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Stunting predictors among children aged 6-23 months in the urban area of Garut Kota Subdistrict, Indonesia

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Abstract

Purpose: Stunting remains a public health and nutrition problem in Indonesia. Stunting is widespread in rural areas, but information on stunting in urban areas is limited. This study aims to determine the risk factors for stunting in children aged 6–23 months in Garut Kota Subdistrict, Garut Regency, West Java, Indonesia. **Method:** A cross-sectional study was conducted between April and July 2021 on 93 children aged 6–23 months in Garut Kota Subdistrict. Child, parental, and household variables were analyzed, and logistic regression was conducted to assess the predictors of stunting. **Results:** Of the 93 children examined, 40 (43%) were classified as stunted. The studies revealed predictors of stunting in the Garut Kota Subdistrict urban region among children under two years old. Stunted children were 0.065 times less likely to have fathers with middle-to-upper-class education (AOR = 0.065; 95% CI: 0.005-0.932). Stunting is less common in children whose homes have access to better drinking water (AOR = 0.268, 95% CI: 0.078–0.915). Furthermore, children from smokers' households were 0.012 times more likely to be stunted (AOR = 0.012; 95% CI: 0.001-0.238). **Conclusion:** Father's education level, access to adequate drinking water, and the presence of family members who smoke are factors that influence the prevalence of stunting in children aged 6-23 months in Garut Kota Subdistrict. A comprehensive, multisectoral program needs to boost family income, provide clean, safe drinking water that is easily accessible, and reduce household smoking to decrease the prevalence of stunting in children.

Keywords: children; Garut; Indonesia; stunting; urban

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INTRODUCTION

Stunting is a critical public health indicator that reflects chronic undernutrition and impacts children's growth and development. It is defined as the impaired growth and development that children experience from poor nutrition, repeated infections, and inadequate psychosocial stimulation. Children are classified as stunted if their height-for-age is more than two standard deviations below the World Health Organization (WHO) Child Growth Standards median [1]. Stunting is not just a matter of short stature but is associated with numerous developmental risks and health problems throughout an individual's life [2]. It results from a complex interaction of household, environmental, socioeconomic, and cultural influences.

These factors include inadequate maternal nutrition, poor feeding practices, suboptimal healthcare, and unsanitary living conditions [3].

Globally, stunting is one of the most significant impediments to human development, affecting approximately 162 million children under the age of 5 years. This largely irreversible outcome results from inadequate nutrition and repeated infections during the first 1000 days of a child's life. Indonesia is home to the fourth-largest population of children under five years globally, with the highest prevalence of stunting in Asia. This condition hampers physical growth and impairs cognitive development, educational attainment, and future economic potential [4,5]. Garut, a regency in West Java, Indonesia, has historically faced high rates of stunting among children, with the highest prevalence of stunted toddlers reaching 35.3% in the 2021 SSGI. Thus, 1 in 3 toddlers in this district are below the height standard for their age [6].

Stunting often occurs in developing countries. Previous studies have shown that the most dominant direct cause of stunting in Asia with lower to middle socioeconomic levels is the anthropometry of mothers and children. This greatly affects children's growth. Meanwhile, the indirect causal factor is maternal education [7]. Stunting is a problem with complex causes. It is not only caused by child factors; maternal factors significantly influence the incidence of stunting. Environmental factors also indirectly influence stunting [8].

Stunting is the biggest threat to the quality of human resources in Indonesia, both in the short and long term. This is because stunting not only disrupts physical growth but also makes children susceptible to illness, inhibits cognitive and motor development, and disrupts brain development and intelligence so that it can cause low productivity in adulthood [9]. To handle stunting, various efforts are needed so that they can be right on target. According to the results of previous research, the risk factors for stunting in developing countries are caused by parental factors, including the mother's education level, parents' occupation, neonatal factors, and the mother's nutritional status in the first 1000 days of birth, social differences, height, and infectious diseases. Child factors include nutrition, gender, age, infectious diseases, weaning process within 6 months, prematurity, and low birth weight. Environmental factors include water sources, shared toilets, and environmental influences on fetal life [8,10,11].

A child's first 1000 days of existence are crucial to healthy growth. Once a child reaches the age of two, stunting is considered irreversible, notwithstanding the possibility of a catch-up development phase during puberty [12]. Thus, this study investigates the factors contributing to stunting in children between six and twenty-three months in Garut Regency, Indonesia.

This study offers a comprehensive approach by thoroughly examining the immediate and underlying factors contributing to stunting among children aged six to twenty-three months in Garut Regency, Indonesia, a region with a significantly high prevalence of the condition. Through a multi-variable analysis incorporating maternal, environmental, and socioeconomic influences, the research delivers a detailed perspective on the local situation, often overlooked in broader studies. This methodology aligns with recent research highlighting the importance of early interventions during the first 1000 days of life to prevent stunting, along with the vital role of family dynamics, particularly the father's participation in nutritional education and support [13,14]. These findings are crucial for shaping targeted public health strategies to prevent stunting and enhance child health outcomes in Indonesia and similar regions [15–17].

METHODS

Study Sites

A cross-sectional study was conducted in Sukanegla Village, Garut Kota Subdistrict, Garut Regency, West Java Province, Indonesia, between April and July 2021. In Kelurahan Sukanegla, one of the Garut Kota Subdistrict's neighboring villages in Margawati, most of the land is used for plantations, rice fields, and settlements. Though Kelurahan Sukanegla is classified as an urban area according to official boundaries, its mountainous topography makes it challenging. The National Ethics Commission has ethically approved this study for Health Research, the National Institute of Health Research and Development (NIHRD), and the Ministry of Health of the Republic of Indonesia (ethic number: LB.02.01/2/KE.048/2021).

Participants

Our sample comprised children registered at the posyandu in Sukanegla Village between 6 and 24 months. Posyandu is a village-level integrated health post that provides maternal and child healthcare services, including child growth monitoring. Binomial proportions were used to determine the sample size of households. A minimum of 87 households were derived from the sample calculation results. A minimum sample size of 93 households was obtained, assuming a 10% dropout rate. By the inclusion criteria, sampling was done on purpose: households residing in the research location's building for longer than two years; Mother or caregiver (should the mother not be the

primary caregiver) between the ages of 15 and 45; infant member (6–24 months) with stunted and normal nutritional status.

Variables

The primary outcome of this study is stunting, which is defined as a height-for-age Z-score below minus two standard deviations (<-2 SD) from the median of the reference population based on the 2006 WHO growth standards (18). Based on this score, children were categorized as either not stunted or stunted. The explanatory variables included immediate factors and underlying factors. Immediate factors were child gender (male, female), gestational age at birth (>37 weeks, <37 weeks), birth weight (>2500 g, <2500 g), colostrum feeding history (absent, present), exclusive breastfeeding history (absent, present), child anemia status (anemic, normal), and immunization history (complete, incomplete). Underlying factors included maternal and paternal education (primary, secondary), maternal knowledge and practices related to nutrition in infants (poor, moderate, and good), and average family expenditure on consumption in one month (<2 million rupiah, >2 million rupiah). maternal employment (not working, informal), paternal employment (informal, formal), Informal employment includes work that is not subject to national labor laws, income tax, social protection, or entitlement to certain employment benefits, such as sick pay or annual leave (19). Therefore, we categorize civil servants and employees of private companies as formal occupations, while farmers, fishermen, laborers, and entrepreneurs.

Statistical analysis

This study used the chi-square test in a bivariate analysis to examine the differences in the nutritional status of children between the ages of 6 and 24 months depending on immediate and underlying determinants at the preliminary analysis stage. Subsequently, the collinearity test was employed to examine each variable to rule out any indications of a strong correlation between the independent variables. Because of the characteristics of the dependent variable, logistic regression was used in the study's final step. Using SPSS 22, the author conducted all statistical analyses. Geographic distribution maps of anti-malarial therapy distribution were produced by this study using ArcGIS 10.5. The author obtained shapefile data in the form of administrative boundary polygons from the Indonesian Central Bureau of Statistics (http://www.silastik.bps.go.id).

RESULTS

Figure 1 presents the spatial distribution of nutritional status among children aged 6–24 in Sukanegla Village, Garut Kota Subdistrict, in 2021. The proportion of stunted children was 43.0%.

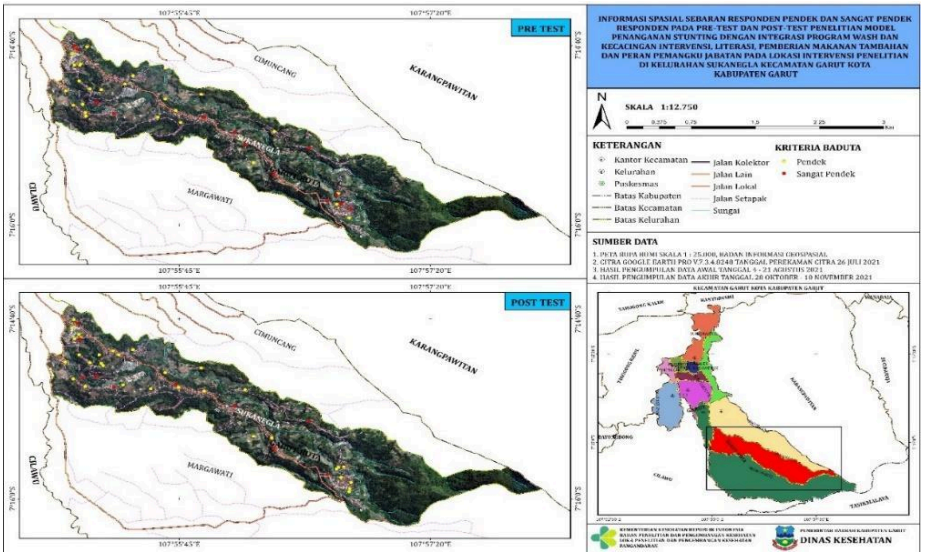

Figure 1. Geographical distribution of nutritional status among children aged 6–24 in Sukanegla Village, Garut Kota Subdstrict, in 2021. The map is generated using ArcGIS 10.5 (ESRI Inc., Redlands, CA, USA). The shapefile of administrative boundary polygons was obtained.

Characteristics of study participants

The respondents' sociodemographic details are shown in Table 1. The investigation comprised 93 children between aged of 6 and 23 months. Of these, 40 (43%) were classified as stunted; nevertheless, based on immediate factors, the proportion was equal for both gender and gestational age at delivery. Unlike other causes, the majority of stunted children suffer from anemia 23 (57.5%) and weren't exclusively breast-fed 39 (97.5%). In the meantime, the history of colostrum revealed that only 6 (15%), 19 (47.5%) did not receive complete immunization, and 10 (25%) of the infants had birth weights under 2500 grams, as found in stunted children.

Based on nine underlying criteria, the majority of stunted children in the Sukanegla Village were primarily mothers who had completed elementary school; 29 (72.5%) and 35 (78.5%) were unemployed. In addition, 28 (70%) fathers had only completed primary school and worked informally, and 34 (85%) had not. In addition, 33 (82.5%) of moms or caregivers have consumption expenses of less than 2 million rupiahs, 37 (92.5%) of the families have smokers in the home, and 23 (57.5%) of moms or caregivers have a lack of nutrition knowledge. The surprising finding is that 33 (82.5%) mothers and caregivers already had access to clean drinking water and followed nutritious dietary habits.

Table 1. Characteristics of stunted and non-stunted children aged 6-23 months in Garut Kota Subdistrict (n=93)

Characteristics	Not stunting n (%)	Stunting n (%)	p-value
Immediate factors			
Sex			0.841
Male	29 (54.7)	20 (50.0)	
Female	24 (54.3)	20 (50.0)	
Gestational age at birth			0.421
<37 weeks	32 (60.4)	20 (50.0)	
≥37 weeks	21 (39.6)	20 (50.0)	
Birth weight			0.031
<2500 g	7 (13.2)	10 (25.0)	
≥2500 g	46 (86.8)	30 (75.0)	
History of immunization			0.999
Uncompleted	25 (47.2)	19 (47.5)	
Completed	28 (52.8)	21 (52.5)	
History of exclusive breastfeeding			0.281
No	49 (92.5)	39 (97.5)	
Yes	4 (7.5)	1 (2.5)	
Anemia Status			0.310
Anemia	36 (67.9)	23 (57.5)	
Normal	17 (32.1)	17 (42.5)	
History of Colostrum			0.237
No	11 (20.8)	6 (15.0)	
Yes	42 (85.0)	34 (85.0)	
Underlying factors			
Mother's education			0.707
Primary	40 (75.5)	5 (12.5)	
Secondary	13 (24.5)	35 (87.5)	
Mother's occupation			0.166
Informal	2 (3.8)	5 (12.5)	
Not working	51 (96.2)	35 (87.5)	
Father's education			0.045
Primary	46 (86.8)	28 (70.0)	
Secondary	7 (13.2)	12 (30.0)	
Father's occupation			0.867
Informal	51 (96.2)	34 (85.0)	
Formal	2 (3.8)	6 (15.0)	
Mother's knowledge			0.187
Poor	36 (67.9)	23 (57.5)	
Moderate	17 (32.1)	17 (42.5)	
Mother's practice			0.391
Moderate	11 (20.8)	7 (17.5)	
Good	42 (79.2)	33 (82.5)	
Consumption expenditure			0.966
<2.000.000 IDR	44 (83.0)	33 (82.5)	
≥2.000.000 IDR	9 (17.0)	7 (17.5)	
Source of drinking water			0.042
Unimproved	19 (35.8)	7 (17.5)	
Improved	34 (64.2)	33 (82.5)	
Smoking of household members			0.004
Yes	38 (71.7)	37 (92.5)	
No	15 (28.3)	3 (7.5)	

Predictors for stunting in 6-23 months

Table 2 shows the final logistic regression model factors associated with stunting in children under two years in the urban area of Garut Kota Subdistrict. Compared to children whose fathers only completed primary school, children whose fathers have middle-to-upper-class education were 0.065 times less likely to have stunted children (AOR = 0.065; 95% CI: 0.005-0.932). Children who live in households with access to improved drinking water are less likely to have stunting than children whose families did not (AOR = 0.268, 95% CI: 0.078–0.915). Additionally, children living in families with smokers had a 0.012 times higher likelihood of stunting (AOR = 0.012; 95% CI: 0.001-0.238) compared to children whose houses were free of smokers.

Table 2. Logistic regression of stunting and its risk factors among children aged 6-23 months in Garut Kota Subdistrict (n=93)

Characteristics	Adjusted		
	OR	95% CI	*p*
Immediate factors			
Birth weight			
<2500 g	Ref		
≥2500 g	0.111	0.372-1.242	0.108
Underlying factors			
Father's education			
Primary	Ref		
Secondary	0.065	0.005-0.932	0.044
Source of drinking water			
Unimproved	Ref		
Improved	0.268	0.078-0.915	0.036
Smoking of household members			
Yes	Ref		
No	0.012	0.001-0.238	0.004

DISCUSSION

This study examined the immediate and underlying causes of stunting in Garut Regency, West Java, Indonesia. Garut has one of the highest prevalences of stunting in West Java and is currently one of the districts prioritizing accelerating stunting reduction programs. Our research demonstrates that key risk factors for stunting among children aged 6-23 months in the Garut Kota Subdistrict include the father's education level, the source of drinking water, and household smoking habits.

The present study revealed that father education is associated with an increased risk of stunting. Studies have shown that higher parental education levels are linked to better child nutrition and reduced stunting [20,21]. This aligns with the significant impact of fathers' education, underscoring its importance in preventing stunting. Higher parental education, particularly secondary education, improves child health outcomes. Fathers' education might be a more robust predictor of child stunting due to its limited impact on household decision-making [22]. Educated fathers are more likely to ensure their children receive immunizations, vitamin A, and iodized salt, thus reducing stunting risks [5]. While our study did not find a significant correlation, maternal knowledge and practices are crucial for child nutrition. Education and health knowledge among mothers are key determinants of children's nutritional status [23]. The non-significant differences in this study indicate a need for a comprehensive approach, including education, healthcare, and community support.

Our study suggested that the source of drinking water was a predictor of stunting. The origin of drinking water and household hygiene practices play significant roles in stunting [24,25]. Proper sanitation facilities and safe drinking water are key to preventing waterborne diseases that can lead to stunting in children [26]. Sources of drinking water significantly impact children's health, growth, and development. Improved water sources enhance health outcomes for children [27]. Unsafe water can cause diarrhea and other infectious diseases, leading to poor nutrient absorption and impaired growth [28]. In Indonesia, reducing stunting in children must include interventions in the water, sanitation, and hygiene (WASH) sector [29].

The presence of smoker household members was one of the predictors of stunting in this study. Household is a significant risk factor for children's health, leading to respiratory issues and poor health outcomes. Research indicates that children from smoking families have a higher incidence of stunting compared to those from non-smoking families [30]. Exposure to tobacco smoke adversely affects child health, including respiratory issues and overall growth. The significant association reinforces the need for

smoke-free environments to promote healthy child development. Children with fathers who smoke are more likely to experience thinness and stunting, with the likelihood of stunting rising by 3.47 percentage points in children of heavy smokers [31]. In impoverished urban slum areas, it has been observed that fathers who smoke often divert household funds from food to tobacco, exacerbating child malnutrition [32].

An Intriguing finding in the present study is that there was no significant correlation between low birth weight and stunting. On the other hand, low birth weight is known as a risk factor for stunting and has been linked to possible intrauterine growth restriction [33]. Birth weight influences toddler height growth, especially at 0-6 months. If, in the first 6 months of age, you can maintain and improve your nutritional status, your toddler's height can grow normally, and he can avoid stunting [34]. The birth weight in this study was related to stunting. Evidence suggests that babies born with low birth weight are four times more likely to experience stunting compared to those born with normal weight [34]. The most common cause of low birth weight (LBW) is premature birth [35,36]. Babies born with LBW have an imperfect digestive system, so that they will experience problems, food will be challenging to absorb, and they will experience electrolyte disturbances [37].

The high stunting rate in urban areas like Garut Kota Subdistrict raises serious public health concerns, closely tied to broader socio-economic and cultural challenges. Stunting is associated with long-term adverse effects such as impaired cognitive and physical development, lower educational attainment, and decreased income potential, reinforcing cycles of poverty and inequality [38,39]. Key factors influencing stunting include access to clean drinking water and household smoking, both of which often reflect deeper issues like inadequate infrastructure and education [40]. Tackling these issues requires a holistic approach that includes community-focused interventions and national policies promoting health equity.

In addition, the social impact of stunting is linked to gender inequality, with maternal education playing a vital role in its prevention [41]. Educating women can improve children's health outcomes while involving fathers in health and nutrition practices is also crucial [42]. A comprehensive strategy integrating health, education, and socio-economic reforms is needed to reduce stunting effectively. Multi-sectoral efforts targeting the root causes of stunting can help break the cycle of malnutrition and promote healthier communities [39,43].

This study's strength was examining key determinants and factors contributing to stunting, such as gestational age, low birth weight, exclusive breastfeeding, occupation, income, and education [44]. Nevertheless, the study has several limitations. Firstly, the data collected is limited to the district level. Second, other known causes of stunting, like illness and infection, feeding data, mean triceps and subscapular skinfold (xSF), food security status, dietary diversity, and more precise information on supplemental feeding could not be included in the article [45–47].

CONCLUSION

The prevalence of stunting in children aged 6-23 months in the Garut Kota Subdistrict is a complex issue affected by multiple socio-economic and environmental factors. Our comprehensive analysis indicates that the father's education level, access to sufficient drinking water, and the presence of smoking among family members significantly increase the risk of stunting in young children.

Addressing these factors with integrated interventions encompassing educational programs for parents, enhancements to water and sanitation infrastructure, and strong tobacco control policies is essential for effectively combating stunting. These comprehensive approaches are crucial for ensuring children's well-being and optimal growth, thereby contributing to the development of healthier future generations.

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