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Factors Related to Incidence of Stunting in Children Aged 24-59 Months in Rancatungku Village, Bandung Regency

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Abstract
Stunting is a chronic nutritional problem characterized by a child's height that is lower than the standard of age which can occur in the first 1000 days of a child's life, and is one of the main indicators of children's health status in Indonesia. This study aims to analyze factors related to the incidence of stunting in children aged 24-59 months in Rancatungku Village, Bandung Regency. The research design was based on a case control approach of 1:1 ratio between the case group and the control group with a total of 206 respondents. The sampling technique in this study is accidental sampling. Data were processed and analyzed univariate, bivariate and multivariate with Chi-Square assays. This study found a meaningful relationship between body length p-value 0.019, education p-value 0.037, history of exclusive breastfeeding p-value 0.002, protein intake p-value 0.007 and history of infectious disease p-value 0.029 with stunting incidence. And the dominant variable related to stunting incidence is the history of exclusive breastfeeding. This study suggests that health workers provide education and counselling on the importance of exclusive breastfeeding and training Integrated Health Service Post cadres so that they are more skilled and can disseminate information about stunting.

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Introduction

Stunting is one of the chronic nutritional problems that is still a public health challenge in the world, including in Indonesia (Mediani, 2020). Stunting occurs due to long-lasting malnutrition, especially in the first 1000 days of life (HPK), which is from pregnancy to a two-year-old child (Meylani, Siregar, Ningsih, Perdana, & Wisudariani, 2023). Children who experience stunting have a lower height than their age standard according to the World Health Organization (WHO), and this can have a long-term impact on children's physical and mental development (Ministry of Health of the Republic of Indonesia, 2016) (Lanita, Al Nabila, Hidayati, Siregar, & Kasyani, 2023), (Harahap, Amelia, Andayani, Lubis, & Aulia, 2022)

WHO targets six global goals related to child health and nutrition by 2025, one of which is to reduce the prevalence of stunting in children under five years old by 40% (WHA, 2012) (Patimah, 2021). However, WHO data in 2018 shows that the prevalence of stunting under five globally still reaches 22%. In Indonesia, the prevalence of stunting is higher than the global average, which is 30.8% according to Riskesdas 2018, although it has decreased from 2013 which reached 37.2%. In fact, Indonesia ranks first in stunting prevalence in the Southeast Asian region, based on World Bank data in 2016 (Moudy Muhaiminurrohima Putri, Mardiah, & Yulianita, 2021)

Stunting has serious impacts, both in the short and long term. In the short term, stunting can lead to an increased incidence of pain and death, as well as impaired cognitive, motor, and verbal development (Liza Diniarizky Putri, Agustin, Bakti, & Suminar, 2025). In the long term, stunting can reduce the quality of life because it has an impact on posture as an adult, the risk of obesity and metabolic diseases, reproductive health disorders, decreased learning capacity and work productivity (WHO, 2017) (Kurniawati et al., 2024), (Supradewi, Batlajery, & Siswanto, 2023)

Many factors contribute to the incidence of stunting, both directly and indirectly. Direct factors include inadequate nutritional intake, a history of babies born with low birth weight (LBW), and the child's health status, including a history of infection (Rusliani, Hidayani, & Sulistyoningsih, 2022). Babies with LBW have experienced growth slowdown since the womb and are at risk of stunting at a later age (Nasution et al, 2014). In addition, protein intake plays an important role in the growth and repair of body tissues. Research also shows a relationship between protein consumption, the incidence of infection, and nutritional status in children (Sundari & Nuryanto, 2016). The interaction between infection and malnutrition will both worsen the child's condition.

Indirect factors such as parenting, parental education level, family income, access to health services, as well as sanitation and environmental conditions also play a role (Solihin, Sari, Shalahuddin, Rahayuwati, & Eriyani, 2024). For example, non-optimal exclusive breastfeeding, lack of access to clean water, and incomplete immunization can increase the risk of stunting (TNP2K, 2017). Low parental education and family income are part of family characteristics that have been shown to be significantly related to the incidence of stunting in children (Illahi, 2017)

Rancatungku Village in Bandung Regency is one of the areas with socio-economic conditions and limited access to health services. Based on initial observations, the incidence of stunting in this region is still quite high. Therefore, the purpose of the interesting issue of this article is to find out the factors related to the incidence of stunting in children aged 24–59 months in Rancatungku Village, as a basis for appropriate and effective interventions in overcoming stunting problems.

Method

This research method uses a type of quantitative research survey method and case control design with a retrospective approach, namely comparing the case group (children aged 24–59 months with stunting) and the control group (children aged 24–59 months without stunting). The sample population consisted of 206 children. This study used accidental sampling techniques using: microtomies for measuring children's height, structured questionnaires for sociodemographic information, health history, and parenting and semi-quantitative Food Frequency Questionnaire (FFQ) to assess energy and protein intake. The inclusion criteria included children aged 24–59 months who lived with their biological mothers and mothers willing to be respondents. The exclusion criteria included respondents with mental disorders, physical disabilities, illnesses, or not domiciled in the research area. The data is collected through the process of editing, coding, entry, and cleaning. Variables are categorized (e.g. stunting, immunization status, nutritional intake, etc.). Energy and protein intake data are processed using nutrition software. Nutritional status was determined based on height z-score by age using WHO Anthro 2005. Univariate, bivariate and multivariate analysis with chi square statistical test using SPSS software.

Result and Discussion

1. Result

This research was conducted in Rancatungku Village, Bandung Regency with data collection from January 15 to February 15. The researcher participated in Integrated Health Service Post activities to distribute questionnaires to mothers under five. A total of 206 toddlers were involved in this study using accidental sampling techniques.

Characteristics of respondents

Table 1
Length

Body length	Stunting Incidence					
	Case		Control		Total	
	n	%	n	%	n	%
Short	30	31.9	19	17.0	49	23.8
Normal	64	68.1	93	83.0	157	76.2

Length: Of the 206 toddlers, 31.9% had short body length in the case group, while 17.0% in the control group.

Table 2
Birth Weight

Birth weight	Stunting Incidence					
	Case		Control		Total	
	n	%	n	%	n	%
Low	12	12.8	12	10.7	24	11.7
Normal	82	87.2	100	89.3	182	88.3

Birth Weight: 12.8% of toddlers in the case group had a low birth weight, compared to 10.7% in the control group.

Table 3
Maternal education

Education	Stunting Incidence					
	Case		Control		Total	
	n	%	n	%	n	%
Low	40	42.6	31	27.7	71	34.5
Tall	54	57.4	81	72.3	135	65.5

Maternal education: 42.6% of mothers in the case group had low education, while 27.7% in the control group.

Table 4
Maternal occupation

Work	Stunting Incidence					
	Case		Control		Total	
	n	%	n	%	n	%
Not working	48	51.1	51	45.5	99	45.1
Work	46	48.9	61	54.5	108	54.9

Maternal occupation: 51.1% of mothers in the case group did not work, while 45.5% in the control group

Table 5
Exclusive Breastfeeding History

Exclusive history of breastfeeding	Stunting Incidence					
	Case		Control		Total	
	n	%	n	%	n	%
Non-exclusive	43	45.7	27	24.1	70	34.0
Exclusive breastfeeding	51	54.3	85	75.9	136	66.0

Exclusive Breastfeeding History: 45.7% of toddlers in the case group did not receive exclusive breastfeeding, compared to 24.1% in the control group.

Table 6
Energy Intake

Energy intake	Stunting Incidence					
	Case		Control		Total	
	n	%	n	%	n	%
Less	47	50.0	50	44.6	97	47.1
Normal	47	50.0	62	55.4	109	52.9

Energy Intake: 50% of toddlers in the case group had less energy intake, while 44.6% in the control group.

Table 7
Protein Intake

Protein intake	Stunting Incidence					
	Case		Control		Total	
	n	%	n	%	n	%
Less	44	46.8	31	27.7	75	36.4
Normal	50	53.2	81	72.3	131	63.6

Protein Intake: 46.8% of toddlers in the case group had less protein intake, compared to 27.7% in the control group

Table 8
Immunization status

Immunization status	Stunting Incidence					
	Case		Control		Total	
	n	%	n	%	n	%
Incomplete	16	17.0	24	21.4	40	19.4
Complete	78	83.0	88	78.6	166	80.6

Immunization status: 17.0% of toddlers in the case group had incomplete immunization status, while 21.4% in the control group

Table 9
ANC visits

ANC Visit	Stunting Incidence					
	Case		Control		Total	
	n	%	n	%	n	%
Non-standard	16	17.0	23	20.5	39	18.9
standard	78	83.0	89	79.5	167	81.1

ANC visits: 17.0% of mothers in the case group did not have a complete ANC visit, compared to 20.5% in the control group.

Table 10
History of Infectious Diseases

History of infectious diseases	Stunting Incidence					
	Case		Control		Total	
	n	%	n	%	n	%
Yes	33	35.1	23	20.5	56	27.2
No	61	64.9	89	79.5	150	72.8

History of Infectious Diseases: 35.1% of toddlers in the case group had a history of infectious diseases, compared to 20.5% in the control group.

Bivariate analysis

Table 11
The relationship between body length and the incidence of stunting

Body length	Stunting Incidence						*P-Value*	OR	(95%CI)	
	Case		Control		Total					
	n	%	n	%	n	%			Lower	Upper
Short	30	31.9	19	17.0	49	23.8				
Normal	64	68.1	93	83.0	157	76.2	0.019	2.294	1.190	4.426

Table 12
The Relationship of Birth Weight with the Incidence of Stunting

Birth weight	Stunting Incidence						*P-Value*	OR	(95%CI)	
	Case		Control		Total					
	n	%	n	%	n	%			Lower	Upper
Low	12	12.8	12	10.7	24	11.7				
Normal	82	87.2	100	89.3	182	88.3	0.811	1.220	0.520	2.858

Table 13
The relationship between maternal education and stunting incidence

Education	Stunting Incidence						*P-Value*	OR	(95%CI)	
	Case		Control		Total					
	n	%	n	%	n	%			Lower	Upper
Low	40	42.6	31	27.7	71	34.5				
Tall	54	57.4	81	72.3	135	65.5	0,037	1.935	1.082	3.463

Table 14
The relationship between maternal work and stunting incidence

Work	Stunting Incidence						*P-Value*	OR	(95%CI)	
	Case		Control		Total					
	n	%	n	%	n	%			Lower	Upper
Not working	48	51.1	51	45.5	99	45.1				
Work	46	48.9	61	54.5	108	54.9	0.515	1.248	0.721	2.162

Table 15
The relationship between exclusive breastfeeding history and the incidence of stunting

Exclusive history of breastfeeding	Stunting Incidence						*P-Value*	OR	(95%CI)	
	Case		Control		Total					
	n	%	n	%	n	%			Lower	Upper
Non-exclusive	43	45.7	27	24.1	70	34.0				
Exclusive breastfeeding	51	54.3	85	75.9	136	66.0	0.002	2.654	1.466	4.805

Table 16
The relationship between energy intake and stunting incidence

Energy intake	Stunting Incidence						*P-Value*	OR	(95%CI)	
	Case		Control		Total					
	n	%	n	%	n	%			Lower	Upper
Less	47	50.0	50	44.6	97	47.1				
Normal	47	50.0	62	55.4	109	52.9	0,531	1.240	0.716	2.149

Table 17
The relationship between protein intake and the incidence of stunting

Protein Intake	Stunting Incidence						*P-Value*	OR	(95%CI)	
	Case		Control		Total					
	n	%	n	%	n	%			Lower	Upper
Less	44	46.8	31	27.7	75	36.4				
Normal	50	53.2	81	72.3	131	63.6	0.007	2.299	1.288	4.103

Table 18
The relationship between immunization status and stunting incidence

Immunization status	Stunting Incidence						*P-Value*	OR	(95%CI)	
	Case		Control		Total					
	n	%	n	%	n	%			Lower	Upper
Incomplete	16	17.0	24	21.4	40	19.4				
Complete	78	83.0	88	78.6	166	80.6	0,535	0.752	0.373	1.518

Table 19
The relationship between ANC visits and stunting incidence

ANC Visit	Stunting Incidence						*P-Value*	OR	(95%CI)	
	Case		Control		Total					
	n	%	n	%	n	%			Lower	Upper
Incomplete	16	17.0	23	20.5	39	18.9				
Complete	78	83.0	89	79.5	167	81.1	0,644	0.794	0.392	1.609

Table 20
The relationship between the history of infectious diseases and the incidence of stunting

History of infection	Stunting Incidence						*P-Value*	OR	(95%CI)	
	Case		Control		Total					
	n	%	n	%	n	%			Lower	Upper
Yes	33	35.1	23	20.5	56	27.2				
No	61	64.9	89	79.5	150	72.8	0,029	2.093	1.121	3.908

The results of this bivariate analysis showed a significant relationship between:

Body length (p=0.019; OR=2.294), maternal education (p=0.037; OR=1.935), history of exclusive breastfeeding (p=0.002; OR=2.654), protein intake (p=0.007; OR=2.299), history of infectious disease (p=0.029; OR=2,093). No significant association was found between birth weight, maternal occupation, energy intake, immunization status, and ANC visits with stunting incidence.

Multivariate Analysis

Table 21
Final Modelling of Logistic Regression

Variable	B	P- *Value*	OR	95% C.I	
				Lower	Upper
Body length	.910	.014	2.484	1.204	5.122
Exclusive history of breastfeeding	1.121	.001	3.067	1.596	5.891
Asupan protein	.805	.012	2.237	1.194	4.189
History of infectious diseases	.807	.023	2.240	1.116	4.495

History of exclusive breastfeeding is the dominant factor that has the most influence on the incidence of stunting, where children who do not receive exclusive breastfeeding are 3.3 times more at risk of stunting than those who receive exclusive breastfeeding.

2. Discussion

Stunting, measured based on height index by age (TB/U), was found in 45.4% of children aged 24–59 months in Rancatungku Village, Bandung Regency, indicating that this problem is still a serious public health issue, in line with national trends in Indonesia (USAID, 2010). Several factors were analyzed to find out their relationship with stunting events.

Birth length: There was a significant relationship between short birth length (<48 cm) and stunting incidence (p = 0.019), where children with short birth length had a 2.2 times greater risk of stunting. These findings are in line with previous research that states

that maternal nutritional intake during pregnancy greatly affects fetal growth, including linear growth (Supariasa et al., 2012; Bernhard et al., 2013).

Birth weight: No significant association was found between low birth weight (BBLR) and stunting (p = 0.811). This indicates that postpartum factors may have a more dominant role. However, the results of previous research on this matter still vary (Lema et al., 2019; Lidia Fitri, 2020).

Maternal education: There was a significant association between maternal education and the incidence of stunting (p = 0.037), where children of mothers with low levels of education were more at risk of stunting. These results support previous studies that have stated that maternal education has a positive effect on children's nutritional behaviour and health (Zottarelli et al., 2007; Gyaltsen, 2010).

Maternal occupation: There was no significant association between maternal employment status and stunting (p = 0.515). The complexity of maternal work factors, including the type and duration of work, may be a mediator of child parenting and nutritional intake (Aerts et al., 2004; Aisyah et al., 2019).

Exclusive Breastfeeding: A significant association was found (p = 0.002), where children who did not receive exclusive breastfeeding had a 2.6 times greater risk of stunting. This shows that suboptimal breastfeeding practices, often caused by misperceptions or technical constraints on the part of the mother, are modifiable risk factors (Aridiyah et al., 2015).

Food intake: Energy intake did not show a significant association (p = 0.531), but inadequate protein intake was significantly associated with the incidence of stunting (p = 0.007), with an OR of 2.2. This is in accordance with the important role of proteins in supporting linear growth and the formation of body tissues (Almatsier, 2004; Mamabolo et al., 2006).

Immunization status and ANC visits: These two variables did not show a significant association with stunting incidence (p = 0.535 and p = 0.644). However, other studies state that immunizations and ANC visits may provide indirect protection through improved maternal general health status and care during pregnancy (Hutasoit et al., 2019).

History of infectious diseases: There was a significant association (p = 0.029), where children with a history of infectious diseases had a 2 times greater risk of stunting. Cycles of infection and malnutrition that exacerbate each other may explain these findings (Maxwell, 2011).

Dominant Factors**:** The results of multivariate analysis showed that the exclusive breastfeeding variable was the dominant factor that had the most influence on the incidence of stunting (OR = 3.067; CI: 1.596–5.891), although it has been controlled with other variables. This emphasizes the importance of promotion and education related to exclusive breastfeeding practices as the main strategy in stunting prevention.

Conclusion

This study shows that several factors are significantly related to the incidence of stunting in children aged 24–59 months in Rancatungku Village, Bandung Regency. There was a relationship between birth length, maternal education, history of exclusive breastfeeding, protein intake, and history of infectious diseases with stunting incidence. Exclusive breastfeeding has been proven to be a protective factor against the incidence of stunting. In addition, early nutrition interventions, increasing maternal knowledge, and preventing and handling infectious diseases are also strategic steps in preventing stunting.

Cross-sectoral efforts need to be strengthened to improve the coverage and quality of nutrition services as well as maternal and child health in the community.

There was a relationship between body length with a p value of 0.019, education with a p value of 0.037, history of exclusive breastfeeding with a p value of 0.002, protein intake with a p value of 0.007, and history of infectious diseases with a p value of 0.029. The most dominant factor is the history of exclusive breastfeeding, where children who do not receive exclusive breastfeeding have a 3.32 times greater chance of stunting than children who receive exclusive breastfeeding.

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