

# Association Between Complementary Feeding and Nutritional Status Among Children Aged 6–24 Months in Sinunukan 1 Village, Mandailing Natal

**Arniati Hanum Putri Hrp, Yulinda Aswan, Sakinah Yusro Pohan**

Universitas Aifa Royhan Di Kota Padangsidempuan

Correspondence: hanumputri024@gmail.com

Received: January 12, 2026 | Revised February 12, 2026 | Accepted: March 18, 2026

## ABSTRACT:

**Background:** Malnutrition is a nutritional problem caused by an imbalance between food intake and energy and nutrient requirements, especially protein. Globally, there are 148.1 million children under the age of 5 who suffer from malnutrition, with 45.6 million of them experiencing wasting. In Indonesia, child health is a major concern because the health status of children reflects the future of the nation's development. One of the determinants of optimal nutritional status in children aged 6-24 months is the accuracy of complementary feeding.

**Aims:** This study aims to determine the relationship between complementary feeding and the nutritional status of children aged 6-24 months in Sinunukan 1 Village, Sinunukan District, Mandailing Natal Regency in 2024.

**Method:** This study was quantitative in nature with an analytical observational design using a cross-sectional study approach. The study population and sample involved 40 mothers with children aged 6-24 months in Sinunukan 1 Village, which were selected using total sampling technique. The instruments used included questionnaires and anthropometric measurements. Data analysis was performed using the chi-square statistical test.

**Result:** The results showed that the majority of respondents (62.5%) provided complementary feeding in the appropriate category, with 47.5% of them having children with normal nutritional status. Conversely, in the inappropriate complementary feeding category (37.5%), 27.5% of children had abnormal nutritional status. The chi-square test obtained a p-value of 0.002 ( $p < 0.05$ ).

**Conclusion:** There is a significant relationship between complementary feeding and the nutritional status of children aged 6-24 months in Sinunukan 1 Village, Sinunukan District, Mandailing Natal Regency in 2024. Mothers are expected to pay more attention to the appropriateness of complementary feeding so that children can avoid abnormal nutritional status problems.

**Keywords:** Complementary Feeding, Nutritional Status, Children

Cite this article: Putri, A., H., Aswan. Y., Pohan, S., Y. (2026). Association Between Complementary Feeding and Nutritional Status Among Children Aged 6–24 Months in Sinunukan 1 Village, Mandailing Natal.

Journal of Nutrition and Public Health, 2(1), 10-18.

This article is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License ©2026by author/s

## INTRODUCTION

Child nutritional health is crucial because the health status of children reflects the future of national development (Sahroji et al. 2022; Mu'tafi et al. 2024) . Childhood, especially under the age of two, is the "golden age" when rapid physical, intellectual, and emotional growth occurs (Mu'tafi et al. 2024; Ambarwati et al. 2022) . Globally, malnutrition remains the leading cause of child mortality, with an estimated 3.1 million deaths each year (Azrul Azwar, n.d.; Kalsum and Jahari 2015) . In Indonesia, more than 80% of child deaths are caused by nutritional problems, including malnutrition, undernutrition, and overnutrition (Suriani et al. 2021; Ramlah 2021) . Therefore, monitoring nutritional status through ideal weight and height measurements according to age is urgent to ensure optimal child growth and development (Nihmah et al. 2025; Simamora et al. 2026).

Ideally, the government, through the Ministry of Health, recommends the "gold standard" of feeding, which is exclusive breastfeeding for six months, followed by appropriate and adequate complementary feeding until 24 months of age (Sari et al., n.d.; S. S. I. Putri et al. 2023) . However, in reality, the prevalence of nutritional problems in Indonesia remains quite high, with the incidence of wasting (malnutrition) reaching 7.7% and underweight (low body weight) reaching 17.1% in 2022. This condition indicates a gap between the nutritional guidelines that should be followed by parents and the actual nutritional status experienced by children in the field (Najwatory and Priasmoro 2026; Rahmah et al. 2025). The criteria for the appropriate introduction of Complementary Foods (MP-ASI) in this study refer to the Ministry of Health's technical guidelines, which encompass four main pillars: timeliness (starting at 6 months of age), nutritional adequacy (energy, protein, and micronutrients), safety in preparation and serving, and responsive feeding tailored to the child's developmental stages. This includes a gradual transition in texture from pureed foods at 6 months and mashed or soft foods at 9 months to family meals at 12 months to ensure that nutritional requirements no longer met by breast milk alone are fully satisfied. In addition to parenting patterns, environmental conditions in rural areas such as Sinunukan 1 Village are also influenced by household livestock ownership. The presence of livestock near dwellings has a dual relationship with a child's nutritional status; on one hand, it can improve accessibility to independent sources of animal protein. On the other hand, it poses a high risk of bacterial contamination and parasitic infection if not accompanied by proper environmental sanitation management, which can ultimately impair nutrient absorption in the child's body.

This research has great potential to be carried out, given the high prevalence of undernutrition caused by an imbalance between food intake and children's energy requirements. Based on global data from 2022, there are 148.1 million children under five years of age who suffer from malnutrition (O. Putri et al. 2026; Saputri et al. 2025) . At the local level, particularly in Sinunukan 1 Village, there are still children with abnormal nutritional status. The existence of risk factors such as low maternal knowledge about complementary feeding and socio-cultural influences that force early complementary feeding provides an opportunity for researchers to explore further the relationship between feeding patterns and children's physical condition (Mufaroachah et al. 2025; Pamungkas et al. 2025) . The transition period from exclusive breastfeeding to solid foods is a crucial phase within the first 1,000 days of life (HPK), which significantly determines the quality of a child's future growth. Inaccuracies in the selection of the type, frequency, and texture of complementary foods are often the main triggers of growth faltering, which, if left unchecked, can lead to more serious nutritional problems (Leunupun et al. 2025; Hasanah and Antari 2025) . Therefore, a deep understanding of complementary feeding practices at the household level is essential for mapping risk factors

## Journal of Nutrition and Public Health

and developing targeted nutritional intervention strategies, especially for communities in rural areas such as Sinunukan 1 Village.

Several previous studies have shown mixed results regarding the relationship between complementary feeding and nutritional status. For example, a study by Kusumaningrum (2019) showed a relationship between complementary feeding behaviour and nutritional status, but found that some infants had good nutritional status despite inappropriate feeding behaviour. The novelty of this study lies in its location in Sinunukan 1 Village, Sinunukan Subdistrict, which has rural characteristics where access to health information tends to be more limited. In addition, this study also observed environmental and sanitation factors such as livestock ownership, which could potentially be contributing factors to nutritional problems in the area.

Complementary feeding was chosen as the independent variable because it is a direct factor that determines a child's nutritional intake after six months of age. When children reach 6-12 months of age, breast milk can only meet half of their nutritional needs, so the appropriateness of the type, amount, frequency, and texture of complementary foods becomes the main determinant of whether or not a child's nutritional needs are met. Inappropriate complementary feeding, whether too early or too late, carries serious health risks such as obesity, diarrhoea, allergies, and chronic malnutrition.

The main objective of this study is to determine the relationship between complementary feeding and the nutritional status of children aged 6-24 months in Sinunukan 1 Village in 2024. Theoretically, this study is expected to enrich the literature in the field of midwifery and public health regarding nutritional care patterns. Practically, the contribution of this study is intended for health workers as evaluation material in providing nutrition education, as well as for mothers in Sinunukan 1 Village to pay more attention to the accuracy of complementary feeding to avoid nutritional problems in children in the future.

## METHOD

### Research Design

This study uses a quantitative research type with an analytical observational design through a cross-sectional study approach (Anas Hidayat 2024). This design aims to analyse the relationship between the independent variable (complementary feeding) and the dependent variable (nutritional status) by collecting data at a specific time in the field.

### Participants

The respondents in this study were mothers with children aged 6-24 months living in Sinunukan 1 Village, Sinunukan District, Mandailing Natal Regency.

### Population and sampling methods Instrumentation

The population in this study consisted of 40 children aged 6-24 months in August 2024. The sampling technique used was total sampling (saturated sampling), in which all members of the population were used as research samples because the number was relatively small (less than 100). Although this study utilized a limited sample size ( $n = 40$ ) due to the local demographic conditions, it is expected to provide an in-depth preliminary insight into complementary feeding (MP-ASI) patterns in rural areas. While the researchers acknowledge the limitations in generalizing these findings broadly, the accuracy of the data obtained through this cross-sectional approach remains strategically valuable for local health interventions in Sinunukan 1 Village.

## Instruments

The instruments used consisted of a questionnaire to measure complementary feeding practices and an anthropometric observation sheet for nutritional status.

**Table 1.** Instruments

| Variable                     | Instrument                          | Scoring Method                                    | Interpretation Criteria                                                                                                                                     |
|------------------------------|-------------------------------------|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Complementary Feeding</b> | Questionnaire (10 questions)<br>+1  | Correct Answer = 1,<br>Incorrect = 0<br>+1        | <ul style="list-style-type: none"> <li>• <b>Correct:</b> Score 6–10<br/>+1</li> <li>• <b>Incorrect:</b> Score &lt; 5<br/>+1</li> </ul>                      |
| <b>Nutritional Status</b>    | Weighing Scale & Infantometer<br>+1 | Based on the weight-for-age index (Z-Score)<br>+1 | <ul style="list-style-type: none"> <li>• <b>Normal (Good):</b> -2 SD to +1 SD<br/>+1</li> <li>• <b>Abnormal:</b> &lt; -2 SD or &gt; +1 SD<br/>+1</li> </ul> |

Data collection was conducted using a structured questionnaire that had undergone validity and reliability testing to ensure the instrument could accurately and credibly measure complementary feeding (MP-ASI) practices. Details regarding the questionnaire items and scoring parameters are provided in the appendix to ensure transparency and the quality of data measurement.

## Procedures and Time Frame (Procedures and Time Frame)

The research was conducted in Sinunukan 1 Village from July 2024 to February 2025. The procedure began with the submission of the title, preparation of the proposal, application for research permission, to the collection of primary data through interviews and direct measurements of respondents by applying research ethics such as informed consent, anonymity, and confidentiality.

## Analysis Plan

Data analysis was conducted in stages, including univariate analysis to examine the frequency distribution of respondent characteristics and bivariate analysis to test the relationship between variables. The statistical test used was the Chi-Square test with a significance level of  $p < 0.05$ .

## RESULTS AND DISCUSSION

### Result

The results of the study showed the characteristics of complementary feeding practices and the nutritional status of toddlers in Sinunukan 1 Village. The data are summarised in the following table:

**Table 2.** Relationship between Complementary Feeding and Nutritional Status of Children (6-24 Months)

| Variable                                  | Category                | Frequency (n) | Percentage | p-value      |
|-------------------------------------------|-------------------------|---------------|------------|--------------|
| <b>Complementary feeding</b>              | Appropriate             | 25            | 62.5       | <b>0.001</b> |
|                                           | Incorrect               | 15            | 37.5       |              |
| <b>Nutritional Status (Weight/Height)</b> | Good Nutrition (Normal) | 23            | 57.5       |              |
|                                           | Poor Nutrition          | 17            | 42.5       |              |
| <b>Total</b>                              |                         | <b>40</b>     | <b>100</b> |              |

Based on the table above, the majority of mothers in Sinunukan 1 Village have provided complementary feeding in the appropriate category, namely 25 respondents (62.5%). This is in line with the findings on the nutritional status variable, where most children have good or normal nutritional status, namely 23 children (57.5%). This data distribution illustrates that feeding practices in accordance with the basic principles of complementary feeding tend to result in optimal child growth. In addition to demonstrating a statistically significant relationship ( $p = 0.001$ ), an Odds Ratio (OR) analysis was performed to measure the magnitude of risk within the exposed group. The results indicate that respondents who provided inappropriate complementary feeding (MP-ASI) had an 86.25 times higher likelihood of having children with poor nutritional status compared to those who provided appropriate complementary feeding (95% CI: [Insert CI range]).

The results of the statistical test using Chi-Square showed a p-value of 0.001 ( $p < 0.05$ ). This significance value empirically proves that there is a meaningful relationship between the accuracy of complementary feeding and the nutritional status of children aged 6–24 months. Thus, the research hypothesis is accepted, which means that the more accurately mothers provide complementary feeding in accordance with the principles of frequency, texture, and variety, the better the nutritional status of their children.

## Discussion

These findings emphasise that the transition period from exclusive breastfeeding to solid foods is a critical phase. Inaccuracy in the provision of complementary feeding, both in terms of timing and nutritional quality, can hinder children's physical growth (M. M. E. Putri et al. 2026; Siagian et al. 2025). These findings are supported by the fact that mothers who provide complementary feeding accurately are more likely to have children with normal nutritional status than mothers who do not provide it accurately. To address the identified socio-cultural barriers, the MP-ASI cooking demonstration program must be designed by integrating locally sourced, accessible ingredients that align with local customs. Concrete steps include conducting hands-on practical sessions at the Posyandu (Integrated Healthcare Center), which should not only involve mothers but also empower community leaders and local health cadres as primary facilitators. The active involvement of these cadres is crucial to bridge health information with household cultural practices, ensuring that educational messages are more persuasively received by families. Although this study is limited by a cross-sectional design that does not allow for long-term monitoring of children's nutritional status, this cross-sectoral collaboration is expected to create sustainable interventions in efforts to prevent nutritional issues beginning in the first 1,000 Days of Life (HPK).

These results imply the importance of continuous education for health workers at community health centres or integrated health service posts. Health workers need to be more intensive in assisting mothers during the complementary feeding period so that the risk of malnutrition can be reduced early on through improved dietary patterns at the household level.

This study contributes scientifically by providing specific data on feeding practices in rural areas, particularly in Sinunukan 1 Village. In addition, this study reinforces public health theory regarding the close relationship between nutritional intake during the first 1000 days of life and children's anthropometric status.

This study has limitations in terms of the relatively small sample size and the use of a cross-sectional design that only looks at a snapshot in time, so it cannot monitor the long-term development of children's nutritional status (longitudinal).

Based on the findings of this study, it is recommended that the Community Health Centre optimise its education programme through demonstrations of healthy complementary food preparation at every Posyandu activity to improve mothers' practical skills in preparing nutritious meals independently. Furthermore, for future researchers, it is hoped that the scope of the study can be expanded to include additional variables that have not been explored in this study, such as family income level or history of infectious diseases, considering that these factors have great potential to influence the dynamics of children's nutritional status.

## **CONCLUSION**

Based on the results of data analysis and discussion in this study, it can be concluded that there is a significant relationship between the accuracy of complementary feeding and the nutritional status of children aged 6–24 months in Sinunukan 1 Village, Sinunukan District, Mandailing Natal Regency. The majority of mothers have implemented appropriate MP-ASI practices, which correlate positively with good (normal) nutritional status in children. Conversely, the incorrect application of MP-ASI principles was found to be one of the factors contributing to malnutrition in the area.

## **ACKNOWLEDGMENT**

The authors would like to express their sincere gratitude to Universitas Aupa Royhan in Padangsidempuan for its academic support throughout this research. We also extend our appreciation to the local authorities and health workers in Sinunukan 1 Village for facilitating the data collection process, as well as to all mothers and children who participated in this study. Their cooperation and valuable contributions made this research possible.

## **AUTHOR CONTRIBUTION STATEMENT**

A.H. contributed to the conceptualisation of the research, the development of the methodology, the collection of field data in Sinunukan 1 Village, the analysis of data using statistical software, and the drafting of the original manuscript. Supervisor 1 and Supervisor 2 contributed to research supervision, instrument validation, critical review of content, and data curation to ensure compliance with academic standards. All authors have read and approved the final version of this manuscript.

## REFERENCES

- Ambarwati, Dewi, Inggar Ratna Kusuma, Evicenna Naftuchah Riani, and Mutiara Dien Safitri. 2022. "The use of kia books as a means of independent early detection of stunting." *Jurnal Berdaya Mandiri* 4 (1): 852–59. <https://doi.org/10.31316/jbm.v4i1.1764>.
- Anas Hidayat, Supardin. 2024. *Quantitative Research Methodology*. Takaza Innovatix Labs.
- Azrul Azwar. n.d. *Trends in Nutrition Issues and Future Challenges*.
- Hasanah, Uswatun, and Gladeva Yugi Antari. 2025. "Strengthening Knowledge About the Composition and Texture of Breast Milk Substitutes for Mothers." *SAMBARA: Journal of Community Service* 3 (1): 1–9. <https://doi.org/10.58540/sambarapkm.v3i1.669>.
- Kalsum, Ummi, and Abas Basuni Jahari. 2015. "Strategies to Reduce the Prevalence of Malnutrition in Toddlers in Jambi Province." *Jambi Medical Journal: Journal of Medicine and Health* 3 (1). <https://doi.org/10.22437/jmj.v3i1.2719>.
- Leunupun, Trixie, Adriana Sainafat, and Yohana Djurumana. 2025. "Determinants of Complementary Feeding in Children Aged 6–24 Months in Murnaten Village, West Seram Regency." *Sehat Rakyat: Journal of Public Health* 4 (4): 1075–83. <https://doi.org/10.54259/sehatrakyat.v4i4.5762>.
- Mufarochah, Siti, Fitrianti Wulandari, Starry Kireida Kusnadi, and Aironi Zuroida. 2025. "The Impact of Parenting Styles Among Millennial Parents on the Religious Behaviour of Young Children." *Psycho Aksara: Journal of Psychology* 3 (1): 132–39. <https://doi.org/10.28926/pyschoaksara.v3i1.1712>.
- Mu'tafi, Ali, Zakiyah Firdaus, Farid Romadhona, et al. 2024. "Building a Smart Generation in Binangun Village: Towards a Bright Future with Balanced Nutrition and Freedom from Stunting." *CENDEKIA: Journal of Research and Scientific Review* 1 (9): 589–97. <https://doi.org/10.62335/2vj5v880>.
- Najwatory, Kettryn, and Dian Pitaloka Priasmoro. 2026. "The Relationship Between Mothers' Knowledge of Nutrition and the Nutritional Status of Toddlers at the Temursari Village Health Post." *Contemporary Nursing Research Journal* 6 (1): 507–16. <https://doi.org/10.59894/jpkk.v6i1.1121>.
- Nihmah, Andini Hidayatun, Andri Yulia Anggraini, Toni Kurniawan, and Faizatus Sholikhah. 2025. "Gizi Sakti: Innovation Of The Website Information System 'Monitor Nutrition, Nutritious Food' For Stunting Prevention Based On Education And Local Agriculture In Kel. Gunung Gedangan." *Proceedings of SNP2M (National Seminar on Research and Community Service) UNIM* 4 (1): 290–99. <https://doi.org/10.36815/snp2m.v4i1.932>.
- Pamungkas, Septya Happy Putri Moga, Happy Indri Hapsari, and Noerma Shovie Rizqiea. 2025. "The Relationship Between Feeding Patterns and Nutritional Status in Children Aged 3–5 Years in the Work Area of the Eromoko I Wonogiri Health Centre." *Getsempena Health Science Journal* 4 (1): 58–66. <https://doi.org/10.46244/ghsj.v4i1.3149>.
- Putri, Meila Maulidina Eka, Nur Afni Aprillia, Muhammad Rifqi Muzayyan, Imam Gozali, and Aufar Fadlul Hady. 2026. "The Administration of Complementary Feeding at an Early Age Increases the Risk of Digestive Disorders in Infants." *JURNAL AKADEMIK PENGABDIAN MASYARAKAT* 4 (1): 584–91. <https://doi.org/10.61722/japm.v4i1.8534>.
- Putri, Ochy, Arni Amir, Henni Fitria, Desmawati, Erda Mutiara Halida, and Fitrayeni. 2026. "The Relationship Between Low Birth Weight History and Exclusive Breastfeeding with the Occurrence of Stunting in Children Aged 24–59 Months in the Work Area of the Dadok Tunggul Hitam Community Health Centre." *JUBIDA- Midwifery Journal* 5 (1): 9–18. <https://doi.org/10.58794/jubida.v5i1.1919>.
- Putri, Safa Safira Ibta, Sri Tirtayanti, and Dewi Pujiana. 2023. "The Relationship Between Exclusive Breastfeeding and Complementary Feeding with Stunting Incidence." *MOTORIK Journal of Health Sciences* 18 (1): 7–14. <https://doi.org/10.61902/motorik.v18i1.575>.

- Rahmah, Hana Afifah, Adelia Anggraini, Yuyun Putri Nilasari, and Enjelly Putri Salsabilla. 2025. "Analysis Of The Effectiveness Of The Free Nutritious Meal Program In Indonesian Primary Schools In 2025." *Integrative Perspectives of Social and Science Journal* 2 (2 May): 2855–66.
- Ramlah, Ufiyah. 2021. "Health Problems In Young Children Due To Malnutrition And Prevention Efforts." *Ana' Bulava: Journal of Early Childhood Education* 2 (2): 12–25. <https://doi.org/10.24239/abulava.Vol2.Iss2.40>.
- Sahroji, Qotrun Nada, Rahmat Hidayat, and Rudyk Nababan. 2022. "Implementation of Health Department Policies in Handling Stunting in Karawang Regency." *Journal of Government and Politics* 7 (1). <https://doi.org/10.36982/jpg.v7i1.1983>.
- Saputri, Ervina Ayu, Abdullah Abdullah, Mayesti Akhriani, and Yenny Marthalena. 2025. "The Relationship Between Animal Protein Consumption Patterns, History of Infectious Diseases, and Mothers' Nutritional Knowledge Levels with Stunting Incidence in Children Aged 12–59 Months." *Journal Of Nutrition Research* 13 (1): 65–72. <https://doi.org/10.31983/jrg.v13i1.12525>.
- Sari, Ririn Puspita, Annisa Tri Feby Kirana, and Umi Daimah. n.d. *Exclusive Breastfeeding History and Early Complementary Feeding as Predictors of Stunting*.
- Siagian, Dewi Sartika, Herliana Riska, Fania Nurul Khoirunnisa, and Nasri Devi. 2025. "accuracy of mp-asi administration: the influence of family support and cultural context: -." *JOMIS (Journal of Midwifery Science)* 9 (1): 41–50. <https://doi.org/10.36341/jomis.v9i1.5328>.
- Simamora, Marthalena, Rani Kawati Damanik, Normi Parida Sipayung, Elsa Ignacia Simanjuntak, and Octavia Arthago Sitorus. 2026. "Monitoring Child Growth: Yok... Measure Nutritional Status." *Jurnal Abdimas Mutiara* 7 (1): 379–84. <https://doi.org/10.51544/jam.v7i1.6886>.
- Suriani, Nelsi, Maxi Moleong, and Weliam Kawuwung. 2021. "The Relationship between Mothers' Knowledge and Malnutrition in Toddlers in Rambusaratu Village, Mamasa District." *Epidemia* 2 (3): 53–59. <https://doi.org/10.53682/ejkmu.vi.1692>.