

Short Communication

Family Feeding Pattern and Severity of Stunting Among Children Aged 12–36 Months: A Cross-sectional Study in Jember, Indonesia

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Stunting is a chronic nutritional problem that impairs linear growth during early childhood. This cross-sectional study examined the relationship between family feeding practices and the severity of stunting among children aged 12-36 months. Data were collected from March to April 2025 in the Rambipuji, Sumberjambe, and Ledokombo sub-districts of Jember Regency, East Java, Indonesia, using stratified random sampling to recruit 212 participants. Family feeding practices were assessed using the child feeding questionnaire (CFQ), and anthropometric measurements of toddlers were taken using digital scales and a microtoise. Data were analyzed using the chi-square test. Most respondents were mothers (97.2%) with a mean age of 28.3 years, had an elementary school education (49.1%), and were housewives (92.5%). More than half of the children were male (52.4%) with an average age of 25.3 months. Appropriate feeding was reported by 71.8% of families, and among the children, 63.2% were moderately stunted and 36.8% were severely stunted. A significant relationship was found between feeding practices and stunting severity ($\chi^2=15.604$; $P<0.001$; $OR=3.381$; 95% CI, 1.822%, 6,275%). These findings suggest that maintaining proper feeding patterns in infants can significantly reduce the risk and severity of stunting in toddlers.

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Introduction

Stunting is a public health problem caused by chronic malnutrition and remains a global issue. As many as 22.3% or 148.1 million children under the age of five are recorded as stunted worldwide in 2022 [1]. According to the 2023 Indonesian Health Survey, the prevalence of stunting in Indonesia is 21.5%. East Java Province has a prevalence rate of 17.17%, while Jember Regency has a significantly higher prevalence rate, ranking fourth at 29.7% [2]. Stunting is a condition of growth failure caused by prolonged malnutrition, resulting in a height below the age-standard [3]. The toddler period, especially ages 12-36 months, is a golden period in the process of growth and development, as malnutrition during this time can have irreversible effects in the future [4], including impairments in child's physical development, cognitive abilities, future productivity, and susceptibility to illness and mortality [5, 6].

Several factors contribute to the severity of stunting, including economic conditions, parental education, sanitation, and parenting practices, particularly feeding practices. Family feeding patterns, including the type, amount, and schedule of meals, play an important role in meeting children's macro- and micronutrient needs [7]. Improper feeding patterns interfere with nutrient absorption and energy balance, thus contributing directly to the increased risk of stunting [8]. From 12-36 months of age, when children begin consuming family foods and are no longer fully dependent on breast milk, the family's role as a determinant of nutritional intake becomes crucial [9]. The family acts as a provider, caregiver, and model for shaping children's healthy eating behavior. Good family functioning has been shown to support optimal nutritional status and reduce the risk of stunting [10, 11] especially nutrition for their children. Meanwhile, the implementation of family functions is needed for monitoring the nutritional status of under-five children. Although National and Regional government programs have been implemented in Jember Regency, the stunting rate remains relatively high. However, studies examining family feeding patterns as a key factor in stunting prevention remain limited, particularly among children aged 12-36 months in areas with high stunting prevalence. Therefore, this study aimed to evaluate the relationship between family feeding patterns and the severity of stunting among children aged 12-36 months, to understand how family functioning influences the effective implementation of appropriate feeding practices to prevent stunting.

Methods

Study design and setting

This study employed a quantitative cross-sectional approach. This study was conducted from March to April 2025 in Rambipuji, Sumberjambe, and Ledokombo, three Jember Regency sub-districts prioritized for stunting reduction due to their many high-risk villages, as designated by the Jember Regent [11, 12]. Data were collected from the respective Public Health Centers.

Participants

Participants were families with stunted toddlers aged 12-36 months. Eligible participants consisted of caregiver-child dyads in which the primary caregiver was a family member (e.g. mother, father, or other guardian) and the child met the stunting criteria within the specified age range. The sample size was calculated using the Neyman formula, resulting in a minimum required sample of 212 respondents. Population parameters were obtained from the Jember district health office. Specifically, the total population of stunted toddlers aged 12-36 months across the study area was 1,014, and 463 stunted toddlers were recorded. Participants in this study were selected using stratified random sampling across each village and integrated health center, known as posyandu in Indonesia, within the study area. The inclusion criteria included families with stunted toddlers aged 12-36 months and were registered at the posyandu in the working areas of Rambipuji, Sumberjambe, and Ledokombo Public Health Centers. The exclusion criteria included stunted toddlers aged 12-36 months who had congenital disabilities or disorders, and families who were not willing to become respondents.

Measurements

The instruments used in this study consisted of a characteristics questionnaire and a feeding patterns questionnaire. The characteristics data comprise family data (ethnicity, age, family role, education, occupation, income, and number of children under five in the family), as well as children's characteristics (age, gender, height, and weight of toddlers). To measure the anthropometrics of the children aged 12-24 months, a digital length board with the onemed digital baby scale model: OD231B was used. For toddlers aged 25-36 months, body weight was measured using onemed digital scales, and height was measured using one health digital microtoise. Children's height and weight measurements were analyzed to determine their nutritional status using the [World Health](#)

Organization (WHO) AntroPlus 1.0.4. In this study, researchers used indicators of height or length by age, and the results were classified according to standards set by the Ministry of Health of the Republic of Indonesia.

The study evaluated feeding patterns using the child feeding questionnaire (CFQ) [12, 13], developed by Camci et al. (2014) and adopted in Indonesia by Putri et al. (2024) [7, 13]. This questionnaire has passed reliability testing, demonstrating reliability for the amount of food, food type, and meal schedule indicators, with Cronbach's alpha values of 0.769, 0.902, and 0.911, respectively. Furthermore, validity testing confirmed that all questionnaire items were valid. Feeding pattern scores were classified into two categories: appropriate (55-100%) and inappropriate (<55%).

Data analysis

Data were analyzed using SPSS software, version 25. Descriptive analysis was used to examine participants' characteristics, and the chi-square test was used to investigate the relationship between stunting severity and family feeding patterns. Statistical significance was set at $P < 0.05$.

Results

A total of 212 participants were involved in the study, most of whom were mothers (97.2%) with an average age of 28.29 ± 6.03 years. The majority identified as the Madurese tribe (85.8%), and the highest level of education attained was elementary school (49.1%). Most respondents were heads of households (92.5%), with incomes below the minimum regional monthly wage. Additionally, most families in this study had only one child under the age of five (89.2%), with an average age of 25.33 months, and a majority of the children were male (52.4%) (Table 1).

Age, tribe, education, and occupation were reported for the primary caregiver respondent only, as provided by one caregiver per child (mother/father/another guardian).

Figure 1 shows the distribution of family feeding patterns and nutritional statuses among the participants. Regarding family feeding patterns, 84.4% of families provided food that fit the appropriate categories. Additionally, 79.7% of the respondents provided sufficient food, and 64.2% maintained a proper meal schedule. Overall, 71.2% of families in this study demonstrated appropriate feeding patterns. In contrast, according to

height-for-age measurements, 63.2% of the toddlers were classified as very short (stunted). When assessed by weight-for-age, 40.6% and 18.4% of toddlers were underweight and severely underweight, respectively, for their age. Based on weight-for-height measurements, 76.9% of the toddlers had good nutritional status, and, according to body mass index for age, this proportion was 78.3%. Furthermore, gender analyses indicated that 69.3% of girls and 72.9% of boys received appropriate feeding. Severe stunting was observed in 38.6% of girls and 35.1% of boys, suggesting minimal gender differences in both feeding practices and nutritional status.

Table 2 presents the results of the chi-square test. The analysis revealed a statistically significant relationship between feeding patterns and stunting among toddlers aged 12-36 months in Jember Regency ($P < 0.001$). An odds ratio (OR) of 3.381 (95% confidence interval [CI], 1.822%, 6.275%) indicates that children with appropriate feeding patterns are 3.4 times less likely to experience severe stunting.

Discussion

This study found a correlation between feeding patterns and the severity of stunting in children aged 12-36 months. Most families have adopted appropriate feeding practices; however, the children aged 12-36 months were classified as stunted based on height-for-age measurements. Toddlers who do not receive proper feeding have a higher risk of linear growth.

In this study, most families adopted appropriate feeding patterns that aligned with the principles of the Balanced Nutrition Guidelines, emphasizing the importance of food diversity, adequate quantity, and regular meal times for children [14]. This finding may be attributed to the central role of the mother as the primary caregiver of toddlers in this study. In Indonesian society, mothers are often the primary figures who actively and consistently ensure their children's nutritional needs are met [15]. Mothers have complete control over the menu, portions, and timing of meals and are responsible for planning varied meals and selecting nutritious ingredients [16]. In addition, the family's affective function also supports this outcome, as mothers who create a loving environment and foster positive communication facilitate effective and efficient feeding interactions for optimal nutritional fulfillment [17]. Proper feeding patterns in this study, based on the number of toddlers, allowed for undivided attention and resources, ensuring that the toddlers' nutritional needs were optimally met [18]. Additionally, relatively young and productive mothers tend to have a

Table 1. Characteristics of respondents (n=212)

Characteristics		Mean±SD/ No. (%)	Md (P25-P75)
Age of respondents	Mother	28.29±6.03	28 (23-32)
	Father	31±3.36	31 (27.75-34.25)
	Grandma	49.50±0.7	49.50 (49-49.50)
Role in the family	Mother	206(97.2)	
	Father	4(1.9)	
	Grandma	2(0.9)	
Tribe	Madura	182(85.8)	
	Javanese	30(14.2)	
Education level	Not in school	5(2.4)	
	Elementary school	104(49.1)	
	Junior high school	68(32.1)	
	Senior high school	33(15.6)	
	Diploma/Bachelor's degree	2(0.9)	
Occupation	Self-employed	4(1.9)	
	Housewife	196(92.5)	
	Laborer/farmer	11(5.2)	
	Civil servants	1(0.5)	
Income	<IDR 2,665,392	188(88.7)	
	≥IDR 2,665,392	24(11.3)	
No. of toddlers in the family	1	189(89.2)	
	2	22(10.4)	
	>2	1(0.5)	
Toddlers	Age of toddler (month)	25.33±6.57	25 (20.25–31)
Gender	Male	111(52.4)	
	Female	101(47.6)	

Table 2. Relationship between feeding patterns and stunting severity (f=212)

Feeding Pattern Eating	No. (%)		χ^2	P	OR	95% CI
	Stunting					
	Stunted	Severely Stunted				
Appropriate	108(50.94)	43(20.28)	15.604	< 0.001	3.381	1.822-6.275
Inappropriate	26(12.27)	35(16.51)				



χ^2 : Chi-square value; P: significance of chi-square test; OR: Odds ratio; 95% CI: 95% confidence interval.

greater capacity to receive information and engage in active parenting practices, particularly in implementing appropriate feeding methods [19]. On the other hand, the low level of education in some families and low family income are the leading causes of the family's inability to provide adequate food in terms of quantity, quality, and variety to meet nutritional needs, thus limiting the family in purchasing sufficient food for all family members [20], especially in terms of the type and amount of food. Thus, although most families have adopted appropriate feeding practices, some require additional support to achieve optimal feeding.

This study showed that most of the children were categorized as short (stunted) based on their height-for-age z-scores, indicating a serious chronic growth problem in the participants' locations. Stunting occurs due to a long-term lack of nutritional intake, especially during the golden period of the first 1000 days of life [21], and negatively impacts cognitive development and intelligence, as well as increasing the risk of chronic diseases later in life [4]. A remarkable result of this study is that 40.1% of stunted toddlers had normal body weight, indicating an imbalance between proportional height and weight growth. Meanwhile, according to weight-for-height and body mass index (BMI)-for-age, stunted toddlers are classified as having good nutritional status. This study found that although toddlers are stunted, their nutritional status is generally still considered good, as stunting is more influenced by chronic malnutrition, which has a greater impact on height than weight [22]. This study suggests that nutritional status, as measured by weight-for-age, weight-for-height, and BMI-for-age, may not always accurately reflect overall stunting, particularly when height-for-age is not considered. In other words, a child can have a proportional weight but still be stunted if their height is not age-appropriate.

This finding highlights a significant relationship between family feeding patterns and stunting among chil-

dren aged 12-36 months, consistent with the study by Liliandrini et al. (2022), which also reported a statistically significant association between feeding patterns and stunting in children aged 2-5 years [23]. Appropriate feeding patterns, including diverse food types, adequate portions, and regular meal times, play a crucial role in reducing the risk of severe stunting. Appropriate feeding patterns, including a diverse range of food types, adequate portion sizes, and regular meal times, play a crucial role in reducing the risk of severe stunting. Although stunted toddlers are still found, toddlers with inappropriate feeding patterns are at greater risk of experiencing severe stunting compared to those who receive appropriate feeding, with a 3.4 times lower risk. Inadequate feeding patterns, whether in terms of type, quantity, or schedule, contribute to deficiencies in essential nutrients such as protein, iron, and vitamins, which can hinder nutrient intake and tissue repair [24], potentially worsening linear growth.

The study's results showed that most nutritional statuses remained normal (based on weight-for-height and BMI-for-age), indicating that their current intake is sufficient in quantity but cannot alter previously established linear growth deficits. These findings also reinforce the theory that stunting manifests as chronic or long-term malnutrition. At the same time, weight-for-age, weight-for-height, and BMI-for-age reflect acute or short-term nutritional status [25]. Although stunting is multifactorial, appropriate feeding patterns remain a key factor in mitigating its severity and should be the primary focus of nutritional interventions. Therefore, families need to actively ensure that feeding practices are appropriate for the child's age, in terms of variety, quantity, and meal timing, to prevent stunting.

One significant limitation of this study is its reliance on respondents' memories for data on feeding patterns, which may have introduced information bias. Also, the CFQ was completed by one primary caregiver per child

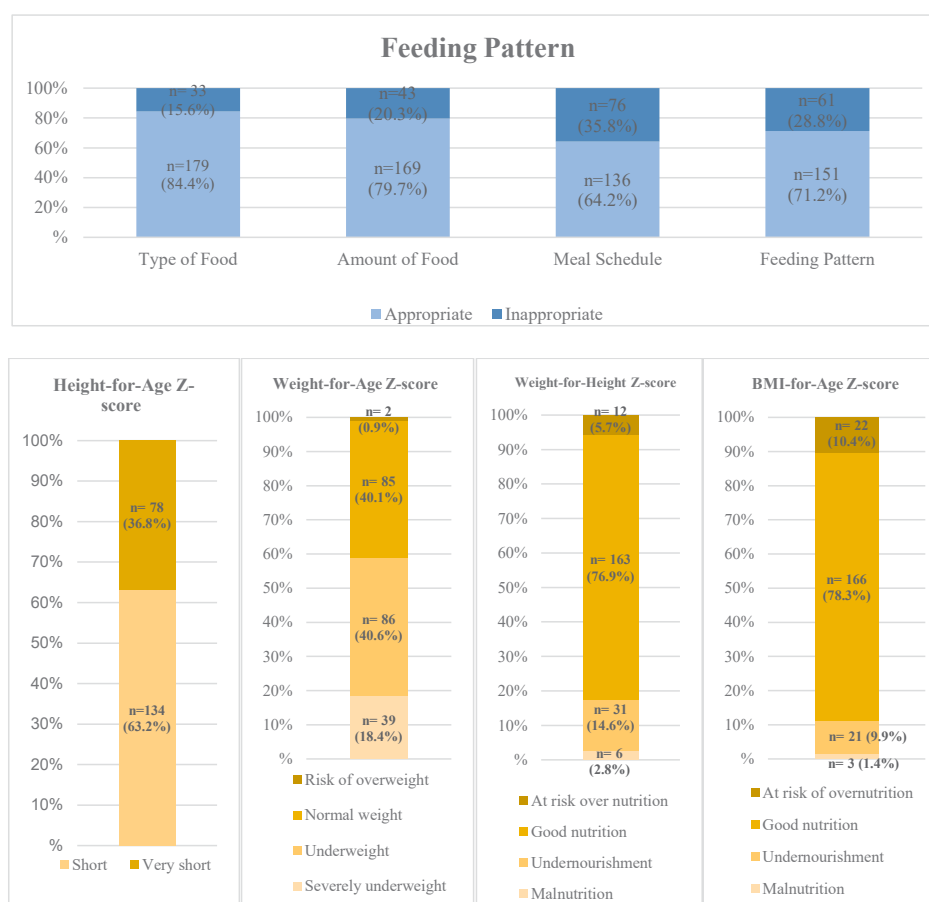


Figure 1. Distribution of feeding pattern and nutritional status among stunting toddlers (n=212)



(predominantly mothers, 97.2%). Therefore, respondent demographics (e.g. education, occupation) largely reflect mother respondents and are not intended for mother–father comparisons. Therefore, future research should use observational or case-control study designs to obtain more valid and comprehensive data. Additionally, it is essential to examine other factors that may impact stunting, such as food quality.

Conclusion

Family feeding patterns significantly impact stunting in children aged 12–36 months, increasing the risk of severe stunting. These findings highlight the crucial role that families play in adopting effective feeding practices to ensure balanced nutrition. This includes selecting appropriate food types, serving adequate portions, and maintaining regular mealtimes, all of which are essential for optimal growth and development during early childhood. Therefore, healthcare workers must collaborate with families to establish proper infant feeding patterns. This collaboration will help ensure that children receive

enough macro- and micronutrients through appropriate meal types, quantities, and schedules, ultimately reducing the risk of severe stunting.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of University of Jember, Jember, Indonesia (Code: 092/UN.25.1.14/KEPK/2025). The researcher obtained written informed consent from all respondents willing to participate.

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Authors' contributions

Conceptualization, methodology, and investigation: Sari Ilmazu Laila Suryono, and Tantut Susanto; Formal

analysis and visualization: Sari Ilmazu Laila Suryono, and Niken Asih Laras Ati; Data collection and investigation: Sari Ilmazu Laila Suryono; Supervision and validation: Tantut Susanto and Niken Asih Laras Ati; Writing original draft, review, and editing: All authors.

Conflict of interest

The authors declared no conflicts of interest.

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