The Effect of Toddler Nutrition Patterns on Toddler Growth (1-5 years) in Tandem Hilir I Village, Deli Serdang Regency

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Abstract

The toddler period is a critical period or "golden age" that determines the quality of future growth and development. Globally, stunting remains a major challenge, with an estimated 150.2 million children affected in 2024. In Indonesia, the prevalence of stunting reached 21.5% according to the 2023 Indonesian Health Survey (SKI). Optimal nutrition through proper diet is a key determinant in preventing linear growth failure and maintaining toddler health. This study aims to analyze the relationship between toddler nutritional intake patterns and growth trends among toddlers aged 1-5 years in Tandem Hilir I Village, Deli Serdang District. This study used a quantitative analytical observational design with a cross-sectional approach. The study was conducted in April 2025 in the working area of the Tandem Hilir I Village Health Center. The study sample consisted of 58 mothers of toddlers selected using the total sampling (saturated sample) technique. The independent variable (eating habits) was measured using a structured questionnaire adapted from the Balanced Nutrition Guidelines with a Cronbach's alpha value of 0.82. The dependent variable (growth) was assessed through longitudinal data in the Health Card (KMS) or Maternal and Child Health Book (Buku KIA) for the last three months. The data were statistically analyzed using the chi-square (X^2) test with a significance level of alpha = 0.05. Bivariate analysis revealed that 71.42% of toddlers with good eating patterns experienced optimal growth, while 34.78% of toddlers with poor eating patterns tended to experience stunting or weight loss. The chi-square test results showed a calculated X^2 value of 7.5, which was greater than the X^2 table value of 2.841 ($p < 0.05$), indicating a statistically significant relationship between nutritional intake patterns and toddler growth. There is a clear correlation between the quality of eating habits and the physical growth trajectory of children in the study location. Growth failure is more influenced by low nutritional literacy and the transition to low-nutrient processed foods

Keywords: Toddler Diet, Growth, Stunting, Deli Serdang, Balanced Nutrition

INTRODUCTION

The toddler (under three years old) and preschool (under five years old) periods are important stages in the growth and development process (Clark & Cifelli, 2020). The preschool years, especially ages 3-5, are a period of human growth and development (Fazrin & Radjak, 2023). Globally, stunting remains a significant challenge. By 2024, an estimated 150.2 million children under five (23.2%) will be affected, mostly in Asia (51%) and Africa (43%), reflecting a slowdown in progress since 2012 and highlighting the urgent need for sustained multisystem interventions (WHO, 2020). The 2023 Indonesian Health Survey shows that the prevalence of stunting in children under five (0–59 months) in Indonesia is 21.5%, including 5.7% severe stunting (95% CI 5.6–5.9) and 15.8% stunting (95% CI 15.6–16.0), according to the TB/U indicator. The prevalence of stunting (TB/U indicator) among toddlers (0–59 months) in North

Sumatra was 18.9%, consisting of 5.7% severe stunting and 13.2% stunting. Among infants (0–23 months), the prevalence based on PB/U is 14.8% (4.8% severe stunting; 10.0% stunting) (Kemenkes RI, 2023).

Growth and development during this period will determine the child's success in the next period. The growth and development period at this age is fast-paced and unrepeatable, which is why it is often referred to as the golden age (Park et al., 2022). If children grow up in a situation of chronic malnutrition, they will become stunted (Akbar et al., 2023). Stunting in children reflects a condition of growth failure in toddlers due to chronic malnutrition, resulting in children who are too short for their age (Raiten & Bremer, 2020). Chronic malnutrition occurs from the time the baby is in the womb until the age of 2 years. Stunting only becomes apparent after the baby is 2 years old (Wells, 2022). Short (stunted) and very short (severely stunted) toddlers are those whose length (LB/A) or height (HB/A), for their age, is below the WHO-MGRS (Multicenter Growth Reference Study 2006) standard.

Proper nutrition plays a crucial role in the optimal development of children (Pinto et al., 2023). The period of growth and development is an important time for establishing healthy eating patterns, which can impact children's health and quality of life into adulthood (Wu et al., 2022). Children who are still in their growth period certainly need a balanced nutritional intake to support their growth and development (Parikh et al., 2021). Therefore, it is important to know which nutrients help children grow and develop. The following explains the nutritional components needed to support healthy growth (Inzaghi et al., 2022). Protein is one of the essential nutrients needed for children's physical and cognitive development. Protein helps build and repair body tissues, aids muscle growth, and plays a role in the production of important enzymes and hormones (Paoli et al., 2024). Good sources of protein include meat, fish, eggs, nuts, and dairy products.

Carbohydrates are the main source of energy for children. Carbohydrates provide the energy needed for activities, play, and learning (Amawi & Alkasasbeh, 2024). To support children's growth and development, choose complex carbohydrates such as whole-wheat bread, brown rice, and vegetables rather than processed carbohydrates high in sugar, such as candy or cookies (Rao et al., 2022). Fat is also important for children's nerve development and brain function (Naveed et al., 2020). Omega-3 fatty acids, found in fatty fish, avocados, and nuts, are an important component in building healthy brain tissue. Avoid saturated and trans fats, which can increase the risk of heart disease (Niforou et al., 2022). Vitamins and minerals also play an important role in children's development. Calcium helps form strong bones and teeth, while iron supports red blood cell formation and brain function (Ayu et al., 2023). Ensure that

children get enough vegetables, fruits, dairy products, and other food sources rich in vitamins and minerals. Parents must closely monitor preschoolers' diets (Esposito et al., 2023). An excessive preference for certain foods at this age can lead to malnutrition. Parents must be creative in varying their children's meals. This includes selecting ingredients, cooking techniques, and presentation so that children do not get bored and remain interested in eating. When planning menus, parents should always adhere to a balanced diet. As a guideline, children should consume foods containing plant-based protein, animal protein, fat, carbohydrates, vitamins, minerals, fiber, and sufficient water every day.

Eating habits in humans are very important because they can fulfill human needs, such as shaping attitudes and confidence in food choices (Bumbac et al., 2020). This study focuses on the village of Tandem Hilir I in Deli Serdang Regency because its population in 2024 will reach 2.05 million, with 23.96% of them being children, making it important to analyze toddler intake patterns as a basis for parent evaluation and intervention. Therefore, parents and educators play a major role in shaping children's habits, so it is important to ensure they have access to healthy, nutritious foods to meet their growth and development needs. Thus, the purpose of this study is to analyze the nutritional intake patterns of toddlers (1-5 years) in Tandem Hilir I Village, Deli Serdang Regency.

METHODS

Study Design and Location

This study used a quantitative analytical observational design with a cross-sectional approach to analyze the correlation between diet and toddler growth. The study was conducted in the service area of the Tandem Hilir I Village Health Center, Deli Serdang District, Indonesia, in April 2025. This location was chosen because its demographic profile represents an area that is transitioning from rural to urban in North Sumatra.

Participants and Sampling

The target population included all mothers with toddlers aged 1-5 years living in the Tandem Hilir I area. Total sampling (saturated sampling) was used, in which all members of the population who met the inclusion criteria were invited to participate. This approach was chosen given the relatively small size of the target population at the village level, ensuring maximum representation of the local context.

Of the total population, 58 respondents met the following inclusion criteria: (1) mothers with children aged 1–5 years; (2) children who lived permanently with their mothers to ensure consistent observation of eating patterns; and (3) children who were free from congenital

disorders or chronic diseases (e.g., tuberculosis or severe chronic diarrhea) that could interfere with growth assessment. Although the sample size of 58 was specific to this location, a post hoc power analysis showed that this sample provided sufficient power to detect medium to large effect sizes in Chi-square analyses at an alpha level of 0.05.

Variables and Instrumentation

The independent variable, dietary habits, was measured using a structured questionnaire adapted from the Indonesian Balanced Nutrition Guidelines (*Pedoman Gizi Seimbang*). This instrument evaluated three domains: (1) frequency and type of snacks, (2) food composition (macronutrient balance), and (3) quality and quantity of daily intake. Responses were measured using a Likert scale, and total scores were categorized as "Good" or "Poor" based on a cutoff point determined by the median score to ensure a balanced distribution in the analysis.

The dependent variable was the growth trend, evaluated using longitudinal data from the Child Health Card (KMS) or the Mother and Child Health Book (BKIA). Growth was operationalized as a categorical variable: "Increasing" (weight gain following the growth curve for three consecutive months) and "Stable/Decreasing" (weight remained constant or fell below the previous month's trend). This categorization aligns with the national growth-monitoring standards set by the Indonesian Ministry of Health for primary health care facilities.

Validity and Reliability

To ensure construct validity, the questionnaire was reviewed by experts, resulting in a Content Validity Index (CVI) of 0.88. A pilot study was conducted with 15 mothers outside the study sample to test internal consistency. The reliability test yielded a Cronbach's alpha coefficient of 0.82, exceeding the minimum threshold of 0.70, confirming the instrument's reliability for the study population.

Ethical Considerations

This study was conducted in accordance with the Declaration of Helsinki. All participants were given a detailed explanation of the study's objectives and procedures. Written consent was obtained from each respondent prior to data collection. Participation was voluntary, and the confidentiality of all personal and health data was strictly maintained.

Data Analysis

Data were analyzed using SPSS software. Univariate analysis was performed to describe the frequency distribution of respondent characteristics. For bivariate analysis, the chi-square (X^2) test was used to explore the relationship between dietary patterns and growth trends.

RESULTS

Based on Table 1, most children aged 1-5 years have a good diet (35 children, 60.34%), while a small number have a poor diet (23 children, 39.66%). Most children aged 1-5 years in Tandem Hilir II village experienced weight gain, namely 38 children (65.51%), while a small number experienced weight loss or remained at the same weight as last month, namely 20 children (34.49%).

Table 1. Characteristics of Weight Gain and Eating Patterns in Children Aged 1-5 Years

Variable	f	%
Dietary Habit		
Good	35	60.34
Bad	23	39.66
Weight Gain		
Up	38	65.51
Down/Stay	20	34.49
Total	**58**	**100**

Based on Table 2, it can be seen that there is a relationship between diet and the growth of children aged 1-5 years, namely that children who have a good diet mostly experience weight gain, i.e., 25 children (71.42%), while those who have a poor diet mostly experience weight loss/remain the same, i.e., 8 children (34.78%). The chi-square test results show a calculated X^2 value of 7.5. Based on this table, for n=58, alpha=0.05, and X^2 table=2.841, the X^2 count value is greater than the X^2 table (7.5>2.841). Because the X2 count exceeds the X2 table value, H0 is rejected, and H1 is accepted, indicating a relationship between diet and the growth of children aged 1-5 years.

Table 2. Cross tabulation between Dietary Patterns and Growth in Children Aged 1-5 Years

Dietary Habit	Weight Gain				Total	
	Up		Down/Stay			
	f	%	f	%	f	%
Good	25	71.42	10	28.58	35	100
Bad	8	34.78	15	65.22	23	100
X2 calculation = 7.5	**ά=0,05**					

DISCUSSION

Cross-tabulation analysis shows a clear relationship between eating habits and weight gain in children aged 1–5 years. Children with healthier eating patterns tend to experience positive weight gain, suggesting that adequate, balanced nutrition supports optimal growth in early childhood. Conversely, children with poor eating habits tend to experience stagnation or weight loss, indicating nutritional deficiencies or an unbalanced diet. These findings highlight the critical role of proper eating practices in supporting healthy physical development and emphasize the need for targeted nutritional interventions in early childhood to prevent growth disorders.

These results are in line with Reksa Pauji's (2021) findings, which reported a significant relationship between nutritional status and the growth and development of children aged 1–5 years, indicating that better nutritional status is associated with better developmental outcomes (Pauji & Lisca, 2023). Research by Wega Upendra Sindhughosa shows that a lack of animal protein, such as consuming it less than twice a week, is strongly associated with stunting, with an odds ratio of 76.6 and a confidence interval indicating strong predictive value. On the other hand, plant protein consumption has no statistically significant association with stunting (Sindhughosa & Sidiartha, 2023). Awalia et al. (2023) found significant correlations between protein intake ($p = 0.013$), vitamin A ($p = 0.019$), and vitamin C ($p = 0.011$) and children's growth and development.

In addition, this study confirms the "Double Burden of Malnutrition" theory at the household level. We observed that many toddlers with poor weight gain had high consumption of "empty calorie" snacks. Malnutrition and nutritional deficiencies are nutritional problems caused by inadequate or non-compliant nutritional intake that does not meet standards or is not in accordance with the nutritional needs required for a child's age over a long period of time, thereby hindering the growth and development of toddlers (Pauji & Lisca, 2023). Parents should be provided with information and guidance on what and how to feed their children, and this promotional strategy should also target parents' unhealthy eating habits to help them improve their diet, thereby encouraging their children to follow their example (Mahmood et al., 2021). Meeting nutritional needs is a key factor in achieving growth and development outcomes in line with genetic potential (Mayar & Astuti, 2021). The nutritional status of parents and their access to appropriate, healthy foods and supplements will be crucial factors in optimal child growth, even before pregnancy (Mart et al., 2022). Therefore, this study contradicts the traditional assumption that growth failure is caused exclusively by food insecurity or poverty; it is increasingly caused by low nutritional literacy and the "nutritional transition" occurring in Indonesian villages.

The implications for local health policy are significant and require immediate changes in strategy. Based on our findings, we propose three specific and actionable recommendations for the Deli Serdang Health Office: Change the Focus of Posyandu: The role of *Posyandu* (Integrated Health Centers) should evolve from passive growth monitoring (weighing and recording) to active nutrition counseling. *Kader* (community health workers) should be trained to use the "Isi Piringku" (My Plate) visual aid to conduct brief, structured counseling during monthly sessions. Protein-First Intervention: Local government interventions should prioritize subsidies or distribution of local animal protein (such as eggs or local fish) rather than

providing carbohydrate-rich supplement biscuits. Digital Food Literacy: Given the high smartphone penetration in rural areas, the Mother and Child Health Book (KMS) should be integrated with a simple mobile-based "self-check diet" tool to help mothers monitor their children's daily intake diversity in real time.

Study Limitations Despite its significant findings, this study has several limitations. First, the cross-sectional design limits the ability to determine a causal relationship between diet and growth, as data were collected at a single point in time. Second, the use of total sampling with a small sample size (n=58) in one village may limit the generalizability of the results to larger groups with different socioeconomic backgrounds. Third, dietary data collection relied on parental recall, which may have introduced recall bias. Future research should use a longitudinal cohort design with a larger sample and a 24-hour dietary recall to improve nutritional assessment.

CONCLUSIONS

Based on the data analysis, most toddlers in Tandem Hilir I Village generally have good eating habits and positive growth trends. Statistical analysis shows a significant relationship between diet and toddler growth (ages 1-5 years). Poor nutritional intake significantly increases the risk of weight stagnation or weight loss. Therefore, it is recommended that health workers at the Tandem Hilir I Health Center strengthen nutrition education programs. Special attention should be given to families with toddlers identified as having poor eating habits to prevent long-term growth failure (stunting). Further research is recommended to explore other factors that affect growth, such as parenting styles, history of infectious diseases, and socioeconomic status.

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