THE RELATIONSHIP BETWEEN EATING PATTERNS AND MINIMUM WEIGHT GAIN AND NUTRITIONAL STATUS AMONG CHILDREN AGED 2–5 YEARS AT PANDANWANGI PUBLIC HEALTH CENTER

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ABSTRACT

Introduction: *Eating patterns play an important role in supporting optimal growth and nutritional status in early childhood. However, weight gain and nutritional status are influenced by multiple factors beyond dietary intake alone.* ***Objective:*** *This study aims to examine the relationship between eating patterns, minimal weight gain, and nutritional status among children aged 2–5 years. The research was conducted due to the persistent nutritional challenges in early childhood, which are often influenced by family eating habits.* ***Methods:*** *This study used an observational analytic design with a cross-sectional approach. The population consisted of 65 children aged 2–5 years at Pandanwangi Public Health Center, Malang City, selected using total sampling. Eating patterns were assessed using a Food Frequency Questionnaire (FFQ), weight gain was measured using digital scales, and nutritional status was assessed based on weight-for-age (BB/U) according to WHO standards. Data were analyzed using Chi-Square and Fisher's Exact tests with a significance level of* $\alpha = 0.05$. ***Results:*** *Most children had adequate eating patterns (69.2%), experienced weight gain (73.8%), and had normal nutritional status (70.8%). Statistical analysis showed no significant relationship between eating patterns and weight gain* ($p = 0.888$) *or nutritional status* ($p = 0.928$). ***Conclusion:*** *Eating patterns were not significantly associated with weight gain or nutritional status. Child growth outcomes are influenced by multifactorial conditions, indicating the importance of comprehensive interventions.*

Keywords: *eating patterns, weight gain, nutritional status, early childhood, growth*

INFO ARTIKEL

Riwayat Artikel: (diisi oleh editor jurnal)
Diterima:19 Oktober 2025
Disetujui: 12 Desember 2025
Tersedia secara online 31 Desember 2025

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INTRODUCTION

Background

Diet plays an important role in children's growth, especially during the early developmental phase. Indonesia continues to face serious nutritional problems, including both undernutrition and overweight (Ministry of Health of the Republic of Indonesia, 2022). Minimal weight gain that does not meet the standard may reflect an unbalanced diet, which is influenced by environmental factors such as parental education and family eating habits (Vollmer et al., 2017). Therefore, understanding the relationship between dietary patterns and minimal weight gain in children is essential for formulating effective interventions.

Parental involvement is crucial in shaping children's eating habits, particularly during the preschool years when children are not yet able to choose appropriate foods. Children raised in families with healthy dietary patterns tend to have better nutritional intake (Agustina, 2019). An unbalanced diet, such as high consumption of processed foods and low intake of fruits and vegetables, is associated with the risk of malnutrition, while parents' nutritional knowledge significantly influences children's food preferences (Luh et al., 2021).

Nutritional problems in Indonesia are reflected in the high prevalence of obesity and stunting. More than 30% of children experience nutritional disorders due to socioeconomic factors, education, and access to healthy food (WHO; SKI Data, 2023; Ministry of Health of the Republic of Indonesia, 2022). A preliminary study at Pandanwangi Health Center showed that 30% of children aged 2–5 years were undernourished and another 20% were overweight, indicating an unbalanced diet. This condition is often caused by parents'limited nutritional knowledge and unhealthy eating habits.

Although many studies have examined childhood nutrition issues, the specific relationship between dietary patterns and minimal weight gain has been insufficiently explored. Most studies only discuss overall nutritional conditions without considering family factors and social dynamics that influence children's eating habits (Sari et al., 2023). In fact, a healthy diet for children aged 2–5 years should include balanced carbohydrates, proteins, fats, vitamins, and minerals.

Good nutritional status indicates that children's nutrient needs are being met, whereas poor nutritional status whether stunting or obesity affects the immune system, organ health, and mental development. Deficiencies in vitamins and minerals can disrupt metabolism and growth, and even increase the risk of stunting if energy intake is inadequate (Darmono, 2021; WHO, 2020). Meanwhile, overnutrition can increase the risk of metabolic diseases in the future (Ministry of Health, 2022).

Nutritional interventions need to be carried out in an integrated manner through nutritional status monitoring, providing supplements when necessary, and offering nutrition education to parents through workshops or counseling at health facilities (WHO, 2020; Kresnadi, 2021). Such education is expected to improve parents' awareness of the importance of a balanced diet to support optimal growth. Based on this background, this study was conducted to determine the relationship between dietary patterns, minimal weight gain, and nutritional status among children aged 2–5 years.

RESEARCH METHOD

This study used an observational analytic method with a cross-sectional approach to assess the relationship between eating patterns, minimum weight gain, and nutritional status among children aged 2–5 years, where exposure and outcomes were measured simultaneously. The study was conducted at Pandanwangi Health Center, Blimbing District, Malang City, in November 2025. The population consisted of 65 children aged 2-5 years, all of whom were included as samples through total sampling. Inclusion criteria included children aged 2-5 who attended the posyandu in the previous month and parents/caregivers willing to participate, while exclusion criteria applied to children with chronic illnesses. The research variables consisted of eating patterns (independent) and minimum weight gain and nutritional status (dependent).

Research instruments included an FFQ questionnaire for eating patterns, a weighing sheet with a digital scale to measure minimum weight, and BB/U anthropometry based on WHO standards to assess nutritional status. The instruments were validated through previous research, with correlation coefficients ranging from 0.265 to 0.787 and a Cronbach's alpha value of 0.863, indicating strong internal consistency. Data collection techniques included ethical approval, informed consent, structured interviews using questionnaires, and standardized weight measurements.

Data processing involved editing, coding, and tabulating using SPSS. Univariate analysis was used to present frequency distributions of each variable, while bivariate analysis using the Chi-Square test assessed the relationship between eating patterns and dependent variables. Fisher's Exact Test was used when Chi-Square requirements were not met. The significance level was set at $\alpha = 0.05$, and relationships were considered significant when p-value < 0.05.

The ethical clearance code for this research was issued by the Health Reasearch Ethics Committee (KEPK) of ITSK RS dr. Soepraoen Malang, with registrasion number KEPK-EC/361/III/2025.

RESEARCH RESULT

This study was conducted at Pandanwangi Health Center and at Posyandu RW 1 and RW 2 in Pandanwangi Village, Malang City. The health center serves as a primary healthcare facility providing outpatient care, maternal and child health services, immunization, basic laboratory testing, and health promotion. Its service area is located on flat terrain at an elevation of approximately 444 meters above sea level and covers the surrounding community. Posyandu RW 1 and RW 2 function as community-based health posts, particularly supporting maternal and child health services. Overall, these locations facilitated the collection of community health data, resulting in a total sample of 65 respondents.

Respondent Characteristics

Table 1. Respondent Characteristics

Data	f	%
Child's Age		
24-36 months	29	44.6
37-48 months	24	36.9
49-60 months	12	18.5
Total	65	100
Child's Gender		
Male	36	55.4
Female	29	44.6
Total	65	100
Parental Education		
College	8	12.3
Elementary School	2	3.1
Senior High School	52	80
Junior High School	3	4.6
Total	65	100
Parental Income		
1.000.000-2.000.000	54	83.1
2.500.000-3.500.000	10	15.4
Total	65	100

Table 1 shows that for the age characteristics, nearly half of the children were aged 24–36 months, totaling 29 individuals (44.6%), followed by those aged 37–48 months with 24 individuals (36.9%), and a smaller proportion aged 49–60 months with 12 individuals (18.5%). For the sex characteristics, most of the children were male, totaling 36 individuals (55.4%), while nearly half were female, totaling 29 individuals (44.6%). For the parents' education level,

the majority had completed senior high school, totaling 52 individuals (80%), while a smaller proportion had completed college (8 individuals; 12.3%), junior high school (3 individuals; 4.6%), and elementary school (2 individuals; 3.1%). For parental income, almost all respondents were in the income group of Rp1,000,000–2,000,000, totaling 54 individuals (83.1%), while a smaller proportion had an income of Rp2,500,000–3,500,000, totaling 10 individuals (15.4%).

Table 2. Respondent Special Data

Data	f	%
Eating Pattern		
Adequate	45	69.2
Poor	20	30.8
Total	65	100
Minimal Weight Gain		
Increased	48	73.8
Not increased	17	26.2
Total	65	100
Nutritional Status		
Normal	46	70.8
Overnutrition	19	29.2
Total	65	100

Based on the results in Table 2, for the variable of minimal weight gain, most respondents experienced weight gain, totaling 48 individuals (73.8%), while nearly half did not experience weight gain, totaling 17 individuals (26.2%). For the variable of nutritional status, most respondents had good nutritional status, totaling 46 individuals (70.8%), while nearly half had excess nutritional status, totaling 19 individuals (29.2%). For the dietary pattern variable, most respondents had an adequate dietary pattern, totaling 45 individuals (69.2%), while nearly half had a poor dietary pattern, totaling 20 individuals (30.8%).

Analysis of Eating Patterns with Minimal Weight Gain in Children Aged 2–5 Years

Table 3. Relationship Between Eating Patterns and Minimal Weight Gain in Children Aged 2–5 Years

Eating Pattern	Minimal Weight Gain		Total	p-*value*	r
	Increased	Not increased			
Enough	33	12	45	0.888	0.573
Not enough	15	5	20		
	48	17	65		

Based on the Chi-Square test results in Table 3, a p-value of 0.888 ($p > 0.05$) was obtained. This indicates that there is no significant relationship between dietary patterns and minimal weight gain among the respondents. Based on the risk ratio analysis ($r = 0.573$),

respondents with adequate dietary patterns had a lower risk of experiencing minimal weight gain compared to those with poor dietary patterns, although this difference was not statistically significant.

Analysis of Eating Patterns with Nutritional Status in Children Aged 2–5 Years

Table 4. Relationship Between Eating Patterns and Nutritional Status in Children Aged 2–5 Years

Eating Pattern	Nutritional Status		Total	p-value	r
	Normal	Overnutrition			
Adequate	32	13	45	0.928	0.575
Poor	14	6	20		
	46	19	65		

Based on the Chi-Square test results in Table 4, a p-value of 0.928 ($p > 0.05$) was obtained. This indicates that there is no significant relationship between eating patterns and nutritional status among the respondents. Based on the risk ratio analysis ($r = 0.575$), it can be seen that respondents with adequate eating patterns have a lower risk of having overnutrition compared to those with poor eating patterns, although this difference is not statistically significant

DISCUSSION

Eating Patterns in Children Aged 2-5 Years

The study results show that most children had adequate eating patterns (45 children; 69.2%), while 20 children (30.8%) were in the poor category. Balanced nutrition is essential for physical growth and cognitive development in early childhood. Adequate macronutrients and micronutrients are required to meet energy needs and bodily functions, while deficiencies in protein or iron may inhibit tissue growth and trigger anemia, which affects cognitive development (De Onis et al., 2019). Children's eating patterns are strongly influenced by the family environment, including meal frequency, food types, and eating atmosphere. An ideal eating pattern includes staple foods, animal and plant proteins, fruits, vegetables, and healthy snacks (Qolbi et al., 2020). Irregular meals and lack of food diversity often contribute to nutritional problems in toddlers, as found in the study by Damayanti et al. (2025).

Previous studies show that children with unbalanced nutritional patterns have a higher risk of malnutrition, including stunting and wasting, which can lead to long-term impacts on brain development, learning ability, and productivity (McCoy et al., 2022). In this study, the adequate eating patterns in most children may explain the tendency for weight gain and good

nutritional status, although adequate eating patterns do not necessarily indicate fully balanced nutrition quality.

Minimal Weight Gain in Children Aged 2-5 Years

Weight gain in children aged 2-5 years is a key indicator of adequate energy intake and overall health, as it reflects whether daily macro- and micronutrient needs are being met. Angliana et al. (2023) emphasized that weight gain is not only influenced by eating patterns but also by illnesses such as diarrhea, respiratory infections, and digestive disorders, which may reduce appetite and nutrient absorption. Hasibuan & Siagian (2020) also showed that poor eating behaviors such as eating while playing, being picky, or having irregular meal schedules significantly affect weight gain, even when portion sizes are sufficient; thus, the quality of eating patterns is more important than quantity. WHO standards referenced in Padiatrica (2019) state that adequate weight gain during this age is a crucial benchmark for determining optimal growth. Modern growth studies describe a normal weight gain range of 2.0–2.5 kg per year (approximately 0.16–0.21 kg per month) in children with proper diets and good health, meaning that weight gain far below this range is categorized as minimal gain and may indicate nutritional problems or inadequate food intake (Schwartz, 2024).

Thus, monitoring weight gain must be conducted systematically and continuously to detect early signs of growth deviation. If weight gain does not reach the reference range of 2.0–2.5 kg per year, this may signal inadequate energy, protein, or overall food quality, or indicate health conditions that hinder metabolism or nutrient absorption. Therefore, insufficient weight gain should be viewed as an important nutritional risk indicator requiring immediate intervention to maintain optimal growth and nutritional status.

Nutritional Status in Children Aged 2-5 Years

Most respondents in this study had normal nutritional status (46 children; 70.8%), while 19 children (29.2%) were categorized as overnutrition. This indicates that children's food intake generally meets energy needs but may not always be balanced. According to Anisa et al. (2019), proper nutrition is essential for optimal health, while poor nutritional status may occur due to inadequate food quality and quantity. This is supported by Yunartha (2015), who states that nutritional status is influenced by consumption patterns, where malnutrition may arise from incorrect food composition, poor food distribution, lack of knowledge, poverty, and inappropriate eating habits. Additional factors such as impaired nutrient absorption may also affect children's nutritional status.

Poor nutrition affects physical and mental development, leading to shorter stature, thinness, and lower cognitive abilities (Jumiatun, 2019). Anisa et al. (2019) also explain that early malnutrition reduces productivity and leads to smaller brain size with cell volume 15–20% lower. Family factors, including improper food provision, are major contributors to nutritional problems (Sukmiati & Nafisah, 2021). Although most children in this study had good nutritional status, the considerable proportion of overnutrition highlights the need for education on food selection, portion control, and reducing intake of foods high in sugar, fat, and calories to maintain ideal nutritional status.

Analysis of Eating Patterns and Minimal Weight Gain in Children Aged 2–5 Years

The Chi-Square test showed a p-value of 0.888 ($p > 0.05$), indicating no significant relationship between eating patterns and minimal weight gain. This finding aligns with Angliana et al. (2023), who explain that weight gain is influenced not only by eating patterns but also by infections such as diarrhea, respiratory diseases, vomiting, and digestive disorders that interfere with nutrient absorption. Hasibuan & Siagian (2020) further note that improper eating behaviors such as eating while playing, lack of meal schedules, and picky eating—can reduce the effectiveness of food intake even when portions are adequate, showing that dietary quality matters more than quantity.

Damayanti et al. (2025) also emphasize that seemingly adequate eating patterns may not lead to weight gain if calorie and protein content do not meet daily needs. This suggests that toddler growth is influenced by direct factors like nutrient intake and infectious disease, as well as indirect factors such as parenting patterns, parental knowledge, and socioeconomic status. Therefore, minimal weight gain is a multifactorial condition requiring comprehensive assessment, including food quality, health history, eating behavior, parenting patterns, and environmental factors

Analysis of Eating Patterns and Nutritional Status in Children Aged 2-5 Years

The Chi-Square test showed a p-value of 0.928 ($p > 0.05$), indicating no significant relationship between eating patterns and nutritional status. This finding is consistent with the basic concept of balanced nutrition, where both excessive and insufficient intake can cause nutritional problems (Sulistyoningsih, 2011). The main portion of the meal is small, Frequent consumption of high-sugar snacks may increase blood glucose levels and lead to excess energy intake, which is subsequently stored as fat and contributes to increased body weight. Nutritional status represents the balance between nutrient intake and needs, and is influenced by eating

pattern assessment and recommended lifestyle changes when nutritional imbalance is detected (Sumarlin, 2021). Factors such as knowledge, eating habits, perceptions, and socioeconomic conditions also play roles in determining nutritional status (Hanim, 2020).

Feeding toddlers aims to meet nutrient requirements for growth and health, making food selection and feeding practices crucial. Mistakes in choosing or giving food can harm child development (Perdani et al., 2017). Consistent with Prakhasita (2018), nutritional status is an accumulation of long-term eating patterns, meaning short-term dietary changes do not immediately affect nutritional status. Success in achieving adequate nutrition heavily depends on parents' knowledge and skills in preparing balanced meals.

According to the researcher, these findings highlight that nutritional status is multifactorial and not solely determined by eating patterns. Although eating patterns are important, other factors including infection history, food quality and variety, parental knowledge, and feeding practices have significant contributions. Children with seemingly adequate eating patterns may not achieve good nutritional status if other supporting factors are lacking. Therefore, improving nutritional status requires a holistic approach involving parental education, food quality enhancement, improved feeding practices, and infection prevention to ensure optimal nutritional outcomes

The findings of this study indicate that eating patterns were not significantly associated with minimal weight gain or nutritional status among children aged 2–5 years. This suggests that child growth and nutritional outcomes are influenced by multiple interacting factors rather than dietary patterns alone. Although most respondents had adequate eating patterns, this did not automatically result in optimal weight gain or nutritional status. Factors such as infection history, food quality and diversity, feeding practices, parental knowledge, and socioeconomic conditions play important roles in determining child growth. Children may consume food regularly, but if the nutritional composition does not meet energy and protein requirements, weight gain may remain suboptimal. These findings support the concept that nutritional status is multifactorial and cumulative in nature. Therefore, interventions aimed at improving child growth should not only focus on meal frequency but also emphasize food quality, balanced nutrient intake, appropriate feeding behavior, and parental education to ensure sustainable nutritional improvement.

CONCLUSION

This study concludes that there is no significant relationship between eating patterns and minimal weight gain or nutritional status among children aged 2–5 years at Pandanwangi

Public Health Center. Although most children had adequate eating patterns and normal nutritional status, these factors alone were insufficient to determine optimal growth outcomes. Child growth is influenced by various biological, behavioral, and environmental factors beyond eating patterns.

The findings of this study imply that nutritional interventions for children aged 2–5 years should adopt a comprehensive approach. Health programs should not only focus on dietary patterns but also emphasize parental education on food quality, balanced nutrition, feeding practices, and infection prevention. Routine growth monitoring at Posyandu and health centers should be strengthened to detect early growth deviations. Future research is recommended to include additional variables such as infection history, parenting patterns, and micronutrient intake to better understand determinants of child growth and nutritional status.

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