

## THE RELATIONSHIP BETWEEN FOOD MODIFICATION AND DIETARY PATTERNS WITH NUTRITIONAL STATUS IN TODDLERS

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### ABSTRACT

Lack of appetite is a cause of nutritional problems in toddlers. A child's appetite often changes depending on how parents present the food. Mothers' lack of creativity in food presentation can lead to decreased appetite and unhealthy dietary patterns in children. The aim of this study was to analyze the relationship between food modification and dietary patterns with the nutritional status of toddlers in Tanjungsari Village, Boyolangu Sub-district, Tulungagung Regency. The research design was correlational with a cross-sectional approach. The independent variables were food modification and dietary patterns, and the dependent variable was the nutritional status of toddlers. The research was conducted from October 20th to November 5th, 2025. The study population consisted of all mothers and toddlers at Posyandu I in Tanjungsari Village, Boyolangu Sub-district, Tulungagung Regency, totaling 27 mothers and toddlers aged 7-59 months. The sample was taken using a total sampling technique, consisting of 27 respondents. Data collection instruments included questionnaires and observation sheets. Data were analyzed using the Spearman rho test. The results of the study in Tanjungsari Village, Boyolangu Sub-district, Tulungagung Regency, showed: 1) Most of the food modifications given to toddlers were good (55.6%). 2) Most toddlers had appropriate dietary patterns (59.3%). 3) Most toddlers were in the normal weight category (55.6%). 4) There was a relationship between food modification and the nutritional status of toddlers ( $P$  value  $0.028 < 0.05$ ). 5) There was a relationship between dietary patterns and the nutritional status of toddlers ( $P$  value  $0.046 < 0.05$ ). Food modified according to the needs of toddlers is often well-consumed and can meet their daily nutritional needs. Food modification includes texture, taste, aroma, appearance, and food presentation. Appropriate dietary patterns, such as providing balanced types and amounts of food, and regular meal schedules, can increase the nutritional needs and adequacy of toddlers, such as protein, fat, vitamins, and minerals.

**Keywords :** Dietary Patterns, Food Modification, Nutritional Status, Toddlers

## 1. INTRODUCTION

Children under the age of five (toddlers) are a "golden period" in growth and development (Ministry of Health of the Republic of Indonesia, 2019). At the age of 0-5 years, it is important for children to get adequate nutritional intake (Sampouw, 2021). Nutritional problems that occur in toddlers are often caused by a lack of appetite because children tend to choose only foods that they like. Appetite in children often changes depending on the condition of parents in serving food. Appetite problems in children can be caused by the mother's lack of creativity in serving food, indicating that the child has decreased appetite and inappropriate diet. An inappropriate diet can cause nutritional problems in toddlers so that it will inhibit the growth and development of children until adulthood and is irrevocable or irreversible (Alkalah, 2016).

The World Health Organization (WHO) 2024, states that malnutrition is still a global health problem, where 45 million children under five in the world have a malnourished status. According to data from the 2022 Indonesian Nutrition Status Survey (SSGI), the prevalence of undernourished toddlers in Indonesia reached 7.7%. This shows an increase in the number of toddlers by 0.6% compared to the previous year. In September 2021, UNICEF Indonesia identified 500,000 cases of children suffering from malnutrition that increases the risk of death. Meanwhile, malnutrition that occurs in East Java is increasing every year by 0.8% from 6.4% in 2022 to 7.2% in 2023 (Oktafiani et al., 2024). One of them is shown by the health profile of East Java in 2023 as many as 103,320 babies and toddlers are malnourished (Pamungkas & Farida, 2023). In Tulungagung Regency, according to the Indonesian Ministry of Health, the malnutrition rate in Tulungagung Regency in 2022 was 25% and increased in 2023 by 25.3% where this figure brought Tulungagung Regency into the top 10 category and ranked 3rd after Situbondo and Bondowoso districts with still high nutritional status problems. Data obtained from the midwife of Tanjungsari Village, Boyolangu District, on October 3, 2025, showed that there were 12 toddlers under the red line out of 47 toddlers. Based on the results of the preliminary study interview was conducted regarding food modification on 5 mothers who had toddlers and was randomly

taken from a total of 47 mothers in Tanjungsari Village, Boyolangu District, it was found that 4 out of 5 mothers did not make food modifications in toddlers.

Nutritional problems that occur in children under five are often caused by the provision of food modifications and poor diets (Fathonah, 2022). The food modification in question is what can attract the toddler to like to consume food in various forms of food that also affect the appetite of toddlers (Akbar et al., 2021). One of the factors that can affect mothers in food modification is mother's creativity. With a creative approach, mothers can create a variety of flavors, serve food in an interesting way, and make healthier food with their creativity (Oktafiani et al., 2024). The factors that affect diet include socioeconomic status, education, environment, socio-culture, and religion. The two things above need to be considered because food and diet modifications will affect the nutritional status of children (Suyuti, 2019). Poor food modifications and diets will also have a bad impact on children's nutritional status in the long term, so that they will inhibit the child's growth and development process (Masa, 2023).

The high number of nutritional status problems in toddlers every year requires efforts to prevent these problems. The incidence of nutritional status problems in toddlers can be prevented and managed properly with posyandu visits (Emmaria et al., 2024). For this reason, in toddlerhood it is necessary to always monitor growth and development. Modification of the right to increase children's appetite is one way to create food variations so that children do not get bored in fulfilling nutrients. Food variety needs to be done to foster children's curiosity, for example serving food in various funny forms (Probowati et al., 2024). Therefore, the solution in the study taken is to provide health education to mothers who have toddlers that modifying food and maintaining the child's diet needs to be done because it is directly related to the nutritional status of toddlers.

## 2. METHODS

The design of correlation research with a cross-sectional approach. Independent variables of food and diet modification, dependent variables of nutritional status of toddlers. The research was carried out on October 20 - November 5, 2025. The research

population of all mothers and toddlers in Posyandu I, Tanjungsari Village, Boyolangu District, Tulungagung Regency, amounted to 27 mothers and toddlers aged 7-59 months. The sample was taken using a total sampling technique of 27 respondents. The data collection instruments are in the form of questionnaires and observation sheets. The data were analyzed with the rho spearman test.

3. RESULTS

General Data

Table 1.1 Characteristics of respondents based on maternal education

No	Education	Frequency	Percentage
1	SD	2	7.4
2	SMP	5	18.5
3	SMA	13	48.1
4	PT	7	25.9
Sum		27	100

Based on table 1, it shows that almost half of the respondents have a high school education of 13 people (48.1%)

Table 1.2 Frequency of respondent characteristics based on the mother's religion

No	Religion	Frequency	Percentage
1	Islam	27	100
Sum		27	100

Based on table 2, it shows that all respondents are Muslims as many as 27 people (100%)

Table 1.3 Characteristics of respondents based on the gender of toddlers

No	Gender of Toddlers	Frequency	Percentage
1	Man	10	37.0
2	Woman	17	63.0
Sum		27	100

Based on table 3, it shows that most of the respondents are female, 17 people (63%)

Table 1.4 Frequency of respondents based on those who have an infectious disease

No	Infectious Diseases	Frequency	Percent age
1	Never	7	25.9
2	Ever	20	74.1
Sum		27	100

Based on table 4, it shows that most of the respondents have experienced infectious diseases in the amount of 20 people (74.1%).

Table 1.5 frequency of respondents based on exclusive breastfeeding in toddlers

No	Exclusive Breast Milk	Frekuensi	Persentase
1	< 6 months	9	33.3
2	> 6 months	18	66.7
Sum		27	100

Based on table 5, it shows that most of the exclusive breastfeeding was given > 6 months to 18 people (66.7%)

Custom Data

Table 1.6 Characteristics of respondents by category of food modification.

No	Food Modification	Sum	Percentage
1	Less	4	14.8
2	Enough	8	29.6
3	Good	15	55.6
Sum		27	100

Based on table 6, it shows that most of the respondents are good at modifying food, amounting to 15 people (55.6%).

Table 1.7 Characteristics of respondents by diet category

No	Dietary Patterns	Sum	Percentage
1	Inaccurate	11	40.7
2	True	16	59.3
Sum		27	100

Based on table 1.7 shows that most of them have a proper diet of 16 people (59.3%).

Table 1.8 Characteristics of respondents by nutritional status category

No	Nutritional Status	Sum	Percentage
1	BB is Very Lacking	1	3.7
2	BB Less	6	22.2
3	BB Normal	15	55.6
4	BB Risk More	5	18.5
Sum		27	100

Based on table 8, it shows that almost half have nutritional status with a normal weight category of 25 people (55.6%).

District, Tulungagung Regency.

Table 1.9 Cross-tabulation of the relationship between food modification and nutritional status in toddlers in Tanjungsari Village, Boyolangu District, Tulungagung Regency

No	Modifikasi Food	Nutritional Status							
		BB Very Less		BB Less		Normal		Risk BB More	
		F	%	F	%	F	%	F	%
1	Less	0	0	2	7.4	1	3.7	1	3.7
2	Enough	1	3.7	4	14.8	2	7.4	1	3.7
3	Good	0	0	0	0	12	44.4	3	11.1
	Sum	1	3.7	6	22.2	15	56.6	5	18.5

Uji spearman rho:  
Correlation Coefficient: 0,424  
P value: 0,028  
 $\alpha$ : 0,05

Table 1.9 shows that most of them have food modifications that are categorized as good and have normal nutritional status, which is 23 (44.4%). The results of the Spearman rank statistical test obtained a probability value  $p = (0.028) < \alpha = 0.05$ , then H1 was accepted, which means that there is a relationship between food modification and nutritional status in toddlers in Tanjungsari Village, Boyolangu District, Tulungagung Regency

Table 1.10 Cross-tabulation of diet with nutritional status in toddlers in Tanjungsari Village, Boyolangu District, Tulungagung Regency

No	Pola Makan	Status Gizi							
		BB Very Less		BB Less		Normal		Risk BB More	
		F	%	F	%	F	%	F	%
1	Inaccurate	1	3.7	6	22.2	1	3.7	3	11.1
2	True	0	0	0	0	14	51.9	2	7.4
	Sum	1	3.7	6	22.2	15	56.6	5	18.5

Uji spearman rho:  
Correlation Coefficient: 0,387  
P value: 0,046  
 $\alpha$ : 0,05

Table 1.10 shows that most of them have the right diet and have normal nutritional status, which is a total of 14 respondents (51.9%).

The results of the Spearman rank statistical test obtained a probability value of  $P = (0.048) < \alpha = 0.05$ , then H1 was accepted, which means that there is a relationship between diet and nutritional status in toddlers in Tanjungsari Village, Boyolangu

4. DISCUSSION

1. Food modification

Based on table 5, it is known that food modification in toddlers in Tanjungsari Village, Boyolangu District, Tulungagung Regency shows that most of the respondents are good in terms of modifying food, amounting to 15 people (55.6%). On the other hand, there are still mothers under five who make food modifications in the categories of insufficient (14.8%) and sufficient (29.6).

Food modification is an activity to create new variations in food so that it looks more attractive. Food variety is the arrangement of menus that are served in an attractive way by showing the color and shape of the food made. Food modification is a way to increase appetite that can affect appetite in everyone (Anggraini et al., 2016). Lack of variety, ignorance of the right portions, or the habit of giving processed foods are often the main causes of food modifications being considered lacking. Therefore, this theory-based educational approach is needed to improve the ability of mothers to develop a balanced diet for toddlers that are in accordance with the needs of children's growth and development (Maya Sari, 2020).

A person's experience and knowledge, including their mother, greatly determines how they make decisions, such as choosing food for toddlers. Mothers who have made good food modifications show that mothers have good attention to the fulfillment of their toddlers' nutrition. According to the researcher, food modification is good in terms of appearance and presentation of food, such as the respondents, providing garnishes in the presentation of food. In addition, respondents served food in certain forms. According to researchers, food modification in toddlers carried out by mothers is categorized as good because most mothers modify food both in the ease of presentation, texture, taste, and aroma of food so that toddlers are interested in consuming the food.

The first factor that affects food modification is maternal education. Based on table 1, it is known that the education of mothers under five in Tanjungsari Village, Boyolangu District, Tulungagung Regency

shows that almost half of them have a high school education of 13 people (48.1%).

In general, mothers with a high school education are classified as quite practical applications in the health education curriculum. Vocational schools and high schools sometimes also teach basic theories of health and nutrition, practical applications related to how to adjust food menus based on children's age are not taught in depth. This supports the mother's good knowledge of how to modify children's food according to their developmental phase (Marfuah, D. 2022).

According to researchers, mothers with a high school education tend to have better knowledge and skills in modifying nutrition and food menu presentation. Subjects are often practical in nature that teach the skills to modify daily food according to nutritional needs. A mother who learns about the basics of nutrition or health, they will also learn how to modify food and prepare age-appropriate foods to meet the child's nutritional standards.

### 2. Diet

Based on table 6, it shows that most of them have the right diet of 16 people (59.3%) and there are almost half of the respondents who have an improper diet, namely 11 people (40.7%).

Diet is the nutritional fulfillment of the food consumed based on the type, amount, and meal schedule. Diet aims to regulate the amount and type of food with specific purposes, such as maintaining health, preventing or helping the cure of disease, and improving nutritional status. Optimal nutrition will increase physical growth and development and intelligence in the age group. Good nutrition will maintain an ideal weight, and not be susceptible to infectious diseases, increase productivity, and be protected from chronic diseases (Idris, 2022). The theory of energy and nutritional needs explains that toddlers need enough calories and nutrients to support their growth and development. In this case, many mothers focus more on the amount of food because they feel that with enough food, the child will get the energy needed for growth and development. However, feeding with an irregular schedule is often ignored, even though it is important to maintain energy stability and relate to the

growth and development process of toddlers (Juwatuti, L. 2020).

According to the researcher, the right diet shows that the mother has given the right food to the toddler including the frequency of the main meals, food interludes, types of food and balanced menu variations to the toddler. Meanwhile, inappropriate eating patterns such as respondents never make a meal schedule for their toddlers, and respondents rarely give interlude meals 1-2 times a day between main meals. Most of the respondents also rarely pay attention to the type of food such as rarely providing a balanced menu variety (rice, side dishes, vegetables, fruit, and milk) to toddlers. According to researchers, the diet of toddlers is categorized as inappropriate because most mothers only focus on the amount of food without paying attention to the type and schedule of meals to their toddlers.

The first factor that affects the diet is the mother's education. Based on table 1, it is known that maternal education in Tanjungsari Village, Boyolangu District, Tulungagung Regency shows that almost half of the 13 people (48.1%) have high school education.

High school education generally emphasizes more on basic nutritional knowledge as well as the practical skills needed to plan a healthy and balanced diet for children. Therefore, mothers with a high school education background are mostly right in the application of diet in toddlers (Rahmawati, 2024).

According to researchers, mothers of toddlers who have a high school education have a fairly good knowledge of nutritional needs, variations of food menus and their application in having suitable food for their toddlers and also the right distribution of meal times for toddlers so that they can meet the nutritional needs of toddlers. Overall, mothers under five who have a history of high school education tend to be appropriate in the application of the toddler diet because the education has provided in-depth and applicative knowledge about the right type of food, the amount needed, and the eating schedule that is in accordance with the child's development.

### 3. Nutritional status

Based on table 8, it shows that almost half have nutritional status with a normal weight category of 25 people (55.6%).

Nutritional status is a state that results from the balance between nutrient intake and the need for nutrients needed for the body's metabolism (Ramlah, U. 2021). Healthy toddlers will grow with optimal potential, but growth will also be influenced by adequate and appropriate nutritional intake. Several factors that affect nutritional status include genetics, gender, age, immunological (immune), and diet (Harjatmo et al., 2017).

According to researchers, nutritional status in toddlers is an important indicator that reflects the health and well-being of children, as well as the success rate of community nutrition interventions. The data shows that almost half of the toddlers have a nutritional status in the underweight category, which can indicate a malnutrition problem.

The main factor that most affects the nutritional status of toddlers lies in the mother's responsibility. The most likely factor is that mothers' knowledge of toddler nutrition greatly affects the mother's ability to provide nutritious food for her toddlers. It was proven that at the research site in Tanjungsari Village, Boyolangu District, Tulungagung Regency, almost half of the respondents had a high school education, 13 people (48.1%).

High school education is generally enough to teach in detail about nutrition and specific nutritional needs for toddlers. Good knowledge of toddler nutrition can be a supporting factor in providing good food according to the child's age, and ultimately has an impact on the nutritional status of toddlers. Social Learning theory states that maternal nutrition knowledge can be obtained from various sources such as family, friends, media, or health workers (Kurniawati, 2022).

If mothers observe healthy eating behaviors and obtain correct information about nutrition, then mothers tend to imitate these behaviors in feeding toddlers. Mothers who have a good understanding of child nutrition, such as the importance of exclusive breastfeeding, proper breastfeeding (MP-ASI), and balanced nutritious food tend to be able to provide good nutritional intake to toddlers. Mothers who have more knowledge about nutrition tend to be more active in seeking

information and adapting to the best feeding practices for their toddlers.

Factors that affect nutritional status other than maternal factors can also be due to the factors of toddlers themselves, one of which is a history of infectious diseases. Based on table 4, it is known that respondents who experienced infectious diseases in Tanjungsari Village, Boyolangu District, Tulungagung Regency showed that most of them had experienced infectious diseases as many as 20 people (74.1%).

The World Health Organization (WHO) states that during periods of acute infection, a child's energy needs can increase by 20-30%, while if the infection lasts longer, energy needs can be even higher. If this nutritional need is not met due to a decrease in food intake, children can experience nutritional deficiencies. When toddlers have a history of infectious diseases, they find it difficult to utilize the nutrients consumed optimally for the growth and development of the body. In addition, toddlers who have experienced infections also have a more difficult time living a consistent diet without interruptions, and have an unstable immune system (Kurniawati, 2022).

According to researchers, toddlers who have had a history of infectious diseases either caused by viruses, bacteria, or parasites, often cause a decrease in appetite. When the body fights infections, toddlers feel unwell, fever, or nausea, which makes them reluctant to eat. Toddlers who have experienced infectious diseases tend to experience nutritional status problems because infections can affect various aspects of children's metabolism and diet, which in turn has an impact on the nutritional status of toddlers.

The third factor that affects the diet is exclusive breastfeeding. Based on table 5, it is known that exclusive breastfeeding for toddlers in Tanjungsari Village, Boyolangu District, Tulungagung Regency shows that most of them are given > 6 months as many as 18 people (66.7%).

WHO (2009) although breast milk contains all the nutrients needed for the development of toddlers in the first 6 months, the quality of breast milk is highly dependent on the nutritional status of the mother. If the mother is deficient in certain energy or micronutrients (such as vitamin A, vitamin D, or essential fatty acids), the quality of the milk produced can be compromised, which in turn

can affect the nutritional status of the baby. (Sari, A.P. 2024).

According to researchers, toddlers who receive exclusive breastfeeding may still experience nutritional status problems even though breast milk is considered the best source of nutrition during the first six months of life. However, there are several factors that are likely to cause nutritional status problems in the toddler, either in the form of malnutrition or overnutrition. Factors that may affect one of them are the quality of breast milk, the quality of breast milk can be influenced by the mother's condition, such as diet, nutritional status, and maternal health. If the mother is malnourished or has an unbalanced diet, then the quality of the breast milk produced is not sufficient for the child's nutritional needs.

#### 4. The relationship between food modification and nutritional status in toddlers in Tanjungsari Village, Boyolangu District, Tulungagung Regency

Based on the results of the study, it was shown that most of them had food modifications that were categorized as good and had normal nutritional status, which was 23 (44.4%). The results of the Spearman rank statistical test obtained a probability value  $p = (0.028) < \alpha = 0.05$ , then  $H_1$  was accepted, which means that there is a relationship between food modification and nutritional status in toddlers in Tanjungsari Village, Boyolangu District, Tulungagung Regency.

When toddlers' diets are well modified, such as food variety, predominance of carbohydrates without protein and balanced fats, or adequate vitamin and mineral content, toddlers will experience adequate energy and nutrients essential for growth. In addition, the texture and taste of food adapted to the preferences of toddlers can also increase their appetite. Therefore, proper and nutritional modification based on the nutritional needs of toddlers is very important to prevent and overcome the problem of malnutrition in children (Yelvi, M. 2020).

According to researchers, there is a very close relationship between good food modification and normal weight nutritional status in toddlers, because foods modified according to the needs of toddlers are often consumed well and can meet their daily nutritional needs. Food modifications include the texture, taste, aroma, appearance, and

presentation of food to ensure that food is nutrient-rich and easily accepted by toddlers.

The results of this study are in line with the research conducted by Anggraini, R. F., in 2020 with the title The Relationship between Food Serving Modification and Changes in Appetite of Children Under Five at the Mojo Surabaya Health Center for children under five shows that the results of the study found that the modification of food presentation in children under five was mostly good (52%), the appetite behavior in children under five was mostly adequate (46%). Based on the chi-square statistical test, the results were obtained with a value of  $p = 0.020 < \alpha = 0.05$  which shows that there is a relationship between food presentation modification and changes in the appetite of children under five at the Mojo Health Center in Surabaya. With the modification of food presentation, it is hoped that families will be able to implement food serving modifications as an effort to increase the appetite of children under five, so that children grow up healthy (Anggraini, R.F.2020)

#### 5. The relationship between diet and nutritional status in toddlers in Tanjungsari Village, Boyolangu District, Tulungagung Regency.

Based on the results of the study, it was shown that most of them had the right diet and had normal nutritional status, namely 14 respondents (51.9%). The results of the Spearman rank statistical test obtained a probability value of  $P = (0.048) < \alpha = 0.05$ , then  $H_1$  was accepted, which means that there is a relationship between diet and nutritional status in toddlers in Tanjungsari Village, Boyolangu District, Tulungagung Regency.

In toddlers, nutritional needs are very specific to support physical growth, brain development, and the immune system. When the diet does not meet these needs, toddlers are at risk of developing malnutrition problems that directly impact their weight and nutritional status. Therefore, educating parents about the importance of a balanced diet and adapted to the needs of toddlers is very important to prevent malnutrition problems (Demsia Simbolon, 2019).

According to researchers, diet is the main factor that determines the energy and nutritional intake that children receive every day. The right diet, such as type feeding, balanced amount of food, and a regular meal schedule can increase the nutritional needs and

adequacy of toddlers such as protein, fat, vitamins, and minerals.

The results of this study are in line with the research conducted by Rakhmawati, N. Z. (2021) entitled The relationship between maternal knowledge and attitudes and maternal behavior in feeding children aged 12-24 months where the results show that 86.15% of mothers have good knowledge, 76.92% of mothers have poor attitudes and 73.95% of mothers have poor behavior. Data analysis showed that there was a relationship between knowledge of maternal behavior in feeding children ( $p=0.003$ ) and there was a relationship between maternal attitudes and behaviors in feeding children ( $p=0.04$ ). Conclusion: There is a relationship between maternal knowledge and attitudes towards feeding behavior of children aged 12-24 months (Rakhmawati, N.Z. 2021).

The results of another study with a different subject conducted by Chabibah, N (2020) with the title The Effect of Educational Modification of Toddler Nutrition Booklet and Cooking Class on Toddler Nutrition Knowledge and Feeding Patterns showed that the results of giving toddler nutrition education booklets and cooking classes to mothers under five increased the knowledge of mothers who had toddlers by 1.15 times even though they were statistically insignificant ( $p<0.85$ ; CI: 0.51-2.63). Providing nutrition education and cooking classes changed the attitude of mothers who have toddlers in the feeding pattern of their toddlers ( $p<0.00$ ; CI: 2.73-22.88) can be concluded that there is an increase in knowledge among mothers under five who are given nutrition booklet education for toddlers and cooking classes as much as 1.15 times and 7 times to change the attitude of feeding toddlers (Chaabibah N. 2021).

### 5. CONCLUSION

1. The modification of food given to toddlers in Tanjungsari Village, Boyolangu District, Tulungagung Regency is mostly good.
2. The diet of toddlers in Tanjungsari Village, Boyolangu District, Tulungagung Regency mostly has the right diet.
3. The nutritional status of toddlers in Tanjungsari Village, Boyolangu District, Tulungagung Regency mostly has a

nutritional status with a normal weight category.

4. There is a relationship between food modification and the nutritional status of toddlers in Tanjungsari Village, Boyolangu District, Tulungagung Regency.
5. There is a relationship between diet and nutritional status of toddlers in Tanjungsari Village, Boyolangu District, Tulungagung Regency.

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