



The Relationship Between Knowledge About Complementary Feeding and Family Income with The Incidence of Stunting

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ABSTRACT

Background: Stunting has been a global health concern. The long-term consequences of stunting include high mortality and morbidity rates, suboptimal cognitive development, especially during school age, reduced work productivity, and future metabolic issues. Family income is a multidimensional factor. Additionally, the gap in knowledge regarding feeding remains a major issue.

Objectives: The aim of this research is to determine the relationship between knowledge about complementary feeding and family income with the incidence of stunting.

Methods: This type of research uses a quantitative analytical observational method with a cross-sectional design. 45 mother who met the selection criteria to participate in this study were obtained by simple random sampling technique.

Results: The results of the univariate analysis showed that some respondents had less knowledge about complementary feeding (46.7%), some respondents had low income (55.6%) and the majority of stunting respondents 26 (57.8%). The results of bivariate analysis using the Chi-Square statistical test found a significant relationship between maternal knowledge ($p=0.002$) and family income ($p=0.001$) with the incidence of stunting.

Conclusion: Mother's knowledge and family income are in the low range, both of which contribute to stunting incidents. Mother's knowledge about feeding is crucial to ensure that children's nutritional needs and adequacy are met. Additionally, family purchasing power, which is influenced by family income, determines the ability to provide various types of food to meet daily calorie intake

Keywords: *Complementary Feeding, Family Income, Stunting, Knowledge*

INTRODUCTION

Globally, numerous interventions have been implemented to improve nutritional status; however, malnutrition remains a serious public health issue, including stunting. Stunting is a nutritional problem caused by prolonged nutrient deficiencies, leading to impaired growth during critical periods. It is characterized by a shorter stature compared to children of the same age, measuring less than -2 Standard Deviations (SD) on the World Health Organization (WHO) growth chart [1]. Stunting can have adverse effects on a person's life. In the short term, stunting can disrupt brain development, reduce intelligence, impair physical growth, and affect the body's metabolism. In the long term, it leads to decreased cognitive abilities and intellectual potential, hindered growth, reduced academic performance, weakened immune system, increased risk of obesity, and vulnerability to non-communicable and degenerative diseases such as diabetes mellitus, cardiovascular diseases, cancer, stroke, and disabilities. Additionally, it can result in reduced productivity in adulthood [2].

According to the World Health Organization (WHO), the global prevalence of stunting continues to rise, reaching 148.1 million cases in 2022. This figure remains high and is still far from WHO's target of 100 million stunting cases worldwide by 2025 [3]. In the Southeast Asian region, Indonesia had a stunting rate of 21.6% in 2022, the second highest after Timor Leste. Bengkulu Province ranked 27th out of 38 provinces in Indonesia, with a stunting rate of 19.8%. Overall, Seluma Regency reported a stunting prevalence of 22.1% in 2022, ranking 5th out of 10 regencies. In 2023, Cahaya Negeri Health Center recorded the highest stunting prevalence, with 148 stunted toddlers, among the 22 health centers in Seluma Regency [4,5].

Stunting is caused by multiple factors. The direct causes of stunting include prolonged inadequate nutritional

intake and recurrent infectious diseases. Meanwhile, indirect causes can include education levels, sanitation and hygiene, food availability or family income, and a mother's knowledge about nutrition [6]. A mother's knowledge of nutrition is one of the factors that influence a person's food consumption. Good nutritional knowledge enables individuals to select and prepare food according to the daily caloric needs appropriate for their age. For children aged 12–24 months, 70% of their nutritional needs are fulfilled through complementary foods to breast milk [7,8].

Complementary feeding (CF) refers to foods or beverages other than breast milk that are introduced to infants during the transitional feeding period. Proper complementary feeding involves timely introduction, safe and hygienic practices, responsive feeding, and appropriate selection and preparation of food. Improper Complementary Feeding practices can lead to gastrointestinal disturbances, making infants more vulnerable to various infectious diseases, especially within the first two years of life [9]. According to Babys (2018), providing complementary feeding that are inappropriate or not age-appropriate can lead to nutritional deficiencies and digestive problems in infants [10].

Knowledge about complementary feeding enables individuals to develop appropriate and proper feeding patterns for infants. The better the knowledge, the more attention will be given to the type and amount of food consumed by toddlers [11]. Supported by research from Hastatiarni (2023), low knowledge about complementary feeding is closely linked to the risk of stunting. Limited understanding often leads to inappropriate feeding practices, such as untimely introduction, improper frequency, incorrect preparation methods, poor food hygiene, insufficient food quantities, and unsuitable food choices [12].

The selection of high-quality and nutritious ingredients for complementary

feeding is closely linked to a family's purchasing power. When household income does not align with the number of family members, it may limit access to nutritious food, increasing the risk of stunting by up to seven times ^[13].

A good family income is one that is sufficient or appropriate to meet the needs of all family members at home, both in quantity and quality, covering necessities such as food, clothing, housing, and other supporting needs ^[14]. This theory is supported by research from Alemayehu (2017), which found that toddlers living in households with more than five family members are approximately twice as likely to experience stunting compared to those living with 2-4 family members. Families with low income and a large number of members often have limited purchasing power for specific types of food. Low-income households tend to prioritize foods high in carbohydrates over protein-rich foods because they are cheaper and available in larger quantities to feed the family. However, such choices fail to meet the nutritional needs adequately ^[15].

Bengkulu Province ranks 27th out of 38 provinces in Indonesia, with a stunting prevalence of 19.8%. In 2022, Seluma Regency had an overall stunting prevalence of 22.1%, ranking 5th out of 10 regencies. In 2023, Cahaya Negeri Health Center reported the highest stunting prevalence, with 148 stunted toddlers, among 22 health centers in Seluma Regency. Seluma Regency also recorded the highest poverty rate in Bengkulu Province in 2021. The poverty rate in Seluma reached 18.72% in March 2021, an increase from 18.56% in March 2020. However, in 2022, the poverty rate declined to 18.36%. These figures indicate that Seluma Regency has consistently had the highest poverty rate in Bengkulu Province for three consecutive years.

An initial survey conducted by the author through direct observation at Cahaya Negeri Health Center over three days revealed 5 toddlers with stunting and

6 toddlers with weight faltering (slowed weight gain). During interviews guided by a research questionnaire, it was found that 4 out of 5 mothers of stunted toddlers had limited knowledge, answering correctly only 3 out of 10 questions. Therefore, this study aims to explore the relationship between maternal knowledge about complementary feeding and family income with the occurrence of stunting.

METHODS

The study used a quantitative analytical observational method with a cross-sectional design. The study population consisted of all mothers with toddlers aged 12 to 24 months, totaling 188. The sample was selected using purposive sampling, with 45 respondents meeting the inclusion criteria: mothers who had complete anthropometric records from birth, with a history of a full-term birth, normal birth weight and length, and no congenital abnormalities. The study has obtained the ethics approval number: 173/FB/KEPKSTIKesSaptaBakti/2024. Nutritional status of the toddlers was assessed by measuring their height and weight. Knowledge and family income were assessed using a questionnaire. The data were then analyzed using statistical tests with chi-square.

RESULT

In this study, univariate analysis was used to analyze respondent demographic data such as age, occupation, parity, education, history of age-appropriate immunization, and history of infectious diseases (diarrhea, pneumonia, tuberculosis) in the past 3 months. The study involved 45 respondents, including both normal and stunted toddlers, within the working area of the Cahaya Negeri Health Center in Seluma Regency. The data were analyzed and presented in the form of frequency tables. The research was conducted in March-April 2024 at the Posyandu within the Cahaya Negeri Health Center area.

Table 1. Frequency Distribution of Characteristics

Variable	Frequency	(%)
Age		
< 20 years	10	22.2
20-35 years	25	55.6
> 35 years	10	22.2
Parity		
Primipara (1)	13	28.9
Multipara (2-4)	26	57.8
Grandemultigravida (≥ 5)	6	13.3
Occupation		
Housewife	28	62.2
Career	17	37.8
Education		
Junior High School	17	37.8
Highschool	20	44.4
Collage	8	17.8
Immunization History		
Complete	28	62.2
Incomplete	17	37.8
History of Illness in the Last 3 Months		
Present	21	46.7
Absent	24	53.3
Total	45	100

Based on Table 1, the majority of mothers with toddlers are aged between 20-35 years, accounting for 25 (55.6%). Most of them have 2-4 children, totaling 26 (57.8%). A majority are housewives, representing 28 (62.2%). The largest group has a high school education, with 20 (44.4%) individuals. Furthermore, the majority have completed toddler immunization, with 28 (62.2%), and most reported no illness history in the past 3 months, totaling 24 (53.3%).

Table 2. The frequency distribution of mothers' knowledge about complementary feeding

Mother's Knowledge	Frequency	Percentage (%)
Poor/Limited	21	46,7
Adequate	14	31,1
Good	10	22,2
Total	45	100

Based on Table 2, it was found that nearly half of the respondents had limited knowledge, with 21 respondents (46.7%) falling into this category.

Table 3. The frequency distribution of family income

Family Income	Frequency	Percentage (%)
Below minimum wage	25	55,6
Equal to or above minimum wage	20	44,4
Total	45	100

Based on Table 3, it shows that nearly half of the respondents, 25 (55.6%), have low family income.

Table 4. The frequency distribution of Stunting

The occurrence of stunting	Frequency	Percentage (%)
Stunting	26	57,8
Not Stunting	19	42,2
Total		100

Based on Table 4, the majority of respondents, 26 (57.8%), have stunted toddlers.

Table 5. The Relationship Between Maternal Knowledge and the Occurrence of Stunting

Knowledge	Occurrence of Stunting				Total		<i>p value</i>
	Yes		No		n	%	
	n	%	n	%			
Poor/Limited	18	85,7	3	14,3	21	100	0,002
Adequate	5	35,7	9	64,3	14	100	
Good	3	30,0	7	70,0	10	100	

Based on Table 5, this study shows that 3 (30.0%) mothers have good knowledge about stunted children, while 7 (70%) have good knowledge about non-stunted children. The results also indicate that, out of 21 mothers with limited knowledge, 18 (85.7%) have knowledge about stunted children, and 3 (14.3%) have limited knowledge about non-stunted children. The table above reveals a significant relationship between mothers' knowledge of complementary feeding and the incidence of stunting, with a p-value of 0.002.

Table. 6 The relationship between family income and the occurrence of stunting

Family Income	Occurrence of Stunting				Total		<i>p-value</i>
	Yes		Not				
	n	%	n	%	n	%	
Below minimum wage	20	80,0	5	20,0	25	100	0,001
Equal to or above minimum wage	6	30,0	14	70,0	20	100	

Based on Table 6, in this study, there are 20 (80.0%) families with low income and stunted children, and 5 (20%) families with low income and non-stunted children. The results also show that, out of 20 families with adequate or higher income, 6 (30%) families have stunted children, while 14 (70%) families have non-stunted children. The data from the table indicate a significant relationship between family income and the incidence of stunting, with a p-value of 0.001

DISCUSSION

Based on the results presented in Table 4.1, the majority of mothers were aged 20–35 years, accounting for 25 individuals (55.6%). Most had 2–4 children (26 individuals or 57.8%), were predominantly housewives (28 individuals or 62.2%), and had a high school education (20 individuals or 44.4%). Additionally, most had a history of complete immunization for their toddlers (28 individuals or 62.2%), and a majority reported no illness in the past three months (24 individuals or 53.3%).

The study revealed that nearly half of the mothers (21 individuals or 46.7%) had limited knowledge about child nutrition. A mother's understanding of nutrition significantly influences food selection, which subsequently affects the nutritional status of toddlers. The questionnaire results indicated frequent errors in five specific areas among the 20 items: the duration of feeding sessions, signs that a baby is ready for complementary feeding, the proportion of breast milk to complementary feeding for toddlers aged 12–24 months, the maximum daily milk intake for toddlers aged 12–24 months, and the types of fats needed by toddlers in this age group.

According to the Indonesian Pediatric Society, toddlers need a structured feeding schedule, consisting of three main meals and two snacks, with each meal not exceeding 30 minutes. Signs that your baby is ready to eat include being able to hold his head up, showing interest in food, and being able to chew and swallow thick, solid food textures. For toddlers aged 12–24 months, the recommended proportion of breastmilk or formula to complementary feeding is 30%

breastmilk/formula and 70% complementary feeding. The maximum daily milk intake for toddlers in this age range is 500 cc. Healthy fat sources suitable for toddlers aged 12–24 months include avocado, olive oil, coconut oil, and fresh coconut milk ^[16].

Parents with adequate knowledge can help improve their children's nutritional status, ensuring proper growth and development. Insufficient knowledge, such as a lack of understanding about healthy eating habits or inadequate awareness of providing appropriate types and quantities of food for their children, can negatively affect optimal growth and development ^[17]. This is supported by research conducted by Musthafa (2024) which emphasizes that adequate nutritional knowledge enables individuals to select and process food based on the nutrients required by toddlers. This helps prevent inadequate food intake and improves nutritional status, thereby supporting optimal growth and development. Daily nutritional needs are not solely fulfilled through breastfeeding, as a toddler's caloric requirements increase with age. Therefore, it is essential to meet these nutritional needs through appropriate types of food, portion sizes, and feeding frequencies tailored to their age, particularly for children aged 12–24 months, where 70% of their nutritional intake comes from complementary foods alongside breastfeeding ^[18].

The provision of adequate complementary feeding refers to the timely, safe, hygienic, responsive, and appropriate selection and administration of complementary foods. Inappropriate practices in complementary feeding can

lead to gastrointestinal disturbances, making children more susceptible to various infectious diseases, particularly during the first two years of life ^[19].

Previous study showed that inappropriate complementary feeding (CF) practices that are not age-appropriate can lead to disruptions in meeting nutritional needs and digestive disorders in infants ^[20]. This is due to the immaturity of the infant's digestive system, which increases the risk of infectious diseases if complementary foods are introduced too early. The results of the Chi-Square test showed a p-value of 0.002, indicating a significant relationship between mothers' knowledge of complementary feeding and the incidence of stunting in the Cahaya Negeri Community Health Center Work Area, Seluma Regency, in 2024

A mother's knowledge significantly influences her attitudes or behaviors in selecting food for her toddlers. Mothers with limited knowledge tend to provide inadequate nutritional intake, which can lead to nutritional issues such as stunting in children ^[21]. The higher a mother's level of knowledge, the better her assessment of nutritional intake. This enables her to more easily accept new information and critically evaluate the positive and negative aspects of the information provided, especially when encountering misconceptions or incorrect practices while feeding her child ^[22]

A well-informed mother will provide appropriate complementary feeding to prevent stunting in toddlers, starting from the timeliness of feeding, frequency, preparation methods, food hygiene, portion sizes, to the selection of food ingredients. This is because toddlers require balanced, nutritious food to support their growth and development ^[23]. Good knowledge in an individual will have an impact on developing proper and appropriate eating patterns. The better the knowledge, the more attention will be given to the type and quantity of food provided for toddlers. Conversely, if a mother has limited

knowledge, the opposite effect will occur ^[24]. This statement is supported by Septamarini's research published in the Journal of Nutrition College in 2019, which states that mothers with low levels of knowledge are 10.2 times more likely to have children experiencing stunting compared to mothers with adequate or good knowledge ^[25].

In this study, among 45 respondents, 21 mothers (46.7%) had limited knowledge, with the majority of them being under 20 years old (22.2%) and primarily first-time mothers (28.9%). The researcher's observations suggest that most girls who drop out of school or do not continue to higher education tend to marry at a young age. Additionally, due to their young age, these couples often live with their parents as they are considered unable to care for a child on their own.

Psychologically, young mothers have not yet reached full maturity in their thinking, which affects their daily parenting patterns. Age can influence behavior, as different age groups have varying perspectives. Mothers who have not reached adulthood may find it harder to understand and grasp certain concepts compared to more mature mothers. Age correlates with a person's experience, and as one matures, both their level of maturity and strength grow, impacting their mindset and overall functioning ^[26].

In this study, mothers with limited knowledge also tend to have a lower level of education, with the majority having completed only elementary or junior high school (37.8%). A mother's formal education impacts her level of knowledge, where higher educational attainment is associated with greater ability to absorb practical knowledge in both formal and informal settings, especially through mass media. As a result, mothers are better equipped to share information according to needs. Low education levels are often linked to a stronger adherence to food-related traditions, making it more difficult to accept new nutritional information.

Higher formal education can foster progressive values, including the importance of proper complementary feeding for infants. However, since many mothers with higher education work outside the home, their babies are often left under the care of grandmothers, mothers-in-law, or caregivers, who may still uphold older food practices for infants ^[27].

In this study, it was also found that the majority of toddlers did not have a complete immunization history, particularly among mothers with limited knowledge (37.8%). Additionally, among respondents with good knowledge (10 people), 3 children experienced stunting, had incomplete immunization histories, and had a history of infections. Incomplete immunization weakens the baby's immunity, making them more susceptible to inflammation. If left untreated, inflammation in children can increase the risk of stunting. The cross-matrix results also showed that, out of 21 mothers with limited knowledge, 12 toddlers had a history of infections in the past 3 months, such as diarrhea, acute respiratory infections, and tuberculosis, and half of them (11 toddlers) had no complete immunization history.

The results of the Chi-Square test on the family income variable showed a *p*-value of 0.001, which is less than α (0.005), indicating a significant relationship between family income and the incidence of stunting in the working area of Puskesmas Cahaya Negeri, Seluma Regency, in 2024. Family income is related to a household's ability to meet primary, secondary, and tertiary needs. Households with higher incomes are more easily able to fulfill their living requirements, while families with lower incomes face greater difficulties in meeting these needs ^[28]. A family with adequate income will have the ability to provide for all of their children's primary and secondary needs. Families with higher incomes also have better access to healthcare services. Children from low-income families tend to consume food in

lower quantities, with poorer quality and less variety compared to children from high-income families, who are able to choose and purchase nutritious and diverse food ^[29]. Other studies have also mentioned that families with low incomes are more likely to have children who experience stunting, as their limited income prevents them from providing food that meets the nutritional needs of their toddlers ^[30].

In this study, out of 45 respondents, 25 mothers (55.6%) had low family incomes, with the majority (57.8%) having a high parity. Families with a large number of members, which are not proportional to their income, may face disruptions in food access because the income they earn is allocated to other essential needs, limiting their ability to purchase food ^[31].

Family income, along with the number of household members living under one roof, can influence food availability. Families with low income tend to buy food items that are higher in carbohydrates rather than those rich in protein, as these carbohydrate-rich foods are cheaper and more abundant. On the other hand, families with higher income typically have greater purchasing power, which allows them to access better public services, such as a wider variety of food options, education, healthcare, road access, and other amenities. This, in turn, impacts the nutritional status of children ^[32].

CONCLUSION

There is a relationship between maternal knowledge of complementary feeding and family income with the incidence of stunting in children aged 12-24 months in the working area of Cahaya Negeri Health Center. The health status of toddlers is closely linked to knowledge, particularly in the provision of complementary feeding and family income. Parents are able to provide age-appropriate and varied food, while also monitoring the growth of their children to ensure that toddlers do not experience the consequences of chronic malnutrition,

including stunting and poor nutritional status.

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