

Factors that Influence Malnutrition Among Toddlers in Padang, Indonesia after COVID-19

Factores que Influyen en la Desnutrición entre los Niños Pequeños en Padang, Indonesia, Después de la COVID-19

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SUMMARY

Objective: This study aims to determine the factors influencing malnutrition among toddlers in Padang, Indonesia, post-COVID-19. **Method:** This study uses explanatory quantitative methods through a cross-sectional approach. Respondents were all mothers with malnourished children in Padang, totaling 256 people. Variables consist of early breastfeeding; exclusive breastfeeding; complementary feeding; infectious disease; socio-economic; parenting style; and environmental sanitation. All variables were measured through a survey using a questionnaire. **Result:** The bivariate statistical test using the Chi-Square test proved that all factors had a statistically significant p -value <0.05 , meaning all variables significantly affected the incidence of partial malnutrition. Three dominant variables affect malnutrition in children in Padang: history of complementary feeding, socio-economic, and

parenting style. Of the three factors, socio-economic is the factor that has the most influence on malnutrition in children after the COVID-19 pandemic. The $Exp(B)$ value of 0.312 indicates that for every one-unit increase in socioeconomic status, malnutrition will decrease by 31.2%. **Conclusion:** The malnutrition of toddlers in Padang City after COVID-19 is influenced by the history of early initiation of breastfeeding, exclusive breastfeeding, complementary feeding, infectious diseases, environmental sanitation, socioeconomic, and parenting style. The most dominant factor is socio-economic.

Keywords: Malnutrition, toddler, post-COVID-19.

RESUMEN

Objetivo: este estudio tiene como objetivo determinar los factores que influyen en la desnutrición entre los niños pequeños en Padang, Indonesia después de COVID-19. **Método:** Este estudio utiliza métodos cuantitativos explicativos a través de un enfoque transversal. Los encuestados fueron todas madres que tenían niños desnutridos en la ciudad de Padang, con un total de 256 personas. Las variables consisten en: historia de inicio temprano de lactancia materna; historia de lactancia materna exclusiva; historia

DOI: <https://doi.org/10.47307/GMC.2023.131.4.9>

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Recibido: 24 de julio 2023

Aceptado: 6 septiembre 2023

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de alimentación complementaria; antecedentes de enfermedades infecciosas; socioeconómico; estilo de crianza; y saneamiento ambiental. Todas las variables medidas a través de una encuesta mediante un cuestionario. Resultado: Los resultados de la prueba estadística bivariada mediante la prueba de Chi-Cuadrado demostraron que todos los factores tenían un valor sig (p) <0,05 por lo que se encontró un efecto significativo en la incidencia de desnutrición parcial. Hay tres variables dominantes que afectan la desnutrición en los niños de la ciudad de Padang, a saber, el historial de alimentación complementaria, socioeconómico y estilo de crianza. De los tres factores, el socioeconómico es el que más influye en la desnutrición infantil tras la pandemia del COVID-19. El valor Exp(B) de 0,312 indica que, por cada aumento de una unidad en el nivel socioeconómico, la incidencia de desnutrición disminuirá en un 31,2%. Conclusión: La desnutrición de los niños pequeños en la ciudad de Padang después de COVID-19 está influenciada por la historia de inicio temprano de la lactancia materna, lactancia materna exclusiva, alimentación complementaria, enfermedades infecciosas, saneamiento ambiental, estilo socioeconómico y de crianza. El factor más dominante es el socioeconómico.

Palabras clave: *Malnutrición, infante, post-COVID-19.*

INTRODUCTION

Malnutrition (undernutrition) is caused by a lack of nutrients, either because of a poor diet or problems absorbing nutrients from food, caused by having a severe or prolonged period of inadequate energy and nutrient intake, this often occurs due to decreased food intake or increased metabolic needs. The COVID-19 pandemic has had a significant economic impact in many countries, including Indonesia. Declining economic activity, unemployment, and declining incomes increase the risk of poverty and economic inequality (1). Therefore, child health, access to nutritious food, health services, and adequate sanitation facilities are challenging to meet ideally. In a difficult economic situation, access to child health services is hampered (2). Decreased household income affects the ability of families to pay for health care costs and limits visits to health facilities so that families cannot detect and treat diseases or health conditions of children early. Economic instability can affect

family access to nutritious food and a balanced diet. Malnourished children have a higher risk of infection, stunted growth, and other health problems (3).

The Indonesian Ministry of Health predicts that the number of cases of malnutrition in toddlers will increase by 15 percent, or the equivalent of 7 million children, after the COVID-19 pandemic. Based on the 2021 Indonesian Nutrition Status Study results, wasting children decreased to 7.1 percent from the previous 7.4 percent in 2019. However, the number of underweight children increased by 17 percent in 2021. This number increased in 2019, reaching 16.3 percent (4). Meanwhile, the prevalence of malnourished toddlers in Padang was 15.40 % in 2018. Several health programs that were delayed and not implemented due to the COVID-19 pandemic are feared to increase the number of malnourished toddlers in the future (5).

A study found that children who experience malnutrition in the first 60 months of life will experience disruption of the neurodevelopmental trajectory (6). Kirolos et al. (2022), in a systematic review of 30 studies on the effect of malnutrition on children's quality of life, indicated that malnutrition affects not only neurodevelopment but also academic achievement, cognitive development, and behavioral problems (7).

Alam et al. assessed the degree of malnutrition risk in Makassar, Indonesia, during the COVID-19 pandemic. They found that less than four prenatal checkups, non-exclusive breastfeeding, and infectious diseases such as acute respiratory infection/diarrhea in low birth weight children in the last three months were risk factors for malnutrition (8). Meanwhile, Loots et al., revealed that the mother's employment status is related to the incidence of malnutrition in children. In effect, they showed no malnourished children from working mothers, few children were found to be malnourished in self-employed mothers, and more malnutrition from non-working mothers (9).

This study aims to identify the factors that influence the incidence of malnutrition in the city of Padang, Indonesia post-COVID-19. The results will allow us to improve our understanding of this issue and help to formulate appropriate public policies. The information

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will give the basis to the government to direct resources and interventions to areas where is needed, such as public health programs, infrastructure improvements, increasing access to health services, and nutrition education for the community.

METHOD

This study uses explanatory quantitative methods through a cross-sectional approach. The data was collected using a survey method using a questionnaire. The research respondents were taken through a total sampling technique, namely all mothers who had malnourished children in Padang with 256 people. Determination of the sample based on data from 23 health centers in Padang. The research was conducted from November 2022 – March 2023.

Data collection used a survey method involving seven independent variables that measured: 1) early initiation of breastfeeding; 2) exclusive breast milk; 3) complementary feeding; 4) infectious diseases; 5) socio-economic; 6) parenting style and 7) environmental sanitation.

Data was analyzed using the Statistical Package for the Social Sciences (SPSS) application with three stages, namely: 1) univariate through the presentation of a frequency distribution to describe each variable; 2) bivariate through the Chi-Square test to analyze the effect of the independent variables on the dependent; 3) multivariate through logistic regression test to examine the overall effect of the independent variables on the dependent simultaneously. The Ethics Committee Dr. MDjamil Padang Hospital approved the research feasibility with number LB.02.02/5.7/481/2022.

RESULT

Most of the mothers were aged 26-35 years (62.9 %), and 68 % had higher education. The majority of respondents were unemployed (86.3 %), so the primary breadwinners were fathers (100 %). In the distribution of the sex of children, boys were 47.3 %, while girls were

52.7 %. Regarding the number of children, most respondents had 1-2 children, with a percentage of 68.8 %. When looking at information about births, a small number of respondents (1.6 %) reported births by traditional birth attendants, while the majority used midwives (58.6 %) or obstetricians (39.8 %).

Table 1
Characteristics of Respondents and Factors that Influence Malnutrition

Variable	Frequency	(%)
Early breastfeeding		
No	162	63.3
Yes	94	36.7
Exclusive breastfeeding		
No	173	67.6
Yes	83	32.4
Complementary feeding		
Less	199	77.7
Good	57	22.3
Infection diseases		
Yes	101	39.5
No	155	60.5
Sanitation		
Not good	143	55.9
Good	113	44.1
Socioeconomic		
Low	195	76.2
High	61	23.8
Parenting style		
Democratic	39	15.2
Otoriter	29	11.3
Permissive	120	46.9
Abandonment	68	26.6

Based on the descriptive survey, we found that most of the respondents (63.3 %) did not initiate early breastfeeding, and 67.6 % of mothers did not give exclusive breastfeeding. Most mothers were less skilled at providing complementary food for breastfeeding, as much as 77.7 %. When looking at the history of infectious diseases, 60.5 % of respondents reported that their child had an infectious disease and was in unhealthy environmental sanitation (55.9 %). For socio-

economic factors, 76.2 % of respondents are in the low category. The main parenting style used by mothers is permissive (46.9 %).

Table 2
Partial effect of each factor on malnutrition

Variable	Sig (p)
Early breastfeeding	0.0001
Exclusive breastfeeding	0.0001
Complementary feeding	0.0001
Infection diseases	0.0001
Sanitation	0.0001
Socioeconomic	0.0001
Parenting style	0.001

The bivariate statistical test using the Chi-Square test proved that all factors had a significant p-value <0.05, affecting the incidence of partial malnutrition.

By removing each variable with a significant p-value > 0.05 at each step, in the regression modeling at step four, it was found three dominant variables that affect malnutrition in children in Padang City: history of complementary feeding, social economics, and parenting. Of the three factors, socio-economic is the factor that has the most influence on malnutrition in children after the COVID-19 pandemic. The Exp(B) value of 0.312 indicates that for every one-unit increase in socioeconomic status, malnutrition will decrease by 31.2 %.

Table 3
The simultaneous effect of all factors on malnutrition

Variable	Step 1		Step 2		Step 3		Step 4	
	Sig (p)	Exp (B)	Sig (p)	Exp (B)	Sig (p)	Exp (B)	Sig (p)	Exp (B)
Early breastfeeding	0.018	0.460	0.002	0.379	0.065	0.765	-	-
Exclusive breastfeeding	0.145	0.604	-	-	-	-	-	-
Complementary feeding	0.042	0.398	0.026	0.270	0.013	0.334	0.007	0.201
Infection diseases	0.088	1.724	-	-	-	-	-	-
Sanitation	0.091	0.568	-	-	-	-	-	-
Socioeconomic	0.001	0.177	0.001	0.476	0.001	0.193	0.000	0.312
Parenting style	0.021	0.468	0.001	0.455	0.001	0.273	0.000	0.305

DISCUSSION

Malnutrition in post-COVID-19 children refers to conditions in which children experience malnutrition, negatively impacting their growth and development after recovering from COVID-19 infection. The COVID-19 pandemic had devastating impacts that risked reversing the slow but gradual progress made in recent years to achieve Sustainable Development Goals. In a context already characterized by a significant increase in the number of people at risk of food insecurity, the pandemic dramatically jeopardized the achievement of many of the objectives of

Agenda 2030, and the number of malnourished people increased with dramatic consequences for the most vulnerable segments of the population such as children, women, and adolescents. In this study, we found that the seven factors significantly influenced the incidence of malnutrition in toddlers.

Early breastfeeding initiation is one of the efforts to provide optimal nutrition to infants early in life. Breast milk contains all the nutrients a baby needs to grow and develop properly. Breast milk contains essential nutrients such as protein, fat, carbohydrates, vitamins, minerals, and antibodies that help protect babies from

infection. Colostrum, the liquid produced by the breasts in the first few days after giving birth, is rich in nutrients and antibodies. Colostrum helps strengthen the baby's immune system and protects it from disease. Early stimulation of the breasts triggers sufficient milk production. Thus, the baby has adequate access to breast milk which is essential for its growth and development. The link between the absence of early initiation of breastfeeding and malnutrition of children under five is evident in this study, as was the previous study by Garti et al. (10), who assess child feeding practices and their association with undernutrition among young children, demonstrated that early initiation of breastfeeding and bottle feeding was associated with acute malnutrition and experiencing feeding challenges were associated with chronic malnutrition. Furthermore, early initiation of breastfeeding within the first hour after birth provides significant benefits in providing early nutrition for the baby. Thus, timely initiation of early breastfeeding is significantly associated with better growth in infants in the form of a better increase in body weight and length at six months (10). Promoting appropriate child-feeding practices can reduce the risk of undernutrition.

In addition to a history of low-quality early breastfeeding, most mothers in this study also had a history of low exclusive breastfeeding. This condition results in the baby not getting the maximum nutrition in breast milk. The baby's digestive tract more easily absorbs the nutritional components in breast milk compared to formula milk. The proper nutritional content in breast milk helps the baby's body utilize nutrients more efficiently, promoting optimal growth and development. In addition, a solid mother-infant bond during the breastfeeding process is a valuable asset besides benefiting from its nutritional content. Research proves that children who grow up in mother-infant solid bonds will have better physical and cognitive development (11).

The pandemic significantly increased the number of children at risk of malnutrition and premature death, due to its direct or indirect consequences such as increased poverty linked to job losses, especially in informal sectors, closure of schools and school canteens, disruption of essential health services and the increase

in various forms of violence and exploitation. Although a year of the COVID-19 pandemic has passed, it still leaves poor quality in serving complementary foods nowadays. Decreased income, changes in daily routine, stress, and worry are all barriers to providing good complementary foods for toddlers. Research in rural areas in China found that poor complementary feeding practices, including malnourished and unbalanced feeding, were associated with a high prevalence of anemia in infants and toddlers (12). Providing complementary food for toddlers is not an easy thing for the community. A study in Myanmar by Mya Kyaw Swa found that out of 1 222 children aged 6-23 months, 20 % of children had obstacles in receiving complementary foods, and 43 % suffered from moderate anemia (13).

The absence of early breastfeeding, exclusive breastfeeding, and poor quality of complementary foods are the causes of infectious diseases in most children under five. Infectious diseases such as diarrhea, pneumonia, and respiratory infections can interfere with the absorption of nutrients in a toddler's body (14), thereby increasing the risk of malnutrition. Roth et al. highlighted the relationship between respiratory infections and nutritional status in children. Respiratory infections can cause decreased appetite, increase energy requirements, and interfere with the absorption of nutrients, which can contribute to the risk of malnutrition in toddlers (15). A study revealed that *Cryptosporidium*, a parasite that infects the human digestive tract, especially the small intestine, is associated with impaired growth in toddlers in sub-Saharan Africa (16). Recurring or prolonged diarrhea can interfere with the absorption of nutrients, including essential nutrients for bone and muscle growth in toddlers, which can impact the risk of malnutrition (17).

Unhealthy environmental sanitation conditions also cause infectious diseases in most toddlers. Prüss-Ustün et al. found an association between inadequate access to clean water, sanitation, and hygiene and the risk of diarrheal disease, respiratory infections, and nutrition-related morbidity in young children in middle and low-income countries (18). Shrestha et al., in a study involving 1 427 respondents in Nepal, found more than 50 % of children were in critical health conditions. The results of this study also emphasize that improving children's

health is highly dependent on appropriate health programs, including meeting optimal nutritional needs, good sanitation management, and reliable health promotion to invite people to understand personal hygiene habits and maintain a clean environment (19).

Socio-economic is the central axis of the cause of maternal and child health problems (20) after the COVID-19 pandemic. This factor is the dominant aspect that influences the incidence of under-five malnutrition in Padang. Decreased income during the pandemic has resulted in economic and infrastructure constraints that hinder access to needed maternal and neonatal care (21). Economic instability also disrupts the food supply, affecting the availability of nutritious food for mothers and babies, which causes the risk of post-pandemic malnutrition. Mothers will experience increased stress and shaken socio-economic conditions that affect the quality of baby care and development (22).

Increased stress can make a mother feel overly tired, overwhelmed, or helpless, which reduces attention and involvement in caring for their children. Mothers who experience decreased mental well-being may be less able to provide adequate time, attention, and interaction with their children. She also has difficulty maintaining a stable daily routine for her children. They may not provide consistent structure regarding sleeping, eating, or other daily activities. This instability can affect the safety and comfort of children, as well as interfere with regular and organized parenting (23).

CONCLUSION

In conclusion, early breastfeeding, exclusive breastfeeding, complementary feeding, infectious diseases, environmental sanitation, socioeconomic status, and parenting style influenced malnutrition among toddlers in Padang City after COVID-19. The most dominant factor is socio-economic.

Acknowledgment

The authors are grateful to mothers in Padang City for the generous contribution provided to this research. The author thanks Universitas.

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