Determinants of Stunting In Children Aged 6–59 Months In West Sulawesi Province: A Secondary Data Analysis of The 2022 Indonesian Nutritional Status Survey (SSGI)

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Abstract.

Introduction:Stunting remains a major public health concern in Indonesia, particularly in West Sulawesi Province, which continues to report a high prevalence. Stunting refers to a failure of linear growth in children under five years of age, primarily resulting from prolonged nutritional deficiency and repeated infections, especially during the critical window of the first 1,000 days of life. This study aimed to identify the determinants of stunting among children aged 6–59 months in West Sulawesi Province using secondary data from the 2022 Indonesian Nutritional Status Survey (SSGI). Methods: This was a cross-sectional study using secondary data from the 2022 SSGI. The study population consisted of 3,686 households with children aged 6–59 months in West Sulawesi. Data analysis was conducted using univariate, bivariate, and multivariate approaches to identify variables significantly associated with stunting. Results: The dominant factor associated with stunting among children aged 6–59 months in West Sulawesi Province is birth weight (OR: 3.369). Children with a history of low birth weight (LBW) are 3.3 times more likely to experience stunting compared to those without such history, after controlling for maternal education, sanitation (latrine ownership), and immunization status. Conclusion: Low Birth Weight (LBW) is a significant contributing factor to the increased risk of stunting in children aged 6–59 months. Therefore, it is recommended to implement targeted interventions focused on fulfilling nutritional needs, monitoring growth and development, providing early stimulation, and promoting exclusive breastfeeding. These measures are essential to prevent and address stunting early in children with a history of LBW.

Keywords*: Stunting; West Sulawesi and SSGI.*

I. INTRODUCTION

Stunting remains a major global nutritional challenge, particularly in low- and middle-income countries where its impact on child development and long-term health outcomes is profound. Stunting is defined as a length-for-age (LAZ) or height-for-age (HAZ) Z-score of less than -2 standard deviations (SD), indicating chronic undernutrition. This condition often begins in utero and continues during the first 1,000 days of life—an essential period for growth and brain development—leading to irreversible consequences if not addressed early [1].Globally, although the prevalence of stunting among children under five declined from 1990 to 2018, it remains a significant public health concern with a prevalence of 21.3% in 2018 [2]. In Indonesia, national efforts have contributed to a reduction in stunting rates from 30.8% in 2018 to 21.6% in 2022 [3]. Despite this progress, stunting continues to affect millions of children and poses a persistent public health issue [4].West Sulawesi Province represents one of the regions with the highest stunting prevalence in Indonesia. According to the Indonesian Nutritional Status Survey, the province reported a stunting rate of 33.8% in 2021, increasing to 35.0% in 2022, with an estimated decline of 4.7% in 2023 [5–7]. Nevertheless, West Sulawesi remains the second-highest province for stunting prevalence nationally, following East Nusa Tenggara. The data suggest that one in every three children under five in this province is stunted.

The highest district-level prevalence was observed in Majene (40.5%), followed by Polewali Mandar (39.3%), Mamasa (38.6%), Mamuju (33.8%), Central Mamuju (28.1%), and Pasangkayu (25.8%) [3]. According to WHO classification, these figures represent a high public health burden, falling within the critical threshold of 20% to <30% [2].To combat stunting, the Indonesian government has implemented a national strategy that focuses on both nutrition-specific and nutrition-sensitive interventions delivered in an

integrated, multisectoral approach. This includes efforts across central, regional, and village-level stakeholders to ensure high-quality, targeted programs. Key preventive strategies include promoting exclusive breastfeeding, enhancing dietary diversity during complementary feeding for children aged 6–23 months, ensuring adequate birth spacing, improving maternal and child health services, and expanding access to safe drinking water and sanitation, especially in rural communities [6].

Exclusive breastfeeding for the first six months has been associated with significantly lower risks of stunting, while other modifiable risk factors such as maternal education, water and sanitation quality, and timely health services also play a vital role. Previous studies in West Sulawesi have identified environmental determinants, such as water sources and treatment practices, as significant contributors to stunting [8]. However, there is limited evidence exploring the broader spectrum of stunting determinants in this province.Given this background, this study aims to examine the determinants of stunting among children aged 6–59 months in West Sulawesi Province. The analysis focuses on child-level factors (sex, birth weight, and birth length), maternal factors (exclusive breastfeeding, maternal education, maternal employment), history of infectious diseases (diarrhea, pneumonia, tuberculosis), environmental health conditions (toilet ownership), healthcare service access (availability of vitamin A supplementation, immunization, and treatment for child illness at health facilities), and socioeconomic factors (receipt of social assistance). Findings from this study are expected to provide a scientific basis for targeted interventions to reduce the prevalence of stunting in high-burden areas.

II. METHODS

Study Design and Data Source

This study utilized a cross-sectional design based on secondary data from the 2022 Indonesian Nutritional Status Survey [9], conducted by the Ministry of Health of the Republic of Indonesia. The national survey was implemented across 33 provinces and 486 districts/cities, involving 334,848 children under five years of age who were successfully measured and interviewed. The survey period spanned nine months, from March to December 2022. The researchers accessed and analyzed the SSGI 2022 dataset specifically for West Sulawesi Province during March–April 2025.

Study Population and Sampling

The study population comprised households with children aged 6–59 months residing in West Sulawesi Province. A total of 3,686 children under five were included in the sample. The sampling strategy employed a **stratified two-stage sampling** technique. In the first stage, census blocks (**Blok Sensus** or BS) were selected using **Probability Proportional to Size (PPS) sampling with replacement,** ensuring representativeness across different regions. In the second stage, households within selected census blocks were randomly sampled for anthropometric assessment and structured interviews.

Data Collection Instruments

Data were obtained from anthropometric measurements and face-to-face interviews using two standardized instruments: the Individual Questionnaire and the Household Questionnaire, both developed and validated by the Indonesian Ministry of Health. Anthropometric data included height and weight measurements, while interviews captured a range of demographic, socioeconomic, health service utilization, and environmental variables relevant to child nutrition.

Data Analysis

Data were analyzed using univariate, bivariate, and multivariate statistical approaches. Univariate analysis was conducted to describe the distribution of each variable. Bivariate analysis explored associations between independent variables and stunting status, while multivariate logistic regression was used to identify determinants of stunting after adjusting for confounders.

Ethical Considerations

This study received ethical approval from the Institutional Ethics Committee of Universitas Respati Indonesia (Approval No. 216/SK.KEPK/UNRI/IV/2025) prior to the commencement of data analysis.

III. RESULT AND DISCUSSION

There are six districts in West Sulawesi Province that served as data collection sites. Table 5.2 shows that the largest proportion of the sample was from Polewali Mandar District (22.1%), while the smallest was from Pasangkayu District (13.1%). The highest prevalence of stunting was found in Majene District (30.0%), whereas the lowest was observed in Pasangkayu District (8.6%).Among the 711 children included in the study, the majority had normal birth weight (87.2%) and normal birth length (50.5%). Most were male (51.5%) and received exclusive breastfeeding (69.8%). More than half of the mothers had a moderate to high level of education (52.3%) and were unemployed (71.0%). All children were reported to have a history of diarrhea and pneumonia, while only 0.4% had a history of tuberculosis. Most households had access to proper sanitation facilities (86.1%) and reported the availability of immunization (80.6%) and vitamin A supplementation services (73.6%). A total of 81.2% of children received treatment at health facilities when sick, and 26% of households were recipients of social assistance. The results of the research carried out are illustrated in the following table:

Table 1. Distribution of Respondents in the Study on Stunting Among Children Aged 6–59 Months in West Sulawesi (N = 711)

Variable	Category	N	%
Birth Weight	Low Birth Weight (LBW)	91	12.8
	Normal Birth Weight	620	87.2
Birth Length	Short Birth Length (SBL)	352	49.5
	Normal Birth Length	359	50.5
Sex of the Child	Male	366	51.5
	Female	345	48.5
Exclusive Breastfeeding	Not Exclusively Breastfed	215	30.2
	Exclusively Breastfed	496	69.8
Mother's Education	Low Education	339	47.7
	Medium–High Education	372	52.3
Mother's Employment	Employed	206	29.0
	Unemployed (Housewife)	505	71.0
History of Diarrhea	Present	711	100.0
	Absent	0	0.0
History of Pneumonia	Present	711	100.0
	Absent	0	0.0
History of Tuberculosis (TB)	Present	3	0.4
	Absent	708	99.6
Toilet Ownership	No Toilet	99	13.9
	Own Toilet	612	86.1
Immunization Service Availability	No	138	19.4
	Yes	573	80.6
Vitamin A Supplementation Availability	No	188	26.4
	Yes	523	73.6
Treatment at Health Facilities	No	134	18.8
	Yes	577	81.2
Receiving Social Assistance	Yes	185	26.0
	No	526	74.0

Table 2. Bivariate Analysis of Determinants of Stunting in Children Aged 6–59 Months

Variable	Category	Stunting (n)	Stunting (%)	Not Stunting (n)	Not Stunting (%)	OR	95% CI	p-value
Birth Weight	LBW	41	24.7	50	9.2	3.25	2.06–5.13	<0.001
Birth Length	Normal	125	75.3	495	90.8			
	Short	95	57.2	257	47.2	1.50	1.06–2.13	0.029
	Normal	71	42.8	288	52.8			
Sex	Male	94	56.6	272	49.9	1.31	0.92–1.86	0.153
Exclusive	Female	72	43.4	273	50.1			
Breastfeedig	No	43	25.9	172	31.6	0.76	0.51–1.12	0.196
Maternal	Yes	123	74.1	373	68.4			
Education	Low	96	57.8	243	44.6	1.70	1.20–2.42	0.004
Maternal	Medium–High	70	42.2	302	55.4			
Employment	Employed	47	28.3	159	29.2	0.96	0.65–1.41	0.907
Toilet	Unemployed	119	71.7	386	70.8			
Ownership	No	33	19.9	66	12.1	1.80	1.14–2.85	0.016
Immunizatio	Yes	133	80.1	479	87.9			
n Services	No	42	25.3	96	17.6	1.58	1.05–2.40	0.038
Vitamin A	Yes	124	74.7	449	82.4			
Services	No	38	22.9	150	27.5	0.78	0.52–1.18	0.278
Health	Yes	128	77.1	395	72.5			
Facility	No	29	17.5	105	19.3	0.89	0.56–1.40	0.686
Treatment								
Social	Yes	137	82.5	440	80.7			
Assistance	No	49	29.5	136	25.0	1.26	0.86–1.85	0.284

The bivariate analysis identified several variables significantly associated with stunting among children aged 6–59 months in West Sulawesi. Low birth weight (OR = 3.25; p < 0.001), short birth length (OR = 1.50; p = 0.029), low maternal education (OR = 1.70; p = 0.004), lack of toilet facilities (OR = 1.80; p = 0.016), and limited access to immunization services (OR = 1.58; p = 0.038) were significantly associated with a higher risk of stunting. Other factors such as sex, exclusive breastfeeding, maternal employment, tuberculosis history, access to vitamin A, health services, and social assistance did not show statistically significant associations with stunting.

Table 3. Multivariate Analysis of Determinants of Stunting in Children Aged 6–59 Months

Variable	p-value	OR	95% Confidence Interval
Low birth weight	<0.001	3.369	2.115–5.367
Maternal education (low)	0.007	1.651	1.144–2.383
Toilet ownership (none)	0.042	1.646	1.017–2.664
Immunization service (unavailable)	0.023	1.641	1.071–2.513

Table 3 presents the final multivariate model, which identifies **birth weight** as the most influential factor associated with stunting among children aged 6–59 months in West Sulawesi Province. An odds ratio (OR) of **3.369** indicates that children with a history of low birth weight (LBW) are **3.4 times more likely** to experience stunting compared to those with normal birth weight.The prevalence of stunting among children aged 6–59 months in West Sulawesi Province was 23.3%, which is lower than the national average of 35.0% (SSGI) but still exceeds the WHO threshold of 20% [2,9]. Of these, 5.8% were severely stunted and 17.6% moderately stunted. The figure remains above Indonesia's national target of 14% by 2024 [10], indicating a continued public health concern requiring multisectoral action [11].Low birth weight (LBW) was found to be the most dominant risk factor. Children with LBW (<2500g) were over three times more likely to be stunted (OR = 3.369; p = 0.001). This supports prior studies linking LBW to impaired growth and increased susceptibility to malnutrition and infections [12,13]. Similarly, children born with short birth length (<48 cm) were 1.5 times more likely to be stunted, reflecting the impact of fetal growth restriction [14,15].Although stunting was more common among boys (56.6%), the association was not statistically significant, consistent with Dewi & Widyaningsih [16]. Some literature, however, suggests boys may have higher energy needs and infection susceptibility [17].Maternal education was significantly associated with stunting. Children of mothers with low education had higher odds of being stunted (OR = 1.651; p = 0.007), consistent with findings from Budhathoki et al. [18] and Ali & Hussain [19]. This underscores the role of maternal knowledge and caregiving behavior in child nutrition.

In contrast, maternal employment and exclusive breastfeeding showed no significant associations, aligning with studies suggesting that employment's effect is mediated by caregiving quality [20,21].While this study found no significant association between a history of diarrhea, pneumonia, or TB and stunting, frequency of infection did correlate with stunting (p = 0.015). Recurrent infections increase energy needs and can hinder nutrient absorption [22,23].Environmental sanitation, specifically latrine ownership, was significantly associated with stunting (p = 0.016). Poor sanitation exposes children to fecal pathogens and environmental enteric dysfunction, impairing growth [24]. Similar findings were reported by Anggraini et al. [25] and Kusumawati et al. [26].Availability of immunization services was also associated with lower stunting risk (p = 0.038), reflecting immunization's role in preventing infections that interfere with nutrition [27]. However, vitamin A supplementation and treatment at health facilities were not significantly associated, potentially due to implementation quality or homogeneity in service access [28,29].Receipt of social assistance showed no significant association with stunting, consistent with Sulastri et al. [30]. Effectiveness may depend on how assistance is allocated within the household [31]. Nevertheless, household poverty remains an underlying determinant of limited dietary diversity [32,33].Multivariate analysis confirmed four dominant factors: LBW, low maternal education, lack of toilet ownership, and absence of immunization. Among these, LBW was the strongest predictor (OR = 3.3), reinforcing the need for early interventions within the first 1,000 days of life, including maternal nutrition and antenatal care [3,19,34–36].

IV. CONCLUSION

Stunting among children aged 6–59 months in West Sulawesi Province remains a significant public health issue, with a prevalence rate of 23.3%. This study found no statistically significant association between child's sex and stunting ($p = 0.153$), consistent with previous evidence [16]. However, low birth weight was significantly associated with a higher risk of stunting ($p < 0.005$; OR = 3.247), as was short birth length ($p = 0.029$; OR = 1.499) [12–15]. Exclusive breastfeeding was not significantly associated with stunting ($p = 0.196$), while low maternal education showed a strong relationship ($p = 0.004$; OR = 1.704) [18,19].Maternal employment status was not linked to stunting ($p = 0.907$) [20,21].No significant associations were found between stunting and the history of diarrhea, pneumonia, or tuberculosis infections [22,23]. However, household sanitation—as indicated by latrine ownership—was significantly associated with stunting ($p = 0.016$; OR = 1.801) [24–26], as was immunization status ($p = 0.038$; OR = 1.584) [27]. No associations were found between stunting and vitamin A supplementation ($p = 0.278$), health service utilization for sick children ($p = 0.686$), or receipt of social assistance ($p = 0.284$) [28–31].The most dominant factor associated with stunting was low birth weight ($p < 0.05$; OR = 3.369), emphasizing the importance of prenatal and perinatal care in preventing early growth faltering [3,19,34–36].

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