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Maternal Caregiving Capabilities are Associated with Energy-Protein Adequacy of Children with Stunting in Central Java, Indonesia

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Abstract

Indonesian children suffer from stunting because of a chronic lack of energy and protein intake. Maternal caregiving capabilities are skills and attributes of the mother which determine their ability to use resources for positive nutrition to support their children's health. This study aimed to analyse the association between maternal caregiving capabilities and energy-protein adequacy among children with stunting. This study used a cross-sectional correlation design. The data was collected using a maternal caregiving capabilities questionnaire and 24-hour food recall in 130 mothers of children aged 2 to 5 years with stunted growth, registered at Puskesmas. The study found a significant association between maternal caregiving capabilities and a child's energy and protein adequacy. As mothers' maternal caregiving capabilities increased, their capacity to provide adequate energy and protein for their children increased. We believe that community health nurses can promote health and empower mothers to increase their capability to meet the nutritional needs of children.

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Introduction

Stunting is still a significant health problem for children under five worldwide that must be urgently addressed, including in Indonesia.[1] The United Nations Children's Fund (UNICEF) defines stunting among children aged 0-59 months as a chronically

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malnourished status with a height-for-age z-score (HAZ) of less than -2 standard deviations (SD) based on World Health Organization (WHO) growth standards.[2] Most children were stated to be stunted by the age of 2 years old. If not treated well, stunted children will experience delays in their growth and development, which is irreversible. It will also increase the child's morbidity and funding to maintain health.[3, 4]

The Sustainable Development Goals (SDGs) are targeted to eliminate all forms of malnutrition by 2030, including stunting. However, UNICEF, WHO, and The World Bank stated that 148.1 million or 22.3% of children under five still suffer from stunting in 2022.[5] Indonesian Nutrition Status Study[6, 7] by 2019, 2021, and 2022 showed a decreased trend of childhood stunting by 1.6% per year, from 27.7% to 24.4%. Nevertheless, the decrease needs to be accelerated to achieve a 14% stunting prevalence in 2024, as targeted by the Indonesian government.[8] The report showed that the prevalence of under-five-years children with stunting in Central Java Province is still 20.9%. Magelang was ranked the ninth-highest regency of childhood stunting, with a prevalence of 22.3%. One of its Puskesmas noted that by December 2021, from 3 937 children under five who measured for HAZ, 259 (6.57%) children were stunted, and 105 (2.67%) children were severely stunted.

Between birth and two years is a critical age for children. They need high-quality care to ensure that they can achieve their optimal health, growth, and development.[9] As young children still depend on others, their well-being highly depends on the quality of care provided by their caregivers, primarily their mothers.[10] Mother's ability in mediating intra-household resources to attain recommended complementary feeding practices is the key to solve childhood stunting.[11, 12]

The UNICEF Model of Care explains the determinants influencing a child's nutritional status. One of the determinants was the mother's ability to provide adequate nutrition according to the child's age which is called maternal caregiving capabilities.[13] It is consist of six factors including physical and mental health, social support, time, decision-making autonomy, gender norm attitudes, and mothering self-efficacy.[14] Previous studies revealed that maternal caregiving capabilities related with appropriate child feeding practice and child's linear growth.[13, 15, 16] However, maternal caregiving capabilities have not yet become a strategic issue explored in the practice of child care as an effort to prevent stunting.

The evidence was essential to develop a health promotion program to improve Infant and Young Children Feeding (IYCF) practice and accelerate the decrease of childhood stunting. We hypothesize that mothers with better capabilities will have children with a lower risk of stunting in Central Java, Indonesia. Therefore, the main aim of this study was to determine the association of maternal caregiving capabilities and Energy-Protein Adequacy of Children with Stunting in Indonesia.

Materials and Methods

This study used a cross-sectional correlation design, conducted by nurses at the community setting. The population were mothers of stunted children aged 2-5, recorded at e-PPGBM (Electronic Community-Based Nutrition Recording and Reporting) of Puskesmas Grabag I, Magelang Regency, Central Java, Indonesia, from April to June 2022 (N=194). The Slovin formula was used to calculate the sample. The random cluster sampling technique was used in Posyandu (Integrated Community Health Care Center) to select the sample. Mothers who can communicate using Bahasa and care for their children alone were included in this study. Mothers whose children have chronic and metabolic illnesses (such as congenital heart defects, Type 1 Diabetes, and tuberculosis) were excluded. One hundred thirty mothers were involved.

In this present study, the independent variable was maternal caregiving capabilities, while the dependent variables was child's energy and protein adequacy. There were three section of questionnaire used.

The first section was the demographic data, including the mother, child, and household characteristics. Mother's characteristics include a) age, which is divided as 25-30 years old, 31-35 years old, 36-40 years old, and 41-45 years old; b) level of education, which is divided as elementary school, junior high school, senior high school, and diploma/higher; and c) working status which is divided as housewives or employees. Child's characteristics include a) age

which is divided as 2 – 2.5 years old, 2.6 – 3 years old, 3.1 – 3.5 years old, 3.5 – 4 years old, 4.1 – 4.5 years old, and 4.5 – 5 years old; b) gender which is divided as male and female; c) history of child's birth which is divided as low birth weight, premature, and a term; and d) height-for-age (HAZ) which is divided as stunted and severe stunted. Household characteristics include: a) number of children in the family, which is divided as ≤ 5 and >5; and monthly family income measured from the minimum regional wage of Magelang Regency, which is divided as <2,081,000 IDR and ≥2,081,000 IDR. The mother answered the closed-ended questions about demographic data except HAZ. The child's HAZ was collected by capturing health professionals' notes (nurses, midwives, or paediatricians) in the Maternal and Child Health Book from the Ministry of Health Indonesia in June 2022.

The second section were maternal caregiving capabilities which constructed by perceived physical health, psychological well-being, social support, decision-making, empowerment, and mothering self-efficacy. A questionnaire modified from SHINE, which represents six constructs of maternal caregiving capabilities, was used. It consists of 21 Likert scale questions with five points. Mother were asked about the extent to which they agreed or disagreed with certain condition. A score greater than or equal to 70 means mother's level of maternal caregiving capabilities were strong, and less than 70 means weak.[14] This instrument has also undergone the back-translation process and was statistically tested for validity and reliability.

The third section was the child's energy and protein adequacy level, which was collected using a 24-hour food recall. It is a structured interview intended to capture detailed information from mothers about all foods and beverages consumed by children in the past 24 hours, most commonly from midnight to midnight the previous day. Food models were used to allow mothers to remember the amount of food consumed by their children easily. The 24-hour food recall data were inputted into a Nutrisurvey program to find the total energy and protein consumed by children. Data was then compared to the Indonesian Recommended Dietary Allowance (RDA) for children 2-5 years old.[17] It was then categorised as extremely lack (<70% RDA), moderately lack (70-80% RDA), slightly lack (80-90% RDA), normal (90-<120 RDA), and excess (≥120% RDA) energy-protein adequacy.

The researcher collected the data door-to-door at mothers' houses accompanied by local health volunteers. Informed consent was obtained from all mothers prior to the data collection. Each mother was visited once without follow-up, approximately in 60 minutes. Utmost care has been taken to maintain the confidentiality of mothers' data during the analysis and dissemination of findings. This study was carried out in accordance with the principles of the Declaration of Helsinki. The Ethical Commission Board of the Faculty of Nursing, Universitas Airlangga, certificate number 2551-KEPK, granted this research.

The data obtained were then analyzed statistically. Descriptive analysis used were frequency and percentage distribution, mean, and standard deviation. Inferential analysis was performed by using Spearman Rho (<0,05) through SPSS program to analyze the association between maternal caregiving capabilities and child's energy-protein adequacy level. The SPSS program for statistical analysis of this study were carried out using IBM SPSS version 26.0 (IBM Corp., Armonk, NY, USA). P-values < 0.05 * and < 0.01 ** were considered statistically significant.

Results

A total of 130 respondents were gathered as samples and included in the statistical analysis. Table 1 shows the distribution of respondent's characteristics.

Table 2 showed that many respondents have strong maternal caregiving capabilities and a slight lack of the child's energy adequacy (36; 27.7%). Maternal caregiving capabilities were significantly associated with the child's level of energy adequacy. It means that as mothers' maternal caregiving capabilities increase, their ability to fulfil energy adequacy for their children is increased.

Table 4 shows that a child's level of energy adequacy is significantly associated with protein adequacy. It means the adequacy of energy consumed by children is aligned with the protein consumed. As their energy becomes more adequate, their protein also becomes adequate.

Tabel 1: The characteristics of respondents

Characteristics	n=130	%	Mean	SD
Mother's age				
25-30 years old	59	45.4	31.66	5.821
31-35 years old	34	26.2		
36-40 years old	28	21.5		
41-45 years old	9	6.9		
Mother's level of education				
Elementary school	20	15.4	-	-
Junior high school	68	52.3		
Senior high school	41	31.5		
Diploma/higher	1	0.8		
Mother's working status				
Housewives	86	66.2	-	-
Employer	44	33.8		
Child's age				
2 – 2.5 years old	36	27.7	3.26	0.797
2.6 – 3 years old	24	18.5		
3.1 – 3.5 years old	28	21.5		
3.5 – 4 years old	13	10		
4.1 – 4.5 years old	25	18.5		
4.5 – 5 years old	5	3.8		
Child's gender				
Male	65	50	-	-
Female	65	50		
History of child's birth				
Low birth weight	15	11.5	-	-
Premature	5	3.8		
A term	110	84.6		
Height-for-Age (HAZ)				
Stunted	94	72.3	-	-
Severe stunted	36	27.7		
Number of family member				
≤ 5	57	43.8	4.9	1.386
>5	73	56.7		
Family's monthly income				
<2,081,000 IDR	108	83.1	-	-
≥2,081,000 IDR	22	16.9		
Maternal caregiving capabilities				
Strong	72	55.4		
Weak	58	44.6		
The level of energy adequacy				
Extremely lack	45	34.6		
Moderately lack	38	29		
Slightly lack	43	33.1		
Normal	4	3.1		
The level of protein adequacy				
Extremely lack	6	4.6		
Moderately lack	33	25.4		
Slightly lack	52	40		
Normal	26	20		
Excess	13	10		

Table 2: The association between maternal caregiving capabilities and the child's level of energy adequacy

Maternal Caregiving Capabilities	Child's Level of Energy Adequacy						Normal		Total	
	Extremely Lack		Moderately Lack		Slightly Lack					
	f	%	f	%	f	%	f	%	f	%
Strong	17	13.1	15	11.5	36	27.7	4	3.1	72	55.4
Weak	28	21.5	23	17.5	7	5.4	0	0	58	44.6
Total	45	34.6	38	29.0	43	33.1	4	3.1	130	100.0

Spearman Rhop=0.000; r=0.422

Table 3: The association between maternal caregiving capabilities and the child's level of protein adequacy

Maternal Caregiving Capabilities	Child's Level of Protein Adequacy										Total	
	Extremely Lack		Moderately Lack		Slightly Lack		Normal		Excess			
	f	%	f	%	f	%	f	%	f	%	f	%
Strong	2	1.5	17	13.1	27	20.8	16	12.3	10	7.7	72	55.4
Weak	4	3.1	16	12.3	25	19.2	10	7.7	3	2.3	58	44.6
Total	6	4.6	33	25.4	52	40.0	26	20.0	13	10.0	130	100.0

Spearman Rhop=0.019; r=0.205

Table 4: The association between child's level of energy and protein adequacy

Child's Level of Protein Adequacy	Child's Level of Energy Adequacy						Normal		Total	
	Extremely Lack		Moderately Lack		Slightly Lack					
	f	%	f	%	f	%	f	%	f	%
Extremely lack	6	4.62	0	0.00	0	0.00	0	0.00	6	4.62
Moderately lack	10	7.69	2	1.54	0	0.00	0	0.00	12	9.23
Slightly lack	13	10.00	3	2.31	2	1.54	0	0.00	18	13.85
Normal	14	10.77	18	13.85	20	15.38	0	0.00	52	40.00
Excess	2	1.54	15	11.54	21	16.15	4	3.08	42	32.31
Total	45	34.62	38	29.23	43	33.08	4	3.08	130	100.0

Spearman Rhop=<.000001; r=0.6034

Discussion

The present study was aimed to analyze the association between maternal caregiving capabilities and child's energy-protein adequacy level. The result showed that maternal caregiving capabilities is associated with child's level energy and protein adequacy. The adequacy of energy consumed by children is also aligned with the protein consumed. Most mothers had strong maternal caregiving capabilities. Maternal caregiving capabilities are mothers' skills that influence their ability to use resources (food, health care, education, and shelter) for positive nutrition, health and developmental outcomes for their children.[16] There were six maternal caregiving capabilities constructs, including perceived physical health, psychological well-being, social support, decision-making, empowerment, and mothering self-efficacy. Mothers with strong maternal caregiving capabilities have good physical and mental health, high levels of social support and mothering self-efficacy, high autonomy for decision-making within the household, and egalitarian gender norm attitudes (high women empowerment level).[13, 14] For most mothers living in a family with a significant number of members (>5), it allows them to have much experience in managing household resources, so they have more knowledge and skills about childcare and nutrition.

However, the children's energy-protein adequacy level was slightly lacking compared to the recommended dietary allowance for Indonesian children under five.[17] Normally, the energy-protein adequacy level of child's nutrition should reach 90-<120% of RDA according to their age, which is different in each country.[17, 18] Most respondents have a monthly income less than the regional minimum wage. It can be a constraint for them to provide the child's nutrition as recommended. This finding is similar to previous researches, which stated that the family's daily consumption could be influenced by their monthly income.[19, 20] Families with low income tend to buy food with more attention to economic than nutritional value,[21] so nutritional intake is not maximally sufficient. Previous research also found that mothers tend to choose plant-based protein foods because they are more affordable than animal-based.[21-24] Low levels of animal-source food in under-fives children cause a lack of protein and other vital micronutrients for growth.[25]

\The study also revealed that maternal caregiving capabilities are associated with the child's level of energy-protein adequacy. This findings were similar with previous study which stated that the quality of maternal caregiving capabilities affects infant care practice in Uganda.[15] Maternal caregiving capabilities (social support and decision-making) are related to infant feeding practices by WHO recommendations[13] and the linear growth of infants.[14, 16]

Each construct of play an important role in strengthening maternal caregiving capabilities. Mothers with the autonomy to make decisions are more likely to fulfil children with stunting nutrition as recommended by WHO to meet the adequate level of energy, protein, and other nutritional intakes.[26] Mothers with strong family support tend to fulfil their child's nutritional needs compared to mothers who do not receive support from their families.[27] Mother's empowerment level was also associated with infant and young child feeding practice.[28, 29] Mothering self-efficacy (MSE) which define as a mother's ability, confidence, success, perceived competence in infant care, perception of motherhood role, and self-esteem also play a role in the fulfilment of child's energy and protein adequacy according to WHO recommendation.[30] Time stress perceived by mother could affect the child's nutrition and care.[31] Children whose mothers have strong caregiving capabilities might have more control over using family-owned resources regarding the child's nutrition fulfilment, contributing to the child's level of energy-protein adequacy.

This study has strengths which is examining maternal caregiving capabilities and child feeding practices which is less analyzed in Southeast Asia. However, the present study had several limitations. First, data were collected using a cross-sectional approach, making it difficult to determine a cause-effect relationship. Second, IYCF practice was measured by asking the mother to recall the child's diet in the last 24 hours before the interview, which increases the probability of information bias.

Conclusion

This study was critical as it gave new insight into the fact that when maternal caregiving capabilities increased in mothers with stunted children in Central Java, Indonesia, their ability to fulfil energy

and protein adequacy in their children improved. Community health nurses can promote health and empower mothers to increase their capability to meet the nutritional needs of their children. Interventions to reduce mothers' physical and psychological stress, dependency in decision-making, and inadequate social support may improve maternal caregiving capabilities.

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Conflict of Interests
The authors declare no conflict of interest regarding this papers research, authorship, and publication.

Authors' Contribution
Author's contributions to the present manuscript are explained as follows:

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Literature review and material preparation : AQ, AS, FAR, RBPW
Project administration and data collection : AS, FAR, RBPW
Statistical analysis and data interpretation : EMMH, AS, FE, SDW, FAR
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Data Availability Statement
Not Applicable

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