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*ORIGINAL RESEARCH*

# THE IMPACT OF KNOWLEDGE, ATTITUDE, AND PRACTICE OF EATING BEHAVIOR ON STUNTING AND UNDERNUTRITION

***Pengaruh Pengetahuan, Sikap dan Perilaku Pola Makan terhadap Stunting dan Gizi Buruk***

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**ABSTRACT**

**Background:** Indonesia as an agricultural country is still having nutritional problems. **Purpose:** This research aimed to investigate the impact of knowledge, attitude, and practice of eating behavior on stunting and undernutrition prevalence in agricultural communities in Jember. **Methods:** This cross-sectional research used questionnaires as a method to collect data from respondents about the knowledge, attitudes, and practice of eating behavior. A total of 414 respondents who met the inclusion criteria were chosen through random sampling. The data were then analyzed by using Spearman rho's test to search the effect of the knowledge and attitudes of the mothers of under-fives toward stunting and undernutrition. While eating behavior was described based on the results of interviews with respondents on 2x24 hours of the food recall and food frequency questionnaires. **Results:** This study showed that the knowledge and attitudes of mothers regarding eating behavior were related to the occurrence of stunting ($p = 0.01$; $p = 0.04$) and malnutrition ($p = 0.04$), except for the attitude variable towards malnutrition ($p = 0.81$). Data analysis results regarding eating behavior showed there was still a lack of fulfillment of certain nutrients, both macronutrients, and micronutrients to the

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RDA reference which was recorded as a severe deficiency in 60-97% of children under five. **Conclusion:** Adequate knowledge and attitudes of mothers about diet can be a factor that prevents nutritional problems (stunting and malnutrition). The consumption pattern assessed showed that there was still a lack of fulfillment of certain nutrients both macro and micronutrients against RDA reference.



***ABSTRAK***

***Pendahuluan:*** *Indonesia sebagai salah satu negara agraris masih mengalami masalah gizi.* ***Tujuan:*** *Penelitian ini bertujuan untuk mengetahui pengaruh pengetahuan, sikap, dan perilaku makan terhadap prevalensi stunting dan gizi buruk balita pada masyarakat pertanian Jember.* ***Metode:*** *Desain cross sectional yang digunakan dalam penelitian ini adalah dengan kuesioner untuk menanyakan kepada responden mengenai sikap dan perilaku pola makan. Responden sejumlah 414 orang dipilih secara random sampling yang memenuhi kriteria inklusi. Data tersebut kemudian dianalisis dengan menggunakan uji Spearman rho untuk mengetahui pengaruh variabel pengetahuan dan sikap pola makan ibu balita terhadap stunting dan gizi buruk. Sedangkan perilaku makan dijabarkan secara deskriptif dari hasil wawancara responden 2x24 jam food recall dan kuisioner food frequency.* ***Hasil:*** *Penelitian ini menunjukkan bahwa pengetahuan dan sikap tentang pola makan ibu berhubungan dengan terjadinya stunting (p = 0.012; p = 0.036) dan gizi buruk (p = 0.035, kecuali variabel sikap terhadap gizi buruk (p = 0,810). Pada hasil perilaku pola konsumsi menunjukkan masih kurangnya pemenuhan zat gizi tertentu, baik zat gizi makro maupun zat gizi mikro terhadap nomor referensi RDA yang tercatat sebagai defisiensi parah pada 60-97% balita.* ***Kesimpulan:*** *Pengetahuan dan sikap ibu yang memadai terhadap pola makan dapat menjadi faktor yang mencegah masalah gizi (stunting dan gizi buruk). Perilaku pola konsumsi yang dinilai menunjukkan masih kurangnya pemenuhan unsur hara tertentu baik makro (serat) maupun mikronutrien terhadap angka referensi AKG.*



## INTRODUCTION

Currently, nutritional problems in developing countries, such as Indonesia has been increasingly becoming the world's attention. The Global Nutrition Report shows that Indonesia is among the 17 countries, of the 117 countries in the world with three main nutritional problems, i.e., wasting, being overweight, and stunting in under five (Global Nutrition Report, 2018; Ministry of Health of the Republic of Indonesia, 2018). Stunting and wasting or malnutrition are indicators that are often used for chronic malnutrition (Beal, Tumilowicz, Sutrisna, Izwardy, & Neufeld, 2018).

Stunting is also called linear growth failure. Linear growth failure compared with body height and Z-score value according to index of height/age (Beal et al., 2018). The prevalence of stunting toddlers in Indonesia reached 27.50% in 2016. The prevalence rate, when compared with data in 2018 (30.80%), data for 2013 (37.20%), data for 2010 (35.60%), and data for 2007 (36.80%), does not show a significant decline or improvement

(Ministry of Health of the Republic of Indonesia, 2018).

According to the results of the East Java Provincial Health Office's Monitoring of Nutritional Status (MNS) survey (Ministry of Health of the Republic of Indonesia, 2018), the prevalence of stunting in Jember District was 39.20% in 2016. The WHO reported that the prevalence of stunting in infants reached 30% or more among those who can be categorized as having very high (chronic) health problems (Li, Kim, Vollmer, & Subramanian, 2020).

Malnutrition is a state of severe malnutrition caused by the low consumption of energy and protein in a long period of time which is characterized by body weight according to age (Weight for Age) which is at <-3SD World Health Organization-National Centre for Health Statistics (WHO-NCHS) standard table (Li et al., 2020). According to the results of the MNS survey, the prevalence of malnutrition in infants, was that 3.39% of children under five were suffering from poor nutrition (<-3SD) and 14.42% from undernutrition (<-2SD) (Ministry of Health of the Republic of Indonesia, 2018). The problem of malnutrition in under-fives in Indonesia is a public health problem that falls into the moderate category (Onis et al., 2018).

Stunting and undernutrition require specific handling because high-quality human resources are also influenced by the quality of nutritional status that comes from nutritional balanced, food safety, and diversity of food consumption. According to Saulle et al., (2020), efforts to improve the quality of nutrition should be made by viewing it from various perspectives including improving nutritional awareness.

Poverty and high food prices in relation to income remain the major challenges in the effort to increase access to food. Poverty is highly correlated with food insecurity. It was smallholder farmers, farm laborers and fishermen who make up most of those who suffer the most from famine (Valešová, Herák, Shinoda, Mazancová, & Verner, 2017). About 60% Indonesian citizens live as farmers that live in rural agricultural area. RISKESDAS (2018) data showed mostly undernutrition happens in rural area (percentage comparison of non rural and rural area for stunting 34.9:27.3, undernutrition 20.0:15.7, wasting 10.7:9.8) (Ministry of Health of the Republic of Indonesia, 2018).

Problems with food and nutrition as well as low food consumption are not only found in the middle to lower economic families but also in wealthy families who do not sufficiently attend to their children nutritional needs (Khamis, Mwanri, Ntwenya, & Kreppel, 2019). For instance, several agricultural areas which are very fertile and have abundant food sources apparently have a high rate of malnutrition in children (Beal et al., 2018). The ability of families to optimally utilize existing potential sources to meet the nutritional needs of children under five shows that the contribution of appropriate technology training to increase knowledge, attitude and practice for low-income residents is a necessity, especially to overcome the problem of under-nutrition in children under five (Marchianti, Sakinah, & Diniyah, 2017).

The aim of this research study was to recognize the correlation between knowledge, attitude and practice of eating behavior and stunting and undernutrition in the agricultural community. Therefore, later shortly, it will be appropriate to provide a holistic approach based on the analysis of the determinants of stunting and undernutrition in children.

## METHODS

### Study design

This research used analytic observational research approached by a cross-sectional study design. This study used the population of food-insecure children (under five) in Jember District, which was estimated to be 180,645 children based on the Central Bureau of Statistics (BPS) data (latest update on January 31, 2018) (Central Bureau of Statistics (BPS), 2017).

### Data collection

Based on the Slovin formula (Dianasari, Marchianti, & Prayitno, 2018), the number of samples needed with a 0.05 level of significance is a minimum of 400 people. The sample was chosen through multistage, the area was based on the district with the ten highest malnutrition prevalence, so that a minimum of 30% sample area was achieved, i.e. 10 out of 31 sub-districts in Jember District. Respondents were selected by using cluster random sampling where a minimum of 40 respondents were taken from each area so that a total of 414 samples were obtained.

The sample for this research were infants aged 0-59 months who met the inclusion criteria, i.e., those who resided in the study area and whose parents or caregivers voluntarily agreed to participate in this study. Respondents who moved or resigned before the study completed were excluded from the dataset. Primary data collection

was carried out by interviews and anthropometric measurements (Więch, Sałacińska, Bączek, & Bazaliński, 2021) while the secondary data were obtained from the selected public health centers and the Jember District Health Office.

**Data analysis**

The questionnaire instrument consisted of 20 questions to assess the mother's knowledge and 24 questions to assess mothers' eating behavior attitude. Data from the structured interview (with 18 questions of mother's eating behavior), and a 24 hours food-recall interview taken twice, in accordance with Gibson method (Gills, Baker, & Auld, 2017) were analyzed with the 2007 version of Nutrisurvey software, as additional information to assess the practice variable descriptively. We analyzed the relation between the average percentage of Recommended Dietary Allowances (RDA) in nutrients with severe deficiency and the percentage of children under five who experienced severe deficiency using excel of Microsoft office professional plus 2016.

Nutritional status parameter was assessed using medline to measure the height and caliberated electronic scale to measure weight. Stunting (short) and severe stunting (very short) were defined as the proportion of children whose height-for-age z-score (HAZ) was below -2 standard deviations and -3 standard deviations, respectively, of the median height-for-age of the standard of Ministry of Health Republic of Indonesia Regulation. Undernutrition and poor nutrition were defined as the proportion of children whose weight-for-age z-score (WAZ) was below -2 standard deviations and -3 standard deviations, respectively, of the median height-for-age of the standard of Ministry of Health Republic of Indonesia Regulation.

The respondents' knowledge interval was as follows: (20-14) good knowledge, (13-7) sufficient knowledge, and (6-0) lack knowledge. While the attitude of mothers' eating behavior interval was as follows: (72-48) good eating behavior, (47-24) sufficient eating behavior, and (23-0) lack eating behavior. The data of knowledge and attitude were then analyzed further to know the relation with stunting and undernutrition by using Spearman rho's 16 version IBM SPSS software. All methods in this study had received the approval of the ethics committee of Faculty of Medicine, University of Jember No. 1167/H25.1.11/KE/2018.

## RESULTS

**Respondents characteristics**

The majority of respondents are families with one child under five, with a household income of less than IDR 600,000 / month. According to Central Bureau of Statistics (BPS), the criteria of low-income households is when the source of income for the head of the household is: farmers with an area of 500 $m^2$, farm laborers, fishermen, construction workers, plantation workers and other jobs with income below IDR 600,000 / month (Central Bureau of Statistics (BPS), 2000).

Stunting and undernutrition occur more in children aged 24 to 59 months, probably because the manifestation of malnutrition is often more visible at the age of 24 to 59 months, although the process has happened before the toddler reaches those ages. The education of both parents was distributed equally among groups with the majority graduating from elementary school (Table 1). This even distribution showed that education may not be related to stunting in children. Other studies also state that there was no relationship between the level of education of mothers and nutritional status in infants (Hasibuan, Batubara, & Suryani, 2019).

**Maternal Eating Behavior's Knowledge**

The investigation of maternal eating behavior knowledge in this study used a questionnaire in the form of questions with multiple choice answers. The highest number of wrong answers was in questions number 3, 14, 16, and 19 (Table 2 and 3). Most respondents do not know that the main energy sources are from carbohydrates, protein, and fat. They also lack the knowledge about the fact that vitamins will diminish when boiled for too long, about how to minimize the loss of vitamins in the cooking process, and about what minerals help the growth of bones and teeth. Only a few respondents understood these facts. These results indicate that there were essential materials that were not yet known by mothers, thus, they need more education about nutrition (Marchianti et al., 2017).

**Table 1.**
Respondents' Characteristics According To Stunting and Malnutrition Status.

| Characteristic | HAZ* | | | WAZ** | | | Total | |
|---|---|---|---|---|---|---|---|---|
| | Non-Stunting | Short | Very Short | Normal weight | Under nutrition | Poor nutrition | n | % |
| **Child age (months)** | | | | | | | | |
| < 24 | 68 | 32 | 22 | 101 | 13 | 8 | 122 | 29.47 |
| 24-59 | 164 | 68 | 60 | 224 | 48 | 20 | 292 | 70.53 |
| **Number of the family member (members)** | | | | | | | | |
| 2 | 4 | 0 | 0 | 4 | 0 | 0 | 4 | 0.97 |
| 3 | 102 | 45 | 35 | 143 | 30 | 9 | 182 | 43.96 |
| 4 | 83 | 26 | 25 | 108 | 18 | 8 | 134 | 32.37 |
| 5 | 29 | 23 | 14 | 51 | 9 | 6 | 66 | 15.94 |
| 6 | 12 | 4 | 3 | 15 | 3 | 1 | 19 | 4.59 |
| More than 6 | 2 | 2 | 5 | 4 | 1 | 4 | 9 | 2.17 |
| **Number of toddlers (children)** | | | | | | | | |
| 1 | 222 | 94 | 76 | 308 | 57 | 27 | 392 | 94,69 |
| 2 | 8 | 5 | 5 | 15 | 3 | 0 | 18 | 4.35 |
| 3 | 2 | 1 | 1 | 2 | 1 | 1 | 4 | 0.97 |
| **Economic status:** | | | | | | | | |
| Low-income | 202 | 94 | 73 | 290 | 54 | 25 | 369 | 89.13 |
| Not low-income | 21 | 2 | 3 | 22 | 4 | 0 | 26 | 6.28 |
| Unknown | 9 | 4 | 6 | 13 | 3 | 3 | 19 | 4.59 |
| **Mother education** | | | | | | | | |
| Some elementary school | 2 | 6 | 7 | 8 | 5 | 2 | 15 | 3.62 |
| Completed elementary school | 101 | 52 | 48 | 152 | 33 | 16 | 201 | 48.55 |
| Completed junior high school | 73 | 31 | 18 | 98 | 15 | 9 | 122 | 29.47 |
| Completed senior high school | 44 | 10 | 6 | 53 | 6 | 1 | 60 | 14.49 |
| Completed college | 11 | 1 | 3 | 13 | 2 | 0 | 15 | 3.62 |
| Unknown | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0.24 |
| **Father education** | | | | | | | | |
| Some elementary school | 3 | 3 | 3 | 2 | 5 | 2 | 9 | 2.17 |
| Completed elementary school | 60 | 47 | 32 | 102 | 23 | 14 | 139 | 33.57 |
| Completed junior high school | 85 | 28 | 29 | 114 | 19 | 9 | 142 | 34.30 |
| Completed senior high school | 73 | 22 | 16 | 95 | 13 | 3 | 11 | 2.66 |
| Completed college | 9 | 0 | 2 | 10 | 1 | 0 | 11 | 2.66 |
| Unknown | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 9.24 |
| Total | 232 | 100 | 82 | 325 | 61 | 28 | 414 | 100.00 |

*Parameter of stunting according to height-for-age z-score (HAZ) by Ministry of Health Republic of Indonesia Regulation.
**Parameter of malnutrition according to weight-for-age z-score (WAZ) by Ministry of Health Republic of Indonesia Regulation.

The results of the statistical analysis showed that there was a significant relationship between maternal knowledge and nutritional status (p = 0.01 for stunting and p=0.04 for undernutrition by Spearman rho test) with a weak relationship (coefficient correlation = 0.12 and 0.10). Parents' knowledge of food and nutrition, especially mothers, affects the types of food consumed as a reflection of practices and behaviours related to nutrition (Sutrisna et al., 2018). Mothers who have good knowledge are expected to be able to apply the knowledge they have in their daily lives.

**Table 2.**
Cross-tabulation data inter-variables of stunting

| Variable | HAZ* | | | Total | | p-value (r) |
|---|---|---|---|---|---|---|
| | Non- Stunting | Short | Very Short | n | % | |
| **Knowledge** | | | | | | |
| Lack | 40 | 27 | 23 | 90 | 21.74 | 0.01 |
| Sufficient | 150 | 63 | 47 | 260 | 62.80 | (0.12) |
| Good | 42 | 10 | 12 | 64 | 15.46 | |
| **Eating Behavior** | | | | | | |
| Lack | 13 | 5 | 0 | 18 | 4.35 | 0.04 |
| Sufficient | 176 | 88 | 77 | 341 | 82.37 | (0.10) |
| Good | 43 | 7 | 5 | 55 | 13.29 | |
| Total | 232 | 100 | 82 | 414 | 100.00 | |

*Parameter of stunting according to height-for-age z-score (HAZ) by Ministry of Health Republic of Indonesia Regulation.

**Table 3.**
Cross-tabulation data inter-variables of malnutrition

| Variable | WAZ* | | | Total | | p-value (r) |
|---|---|---|---|---|---|---|
| | Normal weight | Under-nutrition | Poor nutrition | N | % | |
| **Knowledge** | | | | | | |
| Lack | 77 | 7 | 6 | 90 | 21.74 | 0.04 |
| Sufficient | 203 | 39 | 18 | 260 | 62.80 | (0.10) |
| Good | 45 | 15 | 4 | 64 | 15.46 | |
| **Eating Behavior** | | | | | | |
| Lack | 17 | 1 | 0 | 18 | 4.35 | 0.81 |
| Sufficient | 263 | 53 | 25 | 341 | 82.37 | |
| Good | 45 | 7 | 3 | 55 | 13.29 | |
| Total | 325 | 61 | 28 | 414 | 100.00 | |

*Parameter of malnutrition according to weight-for-age z-score (WAZ) by Ministry of Health Republic of Indonesia Regulation.

Sources of information that can improve the knowledge of mothers outside the formal education often used to attract most of the housewives in the countryside, allowing information including knowledge of food, nutrition, and health is electronic media including television and radio. However, according to Sutrisna et al., (2018), for housewives in the village, the integrated service program (the so-called posyandu in Indonesia) is a more useful source of information on food, nutrition, and health than the aforementioned sources. This condition may happen because, besides the extension activities (delivery of nutritional messages), posyandu is also a meeting place for mothers with toddlers. Hence it may facilitate the exchange of information and experience regarding care of their children.

By having the nutritional knowledge, someone is expected to change the incorrect behaviour so that they can choose nutritious food ingredients and arrange a balanced menu according to their needs and tastes. They are also expected to know the consequences of malnutrition. However, other than knowledge, the behaviour is also influenced by other factors, such as environment, socio-economic status, socio-cultural status, and policy (Langlois et al., 2018).

**Maternal Eating Behavior's Attitude**

Based on the evaluation of respondents who answered the parenting attitude questionnaire for eating behavior, almost all statements were responded positively, indicated by good (15.46%), sufficient (62.80%), and lack (21.74%) attitude. However, if viewed in detail from each statement, many respondents still responded negatively. Among high negative attitudes were 59.67%, 40.13%, and 52.42% of the total 414 respondents indicated in statements number 5, 11, and 14 about calculating the child's nutritional needs first before determining the amount and type of food given

daily to children, serving food by providing decorations for food and using attractive cutlery.

Maternal parenting in eating behavior plays an important role in the incidence of stunting and undernutrition in infants because food intake for infants is entirely arranged by their mothers. Mothers with good attitudes tend to have children with better nutritional status than those with sufficient, or lack attitudes shown by the significant correlation between attitude and stunting ($p = 0.04$ with coefficient correlation = 0.10). However, in this study, the number of mothers with good attitudes but having children with undernutrition was not less than mothers with sufficient attitudes ($p = 0.81$). This could be because even though the maternal parenting in eating behavior was good, the low-income families or those with working mothers have limitations to meet their daily needs so that the attitude of the pattern of maternal eating behavior is less related to the incidence of undernutrition (Fiese, 2018).

**Mother's Eating Behavior**

Mother's eating behavior were assessed by structured interviews providing information about the daily consumption in the families in Jember agricultural area. Most of them consumed staple food, vegetables, and side dishes (66.68%), three times a day (80.23%), dine together with family members at the dinner table (50.37%), or a living room (35.41%). They usually obtained food from the market or shop (88.32%) and processed side dishes by frying (94.09%), only a few by boiling or grilling. Foods that are often consumed and preferred by respondents for staple food was rice (97.67%); fish (52.38%), egg (25.22%), and meat (22.40%) for side dishes; spinach (68.71%), long bean (44.02%), and bean (19.63%) for vegetables; and banana (62.78%), mango (27.74%), and papaya (24.41%) for fruits.

This survey showed that even though living in the agricultural area, apparently only a few of these families consumed food deriving from their crops (19.62%). It seems ironic, that their surrounding environment can be the source of nutritional needs; however, the lack of knowledge made them abandon the available resources. These data also showed that the respondents did not consider eating fruit and drinking milk essential for nutrition. This thought was indicated by the limited number of respondents consuming fruit (24.03%) and milk (8.09%) as their daily meals. There were also some foods that the respondents disliked the most such as bitter melon (55.92%) for vegetables, other than the egg, fish, or meat (61.78%) for animal protein, and avocado (33.71%) for fruit.

Based on preference, as a source of animal protein, egg (25.22%) was preferred over meat (22.40%), but in reality, they consume more eggs than meat, like fish (52.38%) as their favorite source of animal protein. They consume it 1 to 6 times per week. This condition might happen because eggs were more affordable than meat.

**Children Eating Behavior**

The macro and micronutrients intake of the respondents in this study were obtained from the average amount of daily nutrient intake (in %) using the conversion of food ingredients and beverages consumed by the respondents per day (in 24 hours). The amount was collected by using a 24-hour food recall method which was done twice on different days, randomly and not consecutively. Using the Indonesian version of Nutrisurvey for Windows software, the data was converted into a Recommended Dietary Allowances (RDA) table. The distribution of subjects based on severe deficit intake criteria can be seen in Figure 1. As a consequence of the infrequency of mothers' fruit consumption, their children experienced deficits of nutrient especially fiber and minerals sourced in fruit.

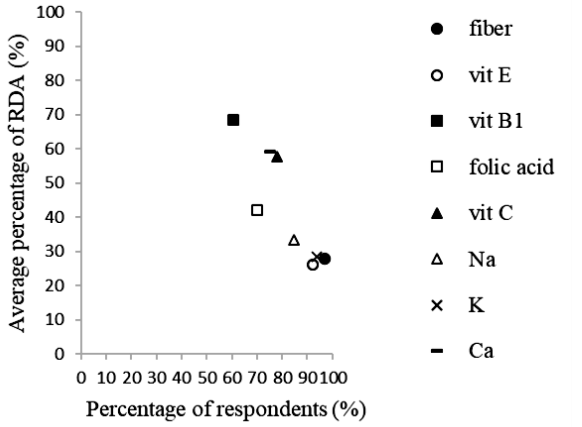


**Figure 1.** The relation between the average percentage of Recommended Dietary Allowances (RDA) in nutrients with severe deficiency and the percentage of children under five who experience severe deficiency.

## DISCUSSION

This study concerned about nutritional problems in children in the agricultural area, because of the ironical condition, they undernourished while the source of nutritional

needs can be obtained from the surrounding environment. There must be different causes with the causes in non-agricultural areas. It was found out eventhough living in agricultural area, apparently only a few of these families get food from their own crops (19.58%).

This study provided evidence that the eating behavior of mothers assessed through the variable of knowledge and attitudes of mothers showed a significant relationship with stunting. However there is only a significant relationship between knowledge and undernutrition. This result could be because even though the attitude of the mother on eating behavior was good, the low-income families may have limitations to meet their daily needs so that the attitude of the mother on eating behavior was not significantly related (Seo & Park, 2021; Shinwell & Defeyter, 2021).

The consumption pattern that was assessed through maternal eating behavior showed that fruit and milk has not become a daily consumption; only 8.09% of respondents consume both daily. This pattern seems to also happen in other areas of Indonesia and low dietary diversity had been proven to be related to nutritional status and stunting prevalence (Halim, Sartika, Sudiarti, Putri, & Rahmawati, 2020; Khamis et al., 2019).

Some respondents answered no fruit to be disliked, in contrast with the daily consumption statement that there was no fruit included in it. This may also be related to the affordability of the family to consume foods as indicated that 89.13% of the respondents had low-income. In the context of food choices, food consumption requires not only money expenditures for purchasing food but also time expenditures for purchasing, preparing, and consuming food and for cleaning up after preparation and consumption. Therefore, according to household production theory, the full price of consumption is the sum of the direct and indirect prices for food, where the direct price is the purchase cost, and the indirect price is the value of the time requirements (Fiese, 2018). Rural mothers who engage in market activities, especially in jobs incompatible with child care, from 34 rural barrios in Laguna, Philippines showed a negative relation on dietary and time inputs into child care, as well as the resultant impact on the nutritional status (Popkin, 1980).

The consumption pattern assessed through the child food frequency and food recall showed that there was still a lack of fulfillment of certain nutrients, both macro (fiber) and micronutrients (Vitamin B1, Vitamin C, Vitamin E, Potassium, Sodium, Calcium and Folic Acid) against RDA reference numbers which were recorded as a severe deficiency in 60-97% of respondents. Therefore, we suggested that nutrition be improved through multi-fortification, specifically for foods favoured by toddlers. The relation between the average percentage of RDA for substances with severe deficiencies and the percentage of children with severe deficiency is shown in Figure 1.

The pattern of eating behavior in children under five, including the diversification of food consumption, is a right causal of good nutritional status of children (Khamis et al., 2019). Food and dietary problems and low quality of food consumption can be found in the middle and lower economic layers, and economically capable families. They are less concerned about the care of their toddlers (Kusumaningtyas, Soesanto, & Deliana, 2017). The household-level food availability, stunting, and undernutrition condition could also be influenced by other factors, such as the history of infectious diseases or hygiene sanitation (Margawati & Astuti, 2018; Torlesse, Cronin, Sebayang, & Nandy, 2016).

This study showed relationships between maternal education level and mothers' nutrition attitudes on mothers' eating behavior with malnutrition problems in children under five. Low education can affect the availability of food in the family, which affects the quantity and quality of food consumption, which is a direct cause of malnutrition in children under five. The level of a mother's education can affect health because maternal education affects childcare quality. The level of a mother's education is also related to the nutritional status of children because the increse in the educational level may likely increase the family's income and thus increase food affordability (French, Tangney, Crane, Wang, & Appelhans, 2019).

This study attempted to determine the best types and amounts of evidence about the roles of diet and nutrition in all aspects of health promotion, disease prevention, and treatment to support the safe and practical application of existing standards or to establish new standards. It is needed to provide the requisite data to support the development and evaluation of programs, policies, and guidance. The WHO concept on *Childhood Stunting: Context, causes, and consequences* outlines the elements associated with different causal categories. It is attributable to a combination of household and family factors, inadequate complementary feeding, inadequate

breast feeding practices, and infection (Beal et al., 2018).

As previously mentioned, mothers' knowledge regarding nutrition and their attitude towards it play a role in preventing stunting and malnutrition. Therefore, we also suggested investigating the role of health workers and cadres in health centers. Analyzing how and what materials are being given to society in general, and mothers specifically, is essential to better nutritional knowledge. Given the time, quality, and quantity of the health workers and cadre that needs to be improved, finding out the methods or formula for best practice in educating the community might just provide an extra boost in empowering health workers and cadres to be able to deliver their best performance to provide beneficial material through effective techniques.

The minister of health in Indonesia has had built a system or program to overcome these nutritional problems and prioritize them since 2018. The determinants of stunting and undernutrition are influenced by the context in which children are born and grow, which is multisectoral. The program launched in Indonesia includes multisectoral programs. However, according to this study, its implementation is still not optimum. This could be the reason why it has not been very successful to reduce stunting and undernutrition (Turnip, 2018).

Other factors that determined stunting and undernutrition problems included the nutritional status of mothers during pregnancy. The deficiency of nutrients during pregnancy that occur continuously will result in low-birth-weight babies. These babies may have lower than average anti-immune substances that may cause them to be more susceptible to disease, especially infectious diseases. Further, the disease causes toddlers to lose their appetite that they have decreasing food intake, thus, causing malnutrition. If this condition persists, it will cause children to experience failure in growth (stunting). In addition, short mothers are also at risk of giving birth to a short child (Aryastami et al., 2017).

## CONCLUSION

It can be concluded from this study that mothers sufficient knowledge and attitude on eating behavior may prevent the occurrence of stunting in children under five. While undernutrition is only affected by knowledge. Another possible cause was the health promotion program that was not yet optimal. It needs intensive prevention intervention to suppress the occurrence of malnutrition, such as how to use posyandu programs effectively by increasing the role of cadres and utilize technology more to deliver the information to the parents. Research should be done further to search for the right promotion and prevention approaches based on the problem found in each area.

## CONFLICT OF INTEREST

The authors declared that there is no conflict of interest.

## AUTHOR CONTRIBUTION

All authors contributed equally. ACNM: Conceptualization, Writing and Article Revision, DAR: Data curation, Writing-Reviewing, and Editing, ISWA: Investigation and Data Validation, AMR: Methodology and Software, RP: Investigation and Supervision.

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