anak di negara berkembang. *Amerta Nutrition*, *3*(3), 122–129. https://doi.org/10.2473/amnt.v3i3.2019.122-129

Byker Shanks, C., Andress, L., Hardison-Moody, A., Jilcott Pitts, S., Patton-Lopez, M., Prewitt, T. E., Dupuis, V., Wong, K., Kirk-Epstein, M., Engelhard, E., Hake, M., Osborne, I., Hoff, C., & Haynes-Maslow, L. (2022). Food Insecurity in the Rural United States: An Examination of Struggles and Coping Mechanisms to Feed a Family among Households with a Low-Income. In *Nutrients* (Vol. 14, Issue 24, p. 5250). https://doi.org/10.3390/nu14245250

Cendana, P., & Kim, S.-Y. (2025). Maternal Factors and Breastfeeding Practices

Associated With Stunting Among Indonesian Children Aged 6 to 23 Months. *Asia Pacific Journal of Public Health*, *37*(4), 402–410. https://doi.org/10.1177/1010539525133 7970

Chirande, L., Charwe, D., Mbwana, H., Victor, R., Kimboka, S., Issaka, A. I., Baines, S. K., Dibley, M. J., & Agho, K. E. (2015). Determinants of stunting and severe stunting among under-fives in Tanzania: Evidence from the 2010 cross-sectional household survey. *BMC Pediatrics*, *15*, 1–13. https://doi.org/10.1186/s12887-015-0482-9

Habimana, S., & Biracyaza, E. (2019). Risk Factors Of Stunting Among Children Under 5 Years Of Age In The Eastern And Western Provinces Of Rwanda: Analysis Of Rwanda Demographic And Health Survey 2014/2015. *Pediatric Health, Medicine and Therapeutics*, *10*, 115–130. https://doi.org/10.2147/phmt.s222198

Hossain, M. S., Akter, T., & Sadiq, M. Z. A. (2023). Nutritional Knowledge, WASH Practices of Mothers and Their Impact on the Nutritional Status of Children Aged 6–59 Months in Cumilla District, Bangladesh. *European Journal of Nutrition & Food Safety*, *15*(12), 104–116. https://doi.org/10.9734/ejnfs/2023/v15i 121371

Ibrahim, I. A., Alam, S., Adha, A. S., Jayadi, Y. I., & Fadlan, M. (2021). Hubungan Sosial Budaya Dengan Kejadian Stunting Pada Balita Usia 24-59 Bulan Di Desa Bone-Bone Kecamatan Baraka Kabupaten Enrekang Tahun 2020. *Al Gizzai Public Health Nutrition Journal*, *1*(1), 16–26. https://doi.org/10.24252/algizzai.v1i1.19 079

Kabdwal, N. C., Yadav, N. K., Singh, K. J., & Yadav, J. (2024). A Decomposition Analysis of Inequality in Malnutrition Among Under Five Children in India: Findings From National Family Health Survey-5. *Research Square*, *13*(2). https://doi.org/10.21203/rs.3.rs-4443583/v1

Karlsson, O., Kim, R., Moloney, G. M., Hasman, A., & Subramanian, S. V. (2023). Patterns in child stunting by age: A cross-sectional study of 94 low- and middle-income countries. *Maternal & Child Nutrition*, *19*(4), e13537. https://doi.org/https://doi.org/10.1111/mcn.13537

Kemenkes RI. (2018). Situasi Balita Pendek (stunting) di Indonesia. In *Buletin Jendela Data dan Informasi Kesehatan* (Vol. 1).

Kemenkes RI. (2022). Survei Status Gizi SSGI 2022. In *BKPK Kemenkes RI*. Kementerian Kesehatan RI. https://www.bps.go.id/publication/2022/12/23/54f24c0520b257b3def481be/profil-kesehatan-ibu-dan-anak-2022.html

Manggala, A. K., Kenwa, K. W. M., Kenwa, M. M. L., Sakti, A. A. G. D. P. J., & Sawitri, A. A. S. (2018). Risk Factors of Stunting in Children Aged 24-59 Months. *Paediatrica Indonesiana*, *58*(5), 205–212. https://doi.org/10.14238/pi58.5.2018.205-12

Maryati, I., Annisa, N., & Amira, I. (2023). Faktor Dominan Terhadap Kejadian Stunting Balita. *Jurnal Obsesi Jurnal Pendidikan Anak Usia Dini*, *7*(3), 2695–2707. https://doi.org/10.31004/obsesi.v7i3.4419

Mugianti, S., Mulyadi, A., Anam, A. K., & Najah, Z. L. (2018). Faktor Penyebab Anak Stunting Usia 25-60 Bulan di Kecamatan Sukorejo Kota Blitar. *Jurnal Ners Dan Kebidanan (Journal of Ners and Midwifery)*, *5*(3), 268–278. https://doi.org/10.26699/jnk.v5i3.art.p268-278

Mulyani, N. S., Fitriyaningsih, E., Al Rahmad, A. H., & Hadi, A. (2022). Peningkatan pengetahuan dan sikap ibu untuk pencegahan stunting di Kabupaten Aceh Besar. *Jurnal PADE: Pengabdian & Edukasi*, *4*(1), 28–33. https://doi.org/10.30867/pade.v4i1.810

Nóblega, M., Retiz, O., Nuñez del Prado, J., & Bartra, R. (2024). Maternal Stress Mediates Association of Infant Socioemotional Development with Perinatal Mental Health in Socioeconomically Vulnerable Peruvian Settings. In *International Journal of Environmental Research and Public Health 21*(7), 844. https://doi.org/10.3390/ijerph21070844

Nugraheni, W., Mahmudiono, T., Faisal, D., Purwatiningsih, Y., Lestyoningrum, S.,

Yulianti, A., … & Abihail, C. (2023). Poor and uneducated parents increased the risk of stunting among children living in non-remote areas of Indonesia. *Research Square, 1*(3) https://doi.org/10.21203/rs.3.rs-2537611/v1

Nugroho, A., & Putri, S. (2020). Perbedaan Determinan Balita Stunting Di Pedesaan Dan Perkotaan Di Provinsi Lampung. *Jurnal Ilmiah Keperawatan Sai Betik*, *15*(2), 84. https://doi.org/10.26630/jkep.v15i2.1499

Nurfita, E. (2019). Faktor Determinan Stunting di Puskesmas Gunung Meriah Kabupaten Aceh Singkil Provinsi Aceh. *Institut Kesehatan Helvetia Medan*.

Perumal, N., Bassani, D. G., & Roth, D. E. (2023). Stunting: Prevalence and prevention. *Encyclopedia of Human Nutrition*, *1*(4), 230–240. https://doi.org/10.1016/B978-0-12-821848-8.00016-0

Pradhan, R., Karn, B. K., Chaudhary, R., Yadav, U., & Bhandari, S. (2022). Perceived Hindering Factors of Exclusive Breastfeeding Among Lactating Mothers of Itahari. *Journal of College of Medical Sciences-Nepal*, *18*(3), 235–243. https://doi.org/10.3126/jcmsn.v18i3.44242

Psaki, S., Bhutta, Z. A., Ahmed, T., Ahmed, S., Bessong, P., Islam, M., John, S., Kosek, M., Lima, A., Nesamvuni, C., Shrestha, P., Svensen, E., McGrath, M., Richard, S., Seidman, J., Caulfield, L., Miller, M., Checkley, W., & Investigators, and M. N. (2012). Household food access and child malnutrition: results from the eight-country MAL-ED study. *Population Health Metrics*, *10*(1), 24. https://doi.org/10.1186/1478-7954-10-24

Putri, I. M., & Astuti, M. D. (2021). Infant's Birth History and Low Birth Weight Increases Risk of Stunting Cases. *International Conference on Health and Medical Sciences (AHMS 2020)*, 192–194. https://doi.org/10.2991/ahsr.k.210127.042

Ramadhan, S., Amalia, R. B., & Sudaryanti, L. (2023). Correlation Between LBW History and Stunting Incidence: A Literature Review. *Indonesian Midwifery and Health Sciences Journal*, *7*(4), 376–389. https://doi.org/10.20473/imhsj.v7i4.2023.376-389

Rao, N., Bala, M., Ranganathan, N., Anand, U., Dhingra, S., Costa, J., … & Weber, A. (2023). Trends in the prevalence and social determinants of stunting in india, 2005–2021: findings from three rounds of the national family health survey. *BMJ Nutrition Prevention & Health, 6*(2), 357-366. https://doi.org/10.1136/bmjnph-2023-000648

Roza, N. (2023). Stunting Management With Exclusive Breastfeeding, Early Breastfeeding Initiation Toddlers at Sei Panas Community Health Center. *International Journal of Multidisciplinary Approach Research and Science*, *1*(03), 503–511. https://doi.org/10.59653/ijmars.v1i03.260

Rukmana, E., Purba, R., Nurfazriah, L. R., & Purba, E. M. (2022). The Correlation Between Characteristics, Knowledge of Nutrition and Nutritional Status (H/A) Among Children Aged 6-59 Months in Medan City. *Bio Web of Conferences*, *54*, 12. https://doi.org/10.1051/bioconf/20225400012

Ruwiah, R., Harleli, H., Sabilu, Y., Fithria, F., & Sueratman, N. E. (2021). Peran Pendidikan Gizi Dalam Pencegahan Stunting. *Jurnal Ilmiah Kesehatan*, *14*(2), 151–158. https://doi.org/10.48144/jiks.v14i2.417

Ryadinency, R., Suwandi, N., & Patmawati, T. A. (2020). Analysis of Determinant Factors in Stunting Children in Palopo, Indonesia. *Journal Wetenskap Health*, *1*(2), 77–82. https://doi.org/10.48173/jwh.v1i2.39

Salsabila, S., Noviyanti, R. D., & Kusudaryati, D. P. D. (2023). Hubungan Tingkat Pendidikan Ibu Dan Pola Asuh Orang Tua Dengan Kejadian Stunting Pada Balita Usia 12-36 Bulan Di Wilayah Puskesmas Sangkrah. *Profesi (Profesional Islam) Media Publikasi Penelitian*, *19*(2), 143–152. https://doi.org/10.26576/profesi.v19ino.2.103

Scherbaum, V., & Srour, M. L. (2016). The Role of Breastfeeding in the Prevention of Childhood Malnutrition. *World Review of Nutrition and Dietetics*, *115*, 82–97.

https://doi.org/10.1159/000442075

Septina, Y., Nurasiah, A., & Rosdiana, R. (2023). Hubungan Antara Pendidikan Dan Pengetahuan Ibu Tentang Menu Gizi Seimbang Dengan Kejadian Stunting Pada Anak Usia 24 – 59 Bulan. *Journal of Nursing Practice and Education*, *4*(1), 156–161. https://doi.org/10.34305/jnpe.v4i1.948

Sufri, S., Nurhasanah, Jannah, M., Dewi, T. P., Sirasa, F., & Bakri, S. (2023). Child Stunting Reduction in Aceh Province: Challenges and a Way Ahead. *Maternal and Child Health Journal*, *27*(5), 888–901. https://doi.org/10.1007/s10995-023-03601-y

Sukmawati, S., Hermayanti, Y., Nurhakim, F., DA, I. A., & Mediani, Henny S. (2021). Edukasi Pada Ibu Hamil, Keluarga Dan Kader Posyandu Tentang Pencegahan Stunting. *Dharmakarya*, *10*(4), 330. https://doi.org/10.24198/dharmakarya.v10i4.33400

Susanti, D., Lutfiyati, A., & Ekawati, E. (2023). Pencegahan Stunting Dengan Peningkatan Pengetahuan Ibu Dengan Balita Di TK Tunas Islam Yogyakarta. *Journal of Innovation in Community Empowerment*, *5*(2), 114–121. https://doi.org/10.30989/jice.v5i2.988

Susilawati, E. F., Raharja, K. T., & Ningsih, W. S. (2024). Peran Ibu Dalam Merawat Balita Stunting Di Desa Larangan Luar Pamekasan. *Jurnal Sains Dan Teknologi Kesehatan*, *4*(2), 8–12. https://doi.org/10.52234/jstk.v4i2.234

Tamir, T. T., Gezhegn, S. A., Dagnew, D. T., Mekonenne, A. T., Aweke, G. T., & Lakew, A. M. (2024). Prevalence of Childhood Stunting and Determinants in Low and Lower-Middle Income African Countries: Evidence From Standard Demographic and Health Survey. *Plos One*, *19*(4), e0302212. https://doi.org/10.1371/journal.pone.0302212

Triana, N. Y., & Haniyah, S. (2020). Relationship of Exclusive Breastfeeding, Complementary Feeding and Nutritional Intake With Stunting in Children in Karanglewas Health Center. *1st International Conference on Community Health (ICCH 2019)*, 74–78. https://doi.org/10.2991/ahsr.k.200204.017

UNICEF, WHO, & WORLD BANK. (2023). Level and trend in child malnutrition. *World Health Organization*, 4.

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

Wahyudi, W., Khoeriyah, S. M., & Monika, R. (2022). Gambaran Faktor Eksternal Yang Berhubungan Dengan Kejadian Stunting Pada Anak Usia 24 – 59 Bulan Di Wilayah Kerja Puskesmas Tepus II Gunungkidul. *Jurnal Kesehatan Samodra Ilmu*, *13*(1), 54–59. https://doi.org/10.55426/jksi.v13i1.199

WHO. (2018). Reducing stunting in children: equity considerations for achieving the Global Nutrition Targets 2025. In *World Health Organization*. World Health Organization.

Wolde, M., Berhan, Y., & Chala, A. (2015). Determinants of underweight, stunting and wasting among schoolchildren. *BMC Public Health, 15*(1). https://doi.org/10.1186/s12889-014-1337-2

Wulandari, U. R., & Kumalasari, D. (2022). Faktor Risiko Kejadian Stunting Pada Anak Balita Usia 3- 5 Tahun. *Jurnal Kebidanan*, *12*(2), 114–120. https://doi.org/10.35874/jib.v12i2.1078

Zaina, M., Ramadhini, F. N., Putra, M. S., & Ferdian, K. J. (2022). Edukasi dan pendampingan dalam pencegahan stunting di Desa Kace. *Jurnal Besaoh*, *1*(02), 67–77. https://doi.org/10.33019/besaoh.v1i02.2650