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THE RELATIONSHIP BETWEEN SOCIO-ECONOMIC, EATING PATTERNS AND EXCLUSIVE BREASTFEEDING WITH UNDERNUTRITION IN TODDLERS IN MERAK VILLAGE

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ABSTRACT

Various factors such as socioeconomic conditions, dietary patterns, and exclusive breastfeeding practices contribute to the incidence of undernutrition among toddlers. A preliminary study in Merak Village recorded that approximately 21.5% of toddlers were affected by undernutrition. This study aims to explore the association between socioeconomic status, dietary patterns, and exclusive breastfeeding practices with the incidence of undernutrition among toddlers in Merak Village. A case-control design was employed, involving 50 respondents in each group, selected through purposive sampling. The sample size was determined using the Lemeshow formula. *Undernutrition served as the dependent variable and was assessed based on the weight-for-age (W/A) index. sosioeconomi and exclusive breastfeeding variables using questionnaires and eating pattern using SQ-FFQ questionnaires.* The data were statistically analyzed through the chi-square test and multivariate logistic regression model*. The findings demonstrated significant associations between undernutrition and several variables, including family income (p = 0.012; OR = 0.316), meal frequency (p < 0.001; OR = 11.156), quantity of food intake (p < 0.001; OR = 24.571), and exclusive breastfeeding (p < 0.001; OR = 0.141). In contrast, maternal education (p = 0.288; OR = 0.566), paternal occupation (p = 0.691; OR = 1.000), and maternal occupation (p = 0.161; OR = 1.909) did not exhibit statistically significant relationships with undernutrition. Multivariate analysis further revealed that meal frequency, the amount of food intake, and exclusive breastfeeding were influential determinants of undernutrition among toddlers. Among these, exclusive breastfeeding emerged as the most dominant factor. Overall, family income, dietary practices, and breastfeeding status were identified as key risk factors contributing to undernutrition in early childhood.*

Keyword*: eating patterns, exclusive breastfeeding, socioeconomics, toddlers, undernutrition.*

INTRODUCTION

Human Resources (HR) in Indonesia are particularly affected by nutrition issues, hence they require special care (Masnah, 2020). Undernutrition in infants is one of the most prevalent nutritional issues in Indonesia (Nuradhiani, 2023). According to UNICEF 2021 figures, around 767.9 million people globally are undernourished in 2021. Compared to the 721.7 million people who lived there the year before, this represents a 6.4% growth (UNICEF, 2021). The World Health Organization (WHO) estimates that 98 million children under five in developing nations, or about 17% of all children, are undernourished. According to WHO (2021), the prevalence of underweight in children under five years old was 28.5% globally, 32.2% in developing nations, 30.6% in Asian countries, and 29.4% in Southeast Asia (WHO, 2021). Based on data from the Food and Agriculture Organization (FAO), In 2021, Indonesia held the position as the third-highest country in Southeast Asia in terms of undernourishment, affecting approximately 17.7 million individuals. (6.5% of the population) experiencing undernourishment (FAO, 2021).

Malnutrition may arise from inadequate dietary intake in relation to a child's demands, particularly during the first 1000 days of life (Siti Rofiqoh Windha Widyastuti, 2021). Undernutrition in toddlers is measured by the BB/U Z-Score threshold, namely, <-2SD to ≥-3SD (Ministry of Health, Guidelines for the Nutrition Care Process at Puskesmas., 2020). Malnutrition among children under five is a complex issue influenced by multiple interrelated factors, including limited nutritional knowledge, family socioeconomic conditions such as poverty, cultural norms and community beliefs, as well as food preparation practices. Each of these elements contributes to the overall nutritional status of children (Anita, 2016).

A family's socioeconomic standing, which encompasses their money, work, and level of education, can also have an impact on their nutritional state. The income level of a family is a key socioeconomic factor influencing both food availability and household dietary patterns. Limited family income is among the contributing elements to the nutritional status of children under five. Due to limited food expenditure, low income can result in low purchasing power and limited food availability, which can lead to suboptimal nutritional consumption among children under five (Wagustina, 2021). According to research (Sampouw, 2021), toddlers' nutritional status in Buha Village, Mapangat District, Manado City in 2021 is correlated with their socioeconomic status.

Given that food contains a variety of nutrients, a toddler's diet has an impact on their development. Food nutrients have an impact on growth and intelligence. One of the impacts of undernutrition is stunting. Stunting is a condition in which a toddler has a shorter length or height compared to their age (Kemenkes RI, 2018). If toddlers eat poorly, their growth will be disturbed, their bodies will be small and skinny, and they may even suffer from malnutrition (Mariyam, 2021). Research carried out in 2016 in the operational area of Danga Health Center, Aesesa District, Nagekeo Regency, demonstrated a notable relationship between the dietary patterns of toddlers and their

nutritional status with a p value = 0.000 (ρ <0.05), this can be seen from the number of toddlers who have a good diet there are 32.3% while the diet is not good 67.7% (Falerius Jago Marni, 2019).

Infants' nutritional status can be impacted by exclusive breastfeeding since it can support healthy growth and development and satisfy their nutritional demands (Seni Rahayu Henni Djuhaeni, 2019). In research (Kartiningrum, 2019) A child's experience of exclusive breastfeeding can significantly influence their nutritional status and may contribute to an increased risk of malnutrition during the toddler stage.

Analysis of maqashid sharia, breastfeeding infants is included in the maqashid of preserving life and reason (Zein, 2023). According to Allah in the Qur'an, in order to live a good and healthy life, one must maintain a diet by not going beyond, meeting the body's nutritional needs, and eating the halal and thayyib foods that Islam has specified. In compliance with the guidelines found in the Qur'an and Hadith, Muslims are permitted to eat halal cuisine. Conversely, ṭhayyiban food is food that is good in terms of its nutritional value, how it is produced, and other factors (Rusmana, 2022).

METHODE

Design, Time and Place of Research

The study used observational analytics with a case control design by looking backward regarding the risks that may be the cause of undernutrition. The research was conducted by comparing Participants were assigned to one of two groups either the case group or the control group for comparative analysis. The research location was Merak Village, Dempet Subdistrict, Demak Regency. The study was conducted in September 2024-February 2025.

Population dan Sample

The population was all toddlers aged 12-59 years in Merak Village. The number of samples taken was 100 toddler respondents and their mothers consisting of 50 from the case group and 50 from the control group. Sampling using the lameshow formula as follows $n1 = n2 = \left[\frac{(Z\alpha\sqrt{2PQ}+Z\beta\sqrt{P1Q1+P1Q2)}}{(P1-P2)}\right]$ with sampling technique using purposive sampling.

Case Inclusion Criteria

a) Mothers and toddlers are willing to be the subject of the research as evidenced by filling out informed consent.

b) In the case group, toddlers aged 12-59 months who were born normal (not premature).

c) In the case group, the z-score of toddlers for the BB/U index is -3SD to < -2 SD. d) Mothers and toddlers living in Merak Village.

Case Exclusion Criteria

a) Withdrawal from research in the middle of research.

b) Mothers of toddlers who refuse to be respondents.
c) Having a congenital disease.
d) Relocation out of Merak Village while the research is being carried out.

Control Inclusion Criteria

a) In the control group, toddlers aged 12-59 months who were born normal (not premature).
b) In thecontrol group,the z-score of toddlers for the BB/U index was -2 SD to +1 SD.
c) Mother and toddler residing in Merak Village.

Control Eksklusi Criteria

a) Withdrawal from research.
b) Mothers of toddlers who refuse to be respondents.
c) Toddlers have congenital diseases.
d) Relocation out of Merak Village while the research is being carried out.

Data Collection and Analysis

Measurement of nutritional status of toddlers using weight scales and stadiometer. Socio-economic, exclusive breastfeeding was measured using a questionnaire. Diet was measured by SQ-FFQ questionnaire. Bivariate analysis was tested using chi-square, such as the family's economic status, the mother's level of education, and her employment role, food frequency, amount of food intake and exclusive breastfeeding while father's occupation was tested using fisher test. Multivariate analysis used ordinal logistic regression test.

RESULT AND DISCUSSION

Analysis of Respondent Characteristic

The results of the study were processed in the form of a frequency table (n=100) as follows:

Table 1. Characteristic Respondent

Variable	General Charateristic of Research Subjects					
	Undernutrition		Normal		Total	
	n	%	n	%	n	%
Age						
12-35 month	25	50,0	35	70,0	60	60,0
36-59 month	25	50,0	15	30,0	40	40,0
Gender						
Male	25	50,0	21	42,0	46	46,0
Female	25	50,0	29	58,0	54	54,0

Table 1 presents the characteristics of the sample, specifically focusing on the age distribution of toddlers included in this study, the number of underweight toddlers at the age of 12-35 months and 36-59 months is equal to 25 toddlers by 50%. The number of well-nourished toddlers with ages 12-35 as many as 35 toddlers by 70% and ages 36-59 months as many as 15 toddlers by 30%. In terms of gender distribution, females comprised the majority among well-nourished toddlers, accounting for 29 individuals or 58%. In contrast, among malnourished toddlers, the gender distribution was equal, with 25 boys and 25 girls each representing 50% of the group

In this study, the number of underweight children aged 12-35 months and 36-59 months was equal to 25 children under five with a percentage of 50%. For the number of well-nourished toddlers the majority with the age of 12-35 as many as 35 toddlers with a percentage of 70%. Children aged 2 to 5 years are vulnerable to malnutrition because children aged 2-5 years begin to choose their own food and are very active so that parents' attention to food quality is reduced (Minkhatulmaula, 2020). The study's findings are consistent with other research showing a substantial correlation between age and the BB/U-based nutritional status index (Nursita Istiqomah, 2024).

This study shows that the number of case groups (undernourished toddlers) are male and female equal to 25 toddlers (50.0%), while in the control group (well-nourished toddlers) are male as many as 21 toddlers (42.0%) and female as many as 29 toddlers (58.0%). According to studies, gender is an internal component that determines newborns' nutritional needs, and there is a correlation between gender and toddlers' nutritional problems (Yuningsih and Dinar Perbawati, 2022).

Table 2. Relationship between Socioeconomic Undernutrition among Toddlers in Merak Village

Variable	Undernutrition		Normal		Total		OR	95% CI		p
	n	%	n	%	n	%		min	max	
Family Income										
Low	38	76,0	25	50,0	63	63,0	0,316	0,134	0,741	0,012*
High	12	24,0	25	50,0	37	37,0				
Mother's Education										
Low	31	62	24	48	55	55,0	0,566	0,255	1,254	0,288*
High	19	38	26	52	45	45,0				
Father's Occupation										
Not	2	4,0	2	4,0	4	4,0				
Working							1,000	0,135	7,392	0,691**
Working	48	96,0	48	96,0	96	96,0				
Mother's Occupation										
Not	20	40,0	28	56,0	48	48,0				
Working							1,909	0,862	4,227	0,161*
Working	30	60,0	22	44,0	52	52,0				

Table 2 shows that low family income is more common among underweight children. The study findings indicate a statistically significant association between family income and undernutrition among toddlers, evidenced by a p-value of 0.012 ($p < 0.05$). Low family income emerges as a risk factor for undernutrition, with an odds ratio (OR) of 0.316, suggesting that toddlers from low-income households are 0.316 times more likely to experience undernutrition compared to those from higher income families.

A significant association was found between family income and undernutrition among toddlers in Merak Village. These findings were consistent with a study by (Herlambang, 2021), which explored factors influencing the nutritional status of toddlers at the Krui Health Center, West Pesisir Regency. The findings revealed a statistically significant association between family income and toddlers' nutritional status, as indicated by a chi-square test yielding a p-value of 0.000 ($p < 0.05$).

Family income in Merak Village shows a low level of family income, seen by most respondents answering the respondent's income <Rp.2,800,000 because the majority of community jobs rely on the economy from rice fields, gardens or livestock products so that the community cannot get the Regional Minimum Wage (UMR) and some people do not have permanent jobs such as farming jobs but the rice fields are not privately owned, so the income is not entirely their own.

Family income is among the key determinants influencing children's nutritional status. Higher income levels enable families to provide more adequate and higher-quality food, which in turn contributes to better nutritional outcomes for children (Ratih Dwilestari, 2019). Lack of income can also affect the family's ability to buy or provide food that needs to be processed (Fitriana Ibrahim, 2023).

The analysis showed no statistically significant association between maternal education level and the incidence of underweight among children ($p = 0.228$; $p > 0.05$). Among mothers with lower educational attainment, 31 toddlers (62%) were classified as undernourished, while 24 toddlers were identified as having adequate nutritional status with a percentage of 48%.

In this study, mothers with lower education levels did not necessarily have more malnourished children than mothers with higher education levels because maternal education is not the main factor causing malnutrition. While maternal education serves as a foundational determinant of malnutrition, numerous additional factors also influence nutritional status. Moreover, the advancement of modern, readily accessible technologies further shapes these dynamics. With today's technological advances, mothers with low education levels can increase their knowledge by accessing various media.

Formal education of parents is different from health education, so it is possible that parents only know about formal education and do not know about health education, so parents, especially mothers, do not know about child nutrition (Putri, 2019). This study is consistent with research by Ana Lestari (2024), This indicates that maternal education

is not associated with the nutritional status of toddlers, as their condition may still be affected by various other contributing factors.

In this study although there was no relationship, however, undernourished toddlers with low mother's education were 31 toddlers (62%), and well nourished toddlers with low maternal education were 24 toddlers (48%). Based on the interview findings, most of the mothers had completed education up to the junior high school level. Research (Rona Firmana Putri, 2020) It is indicated that toddlers experiencing inadequate nutritional status are more frequently associated with mothers who have lower levels of education. Individuals with higher educational attainment tend to have a better ability to comprehend and implement information, particularly regarding health and nutrition.

No meaningful statistical link was found between the father's type of employment and child undernutrition, as reflected by a p-value of 0.691 (p>0.05). The percentage of fathers who did not work was 4% in both the undernourished and well-nourished groups. This is because most of the work done as farmers, laborers, drivers, or other jobs, even though they work but do not have a steady income.

It can also be caused by other things, such as the mother's job. Although the father works, the mother may still provide full time for the child to help develop (Endah Puji Astuti, 2021). Paternal involvement is among several other factors that can impact the nutritional status of toddlers in providing proper nutrition to children in fact, many fathers do not understand the importance of providing proper nutrition to their children or even do not know how to provide adequate food to their children (Endang Yuswatiningsih, 2022).

Father's occupation does not cause malnutrition directly because the main cause of malnutrition is more complex and involves social aspects, behavior, and family education (Ratih Dwilestari, 2019). This study is in line with (Mada Rumende, 2022) The analysis revealed no significant association between the nutritional status of toddlers and their fathers' occupations, as indicated by a p-value of 0.185 (p > 0.05).

The analysis showed no statistically significant association between maternal employment status and the nutritional status of children, as indicated by a p-value of 0.161 (p>0.05). Among mothers who were not employed, 20 children (40%) were undernourished, while 28 children (48%) had normal nutritional status.

The results of this study align with previous research by Anik Sholikah (2019), which found no significant association between maternal employment and the nutritional status of toddlers in both rural and urban settings (p = 0.983). The prevalence of malnutrition among children whose mothers are not employed tends to be low. This may be attributed to the fact that stay-at-home mothers generally have more time to dedicate to supervising their children's nutrition, managing their dietary intake, monitoring growth and development, and regularly attending monthly health check-ups at the *Posyandu* (Atik Kusumawati, 2022).

Employed mothers often face time constraints that may limit their ability to provide direct care and attention to their children, potentially increasing the risk of malnutrition. In contrast, children who receive hands-on care from their mothers on a daily basis are more likely to benefit from consistent nurturing. Nonetheless, it is essential to consider that a family's economic status also plays a significant role in meeting a child's nutritional requirements (Bahriyah, 2024).

Table 3. The Correlation between Toddler Dietary Patterns and Undernutrition in Merak Village

Variable	Undernutrition		Normal		Total		OR	95%CI		p
	n	%	n	%	n	%		min	max	
Frequency of Eating										
Bad	34	68,0	8	16,0	42	42,0	11,156	4,265	29,184	0,000*
Good	16	32,0	42	84,0	58	58,0				
Amount of Food Intake										
Bad	43	86,0	10	20,0	53	53,0	24,571	8,534	70,745	0,000*
Good	7	14,0	40	80,0	47	47,0				

Table 3 demonstrates a statistically significant association between meal frequency and underweight status among toddlers, with a p-value of 0.000 ($p < 0.05$). Inadequate meal frequency is identified as a risk factor for malnutrition, indicated by an odds ratio (OR) of 11.156. This suggests that toddlers with insufficient meal frequency are 11.156 times more likely to experience malnutrition compared to those with adequate meal frequency. These findings are in line with the study conducted by Rostanty (2023), which reported a significant association ($p = 0.006$) between dietary intake and malnutrition in children aged 24–59 months in Sumbersari Village, Sekampung District. Similar results were also observed in the research by Dwibarto (2023), which found a significant correlation between meal frequency and toddlers' nutritional status ($p = 0.000$).

This is because the type and frequency of meals for toddlers are not appropriate. Because at this age, children usually have difficulty eating for various reasons, such as the menu served is not varied or the shape and type are not interesting, so children are bored. In addition, children have difficulty eating because they are accustomed to eating late or suffering from illness (Evie Fitrah, 2019).

A diet that is not balanced between intake and needs both the amount and type of food, for example, toddlers eat foods that are high in fat and consume less vegetables, fruit, and so on. In addition, toddlers with food intake more than needed. The type, amount, and frequency of food consumed by a person is shown in the diet (Atik Kusumawati, 2022).

A statistically significant association was found between the level of food intake and the incidence of underweight among toddlers ($p = 0.000$; $p < 0.05$). Inadequate food intake was identified as a major risk factor for undernutrition, with an odds ratio (OR) of 24.571, indicating that toddlers with insufficient dietary intake are 24.571 times more likely to experience undernutrition than those with adequate intake. These findings are consistent with the study by Apriliya Putri Rh. (2024), which also reported a significant relationship between dietary patterns and the prevalence of malnutrition among toddlers in the Anggut Atas Health Center area, Bengkulu City ($p = 0.001$).

Findings from a study in Merak Village indicate that a significant proportion of undernourished toddlers consume less than 80% of the recommended dietary energy intake based on age-specific Nutritional Adequacy Rates (AKG). According to the Ministry of Health (2019), the estimated energy requirements are 1350 kcal for children aged 1–3 years and 1400 kcal for those aged 4–6 years. Chronic energy deficiency below these thresholds may compromise growth and immune function, thereby increasing the risk of undernutrition.

One way to determine the cause of undernutrition is to examine the diet of toddlers. The food that mothers give to children as toddlers will affect children's development, as well as the eating habits and behaviors that children will have, their health in the next life cycle, and future learning (Rotua Suriany Simamora, 2021). A study (Trihartika Putri Hasibuan, 2020) found that unhealthy diets are strongly associated with malnutrition and undernutrition in toddlers.

Table 4. Association of Exclusive Breastfeeding Practices with Nutritional Status of Toddlers in Merak Village

Exclusive Breastfeeding	Under nutrition		Normal		Total		OR	95% CI		p
	n	%	n	%	n	%		min	max	
Not exclusive breastfeeding	32	64,0	10	20,0	42	42,0	0,141	0,057	0,347	0,000*
Exclusive breastfeeding	18	36,0	40	80,0	58	58,0				
Total	50	100	50	100	100	100				

As presented in Table 4, a statistically significant association was found between exclusive breastfeeding and underweight status in toddlers (p-value = 0.000; $p < 0.05$). Exclusive breastfeeding appeared to serve as a protective factor against undernutrition, with an odds ratio (OR) of 0.141. This suggests that toddlers who were not exclusively breastfed were approximately 0.141 times more likely to experience undernutrition compared to those who received exclusive breastfeeding.

The study findings revealed that the majority of toddlers who received exclusive breastfeeding experienced appropriate growth, whereas only a small proportion of those who were not exclusively breastfed showed similar development. Supporting this, research by Noviana Zara Julia (2020) at the Syamtalira Aron Health Center in North Aceh Regency in 2019 reported a significant association between exclusive breastfeeding and malnutrition, with a chi-square test yielding a p-value of 0.001 ($p < 0.05$). Furthermore, Sab'ngatun (2020) found that most toddlers who were exclusively breastfed by their mothers had normal nutritional status, with a highly significant p-value of 0.000. The results indicated a meaningful link between exclusive breastfeeding and the nutritional well-being of toddlers

Exclusively breastfed infants are less likely to experience delays in speech and motor development, and show better progressivity on developmental scales than non-breastfed children. This is consistent with the fact that the benefits of exclusive breastfeeding are that infants experience age-appropriate growth and development, build strong bonds, and reduce the risk of gastrointestinal, respiratory and other diseases. Exclusive breastfeeding can increase intelligence and ensure optimal development of the child's intelligence potential. Exclusive breastfeeding can function as an antibody and passive immunization, so that toddlers are protected from disease (Rini Fitriani, 2021).

Table 5. Multivariate Analysis of Factors Associated with Undernutrition in Merak Village

Variable	Koefisien	S.E.	Wald	df	p value	OR	CI 95%	
							Min	Max
Mother's Education	1,662	0,821	4,101	1	0,043	5,271	1,055	26,338
Mother's Occupation	-1,374	0,734	3,508	1	0,061	0,253	0,060	0,066
Frequency of Eating	-2,817	0,934	9,104	1	0,003	0,060	0,010	0,373
Amount of Food Intake	-3,077	0,865	12,666	1	0,000	0,046	0,008	0,251
Exclusive Breastfeeding	3,137	0,901	12,133	1	0,000	23,039	3,943	134,615
Constanta	1,743	0,748	5,426	1	0,020	5,714		

Table 5 indicates that following the inclusion of socioeconomic variables, diet and exclusive breastfeeding that meet the multivariate test requirements are tested together, and in 3 stages of testing by one by one removing insignificant variables, the results show that the variables of food frequency, amount of food intake, exclusive breastfeeding, Several factors are linked to undernutrition among toddlers in Merak Village, with a p-value of less than 0.25. Among these, exclusive breastfeeding emerges as the most influential factor.

In this study, the exclusive breastfeeding factor is the main factor that causes malnutrition because breast milk is very useful for meeting the needs of toddlers so that toddlers can avoid malnutrition in the future. This study is in line with research (Siti Ananda Trisnawati, 2024) A statistically significant association was found between exclusive breastfeeding and undernutrition in toddlers (p = 0.004). This finding aligns with the study by Weiqing (2023), which highlights the crucial role of exclusive breastfeeding in shaping toddlers' nutritional status.

Breast milk has an ideal nutrient composition that suits the baby's needs and digestive ability, and helps the baby's physical growth, especially height growth, because calcium is absorbed better than supplementary food (Adenix Putri Ultasari, 2024). The amount of breastmilk consumed by infants and toddlers, including the energy and other nutrients contained in breastmilk, affects growth and development. According to Yusra (2022), breastfeeding is recommended to be sustained up to the age of two years, as it provides essential nutrients required for a child's growth and development.

CONCLUSIONS

A meaningful relationship was observed between household income levels and the prevalence of undernutrition among children under five in Merak Village. Similarly, the frequency of meals and the quantity of food intake were found to be associated with undernutrition in this population. A significant relationship was also observed between exclusive breastfeeding and undernutrition among children under five. In contrast, no significant association was identified between maternal education, paternal occupation, or maternal occupation and the nutritional status of toddlers in Merak Village. Among all the examined variables, exclusive breastfeeding emerged as the most prominent risk factor contributing to undernutrition in children under five.

Conflict of interest

There is no conflict of interest.

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