



The association between household food security, dietary diversity, and stunting among toddlers in West Bandung Regency

Ketahanan pangan keluarga, keragaman pangan, dan kejadian stunting pada balita di Kabupaten Bandung Barat

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Abstract

Stunting remains a major public health issue in Indonesia, particularly in rural areas such as Cihanjuang Rahayu Village, West Bandung Regency, where a high prevalence of stunting coincides with a declining food-security index. This study aimed to analyze the relationship between household food security, dietary diversity, and the incidence of stunting in toddlers aged 24–59 months. A cross-sectional design was employed, involving 94 toddlers selected through proportional stratified random sampling method. Toddler height was measured using a stature meter and analyzed using WHO Anthro software. Household food security was assessed using the Household Food Insecurity Access Scale (HFIAS), and dietary diversity was measured using a 24-hour recall and the Household Dietary Diversity Score (HDDS). Logistic regression analysis (SPSS v29) was conducted to control for potential confounders. Results: The prevalence of stunting in the study area was 30.9%. Food insecurity was significantly associated with stunting ($p = 0.022$; OR = 3.130; 95% CI: 1.182–8.284), as was low dietary diversity ($p = 0.009$; OR = 5.881; 95% CI: 1.564–22.107). In conclusion, these findings highlight the importance of improving household food access and dietary quality through targeted family based nutrition education and community-level interventions to effectively reduce the prevalence of stunting.

Keywords: Dietary Diversity, Early Childhood, Food Security, Nutrition Determinants, Stunting, Toddlers.

Abstrak

Stunting masih menjadi masalah kesehatan masyarakat yang utama di Indonesia, terutama di daerah pedesaan seperti Desa Cihanjuang Rahayu, Kabupaten Bandung Barat, di mana prevalensi stunting yang tinggi bertepatan dengan indeks ketahanan pangan yang menurun. Penelitian ini bertujuan untuk menganalisis hubungan antara ketahanan pangan rumah tangga dan keragaman pangan dengan kejadian stunting pada balita berusia 24–59 bulan. Desain potong lintang digunakan, melibatkan 94 balita yang dipilih melalui pengambilan sampel acak berstrata proporsional. Tinggi badan balita diukur menggunakan stature meter dan dianalisis dengan perangkat lunak *WHO Anthro*. Ketahanan pangan rumah tangga dinilai menggunakan *Household Food Insecurity Access Scale* (HFIAS), sementara keragaman pangan diukur menggunakan *recall* 24 jam dan *Household Dietary Diversity Score* (HDDS). Analisis regresi logistik (SPSS v29) dilakukan, dengan mengendalikan potensi faktor perancu. Hasil, prevalensi stunting di wilayah penelitian adalah 30,9%. Ketidakamanan pangan secara signifikan berhubungan dengan stunting ($p = 0,022$; OR = 3,130; 95% CI: 1,182–8,284), demikian pula dengan rendahnya keragaman pangan ($p = 0,009$; OR = 5,881; 95% CI: 1,564–22,107). Kesimpulan, temuan ini menyoroti pentingnya meningkatkan

akses pangan rumah tangga dan kualitas pangan melalui edukasi gizi berbasis keluarga yang terarah dan intervensi di tingkat masyarakat untuk secara efektif mengurangi stunting.

Kata Kunci: Stunting, Balita, Ketahanan Pangan, Keragaman Pangan, Determinan Gizi, Anak Usia Dini.

Introduction

Nutritional issues in Indonesia have reached a critical stage, as the country encountered the triple burden of malnutrition: wasting, stunting, and obesity (Kemenkes RI, 2022). Stunting, a condition caused by malnutrition that begins during pregnancy and becomes apparent by 24 months of age, remains a major public health concern in Indonesia (Djauhari, 2017), and stunting has significant implications for national development. If left unaddressed, this could hinder the achievement of Indonesia Unggul by 2045 (Priyono, 2020). According to the World Health Organization (WHO), there are 149 million stunted children worldwide, with 6.3 million in Indonesia. Stunting is considered a chronic condition and a public health problem in an area if its prevalence surpasses 20% (Kemenkes RI, 2022). (Kemenkes RI, 2022).

The countrywide prevalence of stunting is 21.5%, according to data from the Indonesian Health Survey (SKI) conducted in 2022. In 2022, West Java Province, with a stunting prevalence of more than 20%, had a rate of 20.2%; (Kemenkes RI, 2022). However, the 2023 SKI reported an increase of 21.7%, marking a 1.5% increase within one year. West Bandung Regency, located in West Java, has a stunting prevalence above the provincial average, with a 25.1% prevalence among children under five (Kemenkes RI, 2023). According to the 2024 West Bandung Regency Health Office report, the prevalence of stunting in the Parongpong District doubled from 5.47% in 2023 to 10.29% in 2024. The Parongpong District consists of eight villages, with Cihanjuang Rahayu Village having the highest stunting prevalence of 13.39%, followed by Cihanjuang Village (12.4%) and Cihideung Village (11.09%).

The high prevalence of stunting poses serious long-term consequences, primarily due to the underlying contributing factors. The UNICEF framework (2020) identifies four determinants of child nutrition: basic, underlying, and immediate causes and outcomes. Food security is a critical determinant of child food intake. A food-secure household ensures consistent access to

sufficient nutritious food (Mumtaza, 2024; Naibaho & Aritonang, 2022).

However, food security in West Bandung Regency demonstrated a downward trend. The Food Security Index dropped from 75.76 in 2020 to 71.59 in 2022 based on local government data. Food insecurity has been linked to limited nutrient intake and higher rates of undernutrition in children (Agbadi et al., 2017). Furthermore, dietary diversity—measured by the Individual Dietary Diversity Score (IDDS)—is a strong indicator of food quality and is consistently associated with child nutritional outcomes (Basri et al., 2021).

While previous studies have examined food security, dietary diversity, and stunting, few have focused on micro-level settings, such as high-prevalence villages, where contextual factors may differ significantly. Moreover, research that concurrently examines household food security and dietary diversity in relation to stunting remains scarce, particularly in the West Bandung Regency.

This study addresses these gaps by focusing on a high-risk rural area (Cihanjuang Rahayu Village) and evaluating two key nutritional determinants of stunting. This dual-focus, localized approach is expected to provide actionable evidence for district-level policies and nutrition-sensitive interventions.

This study aimed to rigorously examine the relationship between household food security, dietary diversity, and stunting incidence among toddlers in Cihanjuang Rahayu Village, Parongpong District, West Bandung Regency. By addressing a specific geographic gap and applying an integrative framework, this study offers novel contributions to both local nutrition policy and the broader scholarly discourse on child undernutrition.

Methods

This study employed a quantitative approach with a cross-sectional design conducted in Cihanjuang Rahayu Village, Parongpong District, West Bandung Regency, from January to March

2025. Although appropriate for examining associations, this design did not allow for causal inference, which is a recognized limitation of cross-sectional studies.

The target population consisted of toddlers aged 24 to 59 months living in Cihanjuang Rahayu Village, specifically in Hamlet 4 (Neighborhood Units 12, 13, 14, and 15), with a total population of 121 toddlers. The inclusion criteria were as follows: (1) toddlers who attended integrated health posts (hereinafter referred to as *posyandu*) in the study area, (2) possession of a Maternal and Child Health (KIA) book, and (3) mothers or caregivers who provided informed consent for interviews.

The sample size was calculated using the Isaac and Michael formula, which is widely accepted for small population studies in social and health research, with a 5% margin of error. The calculation resulted in a sample size of 94 participants in total. Although a power analysis was not conducted, this formula ensured an adequate sample size to represent the population.

To obtain a representative sample, proportionate stratified random sampling was employed, ensuring that samples from each RW and Posyandu were balanced and randomized using a lottery system. The sample allocation for each Posyandu in Hamlet 4. The sample distribution per posyandu is summarized in Table 1.

Table 1. Sample Distribution by Neighborhood Health Post (Posyandu) in Cihanjuang Rahayu Village

Posyandu Name	Ni	N	n	Ni
Melati 12	50	121	94	39
Melati 13	54	121	94	42
Melati 14	6	121	94	5
Melati 15	11	121	94	8

Data collection involved structured interviews with mothers or primary caregivers to assess household food security (HFS) and dietary diversity. Household food security was measured using the Household Food Insecurity Access Scale (HFIAS) developed by USAID (2007). Dietary diversity was assessed using the Household Dietary Diversity Score (HDDS) questionnaire developed by the FAO (2006), which incorporated a 24-hour dietary recall. To ensure contextual relevance and reliability, both instruments were pretested locally on a

subsample of 20 participants. The resulting Cronbach's alpha scores exceeded 0.70, confirming the acceptable reliability of the questionnaires in this setting.

Anthropometric measurements, specifically toddler height, were taken using a stature meter following WHO standard protocols. Measurements were conducted by trained personnel to ensure their accuracy and reliability. Height-for-age z-scores (HAZ) were calculated using the WHO Anthro software, with stunting defined as HAZ < -2 standard deviations (SD) according to the WHO growth standards.

Data analysis was conducted using SPSS (version 29). Logistic regression was applied to examine the relationship between the independent variables (household food security and dietary diversity) and the dependent variable (stunting status). Bivariate and multivariate logistic regression models were used. Before conducting the logistic regression, assumption tests were performed to check for multicollinearity and model fit adequacy. Potential confounders, including child age, sex, and maternal education, were tested and adjusted for in the multivariate regression model to ensure the robustness of the findings.

This study was approved by the Ethics Committee of the Health Polytechnic of the Ministry of Health, Malang, Indonesia, ensuring compliance with established ethical standards for research involving human subjects. Approval was granted under the Ethical Clearance No number. DP.04.03/F.XXI.30/0096/2025, dated March 6, 2025. The ethical review process involved a comprehensive evaluation of the study's objectives, methodology, data collection instruments, and informed consent procedures.

Result and Discussion

The heights of 94 toddlers were measured in this study. Of the total participants, 52 (55.3%) were female and 42 (44.7%) were male.

Regarding nutritional status, as measured by height-for-age (HFA), 29 toddlers (30.9%) were classified as having stunted growth. Although most toddlers had a normal nutritional status, the proportion of stunting remained relatively high at 30.9%. Wardani et al., (2021) stated that a stunting prevalence above 20% indicates chronic nutritional deficiencies and reflects persistent public health challenges.

The socioeconomic characteristics of the study population were as follows: The 24-36-month age group was the largest, comprising 39 children (42%). A history of prematurity was rare, with 90 toddlers (95.7%) reported to have been born full-term. Regarding maternal employment, 70 mothers (74.5%) were informally employed. Among the fathers, 41 (43.6%) worked as laborers. Regarding household demographics, 49 families (52.1%) had more than four family members. Income data indicated that 65 families (69.1%) earned below the regional minimum wage in West Bandung Regency. Overall educational attainment was low, with 50 mothers (53.2%) and 50 fathers (53.2%) having completed only basic education.

Food security and dietary diversity were analyzed using three statistical approaches: univariate analysis for descriptive statistics and multivariate analysis (logistic regression). The

overall effect of the two elements was evaluated, and the relationship between each independent component and the nutritional health of children was examined using bivariate analysis (basic logistic regression).

The majority of stunted toddlers (n = 20, 44.4%) belonged to families categorized as having vulnerable food security compared to those from food-secure households. Conversely, most toddlers who consumed diverse diets (n = 61, 75.3%) were classified as non-stunted toddlers.

Family Food Security, Food Diversity, and Nutritional Status of Toddlers in West Bandung

Based on the results of the bivariate analysis with simple logistic regression (Table 2), the variables significantly related to the nutritional status of toddlers were food security (p=0.008) and food diversity (p=0.003).

Table 2. Family food security, food diversity, and stunting of toddlers in West Bandung Regency

Factor	Stunting		No Stunting		Total		P1	P2	OR	95% CI
	n	%	n	%	n	%				
Food Security										
Food Insecurity	20	44,4	25	55,6	45	100	0,008	0,022	3,130	1,564-22,107
Food Security	9	18,4	40	81,6	49	100				
Food Diversity										
Not diverse	9	69,2	4	30,8	13	100	0,003	0,009	5,881	1,182 -8,284
Diverse	20	24,7	61	75,3	23	100				

*P1 is the result of a bivariate test using simple logistic regression, while P2 is the result of a multivariate test using multiple logistic regression.

Based on Table 2, most toddlers who experienced stunting came from families categorized as having vulnerable food security, with 20 respondents (44.4%) compared to those from food-secure households. Most toddlers who consumed a highly diverse diet (61 respondents [75.3 %]) were classified as non-stunted. Multivariate logistic regression analysis was performed to identify any confounding or interaction variables.

The p-value of the interaction test between Food Security and Food Diversity indicates that there are no confounding or interaction variables between these variables of food security and food diversity on the nutritional status of toddlers aged 24-59 months in Cihanjuang Rahayu Village, Parongpong District, West Bandung Regency. Nutritional health of children and food security were significantly correlated. Similarly, there was a substantial correlation between nutritional status and dietary diversification.

The results of the analysis illustrated a significant relationship between the diversity of family food consumption and the nutritional status of toddlers (P = 0.009). Toddlers from families with non-diverse food consumption were 5.88 times more likely to experience stunting nutritional problems than toddlers from families with diverse food consumptions (OR = 5.881; 95% CI:1,182-8,284). A confidence interval that does not include 1 indicates that the result is statistically significant and illustrates a real increase in risk.

The analysis also revealed a significant relationship between family food security and nutritional status of toddlers (P = 0.022). Toddlers living in households with food insecurity were 3.13 times more likely to experience stunting than those from food-secure households (OR = 3.130; 95% CI: 1.564–22.107). The confidence interval that did not include the number 1 confirmed that

this relationship was statistically significant and did not occur by chance.

The Relationship Between Food Security and Toddler Nutritional Status

Food security is acknowledged as a multi-faceted concern that spans the entire food and nutrition continuum—from production and distribution to consumption and its impact on nutritional status (Verawati et al., 2021). Therefore, ensuring food security necessitates coordinated efforts across multiple sectors involving government institutions, communities, and individuals. At the household level, especially in rural settings, food security is a critical determinant of child nutrition (Pujiati et al., 2020).

Badan Ketahanan Pangan (2016) identifies three primary dimensions that determine food access: physical, economic, and social. The physical dimension pertains to food production and distribution, the economic dimension concerns a household's purchasing power, and the social dimension involves community support mechanisms such as food-sharing or assistance programs. These dimensions are interrelated and collectively influence the household food security. For example, physical accessibility to affordable food sources promotes the consumption of nutritionally balanced diet. Mothers, in particular, are more likely to select nutritious foods when markets or food sources are both nearby and affordable (Kholidah et al., 2023).

Cihanjuang Rahayu Village, situated in a highland area, features abundant vegetable plantations, resulting in a predominantly plant-based diet among its inhabitants with minimal intake of animal protein. Although physical access to markets is relatively unproblematic, economic limitations significantly constrain access to nutritious foods. Most families in the village live below the regional minimum wage, resulting in reduced purchasing power and limited food availability. Consequently, these families prioritize affordability over nutritional value, leading to inadequate dietary intake and, ultimately, household food insecurity (Kholidah et al., 2023).

The government has instituted social assistance programs, such as *Bantuan Langsung Tunai* (BLT), to address this issue. Amrullah et al., (2020) reported that such programs positively influence household energy and protein intakes. Thus, the level of food security among households in a village is shaped by the

interaction between physical, economic, and social access to food.

Food-insecure households frequently encounter difficulties in acquiring sufficient, safe, and nutritious food, which negatively impacts the health and nutritional status of family members, especially toddlers (Mumtaza, 2024). Adequate household food security is essential for achieving optimal nutritional outcomes in toddlers. By contrast, limited food access can result in poor dietary intake and malnutrition, including stunting (Verawati et al., 2021). Toddlers represent a particularly vulnerable group, and stunting remains one of the most prevalent nutritional challenges both nationally and globally (Lestari et al., 2023). The findings of this study are in line with the UNICEF conceptual framework (1990, 2020), which posits that children's dietary intake and overall nutritional status are directly influenced by food availability at the household level.

The results of this study indicate a statistically significant relationship between food security and nutritional status of toddlers. These findings are supported by previous studies (Mumtaza, 2024), which consistently reported that food insecurity is associated with poor nutritional outcomes in toddlers, particularly stunting.

In Cihanjuang Rahayu Village, although the majority of families with toddlers were classified as food secure, a notable proportion still experienced food insecurity. Household food security was measured using the Household Food Insecurity Access Scale (HFIAS), which assesses factors such as anxiety about food access, limited availability, and reduced food consumption (Rahmatika et al., 2024). Stunting was more frequently observed in children from food insecure households. Arifonang et al., (2020) found that toddlers from food-insecure families had a 6.9-fold increased risk of stunting owing to smaller food portions and poor-quality diets.

Household food security profoundly impacts toddlers' daily nutrient intake, influencing not only their immediate health but also their long-term physical, cognitive, and emotional development (Mumtaza, 2024). Food insecurity often results in decreased due to reduced portions and poor food quality, increasing the risk of impaired growth, particularly in height (Mumtaza, 2024).

Several internal household factors may contribute to food insecurity, including parental

smoking habits, low income, and limited parental education. Households where parents smoke often allocate a significant portion of household income to cigarettes, thereby reducing the budget available for nutritious food (Fairuza et al., 2023). In this study, most families of stunted toddlers had at least one parent who smoked.

Low household income is strongly associated with food insecurity. In Cihanjuang Rahayu Village, most families with stunted toddlers earn less than the minimum wage of West Bandung Regency (IDR 3,736,741 per month). Naibaho & Aritonang, (2022) found that higher income levels improve household food security by enabling the purchase of high-protein foods, such as milk, eggs, and meat. Conversely, lower income restricts dietary diversity and reduces the intake of essential nutrients. (Siregar et al., 2023).

Parental education, particularly maternal education, plays a key role in shaping food consumption patterns. Mothers with higher educational levels tend to have greater nutritional knowledge and make healthier food choices. Similarly, fathers with higher educational levels are more likely to earn higher incomes and pay attention to their children's health and nutrition (Lemaking et al., 2022). In addition to income and education, access to health services and maternal caregiving practices are possible confounding variables that may influence food security and nutritional outcomes. Although these variables were considered in the analysis, further research is recommended to explore their potential interactions.

Family size also influences food availability. Most toddlers lived in households with more than four members. The larger the families, the greater the difficulty they often encounter in fulfilling their nutritional needs due to limited food resources (Lemaking et al., 2022).

First, this study used a cross-sectional design, which limits the ability to infer causality. Additionally, dietary data were based on recall, which may have introduced bias. Other unmeasured confounding variables, such as parenting style, household food preparation habits, and disease burden, could also affect the nutritional status of toddlers.

The Relationship Between Food Diversity and Toddler Nutritional Status

Adequate food diversity is essential to ensure that the body receives the nutrients necessary to support physiological processes. Due to

compromised immune systems, malnourished toddlers often have weakened immune systems, making them more susceptible to infection. This vulnerability arises because their bodies cannot produce sufficient antibodies, which in turn can hinder growth and development (Karlina et al., 2023). Nutritional deficiency can also disrupt hormonal regulation. The immune response, marked by elevated levels of cytokines such as TNF- α and IL-1, triggers inflammation, which may suppress the synthesis of insulin-like growth factor 1 (IGF-1), a hormone crucial for long bone growth (Karlina et al., 2023).

Food diversity enhances both macro- and micronutrient intake, helping to prevent nutrient deficiencies resulting from monotonous diets (Dewanti, 2020). Macronutrients, including carbohydrates, proteins, and fats, serve as primary sources of energy and structural substrates, whereas micronutrients, including vitamins and minerals, play essential roles in enzymatic activity, hormone production, and metabolic function. For instance, insufficient carbohydrate intake may lead to reliance on fat stores for energy, thereby disrupting the energy balance necessary for optimal growth (Karlina et al., 2023).

Protein deficiency can severely impair bone development by restricting the availability of amino acids essential for forming the bone matrix and synthesizing growth hormones, such as IGF-1 and GH (Karlina et al., 2023), and inadequate fat intake may hinder growth due to its role in vitamin absorption and hormone regulation. Although required in smaller quantities, micronutrients, including iron and vitamin A, are vital for immune function and hormonal balance. Deficiencies in these nutrients can lead to lower serum ferritin levels and increased susceptibility to infection, thereby increasing the risk of stunting. (Karlina et al., 2023).

The UNICEF framework (2020) asserts that food diversity is a direct determinant of children's nutritional intake and nutritional status. It has been demonstrated to be a reliable indicator of diet quality in young children (Utami & Mubasyiroh, 2020). During the toddler years, a critical developmental period, access to a varied, nutrient-rich diet is essential for promoting physical and cognitive growth (Mumtaza, 2024).

This study identified a significant association between food diversity and nutritional status in toddlers. These findings are consistent with those of Ardianti & Sumarmi (2023), who reported a significant link between

low food diversity and increased stunting prevalence, suggesting that enhanced food diversity improves micronutrient intake, leading to better nutritional outcomes in toddlers.

A positive correlation was observed between dietary diversity and height-for-age z-scores among toddlers, indicating that a greater food variety contributes to an improved nutritional status. Various dietary practices ensure the fulfillment of toddlers' daily nutrient requirements, thereby supporting optimal child growth and health outcomes (Prasetyo et al., 2023). Food diversity is also shaped by internal household factors, including parental education, nutritional knowledge, family size, purchasing power, time for meal preparation, food preferences, availability of local ingredients, and overall socioeconomic status (Mumtaza, 2024).

In Cihanjuang Rahayu Village, Parongpong District, West Bandung Regency, most families exhibit moderate to high food diversity. Dietary diversity was evaluated using a 24-hour recall method, which was translated into scores based on the Household Dietary Diversity Score (HDDS) questionnaire. To provide a more comprehensive nutritional assessment, the HDDS data can be supplemented with the Household Food Insecurity Access Scale (HFIAS).

Despite the generally favorable dietary diversity, some stunted children still came from households with adequate food variety. This underscores the importance not only of dietary variety but also of the quality and type of foods consumed (Dewanti, 2020). In the village, staple foods such as rice, vegetables, and fats are commonly consumed, whereas protein-rich foods such as meat, eggs, milk, and legumes are consumed regularly by only half of the households. This pattern is common in many developing regions, where carbohydrates, especially rice, form the bulk of the daily caloric intake (Dewanti, 2020).

The limited intake of fruits, whole grains, and animal-based products can lead to both macro- and micronutrient deficiencies, compromising immune function and inhibiting growth (Dewanti, 2020). Prasetyo et al., (2023) emphasized that toddlers require adequate macronutrients for energy and tissue development, as well as micronutrients for cognitive and immune development.

Socioeconomic status is a major determinant of dietary diversity. Many families in

Cihanjuang Rahayu Village earn below the minimum wage, which restricts their ability to purchase diverse high-quality foods. Low-income households often decrease their intake of animal-based proteins and predominantly depend on cheap carbohydrate sources, including rice, wheat, and corn (Ruel, 2020). However, animal products are rich in high-quality proteins essential for tissue repair and growth. Even with adequate calorie intake, chronic protein deficiency can lead to stunted growth (Verawati et al., 2021). In support of this, a study conducted in Burkina Faso Mank et al. (2020) demonstrated that the inclusion of foods such as fish, legumes, and poultry significantly improve child development.

In this village, more than half of the toddlers regularly consume vegetables. The availability of home gardens enables many households, particularly those whose members work as laborers, to cultivate their own produce, thereby contributing to increased vegetable consumption and improved nutritional adequacy (Prasetyo et al., 2023). While vegetables do not provide protein, they are rich in fiber, vitamins, and minerals and contribute to a well-balanced diet (Prastia & Listyandini, 2020).

Excessive fat consumption commonly occurs because of the reliance on processed foods that contain unhealthy fats. Despite its role in growth and energy, excessive fat intake, particularly from low-nutrient sources, may not support healthy development. In cases of low carbohydrate intake, the body utilizes fat for energy, demonstrating its compensatory role in supporting growth (Karlina et al., 2023).

Parental influence is another critical determinant of children's dietary habits. In this study, most parents had low educational attainment. Multiple studies have associated maternal education with improved child feeding practices and nutritional outcomes (Ainin et al., 2023). Educated parents are typically economically secure and possess better knowledge of nutrition, leading to more diverse and balanced diets (Utami & Mubasyiroh, 2020). Additionally, toddlers' personal food preferences also affect their intake habits (Prasetyo et al., 2023).

Sociocultural norms influence dietary diversity. Cultural practices related to feeding, such as reliance on salty dishes, gravies, and traditional staples, can reduce the overall nutritional balance of toddler diets (Khasanah &

Sumarmi, 2024). These patterns were reflected in the HDDS data, which demonstrated the predominance of staple foods and dietary fats in toddlers' meals.

Study Limitations and Confounding Factors

The cross-sectional design of this study limits the ability to infer a causal relationship between dietary diversity and nutritional status. Additionally, the 24-hour recall method is subject to recall bias, particularly when parents are unsure or inconsistent in recalling their children's food intakes.

Although no interaction or confounding was identified between food security and dietary diversity, other potential confounding variables, such as maternal education, household income, parenting practices, and access to health services, may still influence the observed relationship. These factors can independently influence both dietary quality and child growth outcomes and should be comprehensively evaluated in future longitudinal studies.

Conclusion

This study found a significant association between food security, dietary diversity, and the incidence of stunting in toddlers. Households experiencing food insecurity or low dietary diversity typically have children with lower height-for-age (HAZ) scores. Despite the majority of households exhibiting moderate to high dietary diversification, cases of stunting persist. Internal household factors, such as income, education, and eating habits, increasingly influence children's nutritional intake. To address this issue, we recommend the following: (1) increasing access to affordable and nutrient-dense food; (2) implementing targeted nutrition education for caregivers; (3) increasing support for complementary feeding through health services; and (4) aligning food pricing policies with household purchasing behavior. These integrated efforts are crucial for reducing stunting and improving child development outcomes in rural areas.

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