

## STUNTING IN CHILDREN IN KENDAL REGENCY: EVALUATION OF BREASTFEEDING AND COMPLEMENTARY FOOD PROVISION PATTERNS AS THE MAIN FACTOR

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### ABSTRACT

**Background:** Kendal Regency is one of the regions in Indonesia registered as a stunting handling locus in the National Development Planning since 2021. The Stunting Reduction Acceleration Team was formed by Regent Regulation Number 42 of 2021, but the prevalence is still high at 22.4%. This study aims to analyze the factors influencing stunting, especially the pattern of exclusive breastfeeding and the pattern of complementary feeding given by mothers in the first 1000 days of a child's life.

**Method:** The cross-sectional study analytical survey research method in the Cepiring Health Center work area, Kendal Regency, Central Java was conducted in March 2025. Data analysis was conducted univariately, bivariate, and multivariately using the Chi-square test ( $\chi^2$ ) with a 95% confidence level ( $\alpha = 0.05$ ) and odds ratio.

**Result:** Children who do not receive exclusive breastfeeding have a 1.5 times greater risk of experiencing stunting with a  $p$  value of 0.003; OR 1.500 (CI 0.945 - 2.381), indicating a significant relationship between exclusive breastfeeding and stunting. Although children who are exclusively breastfed can still experience stunting, other factors, such as inappropriate patterns of complementary feeding (complementary feeding), contribute significantly to stunting. Children who receive inappropriate complementary feeding (late, with low nutritional quality) have a higher risk of stunting with a  $p$  value of 0.039 and OR 10.400 (CI 0.785 - 137.832).

**Conclusion:** To reduce the risk of stunting, it is important to educate parents about exclusive breastfeeding, the right complementary feeding pattern, and ensuring adequate nutrition for children from an early age.

**Keywords:** Kendal Regency, stunting, exclusive breastfeeding, complementary feeding

### INTRODUCTION

Stunting is a serious global problem with significant long-term health impacts, from reduced intelligence to loss of productivity. Children who experience stunting have higher rates of mortality and morbidity, experience cognitive and motor development deficits, and are at risk of chronic diseases in adulthood (WHO, 2015; de Onis & Branca, 2016). Ironically, Indonesia is one of the countries with a high prevalence of stunting. The Indonesian Health Survey in 2023 showed that the prevalence of stunting in Indonesia reached 21.5% of a total of 30.2 million toddlers, meaning that 6,477,000 toddlers experienced stunting (Ministry of Health of the Republic of Indonesia, 2024). The Indonesian government

has been responsive in handling this case by preparing the National Strategy for the Acceleration of Stunting Prevention since 2018 with collaboration between institutions, ensuring the convergence of all stunting prevention programs and activities (Rokx et al., 2018; KemensetnegRI, 2020). However, the prevalence of stunting in Indonesia has not shown a significant decline.

Achieving adequate nutrition for children through optimal breastfeeding patterns and good eating patterns are priority factor for accelerating stunting management. This strategy emphasizes optimizing nutrition during the first 1,000 days of life, from pregnancy to age two (Baye & Faber, 2015). However, the obstacle that often occurs is an increase in stunting problems when the

complementary feeding period begins. This is due to inadequate maternal knowledge and practices, so that the energy and nutrient intake provided does not match the child's needs. Often, mothers or caregivers do not understand their child's hunger and satiety signals, causing irregular provision of adequate nutrition for children (Zeweter et al., 2017). Therefore, health services that reach more people with nutritional interventions that strengthen optimal feeding for children and integrate the promotion of responsive feeding behavior are needed.

Endeavors to handle stunting at the district or village level have the potential to be carried out and developed sustainably because they involve the community directly on a scale that is not too large, so that in the future, program monitoring will be more comprehensive and quickly improved. Kendal Regency is one of the regions in Indonesia that is registered as a locus for handling stunting in the National Development Planning since 2021. The Stunting Reduction Acceleration Team was formed in accordance with Regent Regulation Number 42 of 2021, and with this team, Kendal has succeeded in reducing the prevalence of stunting by 3.7%, to 17.5% in 2022 (BPSIndonesia, 2022). However, in 2023, the prevalence of stunting in Kendal increased significantly by 4.9%, reaching 22.4% (dp2kbp2pa.kendalkab.go.id/, 2024). This proves that even though Kendal has been designated as a locus for handling stunting, there are still many obstacles in efforts to overcome this problem. Therefore, a recent case study of factors influencing stunting is needed. This study aims to analyze the pattern of exclusive breastfeeding and diet given by mothers on the incidence of stunting in Kendal Regency. The results of this study can be used as a reference for improving the prevention and handling of stunting to be more effective and in accordance with conditions in the field.

## METHODS

The type of research used is a cross-sectional study analytical survey. The study was conducted in the working area of the Cepiring Health Center, Kendal Regency, Central Java, in desember 2024. The dependent variables of this study are the pattern of exclusive breastfeeding and the pattern of complementary feeding. The independent variable of this study is the incidence of stunting. Data analysis was carried out univariately, bivariately, and multivariately with the Chi-square test ( $\chi^2$ ) with a confidence level of 95% ( $\alpha = 0.05$ ) and odds ratio. The population in the study was obtained by a purposive sampling technique using the inclusion criteria of being married and having toddlers, consisting of 34 respondents.

## RESULTS AND DISCUSSION

Socioeconomic conditions play an important role in influencing the high prevalence of stunting. Factors such as family income level, parental education, and access to good health and nutrition services can determine the nutritional quality of children in a family (Azriani et al., 2024; Krisnana et al., 2020; Kustanto et al., 2024; Lee et al., 2021; Seran & Sengkoen, 2024; Siramaneerat et al., 2024). Children who grow up in low socioeconomic environments are more susceptible to stunting. The results of univariate analysis related to family characteristics consisting of mother's & father's age, mother's & father's education level, mother's & father's occupation, family income level, breastfeeding, and complementary feeding patterns can be seen in Table 1. The relationship between breastfeeding and complementary feeding patterns and the incidence of stunting is presented in Table 2.

**Table 1** Respondent Characteristics

Characteristics	Respondents' n	Answers Percentage (%)
<b>Gender</b>		
Man	19	55.9
Woman	15	44.1
<b>Mother's Age</b>		
20-35 years	27	79.4
>35 years	7	20.6
<b>Father's Age</b>		
20-35 years	22	64.7
>35 years	12	35.3
<b>Mother's Education: Graduated</b>		
Elementary school	0	0
Junior high school	7	20.6
High school	26	76.5
Academy / College	1	2.9
<b>Father's Education: Graduated</b>		
Elementary school	1	2.9
Junior high school	11	32.4
High school	21	61.8
Academy / College	1	2.9
<b>Mother's Job</b>		
Doesn't work	24	70.6
Laborer	3	8.8
Self-employed	1	2.9
Private employees	6	17.6
<b>Father's occupation</b>		
Doesn't work	0	0
Laborer	15	44.1
Self-employed	5	14.7
Private employees	14	41.2
<b>Family Income</b>		
<Rp. 1,000,000,-	11	32.4
Rp. 1,000,000 to	19	55.9
Rp. 2,000,000,-		
Rp. 2,000,000 to	2	5.9
Rp. 3,000,000,-		
>Rp. 3,000,000,-	2	5.9
<b>Breastfeeding Pattern</b>		
Non-exclusive breastfeeding	25	73.5
exclusive breastfeeding	9	26.5
<b>Complementary Feeding Provision Pattern</b>		
Not exactly	27	79.4
Appropriate	7	20.6
<b>Stunting Incident</b>		
Short	31	91.2
Very Short	3	8.8

Exclusive breastfeeding provides protection from stunting because its nutrients can strengthen the body's immune system,

prevent infections and chronic diseases, and optimize children's growth and development (Rachmayanti et al., 2022). Breast milk contains Secretory Immunoglobulin A (SIgA), which provides the first defense against antigens in the baby's intestines. In addition, the supply of enzymes, active leukocytes, cytokines, oligosaccharides, lactoferrin, lysozyme, and lactoperoxidase, as well as immunological biological factors that prevent infectious and autoimmune diseases, are transferred from the mother through breast milk (Harmancıoğlu & Kabaran, 2019; Lokossou et al., 2022). Exclusive breastfeeding reduces the risk of diabetes mellitus infection (Alotiby, 2023), pneumonia, and asthma in children (Abate et al., 2025). CD8+ T immune cells in breast milk help protect infants from herpes-causing cytomegalovirus infection (Legg et al., 2024). Many studies have revealed the importance of exclusive breastfeeding, but in society, there are various obstacles that hinder its implementation, even though the World Health Organization (WHO) has recommended a minimum of 6 months of exclusive breastfeeding.

The results of the study showed that the pattern of non-exclusive breastfeeding correlated with the incidence of stunting; 25 children (100%) who did not receive exclusive breastfeeding experienced stunting with short stature. Meanwhile, in the group that received exclusive breastfeeding, only 6 children (66.7%) experienced "Short" stunting and 3 children (33.3%) experienced "Very Short" stunting. Statistical analysis showed a *p value* of 0.003 OR 1,500 (CI 0.945 -2.381), which indicated a significant relationship between exclusive breastfeeding and the incidence of stunting. This situation is worrying because children without exclusive breastfeeding have a 1.5 times greater risk of experiencing stunting. A study conducted by Damanik et al. (2025) proved that there are still many children who are not given exclusive breastfeeding; 87 out of 150 children suffer from stunting. Research by

Sari et al. (2021) confirmed that children aged 12-23 months who do not receive exclusive breastfeeding have a 3.1 times greater risk of experiencing stunting. Therefore, exclusive breastfeeding is very important. Hadi et al.'s (2021) research proves through their study in

rural Eastern Indonesia, children who are exclusively breastfed, even from low-income families, are 20% less likely to experience stunting compared to children who are not exclusively breastfed.

**Table 2** Relationship between Breastfeeding and Complementary Feeding Patterns and Stunting Incidence

Independent Variable	Stunting Incident				Total		$\rho$	OR (95% CI)
	Short	Percentage	Very	Percentage	(n)	Percentage		
	(n)	(%)	Short (n)	(%)		(%)		
<b>Breastfeeding Pattern</b>								
Not exclusive breastfeeding	25	100	0	0.0	25	100	0.003	1,500 (0.945 - 2.381)
Exclusive breastfeeding	6	66.7	3	33.3	9	100		
<b>Complementary Feeding Provision Pattern</b>								
Not exactly	26	96.3	1					
Appropriate	5	71.4	2					

The provision of exclusive breastfeeding but short and very short stunting occurs due to other influencing factors, including the pattern of providing complementary feeding. Non-exclusive breastfeeding plus the pattern of providing complementary feeding with low energy and protein intake has a significant effect on increasing stunting cases. The results of the study in the inappropriate group of providing complementary feeding showed that 26 children (96.3%) experienced "Short" stunting and 1 child (3.7%) experienced "Very Short" stunting. While in the appropriate group of providing complementary feeding, only 5 children (71.4%) experienced "Short" stunting and 2 children (28.6%) experienced "Very Short" stunting. The pattern of providing complementary feeding with the incidence of stunting has a  $\rho$  value of 0.039 with an OR of 10,400 (CI 0.785 - 137,832), which indicates a fairly significant risk. The pattern of providing complementary foods that are not timely has a 4.44 times higher risk of causing stunting, while not meeting the minimum frequency of complementary foods has a 2.30 times higher risk of causing stunting (Guirindola et al., 2021). The provision of complementary feeding is currently often not timely, with low

protein adequacy quality and less attention to quantity (Aguayo, 2017; Hijra et al., 2016; Amalia et al., 2022; Waqiyah et al., 2023). A study conducted by Rukmawati et al. (2020) added that 16 out of 22 respondents were short because they did not get the nutrients and energy from the complementary feeding given. Complementary feeding needs to be given when the child is 6 months old because breast milk only provides  $\frac{1}{2}$  of the child's nutritional needs, and when the child enters the age of 12-23 months, breast milk only meets  $\frac{1}{3}$  of the child's nutritional needs (Rukmawati et al., 2020).

The presence of stunting cases in the appropriate group for complementary feeding is influenced by socio-economic conditions. In this study, respondents were predominantly in the lower middle economy with incomes of <1,000,000 to Rp. 2,000,000,-. Low socio-economic status often affects the factors of children's nutritional adequacy, diversity, and frequency of complementary feeding, hygiene practices, and oral hygiene of children. A study conducted by Santika et al. (2016) proved that children from families with high economic status tend to receive exclusive breastfeeding at the age of 6 months and continue it until the age

of 1 year. They also get more diverse foods, rich in iron and fortified. Conversely, low socioeconomic status groups tend to consume more grains and less diversity of food consumed. Children from low socioeconomic families also show poorer oral hygiene habits, such as less frequent visits to the dentist and high consumption of sweet foods, which contribute to poorer dental health conditions (Almajed et al., 2024; Theristopoulos et al., 2024). Thus, education on complementary feeding patterns and the use of appropriate complementary feeding ingredients for parents needs to be intensified.

## CONCLUSION

Exclusive breastfeeding has been shown to play an important role in preventing stunting in children. Research shows that children who do not receive exclusive breastfeeding have a 1.5 times greater risk of experiencing stunting with a  $p$  value of 0.003; OR 1.500 (CI 0.945 - 2.381), indicating a significant relationship between exclusive breastfeeding and the incidence of stunting. Although children who are exclusively breastfed can still experience stunting, other factors, such as inappropriate patterns of providing complementary feeding (Complementary Foods), contribute significantly to the incidence of stunting. Children who receive inappropriate complementary feeding (late, with low nutritional quality) have a higher risk of stunting with a  $p$  value of 0.039 and OR 10.400 (CI 0.785 - 137.832). In addition, socioeconomic factors also influence the provision of exclusive breastfeeding and appropriate complementary feeding. Families with low socio-economic status tend to have problems in meeting their children's nutritional needs, as well as having poor hygiene and oral health habits. Therefore, to reduce the risk of stunting, it is important to educate parents about exclusive breastfeeding, the right complementary feeding pattern, and ensuring

adequate nutrition for children from an early age.

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## CONFLICT OF INTEREST

There was no conflict of interest in the manuscript.

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