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The Association of Food Security, Parenting Patterns, and Nutritional Adequacy Levels with Stunting among Toddlers Aged 6–59 Months at the Dawe Community Health Center, Kudus

Hubungan Ketahanan Pangan, Pola Asuh, dan Tingkat Kecukupan Gizi dengan Kejadian Stunting Balita 6-59 Bulan di Puskesmas Dawe, Kabupaten Kudus

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ABSTRACT

Background: Stunting is a significant issue in Kudus District, with a 2023 prevalence of 15.7%, driven by factors like parenting patterns, food security, and nutritional intake. Despite being food-secure, the Dawe Health Center area has the third-highest stunting rate in Kudus Regency.

Objectives: Examine the correlations of family food security, nutritional adequacy levels, and parenting patterns with the incidence of stunting among toddlers at the Dawe Community Health Center.

Methods: This cross-sectional study sampled 86 mother-toddler pairs at the Dawe Community Health Center purposively. Data on stunting in toddlers and maternal height were assessed using anthropometric measurements. Information on general characteristics, parenting patterns, and household food security was gathered with interviews, questionnaires, and observations. Nutritional intake data were collected with 2×24-hour recall and the SQ-FFQ. Associations were analyzed using the chi-square test, Fisher's exact test, and multiple logistic regression analysis.

Results: The study found that respondents had good parenting patterns (58.1%) and were food-secure (74.4%). Energy (73.3%), zinc (91.9%), calcium (57%), iron (54.7%), and vitamin D (38.4%) intake were sufficient. In addition, all toddlers had sufficient protein and vitamin A. Bivariate test results showed that parenting patterns (p-value = 0.004), food security (p-value=0.006), energy adequacy (p-value<0.001), and calcium adequacy (p-value<0.001) were correlated with stunting. Multivariate test showed that energy adequacy (OR=7.7; p-value=0.003), calcium adequacy (OR=5.2; p-value=0.007), and parenting patterns (OR=5.3; p-value=0.006) were dominant factors associated with stunting.

Conclusions: The dominant factors influencing the occurence of stunting among toddlers at the Dawe Community Health Center were the levels of nutritional adequacy (energy, calcium) and parenting patterns.

INTRODUCTION

Stunting is a condition of growth failure in children under five years of age caused by chronic malnutrition, leading to shorter height compared to their peers'[1,2]. Stunting has various negative impacts on child development, including weakened immunity, impaired motor growth and development, metabolic disorders, and an increased risk of degenerative diseases, all of which contribute to reduced productivity[3–5]. According to the World Health Organization (WHO) in 2023, 22.3% or around 148.1 million of the global population of children under five sufferred from stunting[6]. In Indonesia, the 2023 Indonesian Health Survey (SKI) reported that the prevalence of stunting among toddlers was 21.5%, with Central Java recording a prevalence rate of 20.7%[7]. These figures were considerably higher than the Indonesian government's target outlined in the 2020–2024 Medium-Term Development Plan (RPJMN), which aims to reduce stunting prevalence to 14% by 2024[8,9].

In Kudus Regency, the 2023 SKI results indicate that the prevalence of stunting among children under five decreased to 15.7%[7]. Data from a preliminary study, involving measurements of 52,711 toddlers aged 0–59 months in August 2023, revealed that 2,763 toddlers (5.2%) were affected by stunting. The Dawe Community Health Center working area was ranked third among health centers in Kudus Regency with the highest number of stunting cases. Despite this decline, the eradication of

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stunting remains a government priority and is part of the strategic plan targeting zero stunting by 2024[10,11]. According to the 2023 National Food Security Vulnerability Atlas (FSVA), Kudus Regency is categorized as a food-secure area[12]. Dawe District, one of the main agricultural producers in Kudus, produces various high-value commodities, including rice, coffee, vegetables (e.g., petai, cayenne pepper, chayote, and long beans), and fruits (e.g., grapefruit, jackfruit, bananas, and avocados)[13,14]. Additionally, it contributes significantly to livestock and fishery production, with key commodities including poultry (broiler and native chickens), large livestock (goats, cows, and buffaloes), and aquaculture species (catfish, tilapia, snakehead fish, and gourami)[13,14]. This high productivity in agriculture, livestock, and fisheries supports food availability, contributing to food security in Dawe District and Kudus Regency as a whole. However, although this area has good food availability, Dawe District, one of the nine districts in Kudus Regency, is a highland region categorized as food-secure but highest in stunting rate.

The incidence of stunting in children is influenced by several factors, both direct and indirect. Nutritional intake is one of the direct factors that contributes significantly to stunting[4]. Childhood stunting is a form of long-term malnutrition resulting from prolonged inadequate nutritional intake[15]. Ensuring adequate nutrition during the toddler years is a primary concern, as both micronutrients and macronutrients play essential roles in supporting a child's growth and development[16,17]. A prolonged imbalance in macronutrient consumption can lead to changes in body tissues, subsequently affecting the development of a child's weight and height[18]. Insufficient energy intake in children can hinder the development of brain function and structure, leading to stunting and impaired cognitive development[17]. Deficiencies in micronutrients, such as calcium, can also disrupt bone growth and mineralization, contributing to growth disorders, including stunting[17].

To ensure optimal nutritional intake for children, effective parenting patterns, particularly by mothers, play a crucial role and deserve significant attention[19]. Parenting patterns are one of the indirect factors influencing stunting in children. These patterns, particularly feeding practices, directly affect the nutritional intake of children[20]. Parenting practices involve the selection and provision of food, which impact the quality and quantity of nutrients that enter a child's body[20]. These parenting practices also encompass feeding behavior, health and hygiene care, and the use of health services to monitor children's growth and development[21]. A previous study in the Dawe Community Health Center working area found that 61.68% of mothers of toddlers had insufficient knowledge, and 77.57% of these mothers were working mothers[22]. A mother's employment status can affect the parenting she provides, as working mothers often rely on caregivers or other family members to care for their children. This can result in less time spent with the child, leading to challenges in properly managing the child's nutritional intake[22,23]. For instance, exclusive breastfeeding may be less optimal among working mothers[22,23]. Additionally, maternal education and knowledge play a significant role in shaping a mother's decisions regarding nutrition and health practices for her child[21].

Another indirect factor contributing to stunting in toddlers is household food security, which refers to a household's capacity to provide the necessary food for its members, both physically and economically[16]. The level of household food security influences the amount of food consumed by the family members, which in turn affects their nutritional status[16]. Households categorized as food-secure generally have access to adequate food in both quantity and quality, which can promote adequate nutritional intake and optimal nutritional status[16,24]. Food security factors, such as the availability of food within the household and the mother's level of knowledge or education, affect feeding patterns and the quality of food provided to children[1]. In Dawe District, although food availability is sufficient, economic barriers, such as low household income, and geographical conditions, such as highland and mountainous areas, can limit access to food, particularly for households with limited purchasing power and those living far from markets. Previous research by Adelina et al. showed a significant correlation between household food security and stunting in toddlers at the Duren Community Health Center in Bandungan District[24]. The study found that food-secure households had better access to food because Bandungan is an agricultural area with close proximity to markets[24]. The food insecurity found in the study was attributed to limited food availability within the family, which resulted in suboptimal nutritional intake for household members[24]. On the other hand, a study by Gunawan et al. in Gunungkidul found no correlation between food security levels and stunting in toddlers[25].

Based on the previous discussion, the author took an interest in conducting research on the impact of household food security, nutritional adequacy, and parenting patterns on stunting in toddlers aged 6–59 months in the Dawe Community Health Center working area.

METHODS

This research is an observational analytic study using a cross-sectional design to examine the relationship between variables at a single point in time. The study was conducted from March to April 2024 in all villages within the working area of Puskesmas Dawe (Dawe Community Health Center), Kudus, with the sample size determined using proportional sampling. The study population consisted of households with pairs of mothers and toddlers aged 6–59 months who were registered at the Dawe Community Health Center, Kudus. Sample size calculation was performed based on the formula for the minimum sample size in cross-sectional studies, followed by the determination of the number of sample units taken from each village. The initial calculation resulted in 91 mother-child pairs, but five were excluded due to non-participation until the end of the study and a history of congenital abnormalities. The final sample included 86 mother-child pairs, selected purposively based on the following inclusion criteria: a) willingness to participate as respondents and complete the research process; b) residence in the study area for at least the last six months; c) easy access to the address; and d) possession and

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retention of a complete MCH (Maternal and Child Health) book. The exclusion criterion was toddlers with a history of chronic illnesses (congenital abnormalities, tuberculosis, and chronic digestive or respiratory disorders, as confirmed by medical records from a hospital or health facility).

Data on the toddler's sex, toddler's age, mother's age, parents' education and employment history, family per capita income, number of family members, access to health services, infection history, and parenting patterns were collected through questionnaire-guided interviews. Parents' education (father and mother) was categorized as low (elementary to junior high school) or high (high school to university)[26]. By employment, mothers were classified as either employed or not employed (housewife)[27]. The number of family members was defined as the total number of individuals living in a household, classified into two categories: ≤ 4 members and > 4 members[28]. Family per capita income was calculated by dividing the total family income by the number of individuals living in the household supported by the income earner. The results were categorized based on the 2024 per capita Regency Minimum Wage (UMK) for Kudus Regency: low if < UMK per capita and high if ≥ UMK per capita (IDR 817,171.43)[29,30]. Parenting patterns and access to health services were categorized based on scores from questionnaire responses as good (≥ median) or poor (< median). The infection history in toddlers, including cough, cold, fever, and diarrhea, over the past month was categorized as either having a history or not having a history[31]. Data on the history of low birth weight (LBW) and premature birth were collected from interviews using a questionnaire and verified through observations of medical records or the Mother and Child Health (MCH) book. With regard to LBW, toddlers were categorized as with low birth weight (< 2500 grams) or with no low birth weight (≥ 2500 grams)[32]. Prematurity was categorized as premature (< 37 weeks of gestational age at birth) or not premature (≥ 37 weeks of gestational age at birth)[33]. Maternal height data were obtained through anthropometric measurements, and mothers were categorized based on these data as at risk (< 150 cm) or not at risk (≥ 150 cm)[34].

Data on the stunting variable were obtained through anthropometric measurements of the toddler's height or length (HT/L), which were then used to calculate the height-for-age z-score (HAZ). Based on these data, toddlers were categorized as stunted (HAZ < -2 SD) or not stunted (HAZ ≥ -2 SD)[35,36]. The height or length (HT/L) of the toddler was measured in centimeters (cm), with the median, minimum, and maximum values presented. Data on household food security was obtained using the Household Food Insecurity Access Scale (HFIAS). For this variable, households were categorized based on the coding of respondents' answers to each question as food-secure and food-insecure (mild, moderate, and severe food insecurity)[37]. Data on the toddler's nutritional intake were obtained using 2 × 24-hour dietary recall for macronutrient intake (energy and protein) and the Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ) for micronutrient intake (vitamin A, zinc, calcium, vitamin D, and iron). The dietary intake history was then entered into the Nutrisurvey software to obtain data on the toddler's daily nutritional intake, which was compared with the Recommended Dietary Allowance (AKG) for toddlers by age, as per Minister of Health Regulation No. 28 of 2019 on the Recommended Dietary Allowance for the Indonesian Population, to calculate nutrient adequacy levels[38]. Protein and energy intake were categorized as sufficient (≥ 90% AKG) or insufficient (< 90% AKG). Micronutrient intake was categorized as sufficient (≥ 77% AKG) or insufficient (< 77% AKG)[39].

Data processing and analysis were conducted using the SPSS software. Univariate analysis was performed to describe the characteristics of the subjects. The relationship between variables (bivariate analysis) was analyzed using the chi-square and Fisher's exact tests, with the results used as a basis for determining the multivariate analysis predictors[40]. Variables with a p-value < 0.25 in the bivariate test were considered potential predictors for the multivariate analysis, which used multiple logistic regression[40]. A p-value < 0.05 was considered statistically significant[40].

This study was approved by the Health Research Ethics Committee of the Faculty of Public Health, Diponegoro University (No. 103/EA/KEPK-FKM/2024, dated February 27, 2024). All respondents provided consent to participate in the study, as indicated by the signed informed consent form, and all information was kept confidential.

RESULTS AND DISCUSSIONS

The characteristics of the respondents are shown in Table 1. The study results revealed that the majority of toddlers were aged 12–47 months, male, not premature, not born with low birth weight (LBW), and with a history of illnesses (cough, cold, fever, and diarrhea) in the past month. Most of the respondents had good parenting patterns and good access to health services. Most mothers were aged 21–35 years, with a height considered not at risk, low-educated, and not employed. Most fathers had low education and worked as casual laborers. The majority of households fell into the food-secure category, with > 4 family members and low per capita family income.

Table 1. General Characteristics of Households with Toddlers Aged 6–59 Months in the Dawe Community Health Center Working Area

Characteristics	Results
Toddler Age (months) (median, min–max)	27.50 (6–59)
6–11 months (n, %)	8 (8.9)
12–47 months (n, %)	70 (81.4)
48–60 months (n, %)	8 (9.3)
Toddler Sex	
Male	48 (55.8)

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Characteristics	Results
Female	38 (44.2)
Birth Weight (grams) (median, min–max)	3.000 (2,000–4,200)
History of Low Birth Weight (LBW)	
With LBW	7 (8.1)
No LBW	79 (91.9)
Gestational Age at Birth (weeks) (median, min–max)	38 (24–42)
History of Prematurity	
Premature	14 (16.3)
Not Premature	72 (83.7)
Infection History (median, min–max)	1 (0–2)
With an Infection History (n, %)	79 (91.9)
No Infection History (n, %)	7 (8.1)
Access to Health Services (median, min–max)	16.50 (7–20)
Poor (n, %)	43 (50)
Good (n, %)	43 (50)
Parenting Patterns (median, min–max)	33 (22–41)
Poor (n, %)	36 (41.9)
Good (n, %)	50 (58.1)
Maternal Age (median, min–max)	31.0 (18–47)
< 20 years old (n, %)	1 (1.2)
21–35 years old (n, %)	62 (72.1)
> 35 years old (n, %)	23 (26.7)
Maternal Height (cm) (median, min–max)	152.75 (132.8–165.0)
At Risk (n, %)	31 (36)
Not at Risk (n, %)	55 (64)
Maternal Education	
Low (Elementary to Junior High School) (n, %)	43 (50)
High (Senior High School to University) (n, %)	43 (50)
Maternal Occupation	
Employed (n, %)	32 (37.2)
Not Employed (Housewife) (n, %)	54 (62.8)
Paternal Education	
Low (Elementary to Junior High School) (n, %)	47 (54.7)
High (Senior High School to University) (n,%)	39 (45.3)
Father Occupation	
Not Employed (n, %)	2 (2.3)
Private Employee (n, %)	12 (14)
Self-Employed (n, %)	14 (16.3)
Farmer (n, %)	1 (1.2)
Factory Laborer (n, %)	8 (9.3)
Casual Laborer (n, %)	48 (55.8)
Livestock Farmer (n, %)	1 (1.2)
Number of Family Members (median, min–max)	5.0 (3–9)
≤ 4 Members (n, %)	37 (43)
> 4 Members (n, %)	49 (57)
Family Per Capita Income (IDR) (median, min–max)	658,333.33 (300,000–2,400,000)
Low (n, %)	58 (67.4)
High (n, %)	28 (32.6)
Food Security	
Food-Secure (n, %)	64 (74.4)
Mild Food Insecurity (n, %)	14 (16.3)
Moderate Food Insecurity (n, %)	6 (7)
Severe Food Insecurity (n, %)	2 (2.3)

Table 2 presents the frequency distribution of dietary intake and nutritional adequacy levels of toddlers. It shows that most toddlers were not stunted and had adequate energy, zinc, calcium, and iron intake, although vitamin D intake was insufficient. All toddlers met the adequacy requirements for protein and vitamin A.

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Table 2. Nutritional Status, Nutritional Intake, and Nutritional Adequacy of Toddlers Aged 6–59 Months in the Dawe Community Health Center Working Area

Characteristics	Results
Height/Length (HT/L) of Toddlers (cm) (median, min–max)	82.12 (62.8–109.1)
Z-score H/A or L/A (median, min–max)	(-1.88) ((-4.38)–1.8)
Nutritional Status H/A or L/A	
Stunted (n, %)	37 (43)
Not Stunted (n, %)	49 (57)
Energy Intake (kkal) (median, min–max)	1,367.0 (741–2,353)
Energy Adequacy Level (%) (median, min–max)	104.0 (55–191)
Insufficient (n, %)	23 (26.7)
Sufficient (n, %)	63 (73.3)
Protein Intake (grams) (median, min–max)	34.50 (19–58)
Protein Adequacy Level (%) (median, min–max)	173.0 (97–291)
Sufficient (n, %)	86 (100)
Vitamin A Intake (RE) (median, min–max)	1,593 (559–2,875)
Vitamin A Adequacy Level (%) (median, min–max)	395.50 (140–719)
Sufficient (n, %)	86 (100)
Vitamin D Intake (mcg) (median, min–max)	5 (2–27)
Vitamin D Adequacy Level (%) (median, min–max)	50.00 (11–183)
Insufficient (n, %)	53 (61.6)
Sufficient (n, %)	33 (38.4)
Zinc Intake (mg) (median, min–max)	5 (2–14)
Zinc Adequacy Level (%) (median, min–max)	155 (51–460)
Insufficient (n, %)	7 (8.1)
Sufficient (n, %)	79 (91.9)
Calcium (Ca) Intake (mg) (median, min–max)	548.50 (95–1,506)
Calcium (Ca) Adequacy Level (%) (median, min–max)	86.5 (15–385)
Insufficient (n, %)	37 (43)
Sufficient (n, %)	49 (57)
Iron (Fe) Intake (mg) (median, min–max)	6.0 (1–17)
Iron (Fe) Adequacy Level (%) (median, min–max)	82.50 (13–246)
Insufficient (n, %)	39 (45.3)
Sufficient (n, %)	47 (54.7)

The results of the test on the relationship between variables affecting stunting in toddlers aged 6–59 months at the Dawe Community Health Center can be seen in Table 3, and the multivariate test results to identify the dominant factors causing stunting are presented in Table 4. The results in Table 3 show that energy and calcium adequacy levels were correlated with stunting in toddlers. The study found that the majority of stunted toddlers tended to have lower energy and calcium adequacy levels compared to non-stunted toddlers. Based on the recall data, the primary food sources contributing to energy intake were formula milk, breast milk, and white rice. The data also indicate that most toddlers consumed milk (formula milk, packaged milk, or breast milk) 1–3 times per day and eggs 1–2 times per day, with some meals containing fried dishes. As a result, the adequacy requirements for protein and vitamin A were met[20]. In this study, although the protein intake was sufficient in both stunted and non-stunted toddlers, most of it was used to meet energy needs, which hindered the role of protein in growth[20]. Analysis of responses to the SQ-FFQ showed that most calcium intake came from formula milk, breast milk, and dairy products (e.g., cheese, yogurt, ice cream, and packaged milk). The majority of stunted children tended to consume less formula milk compared to non-stunted children. Consistent with this study, previous research stated that toddlers with inadequate calcium intake were 11.4 times more likely to experience stunting compared to those with normal calcium intake[41]. Another study by Fikawati et al. in Central Jakarta indicated that toddlers with inadequate energy intake were six times more likely to suffer from stunting compared to those with normal energy intake[42].

Based on the results of the bivariate test (Table 3), no correlation between vitamin D, zinc, and iron intake adequacy and stunting was found. The SQ-FFQ analysis indicated that the primary sources of vitamin D intake among toddlers were formula milk, fish, and eggs (i.e., chicken and quail eggs). This study revealed that most toddlers in both the stunted and normal groups had insufficient vitamin D intake, resulting in no statistical difference. Furthermore, there was no observed correlation between vitamin D adequacy and stunting in this study, which, according to the researchers, might be due to the influence of other nutrients, such as vitamin B12, calcium, protein, and zinc, on children's growth[43]. A randomized controlled trial (RCT) conducted in North India also found no significant correlation between vitamin D deficiency (measured as 25-hydroxyvitamin D (25OHD)) and linear growth outcomes, including wasting, stunting, and underweight, in toddlers aged 6–30 months, both before and after supplementation with vitamin B12 and folic acid for six months[43].

The SQ-FFQ analysis also showed that most of toddlers' iron intake came from food sources such as

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formula milk, tofu, tempeh, and eggs (i.e., chicken and quail eggs), while the primary sources of zinc intake were formula milk, breast milk, and white rice. Stunted toddlers tended to consume plant-based proteins (i.e., tofu and tempeh) more frequently and had lower formula milk intake compared to non-stunted toddlers. No significant association was found between iron or zinc adequancy and stunting in this study. This was perhaps due to most toddlers having a history of illnesses in the past month, which likely disrupted the role of iron and zinc in supporting linear growth, as much of their intake was utilized for immune function instead[44]. This finding aligns with previous studies that reported no correlation between iron and zinc adequacy and stunting in toddlers[45,46].

No correlation was found between the nutritional adequacy levels of toddlers (vitamin D, zinc, and iron) and the incidence of stunting, with the majority of toddlers experiencing vitamin D deficiencies but having adequate levels of iron and zinc intake. The lack of association might be linked to dietary habits, particularly picky eating, which could significantly impact overall nutritional intake and adequacy. Such habits might have resulted in substantial variations in micronutrient and fiber intake that were not fully captured in the nutritional analysis, representing a limitation of this study. Interviews revealed that some toddlers consumed a limited variety of fruits and vegetables, avoided rice, and disliked eating meat.

Table 3. Factors Influencing the Incidence of Stunting in Toddlers Aged 6–59 Months in the Dawe Community Health Center Working Area

Variable	Category	Stunting Incidence		p-value
		Stunted N = 37 (n, %)	Not Stunted N = 49 (n, %)	
Food Security	Food-Secure	22 (59.5)	42 (85.7)	0.006*[a]
	Food-Insecure	15 (40.5)	7 (14.3)	
Parenting Patterns	Poor	22 (59.5)	14 (28.6)	0.004*[a]
	Good	15 (40.5)	35 (71.4)	
Energy Adequacy Level	Insufficient	19 (51.4)	4 (8.2)	< 0.001*[a]
	Sufficient	18 (48.6)	45 (91.8)	
Vitamin D Adequacy Level	Insufficient	27 (73.0)	26 (53.1)	0.060[a]
	Sufficient	10 (27.0)	23 (46.9)	
Calcium Adequacy Level	Insufficient	24 (64.9)	13 (26.5)	< 0.001*[a]
	Sufficient	13 (34.1)	36 (73.5)	
Iron (Fe) Adequacy Level	Insufficient	17 (45.9)	22 (44.9)	0.923[a]
	Sufficient	20 (54.1)	27 (55.1)	
Zinc Adequacy Level	Insufficient	4 (10.8)	3 (6.1)	0.457[b]
	Sufficient	33 (89.2)	46 (93.9)	
Maternal Height	At Risk	16 (43.2)	15 (30.6)	0.227[a]
	Not at Risk	21 (56.8)	34 (69.4)	
Maternal Education	Low	23 (62.2)	20 (40.8)	0.050*[a]
	High	14 (37.8)	29 (59.2)	
Maternal Occupation	Employed	11 (29.7)	21 (42.9)	0.212[a]
	Not Employed	26 (70.3)	28 (57.1)	
History of LBW	LBW	4 (10.8)	3 (6.1)	0.457[b]
	No LBW	33 (89.2)	46 (93.9)	
History of Prematurity	Premature	8 (21.6)	6 (12.2)	0.244[a]
	Not Premature	29 (78.4)	43 (87.8)	
History of Infection	With an Infection History	34 (91.9)	45 (91.8)	1.000[b]
	No Infection History	3 (8.1)	4 (8.2)	
Family Per Capita Income	Low	30 (81.1)	28 (57.1)	0.019*[a]
	High	7 (18.9)	21 (42.9)	
Number of Family Members	> 4 Members	22 (59.5)	27 (55.1)	0.686[a]
	≤ 4 Members	15 (40.5)	22 (44.9)	
Access to Health Services	Poor	21 (56.8)	22 (44.9)	0.276[a]
	Good	16 (43.2)	27 (55.1)	

Description: [a]Chi-Squre Test; [b]Fisher's Exact Test; *significant if p-value < 0.05

The chi-square test results (Table 3) indicate a correlation between household food security and stunting in toddlers. While most toddlers in both the stunted and non-stunted groups belonged to food-secure households, food insecurity was more common among stunted toddlers. Consistent with these findings, research by Masitoh et al. demonstrated a correlation between food security and stunting[47], where toddlers experiencing moderate food insecurity had a 1.24 times higher risk of stunting, which increased to 1.39 times under severe food insecurity conditions[47].

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Furthermore, the bivariate test results (Table 3) revealed that parenting patterns were significantly associated with stunting. Parenting patterns in this study encompassed various factors, including early breastfeeding initiation, feeding practices (e.g., exclusive breastfeeding, complementary feeding, and feeding methods), hygiene and sanitation, provision of psychosocial stimulation, and access to health services (e.g., the utilization of *posyandu* (integrated health posts) services, immunization completeness, prenatal care history, and overall healthcare access). The results of the questionnaire analysis revealed that most toddlers received breastfeeding as their first source of nutrition after birth, with colostrum provided to all. They were also bathed at least twice a day. Additionally, these results show that most mothers underwent routine prenatal check-ups, received counseling related to nutrition and health, and had deliveries assisted by healthcare professionals. Supporting these findings, research by Makatita et al. in Bogor Regency reported that poor maternal parenting practices increased the risk of stunting by 1.96 times compared to good maternal parenting practices[19].

Table 3 shows that family per capita income was correlated with stunting. Toddlers from families with low per capita income were more likely to be in the stunted group, while toddlers from families with high per capita income tended to be in the non-stunted group. Low family income results in reduced purchasing power, making it difficult to meet family needs, especially the needs for food, optimally[48,49]. In line with this study, research by Mariza et al. found that in families with low per capita income, the risk of stunting among toddlers increased by 0.395 times compared to families with sufficient per capita income[48].

Table 3 shows the correlation between maternal education and the incidence of stunting, with the majority of toddlers in the stunted group being born to mothers with low education. A higher level of education is often associated with better nutritional knowledge, which influences children's consumption patterns, particularly in terms of the selection of food ingredients for the children[50,51]. This study supports the findings of Rahmawati et al., which state that low maternal education increased the risk of stunting in children by up to 7.2 times compared to high maternal education[52].

The results of the multivariate test (Table 4) show that the dominant factors influencing the incidence of stunting among children aged 6–59 months at the Dawe Community Health Center were energy adequacy, calcium adequacy, and parenting patterns. The test yielded an R-squared value of 0.499, meaning that energy adequacy, calcium adequacy, and parenting patterns contributed to the incidence of stunting at 49.9%. The correlation between food security and stunting was only proved in bivariate analysis but not in multivariate analysis.

Table 4. Results of Multivariate Analysis of Dominant Factors Influencing the Incidence of Stunting in Toddlers Aged 6–59 Months in the Dawe Community Health Center Working Area

	Multivariate Analysis Multiple Logistic Regression†				
	S.E	**OR**	**CI 95%**	***p*-value**	**R-squared**
Poor Parenting Patterns for Toddlers	0.611	5.3	1.603–17.559	0.006*	0.499^
Low Toddler Energy Adequacy Level	0.694	7.7	1.963–29.818	0.003*	
Families with Toddlers at Risk of Food Insecurity	0.657	3.1	0.866–11.368	0.082	
Low Toddler Calcium Adequacy Level	0.614	5.2	1.565–17.365	0.007*	

Description: *Significant if *p*-value < 0.05; ^Nagelkerke R-Squared; OR-Odds Ratio; CI-Convidence Interval; † Multivariate Analysis Multiple Logistic Regression

Based on the multivariate test results (Table 4), inadequate energy intake increased the risk of stunting in children under five by 7.7 times. Adequate intake of macronutrients, especially energy, is crucial to addressing stunting in children[42]. As energy is the result of the accumulation of nutrients in the body, inadequate nutrient consumption hinders optimal energy fulfillment[53]. In other words, energy adequacy can be achieved if other nutrients are consumed at adequate amounts[54]. Prolonged inadequate energy intake can lead to chronic energy deficiency (CED), which inhibits linear growth in children[20,54]. Furthermore, an imbalance in energy intake can lower plasma insulin levels and hinder the synthesis of IGF-1 (Insulin-like Growth Factor 1), which disrupts linear growth, leading to weight loss and tissue damage[53,55]. Deficiencies in macronutrients, such as energy and protein, cause the body to experience nutrient shortages, leading to the depletion of energy and protein reserves as the body compensates for these deficiencies[56]. If this condition persists for a long time, energy and protein reserves will be severely depleted, resulting in damage to body tissues and an increased risk of stunting[57]. Additionally, prolonged energy deficiency can impair bone growth, as energy metabolism for bone mineralization is disrupted[57].

This study also revealed that calcium adequacy was a dominant factor in preventing stunting. Toddlers with low calcium intake had a 5.2 times higher risk of stunting compared to those with adequate calcium intake (Table 4). Calcium intake plays a crucial role in preventing stunting by supporting the development and maturation of bone chondrocytes, which are the primary cells involved in bone formation[41]. Calcium deficiency can disrupt bone mineralization, leading to suboptimal linear growth in children[58]. Consistent with this study's findings, previous research showed that toddlers with calcium deficiency had a 1.543 times higher risk of stunting compared to those with sufficient calcium intake[44]. Additionally, a study on preschool children aged 2–4 years in China revealed that consumption of dairy products high in calcium and protein was linked to improved linear growth[59].

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Nutritional intake in children is also influenced by factors such as parenting and family food security. This study shows that stunted toddlers were more likely to experience poor parenting compared to non-stunted toddlers. This was primarily due to inadequate exclusive breastfeeding practices among the respondents, who engaged in poor parenting, with many of them working or providing food and drinks other than breast milk before the toddlre's age of six months. Toddlers experiencing poor parenting had a 5.3 times higher risk of stunting than those experiencing good parenting (Table 4). Parenting patterns refer to the parenting practices conducted by fathers, mothers, caregivers, and other family members, which include feeding patterns, health maintenance, emotional support, and other practices aimed at supporting the process of child growth and development[1,21]. During the toddler years, parenting plays a crucial role as one of the indirect factors influencing a child's growth, development, and nutritional status[19].

Maternal education and knowledge play an important role in parenting. Mothers with higher levels of education are more likely to easily access information, particularly related to nutrition and health, which in turn supports optimal parenting[19]. This study shows that most toddlers experiencing poor parenting had mothers with low levels of education, while toddlers experiencing good parenting had mothers with higher levels of education. Parenting patterns, especially feeding practices, determine children's consumption patterns and eating habits[60]. Children with inappropriate consumption patterns and eating habits, which involve frequent food choices and reluctance to consume diverse and nutritionally balanced foods, are at a higher risk of stunting and malnutrition[60]. Good parenting practices, including selecting the right types of food, controlling portions, and feeding at the appropriate times, can help fulfill children's nutritional needs and promote optimal growth and development[20]. In contrast, inappropriate parenting practices, such as failing to provide exclusive breastfeeding or offering inappropriate complementary foods, can prevent children from receiving optimal nutrition in their early years, affecting their growth and development and increasing the risk of stunting[20].

Interview results revealed that most parents with poor parenting practices did not prioritize proper feeding for their children. This was evident in behaviors such as introducing nutritional sources other than breast milk (e.g., water, porridge, and formula milk) before the toddler's age of six months, irregular feeding schedules, and poor maternal hygiene practices, with many mothers washing their hands only when they felt dirty or just before feeding. These poor practices might be attributed to the mothers' limited knowledge of nutrition and health, particularly in relation to feeding practices. Low maternal education is often linked to a lack of knowledge and limited access to information regarding nutrition and health, which can lead to inappropriate parenting practices. Furthermore, poor parenting practices can be influenced by maternal employment. Working mothers often rely on caregivers or other family members for childcare, resulting in less direct interaction with their children. As a result, mothers have limited time to monitor their child's growth and development, as well as to ensure that their child's food intake is properly controlled[22]. This study revealed a trend where working mothers tended to have poorer parenting practices, while non-working mothers were more likely to apply better parenting. Toddlers with working mothers in this study were less likely to be exclusively breastfed compared to those with non-working mothers. The low level of knowledge and awareness about the importance of exclusive breastfeeding for child health may influence working mothers' decisions regarding continued exclusive breastfeeding. Previous studies have shown that higher maternal education serves as a protective factor against stunting in children of working mothers[23].

The multivariate test results (Table 4) show that food security was not a dominant factor influencing stunting in toddlers. No correlation was found between family food security and stunting, likely due to other factors, such as nutritional intake (energy and calcium), having a more significant impact. In this context, ensuring adequate nutritional intake in children, including sufficient energy and calcium, is crucial, as both play a significant role in child growth, particularly in linear growth. Deficiencies in calcium and energy can be risk factors for stunting, as children with inadequate nutrition, particularly during periods of rapid growth, are at higher risk of growth disturbances.

In addition, the lack of a correlation between food security and stunting inferred from the multivariate analysis also suggests that food security is an indirect factor influencing stunting. Specifically, food security affects stunting indirectly by limiting nutritional intake. In this study, food insecurity was primarily driven by low or unstable household income, as the majority of mothers were not employed and the fathers worked as casual laborers. This situation could lead to concerns about food availability and limitations in providing or purchasing food[61]. Low family income results in food insecurity due to limited access to food, as families have insufficient purchasing power to meet their needs, including food[56]. Limited purchasing power prevents families from buying adequate or nutritious food, leading to insufficient nutritional intake needed for children's growth, including energy [56,62]. Furthermore, in food-insecure, low-income households, food needs are often unmet due to the need to reduce both the quantity and quality of food, leading to inadequate nutritional intake[62]. The results of this study indicate that most households with low per capita income tended to have insufficient energy intake, while those with higher per capita income tended to have adequate energy intake. Low-income families may be at greater risk of food insecurity, which can lead to nutrient deficiencies and health issues due to inadequate nutritional intake, including stunting and malnutrition[56].

In general, this study employed a combination of 24-hour recall (with two repetitions) and the SQ-FFQ to provide a comprehensive overview of toddlers' nutritional intake in both the short and long term. Additionally, the HFIAS was used to assess household food security, offering insights into issues such as food availability, limited access, and reduced consumption. A limitation of this study is its use of an analytical research design with a cross-sectional approach, meaning that the

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study was conducted at a single point in time and, therefore, could not establish causal relationships between stunting and its contributing risk factors.

CONCLUSIONS

Family food security, parenting patterns, and the adequacy of calcium and energy intake were correlated with the incidence of stunting in toddlers aged 6–59 months at the Dawe Community Health Center. Parenting patterns and the adequacy of calcium and energy intake were the dominant factors influencing stunting in toddlers. Interventions focusing on education and counseling regarding nutrition and health, particularly feeding practices, for mothers of toddlers are necessary to improve mothers' understanding of their children's nutritional and health needs. This would enable them to implement better child-rearing practices, as the study found that parenting practices, especially the practices of feeding, were still inadequate.

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CONFLICT OF INTEREST AND FUNDING DISCLOSURE

All authors of this article have declared no conflicts of interest.

AUTHOR CONTRIBUTIONS

TR: designing the study, collecting data, analyzing and interpreting the data, and contributing to the manuscript preparation and writing; DRP and AFA: designing the study, reviewing, and editing.

REFERENCES

1. Putri, A. R. Aspek Pola Asuh, Pola Makan, dan Pendapatan Keluarga pada Kejadian Stunting. *Jurnal Kesehatan Tadulako* **6**, 7–12 (2020).
2. Putri, E. H. & Muniroh, L. The Relationship Between Characteristics of Toddlers, Socio-Economic, and Household Food Security with Stunting in Kampung 1001 Malam Surabaya, Surabaya. *Media Gizi Kesmas* **12**, 21–29 (2023). DOI:10.20473/mgk.v12i1.2023.21-29.
3. Ekaputi, R. *et al.* Gambaran Asupan Gizi Mikro pada Balita Stunting di Desa Kalumbatan Totikum Selatan Kabupaten Banggai Tahun 2022. *Jurnal Kesmas Untika Luwuk:Public Health Journal* **1**, 117–126 (2023).
4. Ernawati, A. Gambaran Penyebab Balita Stunting di Desa Lokus Stunting Kabupaten Pati. *Jurnal Litbang: Media Informasi Penelitian, Pengembangan dan IPTEK* **16**, 77–94 (2020). DOI:10.33658/jl.v16i2.194.
5. Supariasa, I. D. N. & Purwaningsih, H. Faktor-Faktor yang Mempengaruhi Kejadian Stunting pada Balita di Kabupaten Malang. *Karta Raharja* **1**, 55–64 (2019).
6. United Nations Children's Fund (UNICEF), World Health Organization (WHO) & International Bank for Reconstruction and Development/The World Bank. *Levels and Trends in Child Malnutrition*. (UNICEF / WHO / World Bank Group Joint Child Malnutrition Estimates, New York, 2023).
7. *Survei Kesehatan Indonesia (SKI) 2023 Dalam Angka*. (Kementerian Kesehatan RI, Jakarta, 2024).
8. Priyono, P. Strategi Percepatan Penurunan Stunting Perdesaan (Studi Kasus Pendampingan Aksi Cegah Stunting di Desa Banyumundu, Kabupaten Pandeglang). *Jurnal Good Governance* **16**, 149–174 (2020). DOI:10.32834/gg.v16i2.198.
9. Badan Kebijakan Pembangunan Kesehatan. *Buku Saku Hasil Survei Status Gizi Indonesia (SSGI) 2022*. (Kementerian Kesehatan RI, Jakarta, 2023).
10. Friska, E. & Andriani, H. Implementasi Kebijakan Percepatan Pencegahan Stunting pada Masa Pandemi COVID-19 di Kabupaten Kudus. *Jurnal Kesehatan Masyarakat (JKM)* **10**, 258–292 (2022). DOI:10.14710/jkm.v10i5.35317.
11. *Peraturan Bupati Kudus Nomor 10 Tahun 2023 Tentang Rencana Pembangunan Daerah Kabupaten Kudus Tahun 2024-2026*. *Bappeda Kabupaten Kudus* (2023).
12. Badan Pangan Nasional. *Peta Ketahanan Dan Kerentanan Pangan (Food Security Vulnerability Atlas) Tahun 2023*. (Badan Pangan Nasional, Jakarta, Indonesia, 2024).
13. BPS Kabupaten Kudus. *Hasil Pencacahan Lengkap Sensus Pertanian 2023 - Tahap 1 Kabupaten Kudus*. (BPS Kabupaten Kudus, Kabupaten Kudus, 2023).
14. BPS Kabupaten Kudus. *Kecamatan Dawe Dalam Angka 2023*. (BPS Kabupaten Kudus, Kabupaten Kudus, 2023).
15. Mahudeh, Rohmah, N. & Adriani, S. W. Correlation Between History of Infectious Disease with Stunting in Toddler. *Journal of Nursing Science Update (JNSU)* **10**, 193–200 (2023). DOI:10.21776/ub.jik.2022.010.02.15.
16. Aritonang, E. A., Margawati, A. & Dieny, F. F. Analisis Pengeluaran Pangan, Ketahanan Pangan dan Asupan Zat Gizi Anak Bawah Dua Tahun (Baduta) Sebagai Faktor Risiko Stunting. *Journal of Nutrition College* **9**, 71–80 (2020). DOI:10.14710/jnc.v9i1.26584.
17. Zuhra, F., Sydaryati, E., Y, E. & Aritonang. Relationship Between Energy Intake and Diarrhea with Stunting Incidence in Children Age 0-59 Months in Lhokseumawe City. *Budapest International Research and Critics Institute-Journal (BIRCI-Journal)* **5**, 30640–30645 (2022). DOI:10.33258/birci.v5i4.7223.

How to cite: *Rahmatika, T., Pangestuti, D. R., & Asna, A. F. (2024) The Association of Food Security, Parenting Patterns, and Nutritional Adequacy Levels with Stunting among Toddlers Aged 6–59 Months at the Dawe Community Health Center, Kudus: Hubungan Ketahanan Pangan, Pola Asuh, dan Tingkat Kecukupan Gizi dengan Kejadian Stunting Balita 6-59 Bulan di Puskesmas Dawe, Kabupaten Kudus. Amerta Nutrition, 8(3SP), 82–93.*

18. Siringoringo, E. T., Syauqy, A., Panunggal, B., Purwanti, R. & Widyastuti, N. Karakteristik Keluarga dan Tingkat Kecukupan Asupan Zat Gizi sebagai Faktor Risiko Kejadian Stunting Pada Baduta. *Journal of Nutrition College* **9**, 54–62 (2020). DOI:10.14710/jnc.v9i1.26693.
19. Makatita, S. & Djuwita, R. Relationship of Mothers' Parenting and Stunting in Toddlers Aged 12-36 Months in Bogor Regency, West Java Province, Indonesia in 2019. *Indian J Public Health Res Dev* **11**, 1463–1469 (2020).
20. Femidio, M. & Muniroh, L. Perbedaan Pola Asuh dan Tingkat Kecukupan Zat Gizi pada Balita Stunting dan Non-Stunting di Wilayah Pesisir Kabupaten Probolinggo. *Amerta Nutrition* **4**, 49–57 (2020). DOI:10.2473/amnt.v4i1.2020.49-57.
21. Yanti, N. D., Betriana, F. & Kartika, I. R. Faktor Penyebab Stunting pada Anak: Tinjauan Literatur. *Real in Nursing Journal* **3**, 1–10 (2020).
22. Pangestu, N. K., Lystiarini, A. D. & Cahyanti, L. Faktor-Faktor yang Berhubungan dengan Kejadian Stunting di Kecamatan Dawe. *Jourkep : Journal Keperawatan* **2**, 116–129 (2023).
23. Laksono, A. D., Sukoco, N. E. W., Rachmawati, T. & Wulandari, R. D. Factors Related to Stunting Incidence in Toddlers with Working Mothers in Indonesia. *Int J Environ Res Public Health* **19**, 10654 (2022). DOI:10.3390/ijerph191710654.
24. Adelina, F. A., Widajanti, L. & Nugraheni, S. A. Hubungan Pengetahuan Gizi Ibu, Tingkat Konsumsi Gizi, Status Ketahanan Pangan Keluarga dengan Balita Stunting (Studi pada Balita Usia 24-59 Bulan Di Wilayah Kerja Puskesmas Duren Kabupaten Semarang). *Jurnal Kesehatan Masyarakat (e-Journal)* **6**, 361–369 (2018).
25. Gunawan, D. C. D. & Septriana. Ketahanan Pangan Tingkat Rumah Tangga, Asupan Protein, dan Kejadian Stunting pada Anak Balita di Desa Planjan Kecamatan Saptosari Gunung Kidul. *Jurnal Medika Respati* **14**, 63–68 (2019).
26. Mentari, T. S. Faktor yang Berhubungan dengan Pola Asuh Ibu Balita Stunting (Studi Kasus di Puskesmas Bandar I Kabupaten Batang). (Universitas Negeri Semarang, Semarang, 2019).
27. Susanti, A. Faktor-Faktor yang Berhubungan dengan Perilaku Ibu Balita pada Kejadian Stunting di Kecamatan Tirtomoyo, Wonogiri. (Universitas Diponegoro, Semarang, 2023).
28. Lemaking, V. B., Manimalai, M. & Djogo, H. M. A. Hubungan Pekerjaan Ayah, Pendidikan Ibu, Pola Asuh, dan Jumlah Anggota Keluarga dengan Kejadian Stunting pada Balita di Kecamatan Kupang Tengah, Kabupaten Kupang. *Ilmu Gizi Indonesia* **5**, 123–132 (2022). DOI:10.35842/ilgi.v5i2.254.
29. Dinas Kesehatan Kabupaten Kudus. *Profil Kesehatan Kabupaten Kudus Tahun 2022*. (Dinas Kesehatan Kabupaten Kudus, Kabupaten Kudus, 2023).
30. *SK Gubernur Jawa Tengah No. 561/57 Tahun 2023 Tentang Upah Minimum Pada 35 (Tiga Puluh Lima) Kabupaten/Kota Di Provinsi Jawa Tengah Tahun 2024*. *Bappeda Provinsi Jawa Tengah* (Indonesia, 2023).
31. Atamou, L., Rahmadiyah, D. C., Hassan, H. & Setiawan, A. Analysis of the Determinants of Stunting among Children Aged below Five Years in Stunting Locus Villages in Indonesia. *Healthcare* **11**, 810 (2023). DOI:10.3390/healthcare11060810.
32. Mahayati, N. M. D., Sriasih, N. G. K., Lindayani, K. & Dewi, I. N. Hubungan Riwayat Berat Badan Lahir Rendah dengan Stunting di Kecamatan Ubud Gianyar. *Jurnal IMJ: Indonesia Midwifery Journal* **3**, 51–57 (2023).
33. Armawan, D. S., Hidayatuloh, H. S., Tresnasari, C. & Dharmmika, S. Scoping Review: Hubungan Prematur dengan Kejadian Stunting pada Anak Usia di Bawah 5 Tahun. *Bandung Conference Series: Medical Science* **2**, 664–671 (2022). DOI:10.29313/bcsms.v2i1.1313.
34. Andari, W., Siswati, T. & Pramashanti, B. A. Tinggi Badan Ibu sebagai Faktor Risiko Stunting pada Anak Usia 24-59 Bulan di Kecamatan Pleret dan Kecamatan Pajangan, Kabupaten Bantul, Yogyakarta. *Journal off Nutrition Collage* **9**, 235–240 (2020).
35. Kementerian Kesehatan RI. *Permenkes RI No.2 Tahun 2020 Tentang Standar Antropometri Anak*. *Kementerian Kesehatan RI* (Indonesia, 2020).
36. Nur Asih, R., Sunanto & Ekasari, T. Hubungan ASI Eksklusif dengan Kejadian Balita Stunting Usia 6-59 Bulan di Desa Jambekumbu. *Medical Journal of Al-Qodri: Jurnal Keperawatan dan Kebidanan* **8**, 143–149 (2023).
37. Coates, J., Swindale, A. & Bilinsky, P. *Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access: Indicator Guide: Version 3*. www.fantaproject.org (2007).
38. Kementerian Kesehatan RI. *Permenkes No. 28 Tahun 2019 Tentang Angka Kecukupan Gizi Yang Dianjurkan Untuk Masyarakat Indonesia*. *Kementerian Kesehatan RI* (Indonesia, 2019).
39. Annisa, R. R., Pradigdo, S. F. & Dina, R. P. Hubungan Keragaman Pangan dengan Kecukupan Gizi dan Status Gizi Ibu Menyusui di Daerah Pertanian Kecamatan Karangreja Kabupaten Purbalingga. *Jurnal Media Kesehatan Masyarakat Indonesia(MKMI)* **20**, 300–307 (2021). DOI:10.14710/mkmi.20.4.300-307.

How to cite: *Rahmatika, T., Pangestuti, D. R., & Asna, A. F. (2024) The Association of Food Security, Parenting Patterns, and Nutritional Adequacy Levels with Stunting among Toddlers Aged 6–59 Months at the Dawe Community Health Center, Kudus: Hubungan Ketahanan Pangan, Pola Asuh, dan Tingkat Kecukupan Gizi dengan Kejadian Stunting Balita 6-59 Bulan di Puskesmas Dawe, Kabupaten Kudus. Amerta Nutrition, 8(3SP), 82–93.*

40. Dahlan, M. S. *Statistik Untuk Kedokteran Dan Kesehatan : Deskriptif, Bivariat, Dan Multivariat Dilengkapi Aplikasi Menggunakan SPSS Edisi 6*. vol. 10 (Epidemiologi Indonesia, Jakarta, 2020).
41. Fithria *et al.* Energy, Protein and Calcium Intake are Determinants of Stunting in Toddler Aged 24 - 59 Months in Muna District. *International Journal of Chemical and Biochemical Sciences* **25**, 727–733 (2024). DOI:10.62877/85-IJCBS-24-25-19-85.
42. Fikawati, S., Syafiq, A., Ririyanti, R. K. & Gemily, S. C. Energy and Protein Intakes are Associated with Stunting among Preschool Children in Central Jakarta, Indonesia: A Case-control Study. *Malays J Nutr* **27**, 081–091 (2021). DOI:10.31246/mjn-2020-0074.
43. Chowdhury, R. *et al.* Vitamin-D Status and Neurodevelopment and Growth in Young North Indian Children: A Secondary Data Analysis. *Nutr J* **16**, 1–8 (2017). DOI:10.1186/s12937-017-0285-y.
44. Wulandary, W. & Sudiarti, T. Nutrition Intake and Stunting of Under-Five Children in Bogor West Java, Indonesia. *Journal of Food Sciences Nutrition* **7**, 1–6 (2021). DOI:10.24966/FSN-1076/100104.
45. Azmy, U. & Mundiastuti, L. Konsumsi Zat Gizi pada Balita Stunting dan Non-Stunting di Kabupaten Bangkalan. *Amerta Nutrition* **2**, 292–298 (2018). DOI:10.2473/amnt.v2i3.2018.292-298.
46. Susindra, Y., Wahyuningsih, R. T. & Werdiharini, A. E. Korelasi Faktor Sosial Ekonomi dan Tingkat Konsumsi Zat Gizi dengan Kejadian Stunting. *Jurnal Kesehatan* **8**, 124–133 (2020). DOI:10.25047/j-kes.v8i2.160.
47. Masitoh, S., Nurokhmah, S. & Ronoatmodjo, S. The Correlation Between Food Insecurity Level and Stunting in Indonesia. *Jurnal Ilmu Kesehatan Masyarakat* **13**, 385–398 (2023). DOI:10.26553/jikm.2022.13.2.385-398.
48. Mariza, M. & Putriningtyas, N. D. Kejadian Stunting pada Balita: Studi Kasus di Desa Kebondalem, Kabupaten Pemalang. *Indonesian Journal of Public Health and Nutrition* **3**, 204–214 (2023). DOI:10.15294/ijphn.v3i2.59678.
49. Rahayu, R. M., Pamungkasari, E. P. & Wekadigunawan, C. The Biopsychosocial Determinants of Stunting and Wasting in Children Aged 12-48 Months. *Journal of Maternal and Child Health* **03**, 105–118 (2018). DOI:10.26911/thejmch.2018.03.02.03.
50. Lemaking, V. B., Manimalai, M. & Djogo, H. M. A. Hubungan Pekerjaan Ayah, Pendidikan Ibu, Pola Asuh, dan Jumlah Anggota Keluarga dengan Kejadian Stunting pada Balita di Kecamatan Kupang Tengah, Kabupaten Kupang. *Ilmu Gizi Indonesia* **5**, 123–132 (2022). DOI:10.35842/ilgi.v5i2.254.
51. Wicaksono, R. A. *et al.* Risk Factors of Stunting in Indonesian Children Aged 1 to 60 Months. *Paediatr Indones* **61**, 12–9 (2021). DOI:10.14238/pi61.1.2021.12-9.
52. Rahmawati, N. F., Fajar, N. A. & Idris, H. Faktor Sosial, Ekonomi, dan Pemanfaatan Posyandu dengan Kejadian Stunting Balita Keluarga Miskin Penerima PKH di Palembang. *Jurnal Gizi Klinik Indonesia* **17**, 23–33 (2020). DOI:10.22146/ijcn.49696.
53. Maulidah, W. B., Rohmawati, N. & Sulistiyani, S. Faktor yang Berhubungan dengan Kejadian Stunting pada Balita di Desa Panduman Kecamatan Jelbuk Kabupaten Jember. *Ilmu Gizi Indonesia* **2**, 89–100 (2019). DOI:10.35842/ilgi.v2i2.87.
54. Damayanti, R. A., Muniroh, L. & Farapti, F. Perbedaan Tingkat Kecukupan Zat Gizi dan Riwayat Pemberian ASI Eksklusif pada Balita Stunting dan Non Stunting. *Media Gizi Indonesia* **11**, 61–69 (2017). DOI:10.20473/mgi.v11i1.61-69.
55. Nelly SD Situmeang, Etti Sudaryati & Jumirah. Correlation of Parenting and Nutrient Intake with Stunting in Children 24-59 Months. *Britain International of Exact Sciences (BIoEx) Journal* **2**, 280–285 (2020). DOI:10.33258/bioex.v2i1.147.
56. Rizky Maulidiana, A. & Sutjiati, E. Low Intake of Essential Amino Acids and Other Risk Factors of Stunting among Under-Five Children in Malang City, East Java, Indonesia. *J Public Health Res* **10**, (2021). DOI:10.4081/jphr.2021.2161.
57. Anshori, L. Moh., Fikawati, S. & Sutrisna, B. Relationship Energy and Protein Intake with the Incidence of Stunting Among Toddler Aged (25-60 Months) in Mangkung Village, District of Central Lombok. *Indian J Public Health Res Dev* **11**, 1593–1598 (2020). DOI:10.37506/ijphrd.v11i3.1858.
58. Jayusman, D. D. K., Aritonang, E. Y. & Lubis, Z. Comparison of Calcium and Iron Intake of Stunting and Non-Stunting Toddlers in Langkat Regency. *International Journal of Research and Review (ijrrjournal.com)* **8**, 501–508 (2021).
59. Duan, Y. *et al.* Association between Dairy Intake and Linear Growth in Chinese Pre-School Children. *Nutrients* **12**, 2576 (2020). DOI:10.3390/nu12092576.
60. Tang, X. *et al.* The Effect of Risk Accumulation on Childhood Stunting: A Matched Case-Control Study in China. *Front Pediatr* **10**, (2022). DOI:10.3389/fped.2022.816870.

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61. Sihite, N. W., Nazarena, Y., Ariska, F. & Terati, T. Analisis Ketahanan Pangan dan Karakteristik Rumah Tangga dengan Kejadian Stunting. *Jurnal Kesehatan Manarang* **7**, 59–66 (2021). DOI:10.33490/jkm.v7iKhusus.550.
62. Safitri, C. A. & Susila Nindya, T. Hubungan Ketahanan Pangan dan Penyakit Diare dengan Stunting pada Balita 13-48 Bulan di Kelurahan Manyar Sabrangan, Surabaya. *Amerta Nutrition* **1**, 52–33 (2017). DOI:10.2473/amnt.v1i2.2017.52-61.

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