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Examining the Influence of Maternal Education, Nutritional Knowledge, and Toddler Food Intake on Nutritional Status

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ABSTRACT

Purpose of the study: The purpose of this study was to determine the relationship between the level of maternal education, the level of maternal nutritional knowledge and the food intake of toddlers on the nutritional status of toddlers.

Methodology: This type of research is an analytical survey with a cross-sectional design. The sample in this study was 54 toddlers obtained using random sampling techniques. The instruments used were questionnaires, 24-hour recall forms, foot scales and height measuring tapes or microtoises. The data obtained in this study were processed using chi-square test statistics.

Main Findings: There is a relationship between the level of maternal education and the nutritional status of toddlers with a P value = 0.203 based on BB/A and a P value = 0.847 based on the TB/A index, the level of maternal nutritional knowledge on the nutritional status of toddlers with a P value = 0.990 based on the BB/A index and a P value = 0.171 based on the TB/A index. There is no relationship between food intake and the nutritional status of toddlers in Tamangapa Village, Manggala District, Makassar City with a P value = 0.004 based on energy intake with nutritional status BB/A and a P value = 0.006 TB/A.

Novelty/Originality of this study: As a reference material for health workers and the government so that they can provide information and direction to the community, especially mothers, to pay attention to food intake and the development of the nutritional status of their toddlers.

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1. INTRODUCTION

Nutritional problems that occur at a certain time will cause development problems in the future. Delays in providing nutritional services will result in damage that is difficult and may even be irreparable. Therefore, efforts to improve nutrition must be aimed primarily at infants or toddlers and pregnant women [1]-[3]. Toddlers are undergoing a very active growth process, so they require relatively more nutrients with higher quality [4]-[6]. The results of growth after becoming adults are very dependent on the nutritional and health conditions during toddlerhood [7]-[9]. So toddlers must be given the main share in the family food distribution, not the leftovers from family consumption.

Food consumption affects a person's nutritional status. Good nutritional status or optimal nutritional status occurs when the body obtains sufficient nutrients that are used efficiently, allowing physical growth, brain development, work ability and general health at the highest possible level [10]-[12]. Undernutrition occurs when

the body lacks one or more essential nutrients [13]-[15]. Overnutrition occurs when the body obtains nutrients in excessive amounts [16]-[18].

Malnutrition or poor nutrition is stated as the cause of death of 3.5 million children under the age of five (toddlers) in the world [19]-[21]. The majority of fatal cases of malnutrition are in 20 countries, which are the target countries for aid for food and nutrition issues. These countries include Africa, South Asia, Myanmar, North Korea, and Indonesia. In South Sulawesi to overcome nutritional problems or to obtain a picture of changes in the level of nutritional consumption at the household level and the nutritional status of the community, several activities were carried out such as Nutrition Consumption Monitoring, and Nutritional Status Monitoring in all Districts/Cities. The results of nutritional status monitoring carried out in 2009 illustrated 1.09% of infants and 2.26% of toddlers who were Below the Red Line.

Based on the monthly report of Tamangapa Health Center in February, the number of toddlers in the working area of this health center in 2009 was 666 with the number of toddlers below the red line as many as 37 toddlers (5.55%) and poor nutritional status as many as 18 toddlers (2.70%). Where toddlers with poor nutritional status are spread across each Citizens Association in Tamangapa Village and the number of toddlers with poor nutritional status is 20 toddlers (3.00%).

Previous research conducted by Amaha & Woldeamanuel [22] focused on analyzing maternal and environmental factors, such as access to health facilities and sanitation conditions, that influence the incidence of stunting in children. The study highlighted the importance of the physical and social environment in determining children's nutritional status. Meanwhile, the current study more specifically examines the relationship between maternal education level, maternal nutritional knowledge, and toddler food intake on toddler nutritional status in Tamngapa, Makassar. Gap analysis shows that previous studies have paid less attention to aspects of maternal education and nutritional knowledge directly, even though both are important determinants of toddler diet and health. Thus, the current study makes a new contribution by highlighting internal maternal factors, such as education and nutritional knowledge, which have not been widely discussed in the local context in Indonesia.

This study offers a new approach by focusing on the relationship between maternal education level, nutritional knowledge, and toddler food intake on toddler nutritional status in Tamngapa, Makassar. Unlike previous studies that have focused more on environmental factors and general health access, this study pays special attention to the internal role of mothers as the main managers of children's diets. Thus, this study enriches the literature on toddler nutritional status determinants, especially in the local context of Indonesia, which has not been comprehensively explored.

This research is important to conduct considering the prevalence of malnutrition and stunting in Indonesia, especially in the Makassar region, which is still a major challenge in health development. A deeper understanding of the role of maternal nutrition education and knowledge can help identify more targeted interventions in improving the nutritional status of toddlers. In addition, the results of this study can be a basis for policy makers in designing effective nutrition education and counseling programs, so that they can support government efforts in achieving the target of reducing stunting and improving the quality of children's health.

2. RESEARCH METHOD

2.1. Type and Design of Research

The type of research used in this study is an analytical survey with a Cross Sectional design, namely a study in which variables including risk factors and variables including effects are observed simultaneously at the same time. The Cross-Sectional design is widely used in public health research to analyze associations between variables without requiring longitudinal data [23]-[25]. This design is advantageous for identifying correlations and generating hypotheses, although it does not establish causality due to the absence of temporal sequence [26]-[28].

2.2. Population and Sample

Population is the entire object of research or the object being studied [29], [30]. The population used in this study were all toddlers in Tamangapa Village, Manggala District, Makassar City. The sample is a portion taken from the entire object being studied and is considered to represent the entire population. The sampling method in this study was carried out by simple random sampling. The method of selecting sample member elements in this study was by lottery technique. The sample used in this study were toddlers in Tamangapa Village, Manggala District, Makassar City.

2.3. Data Collection Method

A questionnaire is a list of questions that have been well-structured, mature, where respondents only need to provide answers. The questionnaire in this study was in the form of questions about maternal nutritional knowledge. The Recall Form in this study was in the form of a list of foods and drinks that were actually consumed by toddlers in 24 hours to determine the intake of food nutrients in toddlers. Foot or dacing scales are used to measure toddler weight. Height measuring tape or microtoise.

2.4. Data Analysis

Bivariate analysis is performed on two variables that are suspected to be related or correlated. Bivariate analysis is used to find relationships and prove the hypothesis of two variables. The statistical test used is Chi-Square because the data used are nominal and nominal. The significance level used is 95% with a significance value of 0.05. Interpretation if X^2 count > X^2 table then H_o is rejected.

3. RESULTS AND DISCUSSION

3.1. The Relationship Between Mother's Education Level and Nutritional Status of Toddlers in Tamangapa Village, Manggala District, Makassar City

Education is a process of changing the attitudes and behavior of a person or group of people in an effort to mature through teaching and training efforts. Parents who are highly educated will have the ability to educate their children well, while parents who are less educated are less able to educate or care for their children, especially in terms of providing food. Mothers are the first educators in the family, for that reason mothers need to master various knowledge and skills. Mother's education, besides being the main capital to support the household economy, also plays a role in the pattern of family food preparation.

Formal education levels shape progressive values for a person, especially in accepting new things. Formal education levels are a factor that helps determine whether or not a person can easily absorb and master the knowledge gained. The role of parents, especially mothers, in providing and serving nutritious food for the family, especially children, is important. Children's nutritional input is highly dependent on the sources available in their social environment, one of which is very important is the mother. The quality of maternal services in the family is determined by the mastery of information and the availability of adequate time. These two factors include determinant factors that can be determined by education level, social interaction and work. The description of the relationship between maternal education level and nutritional status of toddlers based on the BB/U anthropometric index can be seen in the following table:

Table 1. Relationship between Mother's Education Level and Nutritional Status of Toddlers Based on Anthropometric Index Weight/age

Mother's Education Level	Nutritional status Weight/age						Amount		P Value
	Good		Not enough		Bad				
	n	%	n	%	n	%	n	%	
Elementary School	16	64.0	8	32.0	1	4.0	25	100.0	
Junior High School	17	85.0	3	15.0	0	0	20	100.0	0.203
Senior High School	4	44.4	4	44.4	1	112	9	100.0	

From the table above, it can be seen that out of 54 samples, toddlers with good nutritional status tend to be more than those with poor or bad nutritional status, this can be seen from the level of education of respondents who graduated from elementary school as many as 16 toddlers (64.0%), junior high school 17 toddlers (85.0%) and high school 4 toddlers (44.4%). From this distribution data, it can be seen that the majority of the respondents' education levels that have the most toddlers with good nutritional status are respondents who graduated from junior high school.

From the results of the chi-square test statistic with a significance level of $\alpha = 0.05$, a p value of 0.203 was obtained because the p value > 0.05 (0.203> 0.05) then H_o is accepted and H_a is rejected. The conclusion is that there is no relationship between the Level of Mother's Education and the Nutritional Status of Toddlers Based on the Weight/age Anthropometric Index in Tamangapa Village, Manggala District, Makassar City.

Table 2. Relationship between Mother's Education Level and Nutritional Status of Toddlers Based on Height/Age Anthropometric Index

Mother's Education Level	Nutritional Status Height/Age				Amount		P Value
	Normal		Short				
	n	%	n	%	n	%	
Elementary School	17	68.0	8	32.0	25	100.0	
Junior High School	15	75.0	5	25.0	20	100.0	0.847
Senior High School	6	66.7	3	33.3	9	100.0	

From the table above, it can be seen that out of 54 samples, toddlers with normal height status are more than those with short height status, this can be seen from the level of education of respondents who graduated from elementary school as many as 17 toddlers (68.0%), junior high school 15 toddlers (75.0%) and senior high school 6 toddlers (66.7%). From this distribution data, it can be seen that the majority of the respondents'

education levels that have the most toddlers with normal height status are respondents who graduated from junior high school.

From the results of the chi-square test statistic with a significance level of α = 0.05, a p value of 0.847 was obtained because the p value > 0.05 (0.847 > 0.05) then H_o is accepted and H_a is rejected. The conclusion is that there is no relationship between the Level of Mother's Education and the Nutritional Status of Toddlers Based on the Height/Age Anthropometric Index in Tamangapa Village, Manggala District, Makassar City.

From the results of the study in Tamangapa Village, it can be concluded that the level of maternal education does not have an effect on the nutritional status of toddlers, this can be seen in respondents who graduated from elementary school who had more toddlers with good nutritional status of 64%, as well as respondents who graduated from junior high school who 85% had toddlers with good nutritional status and 15% with poor nutritional status. Meanwhile, respondents who graduated from high school and were considered highly educated had 44% toddlers with good nutritional status, 44% with poor nutritional status and 11.2% with poor nutritional status.

The results of the search from respondents with a high school education who had toddlers with poor nutritional status and short height were caused by a lack of food intake in the form of energy sources and protein sources consumed, this was also reinforced by the presence of infectious diseases in these toddlers, causing a decrease in appetite and imperfect absorption of food nutrients.

So, the low level of maternal education in this case respondents who graduated from elementary and junior high school does not necessarily guarantee that they will have toddlers with poor nutritional status, and vice versa with the high level of maternal education in this case respondents who graduated from high school will have children with good nutritional status. This is due to the knowledge factor about nutrition including how to provide good food and the selection of food ingredients, not only can be obtained by following education levels or going to school, but also through various sources such as print media and electronic media.

3.2. The Relationship Between Mother's Knowledge Level and Nutritional Status of Toddlers in Tamangapa Village, Manggala District, Makassar City

An important part of nutrition management is knowledge, lack of purchasing power is an obstacle, but nutritional deficiencies will be greatly reduced if people know how to use the existing purchasing power. According to Sediaoetama, the level of knowledge will influence a person in choosing food. For people who are educated and have sufficient knowledge about nutrition, physiological considerations are more prominent than the need for psychological satisfaction. But generally there will be a compromise between the two, so that it will provide delicious and balanced nutritious food.

Low maternal knowledge is an important factor, because it affects the mother's ability to manage existing resources to obtain sufficient food. Knowledge about the nutritional content of various foods, the usefulness of food for family health can help mothers choose foods that are not too expensive but have high nutritional value. The mother's high level of knowledge about nutrition can affect the food intake of toddlers which will ultimately affect the nutritional status of toddlers. With good knowledge, a mother can choose and provide food for toddlers both in terms of quality and quantity that meets the nutritional adequacy for toddlers. The description of the relationship between the level of mother's nutritional knowledge and the nutritional status of toddlers based on the anthropometric index of weight/age can be seen in the following table:

Table 3. Relationship between the Level of Mother's Nutritional Knowledge and the Nutritional Status of Toddlers Based on the Anthropometric Index of Weight/Age

Mother's Knowledge	Nutritional Status Weight/Age						Amount		P Value
	Good		Not Enough		Bad				
	n	%	n	%	n	%	n	%	
Enough	19	67.9	8	28.6	1	3.5	28	100.0	0.990
Less	18	69.2	7	26.9	1	3.8	26	100.0	

From the table above, it can be seen that out of 54 samples, toddlers with good nutritional status tend to be more than those with poor or bad nutritional status, this can be seen from the level of maternal nutritional knowledge that is sufficient, having 19 toddlers (67.0%) with good nutritional status, while respondents with less knowledge also tend to have toddlers with good nutritional status, namely 18 toddlers (69.2%).

From the results of the chi-square test statistic with a significance level of α = 0.05, a p value of 0.990 was obtained because the p value > 0.05 (0.990 > 0.05) then H_o is accepted and H_a is rejected. The conclusion is that there is no relationship between the Level of Maternal Nutrition Knowledge and the Nutritional Status of Toddlers Based on the BB/U Anthropometric Index in Tamangapa Village, Manggala District, Makassar City.

Table 4. Relationship between the Level of Mother's Nutritional Knowledge and the Nutritional Status of Toddlers Based on the Height/Age Anthropometric Index

Mother's Knowledge	Nutritional Status Height/Age				Amount		P Value
	Normal		Short				
	n	%	n	%	n	%	
Enough	22	78.6	6	21.4	28	100.0	0.171
Less	16	61.5	10	38.5	26	100.0	

From the table above, it can be seen that out of 54 samples, toddlers with normal height status tend to be more than those with short height status, this can be seen from the level of nutritional knowledge of mothers who are sufficient, having 22 toddlers (78.6%) with normal height status, while respondents with less knowledge also tend to have toddlers with normal height, namely 18 toddlers (69.2%).

From the results of the chi-square test statistic with a significance level of $\alpha = 0.05$, a p value of 0.171 was obtained because the p value > 0.05 (0.171 > 0.05) then H_o is accepted and H_a is rejected. The conclusion is that there is no relationship between the Level of Nutritional Knowledge of Mothers and the Nutritional Status of Toddlers Based on the Height/Age Anthropometry Index in Tamangapa Village, Manggala District, Makassar City.

From the results of measuring nutritional status by comparing the results of the chi-square test, it can be concluded that the number of respondents with less knowledge does not have a close relationship to the nutritional status of their toddlers. The results of the search conducted on several respondents who had sufficient or less knowledge and had toddlers with poor and poor nutritional status based on Weight/Age and short height status based on Height/Age, are supported by the level of awareness and positive attitudes in raising children that are still lacking.

3.3. The Relationship Between Food Intake and Nutritional Status of Toddlers in Tamangapa Village, Manggala District, Makassar City

The most severe and widespread nutritional deficiencies, especially among children, are due to a lack of energy and protein nutrients as a result of insufficient food consumption and obstacles to absorbing nutrients. Energy substances are used by the body as a source of energy available in foods containing carbohydrates, protein substances are used by the body as builders that function to repair body cells. In severe deficiencies, children can suffer from marasmus, a condition of severe energy and protein deficiency, or kwashiorkor which is caused mainly by severe protein deficiency. Food consumption is very necessary and must be considered by family members in consuming daily food, so that if the family's consumption of nutritious food can be met, then body health can be maintained in addition to activities to maintain other health.

Energy used to carry out daily activities is obtained by the body from the energy released in the body during the burning process of food substances. Food substances that are included as the main source of energy are carbohydrates and fats. Carbohydrates and fats are often called fuel foods or energy materials. If there are no carbohydrates and fats in the body, then protein can act as an energy producer. Examples of food sources of carbohydrates are found in many types of grains and tubers such as rice, corn, potatoes, cassava and others, while food sources of fat are found in many types of plant-based foods such as fruit, seeds, candlenuts, olives, coconuts and corn, while those derived from animals (animal) include butter, cheese, milk, meat, egg yolks and others.

Good nutritional status is one of the important factors in efforts to achieve optimal health. However, in reality, until now in society there are still sufferers of various levels of malnutrition. These nutritional problems are a reflection of the consumption of energy and other nutrients that have not met the body's needs. Energy is needed by humans to move and do physical work and also drive processes in the body. The results of the distribution of energy intake with the nutritional status of toddlers based on the BB/U anthropometric index can be seen in the following table:

Table 5. Distribution of Energy Intake with Nutritional Status of Toddlers Based on Anthropometric Index of Body Weight/Age

Energy Intake	Nutritional status						Amount		P Value
	Good		Not Enough		Bad				
	n	%	n	%	n	%	n	%	
Good	34	79.1	8	18.6	1	2.3	43	100.0	0.004
Not Enough	3	27.3	7	63.3	1	9.1	11	100.0	

From the table above, it can be seen that out of 43 toddlers who have good energy intake or consume more than or equal to 80% of the AKG of energy sources, there are 34 toddlers (79.1%) with good nutritional status, 8 toddlers (18.6%) with poor nutritional status, 1 child (2.3%) with poor nutritional status. And out of 11

toddlers whose energy intake is lacking or consume less than 80% of the AKG of energy sources, there are 3 toddlers (27.3%) with good nutritional status, 7 children (63.6%) with poor nutritional status, and 1 child (9.1%) with poor nutritional status. Thus, it shows that the lack of energy intake consumed also determines the good or bad nutritional status of a toddler.

From the results of the chi-square test statistic with a significance level of $\alpha = 0.05$, the p value = 0.004 was obtained because the p value < 0.05 (0.004 < 0.05) then H_o was rejected and H_a was accepted. The conclusion is that there is a relationship between Energy Intake and Nutritional Status of Toddlers Based on the Height/Age Anthropometric Index in Tamangapa Village, Manggala District, Makassar City.

Table 6. Distribution of Energy Intake with Nutritional Status of Toddlers Based on Height/Age Anthropometric Index

Energy Intake	Nutritional Status Height/Age				Amount		P Value
	Normal		Short				
	n	%	n	%	n	%	
Good	34	79.1	9	20.9	43	100.0	0.006
Not Enough	4	36.4	7	63.4	11	100.0	

From the table above, it can be seen that of the 43 toddlers who have good energy intake or consume more than or equal to 80% of the AKG of energy sources, there are 34 toddlers (79.1%) with normal height status, 9 children (20.9%) with short height status. And of the 11 toddlers who have insufficient energy intake, there are 4 children (36.4%) with normal height status, and 7 children (63.4%) with short height status. Thus, it shows that the lack of protein intake consumed also determines the good or bad nutritional status of a toddler.

From the results of the chi-square test statistic with a significance level of $\alpha = 0.05$, a p value of 0.006 was obtained because the p value < 0.05 (0.006 < 0.05) then H_o was rejected and H_a was accepted. The conclusion is that there is a relationship between Energy Intake and Nutritional Status of Toddlers Based on the Height/Age Anthropometric Index in Tamangapa Village, Manggala District, Makassar City.

In this case, there are children who have good nutritional status but their energy intake is lacking because they generally consume energy sources in small amounts. From the information obtained from respondents, they tend to give any food without paying attention to the nutritional aspects of the food, they just eat as much as they can without paying attention to their energy needs. In addition, the eating habits of toddlers prefer to eat snacks, this snacking habit needs attention so that it can be reduced as much as possible because it greatly affects children's appetite. For the needs of the toddler's body, energy sources are used in the development of body tissues. The amount of energy needed by a person depends on many things, namely age, weight, type of activity, gender and body health.

Protein is a food substance that is important for the body. This substance, in addition to functioning as an energy producer, also has a primary function in the body as a building and regulating substance. Protein also functions as energy in conditions where energy needs are not met by carbohydrates and fats, which energy is needed to meet needs during the activity period, because without this fulfillment, the metabolism in the body does not run smoothly. Based on its source, protein is divided into 2 types, namely animal protein and vegetable protein. Animal protein comes from meat, eggs, milk, cheese, fish and others. While sources of vegetable protein come from grains, nuts, wheat and vegetables.

The more sufficient the protein intake of toddlers, the better the nutritional status of toddlers, conversely, the less protein intake, the less nutritional status of toddlers. The results of the distribution based on protein intake with the nutritional status of toddlers based on the Weight/Age anthropometric index can be seen in the following table:

Table 7. Distribution Based on Protein Intake with Nutritional Status of Toddlers Based on Anthropometric Index of Body Weight/Age

Protein Intake	Nutritional status						Amount		P Value
	Good		Not Enough		Bad				
	n	%	n	%	n	%	n	%	
Good	33	80.5	7	17.1	1	2.4	41	100.0	0.003
Not Enough	4	30.8	8	61.5	1	7.7	13	100.0	

From the table above, it can be seen that of the 41 toddlers who have good protein intake or consume more than 80% of the AKG of protein sources, 33 toddlers (80.5%) have good nutritional status, 7 toddlers (17.1%) have poor nutritional status, 1 child (2.4%) has poor nutritional status. And of the 13 toddlers whose protein intake is lacking or consume less than 80% of the AKG of protein sources, 4 toddlers (30.8%) have good nutritional status, 8 toddlers (61.5%) have poor nutritional status, and 1 child (7.7%) has poor nutritional status.

From the results of the chi-square test statistic with a significance level of α = 0.05, a p value of 0.003 was obtained because the p value < 0.05 (0.003 < 0.05) then H_o was rejected and H_a was accepted. In conclusion, there is a relationship between Protein Intake and Nutritional Status of Toddlers Based on the Weight/Age Anthropometric Index in Tamangapa Village, Manggala District, Makassar City.

Table 8. Distribution Based on Protein Intake with Nutritional Status of Toddlers Based on Height/Age Anthropometric Index

Protein Intake	Nutritional Status Height/Age				Amount		P Value
	Normal		Short				
	n	%	n	%	n	%	
Good	33	80.5	8	19.5	41	100.0	0.007
Not Enough	5	38.5	8	61.5	13	100.0	

From the table above, it can be seen that of the 41 toddlers who had good protein intake or consumed more than or equal to 80% of the AKG of protein sources, 33 children (80.5%) had normal height status, and 8 children (19.5%) had short height status. And of the 13 toddlers who had insufficient protein intake or consumed less than 80% of the AKG of protein sources, 5 children (38.5%) had normal height status, and 8 children (61.5%) had short height status.

From the results of the chi-square test statistic with a significance level of α = 0.05, the p value = 0.007 was obtained because the p value < 0.05 (0.007 < 0.05) then H_o was rejected and H_a was accepted. The conclusion is that there is a relationship between Protein Intake and Nutritional Status of Toddlers Based on the Height/Age Anthropometric Index in Tamangapa Village, Manggala District, Makassar City.

From the results of the chi-square statistical test, it was found that there are still toddlers with good nutritional status but lack protein intake, especially toddlers with poor nutritional status. During the study, several respondents stated that in providing food, they tend to provide vegetable soup or boiled fish soup rather than vegetables or fish meat, assuming it is easier to digest. This is what caregivers should pay attention to.

In addition, it was also found that toddlers with poor nutritional status but sufficient energy and protein intake, this happened because the child had respiratory tract infection and diarrhea. Infectious diseases can act as a precursor to malnutrition as a result of decreased appetite, impaired absorption in the digestive tract or increased nutrient needs due to disease. Low nutritional status will reduce the body's resistance to disease infection so that it causes many deaths, especially in toddlers, this condition will affect the mortality rate.

This study has the potential for significant impact in increasing understanding of the role of maternal education and nutritional knowledge in determining the nutritional status of toddlers. The results of the study can be used as a basis for developing more targeted nutritional education programs, especially in areas with high levels of nutritional problems such as Tamngapa, Makassar. In addition, this study can also help policy makers to design community-based interventions that empower mothers in providing healthy eating patterns for toddlers, thereby supporting the achievement of the target of reducing stunting and improving child health nationally.

This study has several limitations, including the Cross-Sectional design which can only describe the relationship between variables at a certain time without being able to show a cause-and-effect relationship. In addition, data collected from respondents can be influenced by recall bias or inaccuracy in remembering information, especially related to toddler food intake. This study is also limited to the Tamngapa area, Makassar, so the results may be less generalizable to a wider population.

4. CONCLUSION

The conclusion of the results of this study is that there is no relationship between the level of maternal education and the nutritional status of toddlers in Tamangapa Village, Manggala District, Makassar City. There is no relationship between the level of maternal knowledge and the nutritional status of toddlers in Tamangapa Village, Manggala District, Makassar City. There is a relationship between the food intake of toddlers and the nutritional status of toddlers in Tamangapa Village, Manggala District, Makassar City. Further research is suggested to use a longitudinal design to observe the causal relationship between maternal education level, nutritional knowledge, and toddler nutritional status in more depth. In addition, the scope of the research area can be expanded to other areas to increase the generalizability of the findings and provide a more comprehensive picture of the factors that influence toddler nutritional status.

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REFERENCES

[1] N. E. Marshall *et al.*, "The importance of nutrition in pregnancy and lactation: lifelong consequences," *Am. J. Obstet. Gynecol.*, vol. 226, no. 5, pp. 607–632, 2022, doi: 10.1016/j.ajog.2021.12.035.
[2] V. Von Salmuth, E. Brennan, M. Kerac, M. McGrath, S. Frison, and N. Lelijveld, "Maternal-focused interventions to improve infant growth and nutritional status in lowmiddle income countries: A systematic review of reviews," *PLoS One*, vol. 16, no. 8 August, pp. 1–30, 2021, doi: 10.1371/journal.pone.0256188.
[3] B. Kumari, "Factors Affecting Nutritional Status of Pregnant Women," *J. Sci. Innov. Nat. Earth*, vol. 3, no. 4, pp. 51–56, 2023.
[4] J. L. Hudson, J. I. Baum, E. C. Diaz, and E. Børsheim, "Dietary protein requirements in children: Methods for consideration," *Nutrients*, vol. 13, no. 5, pp. 1–14, 2021, doi: 10.3390/nu13051554.
[5] M. Homan *et al.*, "Percutaneous Endoscopic Gastrostomy in Children: An Update to the ESPGHAN Position Paper," *J. Pediatr. Gastroenterol. Nutr.*, vol. 73, no. 3, pp. 415–426, 2021, doi: 10.1097/MPG.0000000000003207.
[6] L. Day, J. A. Cakebread, and S. M. Loveday, "Food proteins from animals and plants: Differences in the nutritional and functional properties," *Trends Food Sci. Technol.*, vol. 119, no. December 2021, pp. 428–442, 2022, doi: 10.1016/j.tifs.2021.12.020.
[7] M. M. Black, A. C. B. Trude, and C. K. Lutter, "All Children Thrive: Integration of Nutrition and Early Childhood Development," *Annu. Rev. Nutr.*, vol. 40, pp. 375–406, 2020, doi: 10.1146/annurev-nutr-120219-023757.
[8] M. M. Black *et al.*, "The principles of Nurturing Care promote human capital and mitigate adversities from preconception through adolescence," *BMJ Glob. Heal.*, vol. 6, no. 4, pp. 1–9, 2021, doi: 10.1136/bmjgh-2020-004436.
[9] L. F. Grilo *et al.*, "Metabolic Disease Programming: From Mitochondria to Epigenetics, Glucocorticoid Signalling and Beyond," *Eur. J. Clin. Invest.*, vol. 51, no. 10, pp. 1–21, 2021, doi: 10.1111/eci.13625.
[10] T. Peni, S. I. Laili, E. D. Jayanti, and D. A. Sari, "Analysis of Cognitive Abilities of School-Age Children Based on," *Int. J. Nurs. Midwifery Sci.*, vol. 4, no. 1, pp. 37–45, 2020.
[11] R. Sepriani, Y. Ockta, E. Eldawaty, and P. Padli, "How do physical fitness, nutritional status, and self-concept affect student learning outcomes in physical education with a focus on health and hygiene education?," *J. Konseling dan Pendidik.*, vol. 12, no. 3, pp. 1–12, 2024.
[12] J. M. Saavedra and A. M. Prentice, "Nutrition in school-age children: a rationale for revisiting priorities," *Nutr. Rev.*, vol. 81, no. 7, pp. 823–843, 2023, doi: 10.1093/nutrit/nuac089.
[13] N. M. Cristina and D. Lucia, "Nutrition and healthy aging: Prevention and treatment of gastrointestinal diseases," *Nutrients*, vol. 13, no. 12, pp. 1–23, 2021, doi: 10.3390/nu13124337.
[14] E. Kose, H. Wakabayashi, and N. Yasuno, "Polypharmacy and malnutrition management of elderly perioperative patients with cancer: A systematic review," *Nutrients*, vol. 13, no. 6, pp. 1–17, 2021, doi: 10.3390/nu13061961.
[15] M. Roberts, T. Tolar-Peterson, A. Reynolds, C. Wall, N. Reeder, and G. Rico Mendez, "The Effects of Nutritional Interventions on the Cognitive Development of Preschool-Age Children: A Systematic Review," *Nutrients*, vol. 14, no. 3, pp. 1–15, 2022, doi: 10.3390/nu14030532.
[16] G. Yadav and K. Chowdhury, "From undernourished (Karshya) to thriving: How food nutrition supports preschool children's growth," *Int. J. Food Sci. Nutr.*, vol. 8, no. 3, pp. 5–8, 2023.
[17] A. A. Almulla, A. S. Alanazi, M. Ahmad, and S. Khasawneh, "The Relationship between Nutritional Intake and Mother's Education Level with the Nutritional Status of Children with Special Needs," *J. Re Attach Ther. Dev. Divers.*, vol. 6, no. 8s, pp. 686–692, 2023, [Online]. Available: https://jrtdd.com
[18] N. Indrawati, S. Katmawanti, and F. Paramita, "Proceedings of the International Conference on Sports Science and Health (ICSSH 2022)," in *Proceedings of the International Conference on Sports Science and Health (ICSSH 2022)*, Atlantis Press International BV, 2022, pp. 316–331. doi: 10.2991/978-94-6463-072-5.
[19] M. Sotiraki *et al.*, "Burden of Childhood Malnutrition : A Roadmap of Global and," *Children*, vol. 9, no. 1179, pp. 1–17, 2022.
[20] A. N. Kusuma, "Nutritional Problems of Toddlers and Its Relationship with Indonesia's Public Health Growth Index," *NeuroQuantology*, vol. 20, no. 15, pp. 2685–2692, 2022, doi: 10.14704/NQ.2022.20.15.NQ88259.
[21] M. Ratnawati, M. S. Prihatini, R. Probowati, R. H. Lestari, and D. Puspitaningsih, "Analysis of The Situation of Undernutrition and Malnutrition on Toddlers," *Malaysian J. Med. Res.*, vol. 06, no. 03, pp. 01–05, 2022, doi: 10.31674/mjmr.2022.v6i03.001.
[22] N. D. Amaha and B. T. Woldeamanuel, "Maternal factors associated with moderate and severe stunting in Ethiopian children: analysis of some environmental factors based on 2016 demographic health survey," *Nutr. J.*, vol. 20, no. 1, pp. 1–9, 2021, doi: 10.1186/s12937-021-00677-6.
[23] X. Wang and Z. Cheng, "Cross-Sectional Studies: Strengths, Weaknesses, and Recommendations," *Chest*, vol. 158, no. 1, pp. S65–S71, 2020, doi: 10.1016/j.chest.2020.03.012.
[24] T. W. Taris, S. R. Kessler, and E. K. Kelloway, "Strategies addressing the limitations of cross-sectional designs in occupational health psychology: What they are good for (and what not)," *Work Stress*, vol. 35, no. 1, pp. 1–5, 2021, doi: 10.1080/02678373.2021.1888561.
[25] Q. Han *et al.*, "Trust in government regarding COVID-19 and its associations with preventive health behaviour and prosocial behaviour during the pandemic: A cross-sectional and longitudinal study," *Psychol. Med.*, vol. 53, no. 1, pp. 149–159, 2023, doi: 10.1017/S0033291721001306.
[26] B. Gao *et al.*, "Causal inference from cross-sectional earth system data with geographical convergent cross mapping," *Nat. Commun.*, vol. 14, no. 5875, pp. 1–12, 2023, doi: 10.1038/s41467-023-41619-6.
[27] H. Mohajan, "Quantitative Research: A Successful Investigation in Natural and Social Sciences," *J. Econ. Dev.*

Environ. People, vol. 9, no. 4, pp. 52–79, 2020, [Online]. Available: https://mpra.ub.uni-muenchen.de/105149/

[28] W. Sui, X. Gong, and Y. Zhuang, "The mediating role of regulatory emotional self-efficacy on negative emotions during the COVID-19 pandemic: A cross-sectional study," *Int. J. Ment. Health Nurs.*, vol. 30, no. 3, pp. 759–771, 2021, doi: 10.1111/inm.12830.

[29] S. J. Stratton, "Population Research: Convenience Sampling Strategies," *Prehosp. Disaster Med.*, vol. 36, no. 4, pp. 373–374, 2021, doi: 10.1017/S1049023X21000649.

[30] S. Rico, Nur Ilham; Irada, Sinta; Mangasi, "the Effect of Technical Analysis on Cryptocurrency Investment Returns With the 5 (Five) Highest Market," *Ejournal Sean Inst.*, vol. 11, no. 02, pp. 1022–1035, 2022.