

COMPLEMENTARY BREASTFEEDING (MPASI) FEEDING PATTERNS AND HISTORY OF INFECTIOUS DISEASES IN STUNTED AND NON-STUNTED CHILDREN AGED 12-24 MONTHS IN THE GANTING COMMUNITY HEALTH CENTER AREA, GEDANGAN DISTRICT, SIDOARJO REGENCY

Nabila Aulia Rahmania¹, Amalia Ruhana²

^{1,2}Nutrition Study Program, Universitas Negeri Surabaya

E-mail: nabila.22053@mhs.unesa.ac.id

Received : May 30, 2026

Published : June, 29, 2026

Revised : May 31, 2026

DOI : <https://doi.org/10.59733/medalion.v7i2.315>

Accepted : June, 22, 2026

Publish Link : <https://medalionjournal.com/index.php/go>

Abstract

Stunting is a condition of growth failure that occurs in toddlers due to chronic malnutrition that occurs in the First 1000 Days of Life (HPK), starting from the formation of the fetus until the child is 24 months old. Factors that influence the incidence of stunting are direct factors (food consumption, history of infectious diseases, breastfeeding practices, food availability) and indirect factors (economic conditions, health services, education level, social and cultural aspects). This study aims to determine the pattern of complementary feeding (MPASI) and history of infectious diseases, as well as differences in the pattern of complementary feeding (MP-ASI) and history of infectious diseases in stunted and non-stunted children in the work area of Ganting Health Center, Gedangan District, Sidoarjo Regency. This study uses a quantitative approach with a 1:1 case control design paired by age and sex. The sample of this study was 60 children, consisting of 30 stunted children as the case group and 30 non-stunted children as the control group taken using a purposive sampling technique. Data collection on complementary feeding (MPASI) patterns was conducted using the Child Feeding Questionnaire (CFQ) and infectious disease history was obtained through interviews using a questionnaire. Data analysis used the McNemar test. The results of this study showed a significant difference in complementary feeding (MPASI) patterns ($p = 0.035$) and infectious disease history ($p = 0.022$) in stunted and non-stunted children in the working area of the Ganting Health Center, Gedangan District, Sidoarjo Regency.

Keywords: Stunted, children, complementary feeding patterns (MPASI), history of infectious diseases

INTRODUCTION

The growth period for toddlers is an optimal time for health. During this period, it's crucial to ensure adequate, high-quality food intake. Growth occurs not only in physical aspects like height and weight, but also in the child's nervous system, organs, and cognitive function. (Ananda Frasetya et al., 2023) Nutrition is a very important aspect in a child's growth process, because it is one of the factors that influences a child's health and intelligence (Alhamid et al., 2021).

Stunting is a condition of growth failure that occurs in toddlers with a period of 1000 First Days of Life (HPK) which begins from the formation of the fetus until the child is 24 months old. This is indicated by a body length index or height that is not appropriate for their age. Assessment of nutritional status based on anthropometric measurements using indicators of height according to age or body length according to age (PB/U or TB/U) is assessed using a z-score which is then classified into several categories of child nutritional status, namely: very short (severely stunted) which is $<-3SD$, short (Stunted) $-3 SD$ to $<-2SD$, and normal which is $-2SD$ to $+3SD$ (Rahmadhita, 2020).

The prevalence of stunting in Indonesia according to the 2022 Indonesian Nutritional Status Survey (SSGI) was 21.6%, while the prevalence of stunting in Sidoarjo Regency in 2021 was 14.8% and increased in 2022 to 16.1% (Ministry of Health of the Republic of Indonesia, 2022). Although the stunting prevalence

rate in Sidoarjo Regency is lower than the national average, stunting remains a serious problem. This is because stunting can impact a child's future quality of life.

The WHO explains that the causes of stunting can be divided into two categories: direct and indirect. Direct causes are the primary factors, including food consumption, history of infectious diseases, breastfeeding practices, food availability, and household and family environmental conditions. Meanwhile, indirect causes are related to social factors, such as economic conditions, health services, education levels, social and cultural aspects, agricultural and food systems, and access to clean water, sanitation, and a healthy environment (Khoiriyah et al., 2021).

A child's food intake can be influenced by various factors, one of which is feeding patterns. If feeding patterns are inadequate, the child's nutritional needs will not be met, which can impact their growth and development (Sari & Ratnawati, 2018). A good feeding pattern ensures that children receive adequate, balanced nutrition to meet their nutritional needs, in terms of type, quantity, and frequency. Food quality is greatly influenced by a person's eating habits.(Putri, 2023). Feeding patterns in children are influenced by various factors, including physiological, psychological, social and cultural factors (Sari & Ratnawati, 2018).

Feeding patterns are closely related to children's nutritional status. Proper maternal feeding patterns, including the type of food, quantity, and meal schedule according to recommended indicators, play a crucial role in supporting optimal child growth. Inappropriate feeding patterns can increase the risk of infectious diseases in children. Infections cause decreased appetite, impaired nutrient absorption, and increased catabolism, thus preventing optimal nutrient requirements for growth from being met (Rahman, 2018).

In addition to feeding patterns, a history of infectious diseases also influences a child's nutritional status. Infections in children can cause decreased appetite and limited food intake. This can increase the risk of nutritional problems. Children with infectious diseases tend to experience weight loss due to increased metabolic rate, which is often accompanied by a decreased appetite. Some examples of infectious diseases include diarrhea, fever accompanied by flu and cough, bronchitis, pneumonia, tuberculosis, worms, and measles (Cono et al., 2021).

Based on the 2023 Sidoarjo Regency Health Profile, the prevalence of stunted toddlers in the Ganting Community Health Center area, Gedangan District, Sidoarjo Regency, was 8.8%. Meanwhile, the average stunting rate in Sidoarjo Regency was 3.17%.(Sidoarjo Health Office, 2023). Based on information obtained from a nutritionist at Ganting Community Health Center, factors contributing to malnutrition in toddlers include close birth spacing, mothers' inaccurate knowledge of complementary feeding (MP-ASI), socioeconomic status, and infectious diseases. Toddlers are highly susceptible to health problems caused by nutritional issues. Inappropriate provision of complementary feeding (MP-ASI) can disrupt a child's growth and development. This is due to a weakened immune system, decreased productivity, and emotional disturbances in toddlers (Zogara et al., 2021).

From the above background, the researcher is interested in conducting a study entitled 'Patterns of Complementary Breast Milk Feeding (Mp-Asi) And History Of Infectious Diseases in Stunted and Non-Stunted Children Aged 12-24 Months in the Ganting Health Center Area, Gedangan District, Sidoarjo Regency'. This research is important due to the high prevalence of stunting in the study area and the need to identify modifiable risk factors. The novelty of this study lies in its comparative analysis of complementary feeding practices and infectious disease history among stunted and non-stunted children under two years of age. Theoretically, this study contributes to the evidence on determinants of stunting during the First 1,000 Days of Life. Practically, the findings can support the development of nutrition

education, improved feeding practices, and infectious disease control programs to reduce stunting prevalence.

METHOD

This study is a quantitative study with an analytical observational design using a case-control approach that aims to compare the pattern of complementary feeding (MP-ASI) and the history of infectious diseases between stunted and non-stunted children. The case group consists of children aged 12–23 months who experience stunting, while the control group is children aged 12–23 months with normal nutritional status. The study was conducted in the working area of the Ganting Community Health Center, Gedangan District, Sidoarjo Regency in December 2025. The case-control design was chosen because it is effective in identifying factors related to the incidence of stunting through comparisons between case and control groups that have similar characteristics.

The study population was all children aged 12–23 months and their mothers or primary caregivers residing in the Ganting Community Health Center, Gedangan District, Sidoarjo Regency. The sample was selected using a purposive sampling technique with a 1:1 matching approach based on age and gender. The sample consisted of 30 stunted children as the case group and 30 non-stunted children as the control group, resulting in a total sample of 60 children. Respondents were selected based on predetermined inclusion and exclusion criteria, including having complete anthropometric data, residing in the study area, and being accompanied by a mother or primary caregiver who was willing to participate in the study by signing an informed consent.

The study began with obtaining permission and coordination with the Ganting Community Health Center to obtain baseline data on the nutritional status of children. Respondents were then selected based on the research criteria, explained the objectives and procedures, and obtained informed consent. Data were collected through structured interviews, questionnaires completed by the respondents' mothers, and anthropometric measurements. Data collected included maternal and child characteristics, complementary feeding patterns, infectious disease history, and child nutritional status based on length-for-age or height-for-age indicators according to WHO growth standards.

The instruments used in this study included a Pre-Study Explanation (PSP) sheet, an informed consent form, a Child Feeding Questionnaire (CFQ), an infectious disease history questionnaire, an infantometer, and a stadiometer. The CFQ was used to measure complementary feeding patterns and was categorized as appropriate if the score was 56–100% and inappropriate if the score was $\leq 55\%$. Infectious disease history was obtained through interviews regarding the occurrence of diarrhea, acute respiratory infections (ARI), measles, tuberculosis, pneumonia, hepatitis, or urinary tract infections in the past month. Nutritional status was measured using an infantometer and a stadiometer according to the child's age and standing ability.

The collected data underwent editing, coding, entry, and cleaning before being analyzed using statistical software. Univariate analysis was used to describe the characteristics of respondents, complementary feeding patterns, and infectious disease histories in the form of frequency distributions and percentages. Furthermore, bivariate analysis was conducted using the McNemar test to determine differences in complementary feeding patterns and infectious disease histories between stunted and non-stunted children matched by age and gender. The analysis results were declared significant if the p-value was <0.05 .

RESULTS AND DISCUSSION

Univariate Analysis

Table 1 Characteristics of Children

Characteristics	<i>Stunted</i>		<i>Non-stunted</i>	
	n	%	n	%
Age				
12-23 months	30	100%	30	100%
Total	30	100%	30	100%
Gender				
Man	16	53.3%	16	53.3%
Woman	14	46.7%	14	46.7%
Total	30	100%	30	100%
Birth Order				
1st child	7	23.3%	14	46.7%
2nd child	14	46.7%	12	40%
3rd child	9	30%	4	13.3%
Total	30	100%	30	100%
Nutritional Status (PB/U or TB/U)				
Very Short (severely stunted <-3 SD)	4	13.3%	0	0%
Short (stunted - 3 SD sd <- 2 SD)	26	86.7%	0	0%
Normal (-2 SD to +3 SD)	0	0%	30	100%
High (> +3 SD)	0	0%	0	0%
Total	30	100%	30	100%

Table 1 shows the distribution of characteristics of children in the Ganting Community Health Center area, showing that all respondents in the stunted and non-stunted groups aged 12–23 months (100%) had the same gender distribution, namely 16 boys (53.3%) and 14 girls (46.7%), because matching was carried out based on age and gender. Based on birth order, most of the stunted children were the second child (46.7%), while in the non-stunted group, most were the first child (46.7%). In terms of nutritional status, the majority of stunted children were in the stunted category (86.7%) and a small portion were severely stunted (13.3%), while all non-stunted children had normal nutritional status (100%).

Table 2 Characteristics of Mothers

Characteristics	<i>Stunted</i>		<i>Non-stunted</i>	
	n	%	n	%
Mother's Age				
17-25 years	7	23.3%	4	13.3%
26-35 years old	19	63.3%	23	76.7%
46-55 years	4	13.3%	3	10%
Total	30	100%	30	100%
Last education				
Elementary School	1	3.3%	1	3.3%
Junior High School	8	26.7%	1	3.3%
Senior High School	15	50%	22	73.3%

College	6	20%	6	20%
Total	30	100%	30	100%
Mother's Job				
Work	7	23.3%	5	16.7%
Doesn't work	23	76.7%	25	83.3%
Total	30	100%	30	100%
Family Income				
0-500,000	1	3.3%	0	0%
>500,000 – 1,000,000	1	3.3%	1	3.3%
>1,000,000 – 3,000,000	5	16.7%	7	23.3%
>3,000,000 – 5,000,000	20	66.7%	15	50%
>5,000,000	3	10%	7	23.3%
Total	30	100%	30	100%

Based on table 2 maternal characteristics, the majority of mothers in both stunted and non-stunted children groups were in the 26–35 years age range, with proportions of 63.3% and 76.7%, respectively. The highest level of education of mothers in both groups was predominantly high school/vocational high school, namely 50.0% in the stunted group and 73.3% in the non-stunted group. Most mothers in both groups were also unemployed, at 76.7% and 83.3%, respectively. In addition, the majority of families in both groups had incomes in the range of >Rp3,000,000–Rp5,000,000, with the largest proportions in the stunted (66.7%) and non-stunted (50.0%) groups.

Univariate Analysis

Complementary Breastfeeding Feeding Patterns (MPASI)

Table 3 Distribution of Complementary Breastfeeding Feeding Patterns (MPASI) in Stunted and Non-stunted Children Aged 12-24 Months

Complementary Food (MPASI) Provision Pattern	<i>Stunted</i>		<i>Non-stunted</i>	
	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
56% - 100% (appropriate)	16	53.3%	25	83.3%
≤55% (inappropriate)	14	46.7%	5	16.7%
Total	30	100%	30	100%

Table 3 shows the frequency distribution of complementary feeding (MPASI) patterns in the stunted children group. It is known that 14 (47%) stunted children were in the inappropriate category. Meanwhile, 25 (83.3%) non-stunted children were in the appropriate category.

History of Infectious Diseases

Table 4 Distribution of Infectious Disease History in Stunted and Non-Stunted Children Aged 12-24 Months

History of Infectious Diseases	Stunted		Non-stunted	
	n	%	n	%
Yes	26	86.7%	17	56.7%
No	4	13.3%	13	43.3%
Total	30	100%	30	100%

Based on Table 4, the distribution of the presence or absence of disease in stunted and non-stunted children, most children in the stunted group had a history of infectious disease, namely 26 children (86.7%), In the non-stunted children group, more than half had a history of infectious disease, namely 17 children (56.7%). In general, the number of children with a history of infectious disease was higher in the stunted group than in the non-stunted group.

Table 5 Distribution of Infectious Disease History in Stunted and Non-Stunted Children Aged 12-24 Months

History of Infectious Diseases	Stunted		Non-stunted	
	n	%	n	%
Diarrhea	9	30%	8	26.6%
ARI	23	76.6%	14	46.6%
Measles	2	6.6%	0	0%
Tuberculosis (TB)	1	3.3%	0	0%
Urinary Tract Infection (UTI)	1	3.3%	0	0%

Based on Table 5, Distribution of infectious disease history, in the stunted children group, 25 children (83.3%) had a history of ARI, while in the non-stunted group, 17 children (56.7%) had a history of ARI. In addition to ARI, a history of diarrhea was also quite common in both groups, namely in stunted children as many as 10 children (33.3%) and in non-stunted children as many as 8 children (26.6%). Measles was only found in the stunted children group as many as 2 children (6.6%) and was not found in the non-stunted group. Meanwhile, a history of tuberculosis (TB) and urinary tract infection (UTI) was only found in the stunted group as many as 1 child (3.3%) each. In general, the prevalence of infectious diseases tends to be higher in the stunted children group than in the non-stunted group.

Bivariate Analysis

Table 6 Results of Analysis of Differences in Complementary Food (MPASI) Provision Patterns in Stunted and Non-Stunted Aged 12-24 Months

Complementary Food (MPASI) Provision Pattern	Stunted	Non-stunted	<i>p-value</i>
Appropriate	16	25	0.035
Inappropriate	14	5	
Total	30	30	

Based on Table 6, Bivariate Analysis using the McNemar test, the significance value of feeding patterns in stunted and non-stunted children is 0.035 (p-value <0.05). This indicates a significant difference in complementary feeding (MPASI) patterns in stunted and non-stunted children.

Table 7 Results of the Analysis of Differences in Infectious Disease History in Stunted and Non-Stunted Children Aged 12-24 Months

History of Infectious Diseases	Stunted	Non-stunted	<i>p-value</i>
Yes	24	17	0.022
No	4	13	
Total	30	30	

Based on Table 7, bivariate analysis using the McNemar test, the significance value of infectious disease history in stunted and non-stunted children is 0.022 (p-value <0.05). This indicates a significant difference in infectious disease history between stunted and non-stunted children.

Discussion

Univariate Analysis

1. Complementary Breastfeeding (MPASI) Feeding Patterns

Feeding practices describe the nutritional intake provided to children, including the types of foods consumed, the quantity or portion sizes, and the feeding schedule, with the aim of meeting nutritional requirements according to their age and stage of growth (Maulina et al., 2024). Consuming a variety of foods with balanced nutritional content reflects a healthy dietary pattern, enabling the body to meet its needs for growth, development, and overall health maintenance (Natalia et al., 2022).

The results of this study showed that, regarding the type of food consumed by children under two years of age, 15 (50%) mothers of stunted children (case group) and 8 (26.6%) mothers of non-stunted children (control group) rarely provided complete meals to their children. A complete meal refers to a balanced diet containing carbohydrates, proteins, fats, and vitamins that support child growth and development. Protein is one of the most essential nutrients because it plays a vital role in growth and development, tissue formation and repair, and immune function through antibody production (Sari et al., 2022).

Dietary patterns, which encompass the type, quantity, and timing of meals, are crucial determinants of child growth. Adequate and balanced nutrition supports optimal physical and cognitive development. Inadequate feeding practices may increase the risk of growth failure. Therefore, food provision should be adjusted according to the nutritional needs of the child’s age and developmental stage (Prakhasita, 2018).

2. History of Infectious Diseases

Infectious diseases are conditions caused by the growth and proliferation of microorganisms within the body. These microorganisms include viruses, bacteria, fungi, and parasites (World Health Organization, 2019). Infection cannot occur in the absence of pathogenic agents. The occurrence of infectious diseases is influenced by the interaction of three main factors: the pathogen as the agent, humans as the host, and the surrounding conditions as the environment. These factors are interrelated in determining the presence or absence of infectious diseases (Salsabila, 2022).

The results of this study showed that 86.7% of stunted children under two years of age had a history of infectious diseases, while 13.3% had no such history. In contrast, among non-stunted children, 56.7% had experienced infectious diseases and 43.3% had no history of infection. The most common infectious

diseases reported were diarrhea and acute respiratory infections (ARI). However, among stunted children, several cases of other infectious diseases were also identified, including measles, tuberculosis, and urinary tract infections (UTIs). Specifically, 2 (6.6%) stunted children had measles, 1 (3.3%) had tuberculosis, and 1 (3.3%) had a urinary tract infection.

In this study, infectious disease history was categorized into two groups: presence of infection and absence of infection. Other infectious conditions included comorbid diseases such as measles, tuberculosis (TB), hepatitis, pneumonia, and urinary tract infections (UTIs). These conditions were classified based on whether the child had ever been diagnosed with the disease during their lifetime or within the previous month. Infectious diseases are recognized as one of the major contributors to stunting. Nutritional intake and infectious diseases are closely interconnected and cannot be considered separately. Infectious diseases may worsen a child's nutritional status due to reduced appetite and impaired nutrient absorption (Novikasari et al., 2021).

Bivariate Analysis

1. Differences in Complementary Breastfeeding (MPASI) Feeding Patterns for Stunted and Non-Stunted Children Aged 12-24 Months

The statistical analysis used in this study was the McNemar test. The results showed a p-value of 0.035 and an odds ratio (OR) of 4, indicating a significant difference in complementary feeding practices between stunted and non-stunted children under two years of age in the working area of Ganting Community Health Center, Gedangan District, Sidoarjo Regency. An OR of 4 indicates that children with inappropriate feeding practices were four times more likely to experience stunting than those receiving appropriate feeding practices.

These findings are consistent with the study by Ningtias and Solikhah (2020), which reported a significant difference in nutritional feeding practices between stunted and non-stunted toddlers (p-value = 0.001). Similarly, Farantika and Indrawati (2023) found a significant relationship between feeding practices and the nutritional status of children attending integrated health service posts in Klampisan Village, Geneng District, Ngawi Regency (p-value = 0.001).

Feeding practices reflect the adequacy of dietary intake in terms of food type, quantity, and feeding schedule to meet children's nutritional needs. The types of foods consumed greatly influence nutritional status. Therefore, the quality of a child's diet should be carefully considered to ensure it is nutritious, balanced, and varied according to their needs (Fauziah et al., 2023). Feeding practices refer to the provision of food by parents, particularly mothers, to meet children's nutritional requirements and support their survival, growth, and development. Consequently, parents play a substantial role in ensuring adequate nutritional intake within the household.

Feeding practices include the type, amount, and timing of meals. In this study, regarding the type of food consumed, 15 (50%) mothers of stunted children (case group) rarely provided complete meals, whereas among non-stunted children, 7 (23.3%) mothers very frequently and 15 (50%) mothers frequently provided complete meals. These complete meals consisted of carbohydrates, proteins, fats, and vitamins. This finding is consistent with the study by Abi Khalil et al. (2022), which reported that inadequate dietary diversity among children aged 6–59 months is one of the primary factors contributing to suboptimal nutrient intake and absorption.

2. Differences in Infectious Disease History in Stunted and Non-Stunted Children Aged 12-24 Months

For the infectious disease history variable, the McNemar test was also applied. The results showed a p-value of 0.022 and an OR of 5.5, indicating a significant difference in the history of infectious diseases between stunted and non-stunted children under two years of age in the working area of Ganting Community Health Center, Gedangan District, Sidoarjo Regency. An OR of 5.5 suggests that children with a history of infectious diseases were 5.5 times more likely to experience stunting than those without such a history.

These findings are consistent with the study by Winarti et al. (2020), which found a significant association between a history of acute respiratory infections (ARI) and stunting (p-value = 0.016). Similarly, Wulandari et al. (2019) reported a significant relationship between infectious disease history and stunting in the working area of Kerkap Community Health Center, North Bengkulu Regency (p-value = 0.000). Children under two years of age with a history of infectious diseases were found to be 5.5 times more likely to be stunted compared to those without such a history.

The relationship between infectious diseases and stunting is bidirectional. Children who are stunted are more susceptible to infections, while infectious diseases can impair growth by disrupting nutrient absorption and utilization for tissue repair and development. In this study, the most common infections experienced by children were diarrhea and ARI. According to Pratama et al. (2019), infectious diseases are among the direct causes of stunting because they interfere with nutrient utilization and reduce food intake, thereby increasing the risk of malnutrition. Furthermore, Nugraheni et al. (2023) stated that the incidence of infectious diseases is also influenced by poor hygiene and sanitation conditions, which increase the risk of exposure to viruses and bacteria responsible for infections.

CONCLUSION

Based on the research conducted in the Ganting Community Health Center Working Area, Gedangan District, Sidoarjo Regency, This study concludes that significant difference between the Complementary Breastfeeding (MPASI) Feeding Patterns and the history of infectious diseases in stunted and non-stunted children at the Ganting Community Health Center, Gedangan District, Sidoarjo Regency. Most mothers in the stunted children group had not provided complete meals to their children, whereas the majority of mothers in the non-stunted children group had provided complete meals that met the children's nutritional needs. In addition, a history of infectious diseases was found more frequently among stunted children than among non-stunted children.

However, this study has several limitations. In the feeding pattern variable, data collection related to protein intake was not yet known, as to why mothers did not provide sufficient protein to their children. Furthermore, data on infectious disease histories in stunted and non-stunted children did not observe factors that caused infections, and the data obtained were based on respondents' memories, potentially leading to bias. Practically, the results of this study can serve as a basis for community health centers and policymakers to strengthen nutrition education programs, counseling on appropriate complementary feeding, and promoting exclusive breastfeeding through integrated health posts (Posyandu) and primary health care services to reduce the risk of stunting in early childhood.

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