

# Biological analysis of growth patterns in children aged 6–59 months: correlation between nutritional intake and body weight status

*Suci Ramadhinna, Emy Fitriahadi\* , Luluk Rosida*

Study Program of Midwifery, Faculty of Health Sciences, Universitas Aisyiyah Yogyakarta, Yogyakarta, Indonesia

**Abstract.** Children under five years old (Balita) are in a critical period of growth and development, thus requiring an appropriate feeding pattern to prevent nutritional problems. A preliminary study in February 2025 also found that 17.39% of children under five experienced moderate to severe malnutrition. This study aims to determine the relationship between feeding patterns and the nutritional status of children under five in the working area of the Gedongtengen Puskesmas, Yogyakarta City. This quantitative research used a cross-sectional design with an observational analytic approach. The population consisted of mothers and children aged 6 – 59 months, totaling 427 individuals, with a sample of 81 respondents selected using purposive sampling. Data were collected through a feeding pattern questionnaire and nutritional status measurement using the Weight-for-Age (BB/U) indicator. Analysis was performed univariately and bivariately using the Chi-Square test. The majority of respondents implemented an appropriate feeding pattern (90.1%), and most children under five had a normal nutritional status (86.4%). The statistical test results showed a significant relationship between feeding patterns and the nutritional status of children under five ( $p$ -value=0.000). The conclusion is that there is a significant relationship between feeding patterns and the nutritional status of children under five.

## 1 Introduction

Children under five are in a critical phase of the life cycle, as rapid growth and development occur during this period, requiring special attention to nutrition and parenting. According to a UNICEF report (2023), the number of children under five worldwide reaches about 676 million, with the largest proportion in developing countries still facing challenges in meeting children's basic needs, including nutritious food and optimal parenting. The Central Bureau of Statistics (2023) recorded that in Indonesia, the number of children under five is about 23 million, spread across various regions with diverse socioeconomic conditions. Meanwhile, in the Special Region of Yogyakarta, the number of children under five in 2023 was recorded at 181,632 [1].

Underweight or undernutrition is a significant nutritional status problem in Indonesia. The main causes of undernutrition in children under five include infectious diseases, non-exclusive breastfeeding for the first 6 months, mother's knowledge level, mother's education level, feeding patterns, economic status, inadequate environmental sanitation, and infectious diseases [2]. The short-term impacts of nutritional problems in children under five include impaired motor, cognitive, and speech development, while long-term impacts include decreased reproductive health, loss of attention or focus, and increased risk of infection and non-communicable diseases [3].

The United Nations International Children's Emergency Fund (UNICEF) in 2020 mentioned that 167 million children under five worldwide were underweight or undernourished. Most children under five in South Asia experienced undernutrition at 52%, followed by West Asia at 15%, and Southeast Asia at 17%. The 2018 Basic Health Research (Riskesdas) results recorded the prevalence of undernutrition in Indonesian children under five at 13.8%. The 2021 Indonesian Nutritional Status Study (SSGI) recorded that 17% of children under five in Indonesia were underweight, and this increased to 17.1% in 2022.

The government plays an important role in addressing the nutrition of children under five to improve their nutritional status through programs such as Supplementary Feeding (PMT), Exclusive Breastfeeding, and the Healthy

---

\* Corresponding author: [ennyfitriahadi@unisavogya.ac.id](mailto:ennyfitriahadi@unisavogya.ac.id)

Indonesia Card (KIS) to ensure healthcare access for poor families. In addition, education about balanced diets is carried out through Posyandu (Integrated Health Posts) to monitor the growth and development of children under five, aiming to reduce the rates of severe malnutrition and stunting in Indonesia [4-5]. The role of midwives in managing the nutritional status of children under five involves monitoring growth and development through routine checks at Posyandu, providing education about exclusive breastfeeding, complementary feeding (MPASI), and balanced nutrition. Midwives also perform early detection of nutritional problems, refer children who need further care, and provide counseling on nutritious diets and the importance of maintaining children's health [5].

Previous research has shown a significant relationship between the feeding pattern of children under five and their nutritional status at Posyandu Karang Jati, Bergas District. Out of 47 respondents, the majority had a good feeding pattern (61.7%), and 78.7% of children under five had good nutritional status. The chi-square statistical test resulted in a  $p=0.002$ , indicating a significant relationship between the feeding pattern and the nutritional status of children under five. This suggests that a regular, balanced, and nutritious feeding pattern can contribute to a better nutritional status for children under five. Therefore, mothers are expected to pay more attention to their children's diet by providing varied, appealing, and nutrient-rich food [6].

Several studies indicate a significant relationship between mothers' knowledge of nutrition and feeding patterns with the nutritional status of children under five in Srimulyo Village, Piyungan Bantul Puskesmas working area in 2022. Out of 92 respondents, 52.2% of mothers had good nutritional knowledge, and 51.1% applied good feeding patterns. The nutritional status of the children was also generally good, at 81.5%. The chi-square and Kendall's tau statistical tests showed  $p=0.032$  for the relationship between mothers' nutritional knowledge and children's nutritional status, and  $p=0.031$  for the relationship between feeding patterns and children's nutritional status, meaning there is a significant relationship between the two variables. This indicates that increasing mothers' nutritional knowledge and improving feeding patterns can contribute to a better nutritional status for children under five [7-8].

The nutritional status of preschool children in a community in Southwest Nigeria was generally good, with a stunting prevalence of 8.1%, underweight 7.7%, and wasting 1.9%, making stunting the most common indicator of malnutrition. The majority of children (78.2%) ate more than three times a day, and 96.4% had a regular eating pattern. A significant relationship was found between skipping meals and wasting ( $p<0.05$ ), suggesting that irregular eating patterns can contribute to malnutrition. Therefore, education for parents about the importance of a balanced diet and good eating habits needs to be improved to support the optimal growth and development of preschool children [8].

Data from the Yogyakarta Special Region Health Office in 2023 showed that Yogyakarta City had the highest prevalence of underweight children in the province at 11.8%, with Gedongtengen Public Health Center recording the highest rate at the city level at 15%. This makes the area particularly important to investigate. Based on a preliminary study conducted at the Gedongtengen Puskesmas in Yogyakarta City in February 2025, data from the nutritionist showed a total of 351 children under five were weighed: 6 children (1.71%) had severely underweight, 55 children (15.68%) had underweight, 260 children (74.02%) had normal weight, and 30 children (8.55%) were at risk of overweight.

## 2 Method

This research is a quantitative study with an observational analytic design using a cross-sectional approach. The study was conducted in the working area of the Gedongtengen Puskesmas in August 2025. The population in this study was all mothers and children aged 6–59 months in the working area of the Gedongtengen Puskesmas, Yogyakarta City, in August 2025, totaling 427 individuals. The sample was calculated using the Slovin formula, yielding a sample of 81 respondents, selected through purposive sampling based on inclusion and exclusion criteria. The data collection technique used primary data with a feeding pattern questionnaire adopted from Prakhasita (2018), which had been previously tested for validity and reliability, ensuring its suitability for assessing feeding practices and digital scales/baby scales to measure the children's weight for nutritional status assessment. Data analysis included univariate and bivariate analysis. Statistical analysis used the Chi-Square Test. This research received approval from the Aisyiyah University Yogyakarta Ethics Committee No. 4714/KEP-UNISA/VII/2025.

### 3 Results and Discussion

#### 3.1 Results

Data collection was carried out using a feeding pattern questionnaire and digital scales/baby scales to measure the children's weight for nutritional status assessment. The study sample consisted of 81 mothers and children aged 6–59 months. The research results obtained are as follows:

**Table 1.** Frequency distribution of mother and child characteristics

Characteristic	Amount (n)	Prosentase (%)
<b>Age</b>		
<21	1	1,2
21-35	66	81,5
>35	14	17,3
<b>Education</b>		
Primary School (SD)	1	1,2
Junior High School (SMP)	22	27,2
Senior High School/Vocational (SMA/SMK)	47	58,0
Higher Education	11	13,6
<b>Occupation</b>		
Housewife (IRT)	52	64,2
Employee	13	16,0
Entrepreneur	11	13,6
Teacher	5	6,2
<b>Family Income</b>		
<UMK (Minimum Wage)	19	23,5
>UMK (Minimum Wage)	62	76,5
<b>Child's Gender</b>		
Male	42	51,9
Female	39	48,1

Based on Table 1, the majority of respondents were in the age group 21–35 years (n=66, 81.5%). Respondents aged >35 years totaled 14 people (17.3%), while those aged <21 years were only 1 person (1.2%). Regarding education level, most respondents had their last education as Senior High School/Vocational (n=47, 58.0%). Respondents with Junior High School education numbered 22 people (27.2%), Higher Education 11 people (13.6%), and Primary School 1 person (1.2%). The occupation category shows that the majority of respondents were Housewives (IRT) (n=52, 64.2%). Respondents working as employees totaled 13 people (16.0%), entrepreneurs 11 people (13.6%), and teachers 5 people (6.2%). In terms of family income, most respondents had an income >UMK (n=62, 76.5%), while respondents with an income <UMK totaled 19 people (23.5%). Table 1 also shows that out of 81 child respondents, 42 were Male (51.9%) and 39 were Female (48.1%).

**Table 2.** Feeding pattern

Feeding Pattern	Amount (n)	Prosentase (%)
Appropriate	73	90,1
Inappropriate	8	9,9
<b>Total</b>	<b>81</b>	<b>100</b>

Based on Table 2, the majority of respondents had an appropriate feeding pattern, totaling 73 people (90.1%). Meanwhile, respondents with an inappropriate feeding pattern numbered 8 people (9.9%).

**Table 3.** Nutritional status of children under five (BB/U)

Nutritional Status (BB/U)	Amount (n)	Prosentase (%)
Severely Underweight	0	0
Underweight	11	13,6
Normal Weight	70	86,4
Risk of Overweight	0	0

Nutritional Status (BB/U)	Amount (n)	Prosentase (%)
<b>Total</b>	<b>81</b>	<b>100</b>

Based on Table 3, it is known that the majority of children under five had a nutritional status according to the W/A indicator in the normal weight category, totaling 70 children (86.4%). Children in the underweight category were recorded as 11 people (13.6%). No children were found in the severely underweight or risk of overweight categories.

**Table 4.** Relationship between feeding pattern and nutritional status of children under five

Feeding Pattern	Nutritional Status of Children				Total	p-value	Nilai r
	Severely Underweight	Underweight	Normal Weight	Risk of Overweight			
Appropriate	0 0%	3 3,7%	70 86,4%	0 0%	73 90,1%	0,000	0,641
Inappropriate	0 0%	8 9,9%	0 0%	0 0%	8 9,9%		
<b>Total</b>	0 0%	11 13,6%	70 86,4%	0 0%	81 100%		

Based on Table 4, all children under five with normal weight nutritional status came from the group with an appropriate feeding pattern, totaling 70 children (86.4%). Conversely, children under five with underweight nutritional status were mostly found in the group with an inappropriate feeding pattern, totaling 8 children (9.9%), while in the appropriate feeding pattern group there were only 3 children (3.7%). The results of the correlation test using the chi-square between the feeding pattern and the nutritional status of children under five showed a p-value=0.000 (p<0.05) with a correlation coefficient of r=0.641, which means there is a significant relationship between the feeding pattern and the nutritional status of children under five with a strong correlation strength.

### 3.2 Discussion

#### 3.2.1 Feeding pattern of children under five

The results of this study show that the majority of respondents have implemented a feeding pattern in the appropriate category, namely 73 respondents (90.1%), and the inappropriate category, 8 respondents (9.9%), where the mother respondents provide food according to the type of food, amount of food, and feeding schedule for the child. Based on the questionnaire assessment, the scores in the inappropriate category were also not too low, meaning the difference in feeding patterns between the two groups was not overly significant. That feeding children under five is the mother's way of meeting the child's nutritional needs, both in terms of the quantity and quality of food provided, thus supporting optimal nutritional status for the child [9].

The choice of food type was appropriate because it contained balanced menu nutrients based on "Isi Piringku" (My Plate). The food content included staple foods, side dishes, vegetables, and fruits. Mother respondents applied a timely feeding schedule with a frequency of 3 times a day and had snacks between main meals. who state that a good feeding pattern for children under five is very important to establish as an effort to meet nutritional needs. An unsuitable eating pattern will lead to excessive or insufficient nutrient intake. A mother who has instilled good eating habits with good nutrition early on will certainly find it easy to guide her child to eat because the child has been introduced to good food at a previous age [10].

The appropriate feeding pattern for children under five in this study may also be influenced by the mother's education. Based on Table 1, the education of mother respondents in this study was mostly Senior High School/Vocational (47 people) and Higher Education (11 people). Thus, the higher the parents' education, the higher their knowledge and experience in caring for their child under five, especially regarding feeding patterns. Higher education makes it easier for mothers to receive and apply information related to children's health and nutrition, thereby supporting the formation of good feeding patterns and contributing to optimal nutritional status for children under five. Found that mother's education is a significant factor affecting complementary feeding practices among children under five in Indonesia and also confirmed that parental education is positively related to the diversity of children's food consumption, which ultimately affects nutritional status and the risk of stunting [10,11].

Based on the research results in Table 1, the majority of respondents were Housewives (52 people). Child growth is an important matter that must be known by everyone, especially mothers. More attention is needed regarding the

growth of children under five, based on the fact that malnutrition occurring during this golden period is irreversible (cannot be recovered). The mother's behavior in providing food intake to the child is also influenced by the mother's employment status. Working mothers result in less time spent with the child, thus reducing the mother's attention to the child's development. The impact of working mothers also depends on the type of work the mother does. Mothers with heavy work will experience physical fatigue, so the mother will tend to choose to rest rather than taking care of her child [11].

Based on the questionnaire results, the lowest scores were found on the statements "My child eats on time" and "I make a feeding schedule for my child." This indicates that some mothers have not consistently applied a regular feeding schedule for their children, which can impact the overall eating pattern of the child, including decreased appetite and an imbalance in daily nutrient intake. This finding aligns with the research by Naysilla et al. (2025), which showed that although most children have sufficient eating frequency (3–5 times per day), there is still irregularity in meal times and low diversity in food types, especially vegetables and fruits and that the application of feeding rules, including setting meal schedules, a pleasant eating atmosphere, and appropriate feeding procedures, significantly influences the improvement of children's nutritional status, where after the implementation of feeding rules, the proportion of infants with good nutritional status increased from 33.3% to 66.6%. This confirms that structured and consistent mealtime settings are an important factor in forming appropriate feeding patterns and supporting the fulfillment of nutrition and optimal growth in children [12-13].

The researcher believes that the appropriateness of the mother's feeding pattern for her child is due to the mother having good education, mother's employment status, and high family income. In addition, the feeding pattern for children under five is one of the mother's efforts to feed her child with the aim of meeting food needs both in quality and quantity. The feeding pattern is one form of parental care that can affect the nutritional status of children under five. If the child's nutrition is not met, malnutrition will occur.

### 3.2.2 *Nutritional status of children under five*

Nutritional status is a measure of a person's physical well-being based on the food consumed and how they utilize the nutrients in their body. One of the impacts of poor nutrition on children under five is a decrease in intelligence level/IQ [19]. Nutritional problems in children under five are health and well-being disorders resulting from an imbalance between nutrient intake and the body's need for food, and the influence of infectious disease interaction. An imbalance in nutrient intake leads to either under- or over-nutrition. Good nutritional status is needed to determine the presence or absence of malnutrition in children under five [14].

Good or normal nutritional status is demonstrated by the harmony between Weight-for-Age (BB/U). Nutritional status in children under five is influenced by nutritional intake and parenting patterns in feeding. The nutrient intake entering the child's body will determine their nutritional status and health [10]. Nutritional status is very important for parents to know, especially those with children under five, because this age group shows rapid physical growth, thus requiring high nutrients per kilogram of body weight and is the golden period related to growth and development in the subsequent phase [14].

This study shows that the majority of children under five have a nutritional status based on the BB/U indicator in the normal weight category, totaling 70 children (86.4%), and children in the underweight category were recorded as 11 people (13.6%). No children were found in the severely underweight or risk of overweight categories. This result illustrates that the majority of children under five have good nutritional status, but a small proportion still experience undernutrition that needs attention. This is because regular feeding means providing all the necessary nutrients, both for energy and for optimal growth and development. Thus, whatever food is given, children under five must receive all the substances appropriate to their needs, so that their bodies can grow and develop [10]. The researcher believes that the nutritional status of children under five is an important indicator of health and development. This period is when children experience rapid growth, so adequate nutrient intake is essential to support physical and cognitive development.

### 3.2.3 *Relationship between feeding pattern and nutritional status of children under five in the working area of Gedongtengen Puskesmas, Yogyakarta*

The research results show a significant relationship between feeding patterns and the nutritional status of children under five, with a p-value=0.000 ( $p<0.05$ ). All children under five with normal weight nutritional status (86.4%) came from the group with an appropriate feeding pattern, while most children under five with underweight nutritional status (9.9%) were found in the group with an inappropriate feeding pattern. This shows that appropriate feeding practices,

both in terms of type, amount, and feeding schedule, play an important role in supporting the optimal growth of children under five.

A relationship between the feeding pattern and the nutritional status of children under five at Posyandu Karang Jati, indicated by a p-value of 0.002. The period under five is often stated as a critical time for optimizing brain growth and development, which is greatly influenced by parental care, one of which is the feeding pattern as the entry point for fulfilling various nutrient requirements. However, sometimes poor feeding patterns can affect the child's nutritional status [10].

Regular and appropriate feeding patterns play an important role in determining the nutritional status of children under five. This includes the mother's efforts in menu planning, processing, serving, and providing food with the aim of meeting the necessary nutrients to support the child's growth and development process [10]. The better the feeding pattern of a child under five, the better the nutritional status of that child, because food consumption affects a person's nutritional status. A good daily diet will provide all the nutrients the body needs, so if a person's food consumption is good, their nutritional status will also be good.

The researcher believes that the health of children under five is highly influenced by the type, amount, schedule, and quality of the food consumed. The nutrient content in food plays a major role in body health, so the diet becomes one of the main factors determining the child's nutritional status. The application of a good diet by parents will have a positive impact on improving the nutritional status of children under five. In addition, appropriate feeding practices are an important strategy in overcoming nutritional problems and supporting the optimization of child growth. With the support of appropriate nutrient intake, good nutritional status in children under five can be more easily achieved. This verse explains that humans are commanded to consume food that is lawful and good. This shows the importance of choosing food that is not only compliant with Islamic law but also beneficial for health and physical well-being. In addition, the verse also warns humans not to follow the footsteps of Satan, which can lead to bad deeds, including in choosing food that is not lawful or harmful to health. Satan is depicted as a clear enemy, who constantly tries to mislead mankind in various matters, including in the aspect of food consumption [15].

## 4 Conclusion

Based on the results of the research on the Relationship between Feeding Pattern and Nutritional Status of Children Under Five in the Working Area of Gedongtengen Puskesmas, Yogyakarta, the researcher can conclude that: The feeding pattern in children under five in the working area of the Gedongtengen Puskesmas is mostly in the appropriate category (n=73, 90.1%) and inappropriate (n=8, 9.9%). The nutritional status of children under five in the working area of the Gedongtengen Puskesmas is mostly in the normal weight category (n=70, 86.4%) and the underweight category (n=11, 13.6%). The results of the statistical test showed a p-value=0.000, which is <0.05, and an r=0.641, meaning there is a significant relationship between the Feeding Pattern and the Nutritional Status of Children Under Five in the Working Area of Gedongtengen Puskesmas, Yogyakarta, with a strong correlation strength. Recommendation: It is recommended that mothers of children under five improve their knowledge and skills in food processing and presentation for children under five so that they can apply an appropriate feeding pattern according to the child's nutritional needs and age stages.

## References

- [1] UNICEF, "The State of the World's Children 2023: For Every Child, Vaccination," *UNICEF*, 2023. <https://www.unicef.org/reports/state-of-worlds-children-2023> (<https://www.unicef.org/reports/state-of-worlds-children-2023>)
- [2] A. Nuradhiani, "Faktor Risiko Masalah Gizi Kurang pada Balita di Indonesia," *J. Ilm. Kesehatan Masy. Dan Sos.*, vol. 1, no. 2, pp. 17–25, 2023, doi: 10.59024/jikas.v1i2.285.
- [3] S. Ratna and S. Endang, "Faktor Penyebab Gizi Kurang Pada Balita," *J. Gizi Ilm.*, vol. 10, pp. 1–9, 2023.
- [4] I. Suryani and E. Purnamasari, "Peran pemerintah dalam penanganan gizi balita melalui program kesehatan masyarakat," *J. Kesehatan Masy.*, vol. 18, no. 2, pp. 123–131, 2022.
- [5] A. Wulandari and M. Sari, "Peran Bidan Dalam Pemantauan Status Gizi Balita di Posyandu," *J. Kebidanan dan Kesehatan*, vol. 9, no. 1, pp. 45–52, 2021.
- [6] R. Susanti and R. A. Putri, "Hubungan Pola Pemberian Makan Balita dengan Status Gizi di Posyandu," *J. Holistics Heal. Sci.*, vol. 5, no. 2, pp. 296–305, 2023.
- [7] H. Adnani and K. K. Rettob, "Pengetahuan ibu Balita tentang gizi dan pola pemberian makan dengan status gizi Balita," *Heal. Sci. Pharm. J.*, vol. 7, no. 1, pp. 167–174, 2023, doi: 10.32504/hspj.v7i1.784.

- [8] O. O. Mary, O. K. Jerffson, and O. J. Abiodun, "Nutritional status and eating patterns of preschool children in a community in south-west Nigeria," *Niger. J. Nutr. Sci.*, vol. 40, no. 2, pp. 30–37, 2019.
- [9] D. Nelissa, L. Tiandari, M. Puspitaningsya, M. N. Amaliyah, and G. T. Lazuardi, "Skrining Status Gizi dan Kelainan Kulit pada Anak Pra Sekolah di Tk Islam Al-Fathonah," vol. 1, no. 1, pp. 42–45, 2023.
- [10] Novita Aryani and Henny Syapitri, "Hubungan Pola Pemberian Makan Dengan Status Gizi Balita Di Bagan Percut," *J. Keperawatan Prior.*, vol. 4, no. 1, pp. 135–145, 2021, [Online]. Available: <https://jurnal.unprimdn.ac.id/index.php/jukep/article/view/1402/861>
- [11] E. Yunitasari *et al.*, "Factors associated with complementary feeding practices among children aged 6 – 23 months in Indonesia," *BMC Pediatr.*, pp. 1–8, 2022, doi: 10.1186/s12887-022-03728-x.
- [12] O. Samosir, D. Radjiman, and F. Aninditya, "Food consumption diversity and nutritional status among children aged 6 – 23 months in Indonesia : The analysis of the results of the 2018 Basic Health Research," *PLoS One*, vol. 18, pp. 1–13, 2023, doi: 10.1371/journal.pone.0281426.
- [13] A. Naysilla, T. Tamin, D. Ulandari, and R. Suraya, "Analisis Perilaku Makan Pada Anak Balita Dan Implikasinya Terhadap Status Gizi Di Kelurahan Kotamatsum IV Medan, Sumatera Utara Aura," *J. Ilmu Psikol. Dan Kesehat.*, vol. 01, no. 04, pp. 237–244, 2025.
- [14] Meliliana, D. Siregar, M. Wati, M. Hidayat, T. Simanjuntak, and E. Sinulingga, "Pengaruh Penerapan Feeding Rules Terhadap Status Gizi Bayi Usia 6- 12 Bulan di Klinik Pratama Hadijah," *MAHESA Malahayati Heal. Student J.*, vol. 4, no. 3, pp. 1079–1091, 2024.
- [15] R. Sari and K. Agustin, "Analisis Hubungan Status Gizi Dengan Kejadian Penyakit Infeksi Pada Anak Balita Di Posyandu Wilayah Puskesmas Colomandu I," *J. Ilmu Keperawatan dan Kebidanan*, vol. 14, no. 1, pp. 171–178, 2023.