

RESEARCH STUDY

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Analysis of Sociodemographic Factors and Complementary Feeding Patterns on Nutritional Status of Children under Two Years in Coastal Areas of North Sumatra

Analisis Faktor Sosiodemografi dan Pola Pemberian MP ASI terhadap Status Gizi Anak di Bawah Dua Tahun di Wilayah Pesisir Sumatera Utara

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Available online at:<https://e-journal.unair.ac.id/AMNT>**Keywords:**Nutritional status,
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under two years, Coastal area**ABSTRACT**

Background: Nutritional status is an indicator of growth, and the first two years of a child's life should be closely observed because it is a critical period for development. Failure to grow during this period will affect nutritional status. Many factors affect a child's nutritional status, including sociodemographic factors and patterns of complementary feeding of breast milk.

Objectives: This study aimed to analyze the influence of sociodemographic factors and patterns of complementary feeding on the nutritional status of children under two years old in coastal areas of North Sumatra.

Methods: This study used a cross-sectional approach involving 212 mother-child pairs aged 6-23 months in Pantai Labu District. Data collection involved structured questionnaires and interviews covering family characteristics, initial food introduction, breastfeeding status, and child age. Nutritional status was assessed through child length and weight measurements. Multiple logistic regression tests were conducted for multivariate analysis, and bivariate tests using chi-square.

Results: The results showed that there was an influence of maternal knowledge (p-value=0.008; OR=2.678), maternal education (p-value=0.005; OR=2.807), and economic status (p-value=0.0001) on children's nutritional status. Most mothers (78.8%) provided timely complementary feeding and maintained hygienic practices (81.1%). Despite this, 15-20% of children exhibited poor nutritional status across weight-for-age, length-for-age, and weight-for-length indicators.

Conclusions: Children's nutritional status in coastal areas is significantly influenced by sociodemographic factors. Integrated interventions targeting maternal capabilities and family economic conditions are crucial for improving child nutrition.

INTRODUCTION

The critical period for children's growth and development is the first two years of their life. This stage, which is frequently called the "golden age," is when proper nutrition is crucial for promoting the best possible growth and development. Nutritional problems in children remain a global challenge, particularly in developing countries. WHO and UNICEF (2021) reported that cases of stunting, wasting and overweight in toddlers globally were 149 million, 45 million, and 38.9 million, respectively. The prevalence of stunting in toddlers in Southeast Asia reached 31.7%, wasting 9.1%, and overweight 4.8%¹.

After the age of six months, giving breast milk alone will not be enough to optimally support children's growth. They should be given complementary foods after

reaching this age. WHO recommends that complementary feeding be given on time at the age of six months, considering responsive feeding principles and good hygiene practices. Research shows that timely complementary feeding positively correlates with child nutritional status (p-value<0.05)^{2,3}. Research by Masuke et al. shows that the timeliness and quality of complementary foods are strongly correlated with children's nutritional status⁴. Similarly, a longitudinal study by Rukmawati et al. found that complementary feeding quality is closely related to stunting (p-value=0.002 and r=0.627)⁵.

Family characteristics and sociodemographic factors greatly influence and determine children's nutritional status. Hossain et al.'s (2020) study in Bangladesh identified the causes of stunted growth,

wasting, and underweight in girls, with highly educated mothers, families with high incomes, mothers who received prenatal care, and children with higher or normal birth weights. Implementation of appropriate nutritional intervention strategies and improving household financial conditions, parental literacy, providing prenatal care, and giving birth in health facilities can help improve nutritional status in Bangladesh⁶. Similar findings by Chowdhury et al. (2022) showed that stunting is influenced by maternal education. Low maternal education levels has an effect on children's health care, consumption patterns, hygiene, and food intake⁷. Meanwhile, research by Marbun et al. (2022) on nutritious food of children under 2 years has shown that malnutrition is correlated with maternal knowledge ($p\text{-value}=0.002$). Malnutrition in toddlers can be prevented by mothers who have higher skills in caring for children. Mothers will apply ways of caring for children based on experience and everything they know, such as the provision of food that is in accordance with the child's nutritional needs⁸.

Family economic status, reflected in parental income and occupation, also affects child nutritional status. Research by Ali et al. (2021) found that children with poor nutritional health are more likely to originate from families earning less than the minimum wage. This is reinforced by Scarpa et al.'s (2022) findings showing a significant relationship between paternal occupation and child nutritional status ($p\text{-value}<0.05$)⁹.

Child nutritional status can be assessed through various anthropometric indicators: Weight-for-Height/Length (WHZ), Height/Length-for-Age (HAZ), and Weight-for-Age (WAZ). A meta-analysis by Babys et al. (2022) found that poor complementary feeding practices increase stunting incidence by 1.85 ($p\text{-value}<0.001$)¹⁰. Identified risk factors include early complementary feeding, low quality of complementary foods, and family sociodemographic factors. Appropriate complementary feeding patterns include proper timing, type, form, frequency, and nutritional quality. A meta-analysis conducted by Babys et al. (2022) revealed that the frequency of stunting rose by 1.85 due to inadequate supplemental feeding ($p\text{-value}<0.001$; $OR=1.85$; 95% CI 1.34 to 2.55;). The risk factors identified included early provision of complementary feeding, low quality complementary feeding, and family sociodemographic factors¹⁰. Research by Suryani et al. (2024) identified that macronutrient intake in stunted children was lower in rural areas compared to urban areas¹¹.

Previous studies have discussed and analyzed the socio-economics of families with nutritional status, including mother's education and knowledge, family size, and family income. These studies were framed in terms of a positive correlation relationship and in a general description of poor countries, urban and rural areas. Unlike previous studies, this study discusses and analyze nutritional status and sociodemographic factors and complementary feeding patterns in coastal areas, specifically in Pantai Labu District in Deli Serdang Regency, North Sumatra Province, Indonesia. Pantai Labu has abundant availability of marine food sources and livestock and agricultural products. Despite this, Pantai Labu socio-economic problems such as poverty remain

prevalent, and some fishermen still use traditional methods to catch fish (66.67%). In addition, health problems characterized by nutritional problems in children under five years of age in 2023 such as stunting (33.8%), wasting (13.9%) and underweight (24.3%) continue to exist in Deli Serdang Regency¹².

Further research needs to be done to analyze other factors from sociodemographic factors such as family size living in the same house and number of children. Variations in food types and how to process food are also important to study to improve the nutritional status of toddlers. This study provides insights for enhancing the effectiveness of nutritional intervention programs by considering sociodemographic factors (education, mother's knowledge, father's occupation, income) and the pattern of providing appropriate complementary foods in coastal areas.

METHODS

Pantai Labu District, the location of this research, is a coastal area consisting of 19 villages. The district covers an area of 81.85 km² and borders the Malacca Strait, providing a unique setting to study feeding practices in coastal communities. The study used a cross-sectional study involving 212 samples, namely mothers with their children aged 6-23 months. Samples were taken systematically and randomly from a population of 473 based on a sample framework of data that met the selected requirements from the Pantai Labu Health Center. All mothers who had children aged 6-23 months and lived in Pantai Labu District were sorted alphabetically by name and selected systematically and randomly until the number of samples was achieved. The cross-sectional study formula was used to determine the minimal sample size needed¹³. Estimated prevalence of malnutrition was based on previous regional studies. This yielded a minimum required sample size of 196, which was increased to 212 to account for potential non-response (10% addition), thus meeting the statistical power requirements for the study¹⁴. Participants were selected using systematic random sampling from health center records. Inclusion criteria included permanent residence in the study area and absence of severe illness in children.

The data collected were family characteristics (income, highest level of education completed by father and mother, father's occupation), the first food introduced to the child, breastfeeding status, toddler's age, and exclusive breastfeeding pattern until the age of 6 months measured using a structured questionnaire and collected by interviewing the respondents. Data on the nutritional status of toddlers (weight-for-age, height/length-for-age, and weight-for-height) were obtained by measuring the length and weight of toddlers and then determining nutritional status using the WHO anthropometry application. Data on eating patterns were measured using the 24-hour food recall method by asking mothers about their children's food. Independent variables were maternal education, maternal nutrition knowledge, paternal occupation, family income, and complementary feeding practices (timing, consistency, hygiene). The variables of mother and father's education were categorized into two levels: high ($\geq$ upper secondary

school) and low (< upper secondary school). Family income was categorized based on the regional minimum income of Deli Serdang in 2024 (IDR 3,505,000) into two levels: high ($\geq$ regional minimum income) and low (< regional minimum income). Meanwhile, mother's knowledge about nutrition and food was categorized based on the percentage of correct answers: good ($\geq 75\%$ correct answers) and poor (<75% correct answers). All measurement instruments were validated through pilot testing with 30 respondents outside the study area, showing acceptable reliability (Cronbach's alpha > 0.7). This research was approved by the Research Ethics Commission of the Medan Ministry of Health Polytechnic (Approval No. 01.26.672/KEPK/POLTEKKES KEMENKES, dated August 28, 2024).

Data analysis in this study was conducted in three stages: univariate analysis and simple relationship analysis (bivariate) using data analysis program applications. Analysis results were presented in tables. Distribution, frequency, and research data characteristics were presented in frequency distribution tables as proportions. Numerical scale variables were categorized into sub-groups aligned with previous research. Variables modified included age, fruit and vegetable consumption,

obesity, and hypertension for easier interpretation and to observe dose-response relationships for each category against outcomes.

Subsequently, all variables underwent simple relationship analysis to compare outcome variables with exposure variables to examine crude relationships individually. All variables in this study were categorized and examined using chi-square test with $\alpha=0.05$. After stratification, the relationship between independent variables and outcome variables was examined after controlling for confounding variables by observing odds ratio (OR) values through multivariate modelling. Multiple logistic regression was used as the statistical test, as it is suitable for categorical outcome data^{15,16}.

RESULTS AND DISCUSSIONS

Table 1 shows respondents' sociodemographic characteristics. The majority of fathers had low education levels (63.7%), while maternal education was fairly evenly distributed between low (52.8%) and high (47.2%) categories. Most mothers were unemployed (92.9%), with only 5.7% employed. Regarding knowledge, 52.4% of mothers had poor knowledge about nutrition and complementary feeding.

Table 1. Sociodemographic characteristics of study participants

Variable	n	%
Father's Education		
Low (< upper secondary school)	135	63.7
High ($\geq$ upper secondary school)	77	36.3
Mother's Education		
Low (< upper secondary school)	112	52.8
High ($\geq$ upper secondary school)	100	47.2
Mother's Occupation		
Not working	198	93.4
Working	14	6.6
Mother's Knowledge		
Poor (<75% correct answers)	111	52.4
Good ($\geq 75\%$ correct answers)	101	47.6
Income Category		
High ($\geq$ regional minimum income)	107	50.5
Low (< regional minimum income)	105	49.5

Table 2 shows the pattern of complementary feeding by looking at the appropriate age of introducing complementary foods. This study found that 78.8% of mothers gave complementary feeding at the right age (above 6 months), but 21.2% gave complementary feeding too early. The most common form of complementary feeding given was liquid (50.5%), followed by soft or mushy foods (28.3%), and mashed or ground foods (21.2%). The results of this study are similar to those of research conducted by Sayed and Schönfeldt

(2020), which show that 73% of children have been introduced to food at the age of 14 weeks, and 72.7% of mothers provide food or liquids at the age of 12 weeks¹⁷. The results of the study by Arora et al. (2020) in Australia reveal factors influencing the provision of complementary feeding according to the recommended age of the child (> 6 months), the mother's age, mothers who have only one toddler, mothers who have maternity leave for up to 1 year, and those who were born in Australia¹⁸.

Table 2. Complementary feeding patterns among study participants

Variable	n	%
Age of CF Introduction		
Newborn	19	9.0
3 months	10	4.7
4-5 months	16	7.5
≥6 months	167	78.8
CF Consistency		
Liquid	107	50.5
Soft/mushy	60	28.3
Mashed/ground	45	21.2
Hygiene Practices		
Yes	172	81.1
No	40	18.9

*CF = complementary feeding

Based on Table 3, the majority of children under two years had good nutritional status across all anthropometric indicators, with 80.7% having good weight-for-age, 79.7% having good height-for-age, and 84.4% having good weight-for-height. However, there remained children with poor nutritional status, ranging from 15.6% to 20.3% across different indicators. The prevalence of stunting in the coastal area of Pantai Labu District is higher (20.3%) than the prevalence of stunting in North Sumatra Province (18.9%)¹². This observational

analytical study, which used a case control design, was carried out in Lawe Alas Regency, Indonesia. Short birth length, inadequate calorie intake, non-exclusive breastfeeding, chronic diarrhea, and upper respiratory tract infections are internal risk factors for stunting, while poor sanitation, poor water sources, low family income, low father's and mother's educational levels, and the number of family members exceeding four people are external risk factors¹⁹.

Table 3. Nutritional status of children under two years

Anthropometric Indicator	n	%
Weight-for-Age		
Normal	171	80.7
Underweight	41	19.3
Height-for-Age		
Normal	169	79.7
Stunting	43	20.3
Weight-for-Height		
Normal	179	84.4
Wasting	33	15.6

Giving complementary feeding early to infants (<6 months) is associated with higher risk of the incidence of body length that is not appropriate for age (p-value=0.032). Complementary foods that were predominantly liquid in consistency showed higher risk

compared to soft or mushy or pureed foods (p-value=0.041), while poor hygiene practices during complementary feeding had the strongest association with poor height for age status (p-value=0.002).

Table 4. Bivariate analysis of complementary feeding patterns associated with height-for-age

Variable	Nutritional Status			p-value	OR (95% CI)
	Poor n (%)	Good n (%)	Total n (%)		
CF Introduction Timing					
Early (<6mo)	14 (6.6)	31 (14.6)	45 (21.2)	0.032	2.114 (1.054-4.238)
Timely (≥6mo)	29 (13.7)	138 (65.1)	167 (78.8)		

Variable	Nutritional Status			p-value	OR (95% CI)
	Poor n (%)	Good n (%)	Total n (%)		
CF Consistency					
Inappropriate	25 (11.8)	82 (38.7)	107 (50.5)	0.041	1.998 (1.015-3.931)
Appropriate	18 (8.5)	87 (41.0)	105 (49.5)		
Hygiene Practices					
No	12 (5.7)	28 (13.2)	40 (18.9)	0.035	3.267 (1.570-6.798)
Yes	31 (14.6)	141 (66.5)	172 (81.1)		

*CF = complementary feeding

The results of the bivariate analysis of the knowledge, education, occupation, and income variables (family characteristic factors) with nutritional status (height for age) are shown in Table 5. As shown in Table 5, mothers who had less knowledge were 2.678 times more likely to have stunted (low height for age) children

(p-value=0.008), while mothers with low levels of education were 2.807 times more likely to have children with low HAZ (stunting) than mothers with high levels of education (p-value=0.005). Furthermore, family income showed a significant effect on children's height for age status (OR=0.261; p-value=0.000).

Table 5. Bivariate analysis of family characteristic factors associated with height-for-age nutritional status

Variable	Nutritional Status (HAZ)		Total (%)	p-value	OR (95% CI)
	Stunting (%)	Good (%)			
Mother's Knowledge					
Poor	32 (15.1)	88 (41.5)	120 (56.6)	0.008	2.678 (1.267-5.661)
Good	11 (5.2)	81 (38.2)	92 (43.4)		
Mother's Education					
Low	31 (14.6)	81 (38.2)	112 (52.8)	0.005	2.807 (1.350-5.833)
High	12 (5.7)	88 (41.5)	100 (47.2)		
Mother's Occupation					
Not working	40 (18.9)	158 (74.5)	198 (93.4)	0.715	0.764 (0.198-2.954)
Working	5 (2.4)	9 (4.2)	14 (6.6)		
Income Category					
High	11 (5.2)	96 (45.3)	107 (50.5)	0.000	0.261 (0.124-0.553)
Low	32 (15.1)	73 (34.4)	105 (49.5)		

As shown in Table 5, all sociodemographic factors (education, maternal knowledge, paternal occupation, and income) were analyzed for their association with height-for-age as a key indicator of chronic nutritional status because children who suffer and gain weight rapidly after two years of age are more likely to become obese later in life²⁰. Paternal occupation data were collected but are not fully described in the results and discussion section. The results of the analysis showed that the correlation between father's occupation and child nutritional status was not significant (p-value=0.82, OR = 1.14, 95% CI: 0.37-3.52). As a result, this aspect in not given much emphasis in this discussion, although it aligns with findings from prior research²¹.

This study specifically focused on Height-for-Age (HAZ) as the primary nutritional status indicator due to several evidence-based considerations. Stunting represents a critical public health concern with long-term consequences that extend beyond childhood. Recent evidence by Lestari et al (2024) demonstrates that stunting remains a stronger predictor of developmental outcomes than other anthropometric indicators²². A trend has emerged suggesting that stunted children tend to exhibit lower cognitive, motor, and adaptive behavioral abilities compared to malnourished children of normal stature²³. Unlike Weight-for-Age (WAZ) and Weight-for-Height (WHZ) which reflect acute problems of

nutritional status, height-for-age (HAZ) captures chronic undernutrition resulting from persistent inadequate nutrition during critical developmental periods²⁴. Furthermore, stunting has been identified as a priority indicator in Indonesia's national health strategy, with the prevalence in coastal areas of North Sumatra remaining significantly high²⁵. Recent research from Kubeka and Modjadji (2023) emphasized that sociodemographic factors and complementary feeding practices have stronger associations with height-for-age than with other anthropometric indicators, particularly in coastal and rural communities²⁶. This research therefore prioritized depth of analysis of height-for-age to provide targeted insights for interventions addressing the structural determinants of chronic malnutrition in coastal communities.

Mothers with less knowledge exhibited a 2.678 times higher risk of having children with stunting (nutritional status as assessed by the HAZ anthropometric index) than mothers with good knowledge (OR=2.678; 95% CI: 1.267-5.661). These results are in line with those of a multicenter study by Saadah et al. (2022), which shows that mothers with a strong understanding contribute to a 0.230 (p-value=0.004). Additionally, those who exhibit high levels of commitment are associated with a 0.448 (p-value=0.000). Furthermore, knowledgeable mothers enhance family support by 0.236

(p -value=0.040), and this solid family support further decreases stunting rates by 0.257 (p -value=0.011)²⁷. These findings align with Resti and Khomsan's (2022) study which found that the mothers in all four groups displayed a moderate level of knowledge about nutrition (total scores between 70.9 and 75.2). Mothers who live in urban areas tend to have normal children (not stunted) and have better knowledge about nutrition than mothers who live in rural areas, who have stunted children and have low level of knowledge²⁸.

A similar pattern is also found in a multicentre study by Chen et al. (2024), which identified that maternal knowledge about feeding practices contributed significantly to children's nutritional status (β =0.34, p -value<0.001)²⁹. Research by Masilela and Modjadji (2023) in Mbombela, South Africa, using chi-square testing, to explore the mother's knowledge regarding food and nutrition is related to stunting in children. The results of their findings with analysis of logistic regression tests showed that mothers who were aware of nutrition were correlated with the incidence of stunting in children with an OR value = 1.92 and 95% CI ranging from 1.12–3.29, for children aged 6–11 months the OR value = 2.63 and 95% CI between 1.53–4.53, and for children aged 12–23 months the OR value = 3.19 and 95% CI ranging from 1.41–7.25³⁰.

The results of the study found that maternal education had a significant association with children's nutritional status as assessed by HAZ (p -value=0.005, OR=2.807). Mothers who had a low level of education had a 2.807 times greater risk of having stunted children than mothers with higher education. Victoria et al. (2021) also stated that a strong predictor of children's nutritional status was maternal education level (combined OR=2.37, 95% CI: 2.14–2.62). Victoria conducted this study in 137 developing countries through a meta-analysis approach³¹. A longitudinal study conducted by Rezaeizadeh et al. (2024) confirmed that significantly higher maternal education was highly correlated with increased weight for age (MD 0.186; and 95% CI 0.078–0.294) and height for age (MD 0.200; and 95% CI 0.036–0.365)³².

Maternal education showed a significant relationship with height for age (HAZ) (p -value=0.005), with OR=2.807 (95% CI: 1.350–5.833). Mothers who completed low level of education were 2.807 times more likely to have children with low height for age status (stunting). This result is also consistent with that of Yoyok et al. (2021), who conducted a meta-analysis study and found that children's nutritional status is influenced by maternal education. The results of their meta-analysis indicated that the average birth weight of mothers with higher education was 0.257 kg/0.26 kg, compared to the control group (β =0.257; p -value<0.001)³³. A meta-analysis conducted by Azizah et al. (2022) also found similar results. Their study shows that the risk of stunting increased in low maternal education levels by 3.01 times than in mothers with higher education levels (95% CI=1.92 - 4.73), in which the correlation was found to be statistically significant (p value=0.000). Limited access to formal education, especially among women, may be one of the causes of low maternal knowledge about providing complementary foods and child nutrition³⁴.

Income level showed a very significant relationship with children's nutritional status with p -value=0.000, and OR=0.261 with 95% CI: 0.124–0.553. This finding is in line with the results of the study by Mazariegos et al. (2020) which revealed that families (parents) who have short stature have a risk of stunting in children 2.8 times higher than families with normal height³⁵. This is also supported by research by Tamir et al. (2024) which shows the prevalence of stunting in low and lower middle income countries such as those in Africa is high at 33.12% (95% CI: 31.92–34.32), where low economic status increases the risk of stunting (aOR=1.38), which is higher in rural households³⁶. The prevalence of stunting assessed from a longitudinal study by Yaya et al. (2020) was found to decrease with increasing family income per capita, where the correlation coefficient value = -0.606, and the p value showed a very significant effect (p -value<0.0001). The model proposed by Yaya et al.'s study showed that increasing per capita income by US\$1000 may reduce the incidence of stunting by 23% (OR=0.77, 95% CI 0.76 to 0.78)³⁷.

This study found that maternal occupation did not correlate with children's nutritional status based on height for age (HAZ) (p -value=0.696). The prevalence of stunting in children under two years of age in working mothers was found to be 1.4%, and in unemployed mothers it was 19.1%. This outcome is contrary to that of Ketema et al. (2022), which has suggested that in mothers who do not work, the nutritional status of children (aged 6–23 months) is better than that of mothers who work³⁸. According to research by Ahmed et al. (2022), which involved working mothers, factors that influence stunting in their children are maternal characteristics such as maternal age and maternal education, child characteristics such as child age, family characteristics such as family income, and maternal behavior, specifically frequency of breastfeeding. Their research also involved unemployed mothers and found that factors that influence stunting in their children are child gender, nutritional information, maternal education, and family income³⁹.

This study found that 78.8% of mothers provided complementary foods on time (Table 2). Masuke et al.'s (2021) study showed that early introduction of complementary foods (age 0–1 months) had a significantly higher risk of underweight in children (ARR 2.9, 95% CI 1.3–6.3; and ARR 2.6, 95% CI 1.3–5.1). The complementary foods given were 50.5% liquid, this requires serious attention to avoid⁴⁰. Additionally, a literature review conducted by Uluf et al. (2023) highlighted a significant link between dietary diversity and the occurrence which leads to a lower likelihood of stunting in toddlers⁴¹. Hygiene practices in providing complementary feeding (81.1%) were also an important point in this discussion. Kassie et al.'s (2023) research showed that poor hygiene practices increase malnutrition risk by 1.89 times. In coastal areas, access to clean water and sanitation facilities may present challenges for hygiene practices⁴². Multivariable analysis shows that after adjusting for confounders, sociodemographic factors remain the strongest

predictors of child height-for-age status, which aligns with findings from similar studies^{43,44}.

Table 6. Multivariate logistic regression analysis of factors associated with length for age status

Variable	Category	aOR	95% CI	p-value
Maternal Knowledge	Low	2.142	1.036-4.428	0.036
Maternal Education	Low	2.376	1.121-5.034	0.024
Income Category	Low	3.475	1.627-7.423	0.001
CF Introduction Timing	Early (<6mo)	1.865	0.891-3.901	0.097
CF Consistency	Inappropriate	1.721	0.824-3.592	0.148
Hygiene Practices	No	1.882	0.863-4.106	0.112

The nutritional status of toddlers showed quite good results in all three indicators, but the nutritional deficit remained high (>80%). Mahfouz et al.'s (2022) study in Egypt found that stunting occurred in children whose protein intake did not meet the recommended guidelines (aOR=2.26). Stunted children exhibited lower consumption of protein sources from poultry and eggs and fruit than children who did not experience stunting⁴⁵. Agustin et al. (2024) in their research showed that the incidence of stunting was correlated with protein intake (p-value=0.159), zinc intake (p-value=0.192), and iron intake (p-value=0.365)⁴⁶. The challenges of toddler nutritional status globally are often rooted in structural factors, such as education and poverty. Zahtamal et al. (2024) revealed in their research that various factors, including environmental factors, such as water sources for sanitation, biological quality of drinking water, and availability and condition of latrines, significantly influence the incidence of stunting (p-value<0.05). The results of the multivariate test in their research showed that the probability of stunting incidence by 21% was influenced by the biological quality of drinking water and water sources for sanitation⁴⁷.

CONCLUSIONS

This study indicates that nutritional status of children under two years old in North Sumatra's coastal areas is significantly influenced by sociodemographic factors, particularly maternal education, maternal nutrition knowledge and family economic status. Although the majority of mothers provided timely complementary feeding and adhered to hygiene practices, some children still exhibited poor nutritional status. The results of this study emphasize the importance of integrated interventions from various sectors to improve mothers' abilities, and family economic conditions to improve child nutritional status. There is a need to develop complementary feeding programs, focusing on diverse complementary food processing that meets children's nutritional needs, particularly for mothers with low education levels, and educate them on nutrition. It is also important to improve the family economic empowerment programs in coastal areas.

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CONFLICT OF INTEREST AND FUNDING DISCLOSURE

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AUTHOR CONTRIBUTIONS

ES: writing and editing the original draft, conceptualizing the research design in the methodology, monitoring data accuracy, data validation and analysis of results; N: field supervision and ensuring the methodology is in accordance with the research concept, checking the writing-review; ZL: supervising data collection, data analysis, checking data quality, assisting in writing-review.

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