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Factors Influencing Malnutrition of Children Aged 24-60 Months Old in Flores Timur, Nusa Tenggara Timur

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Abstract

Malnutrition remains a global health problem, especially in developing countries such as Indonesia. This study aimed to determine factors influencing the nutritional status of children aged 24-60 months in rural communities of Flores Timur, Nusa Tenggara Timur. A cross-sectional design involving purposeful sampling was used to conduct a study in five rural villages. The sample size for the study involved 250 mothers with children aged between 24-60 months. Data collection was conducted using questionnaires with information regarding socio-demographic, dietary intakes, diseases, childcare practices, and anthropometric measurement. Furthermore, a multivariate binary logistic regression was employed for the data analysis. Results from binary logistic regression revealed that energy intake (OR=8.99), protein intake (OR=6.95), the occurrence of infectious diseases (OR=6.45), the frequency of infectious diseases (OR=6.00), and age of introduction of complementary foods (OR=34.55) significantly influenced nutritional status in rural communities. Based on these findings, health workers should promote the appropriate time for giving complementary foods to children. Moreover, interventions should be made for children with an acute respiratory infection and/or diarrhea over the past six months to maintain nutritional status.

INTRODUCTION

Nutrition is essential for healthy growth in early childhood. On the other hand, early childhood development can be affected by malnutrition. Malnutrition is associated with the development of the brain areas that function as a certain fine motor controller. Further, children who have lower brain functions have a greater chance of lower cognitive and academic abilities (Chang et al., 2010). Malnutrition among children under five years old can also cause a variety of impacts on physical, mental, development, social, and mortality. Some studies conducted about the magnitude of malnutrition's impact in early childhood. A systematic review of a prospective study about the long-lasting

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effect of malnutrition revealed that malnutrition is the most common cause of death in children and has a long-term psychological impact. In addition, malnutrition can also affect mental development and the decline of an individual's workability in the future (Martins et al., 2011). Another systematic review of cohort studies showed that children who experienced nutritional problems early in life can cause permanent damage and might impact future generations (Victora et al., 2008).

Therefore, malnutrition is included as one of the global priorities set by 191 United Nations member countries through the Millennium Development Goals (MDGs). The first goal of MDGs is to overcome the problem of hunger and poverty. One of the indicators for monitoring progress is malnutrition prevalence among under-five children (United Nations, 2008). However, malnutrition remains a health problem in the world especially in developing countries such as Indonesia. The malnutrition issue receives special attention from the Indonesian Government. The country had started a nutrition program that focused on toddlers and pregnant women at the village level to reduce the level of malnutrition. The program is carried out by health cadres and health workers from the primary health centers (Health Department of East Flores District, 2014).

Government efforts to reduce the number of malnutrition have been shown significant progress. This can be seen from the data released by Indonesian Basic Health Research. There was a decreasing number in the incidence of underweight, stunting, and wasting in Indonesia from 19.6%, 37.2%, and 12.1%, respectively in 2013 to 17.7%, 30.8%, and 10.2% respectively in 2018 (Kementerian Kesehatan RI Badan Penelitian dan Pengembangan, 2018). The number of malnutrition is also declining in East Nusa Tenggara Province. However, this province remains the highest rates of underweight and stunting compared to other provinces in Indonesia, namely 29.5% and 42.6%, respectively. Furthermore, the prevalence of acute and chronic malnutrition is critical in the province of East Nusa Tenggara. According to the classification for assessing the severity of underweight, stunting, and wasting by World Health Organization, the prevalence in East Nusa Tenggara was categorized as very high underweight (29.5%) and very high stunting (42.6%) in 2018. Moreover, malnutrition is one of the causes of under-five children's death in this province (Health Department of East Nusa Tenggara Province, 2014; World Health Organization, 2015).

Wulanggitang is one of the rural areas in East Flores District (one of the districts in East Nusa Tenggara) with a high prevalence of malnutrition (23%) as compared to the district (18.9%) level. This is denying the target of the local government to reduce the percentages to be 15.5% in 2015. The prevalence of malnutrition in 10 villages was high as compared to the local government target. Further, the prevalence of acute and chronic malnutrition in children aged 24-60 months in this rural community was higher namely 23% than children aged 0-23 months namely 14% (Health Department of East Flores District, 2014). In addition, the children in this group of age (24-60 months old) already have a choice of the preferred food including snacks. Therefore, the amount and variety of dietary intakes should get special attention from the mother or caregiver especially in winning the child's choice to choose foods that are nutritionally balanced. Furthermore, dietary assessment of dietary intakes among infants and preschool children are complicated because the rapid change of dietary habit. Parents may share the responsibility for the child with other adults in the family or in daycare that can affect the children's food consumption. Children at this age also are susceptible to diarrhea, acute respiratory infections, and worms infection. This condition will have an impact on the nutritional status of the child (Andersen et al., 2003; Department of Health of Indonesia, 2014). Based on these several shreds of evidence, this study was focused on 24-60 months old children in rural communities of Flores Timur, Nusa Tenggara Timur.

Malnutrition in children can be influenced by several factors including dietary intake,

diseases, and child care practices. The conceptual framework of United Nations International Children's Emergency Funds (UNICEF) is useful for understanding the factors that could be related to malnutrition. Based on the conceptual framework, the level of causes of malnutrition consists of three levels. First, basic causes including potential resources including environment, technology, and people. Second, underlying causes including poor sanitation, inadequate health services, access to food, and maternal and child care practices). The third is immediate causes including inadequate dietary intake and diseases (United Nation Children's Funds, 2015). Previous international studies provide evidence of the impact of childhood malnutrition. However, the studies of factors influencing malnutrition using the UNICEF conceptual framework have been rarely studied in the study area.

A literature review revealed several gaps in malnutrition problems among children. Firstly, despite various activities provided by the Indonesian government, the cases in the study area remain high (Health Department of East Flores District, 2014). Next, studies on dietary intakes, diseases, child care practices in relation to childhood malnutrition present inconsistent findings (Asfaw et al., 2015; Dangour et al., 2013; Khatri et al., 2015; Meshram et al., 2012; Nakamori et al., 2010; Odunayo & Oyewole, 2006; Rah et al., 2015; Lian et al., 2012; Wolde et al., 2015; Wong et al., 2014). Prior to conduct an interventional study, there was a need to determine factors influencing childhood malnutrition in rural areas. Therefore, this study aimed to determine factors influencing the nutritional status of children aged 24-60 months old in rural communities.

METHOD

Research Location

This research was conducted in rural communities. The study area consists of 11 villages. The study area is one of the top five sub-districts that have a high rate of malnutrition which is 23%. In 2014, the total of under-five children in this area was 1,106 children (Health Department of East Flores District, 2014).

This area consists of one Primary Health Care (PHC) that serves all villages (11 villages). The primary health care consists of 29 community health posts that exist in all villages. The community health posts are one of the community-based health efforts that are managed and organized from, by, for, and with the community. One of the main focuses is on under-five children and pregnant women. The activities in the community health posts are height or length measurement of the children, health education for parents, vitamin A provision, immunization and free complimentary feeding provision for malnourished children, and pre-post natal care for pregnant women (Health Department of East Flores District, 2014).

Based on the UNICEF Conceptual framework, this study was focused on dietary intakes and diseases which are immediate causes, and child care practices which are underlying causes. The basic causes such as social-economic status, level of education, and employment status were not included because most of the population in the study area have similar such factors. Most of the population is farmers, traders, fishermen, and civil servants. The other cause such as insufficient access to food was not included in this study because people in this area have sufficient access to food. Almost every household has a fruit and vegetable garden such as moringa leaf, cassava leaves, papaya, mangoes, pome, and oranges. These kinds of foods are micro and macronutrient sources. The other causes like poor water/ sanitation, inadequate health services, and maternal care services were not included in this study because the government in the study area provides clean water, health services for toddlers, and maternal care services in all villages (Health Department of East Flores District, 2014).

Ethics

The approval was given by the Ethical Review Board of Boromarajonani College of Nursing NopparatVajira (ERB No.12/2558). The data was collected after getting a letter of

permission from the Head of the study area, and the Head of primary health care. Respondent signed in the informed consent to indicate that they were willing to participate in the study.

Study design, sample, and sampling

The research design used in this study was a descriptive cross-sectional. The participants were selected purposively in community health posts. A minimum sample size of 227 mother-child pairs was calculated using the expected proportion of malnutrition in the study area (23%).

A formula developed by Daniel was used to calculate the sample size of this study (Daniel, 1999).

$$n = \frac{NZ^2P(1-P)}{d^2(N-1) + Z^2P(1-P)}$$

Where:

n = sample size

N= population size (692 children aged 2-5 years old)

Z =Z statistic for a level of confidence (1.96)

p = expected proportion (in proportion of one) (0.23)

d = precision (0.05)

Ten percent of the sample was added to anticipate possible missing data. Two hundred and sixty mothers were approached in total, however, ten mothers declined to participate in this study since the mothers should return home quickly and directly. Finally, the total sample for this study was 250 mother-child pairs. The inclusion criteria of the study were as follows. Firstly, mothers who had children aged 24-60 months. Children who came with their mothers who take care of them were included as respondents. The mother has a pivotal role in terms of providing nutrition to the children. Secondly, mothers who could speak, listen, and understand the Indonesian language since the questionnaire was read to the mothers and the research coordinator filled in the answers. Lastly, mothers who were willing to become respondents were included in this study. Children with edema were excluded from this study since the weight of children with oedema did not describe the actual weight (Betan et al., 2016). In this study, there were no excluded cases.

The purposive sampling method was used to select the target population in this study. Wulanggitang sub-district consists of 11 villages. The Community Health Post (CHP) or "*posyandu*" for children under five years old is located in all villages. The top 5 villages with a high prevalence of malnutrition were selected as representative villages from the study area. The sampling diagram of the study was shown in figure 1.

Variables

Malnutrition: in this study, malnutrition refers to undernutrition or deficiency of nutrition including, stunting, wasting, and underweight. This variable was divided into two categories; having malnutrition including stunting, wasting, and underweight (< 2SD of Height- for Age-Z score (HAZ), Weight-for Height Z score (WHZ) and Weight-for-Age Z score (WAZ)), and not having malnutrition (-2SD to +2SD of HAZ, WHZ, and WAZ). This dependent variable was assessed using anthropometric measurements (Health Research Department, 2013).

Dietary intakes: this variable refers to a single day of children's food intakes including carbohydrate, energy, fat, protein, zinc, vitamin A, and iron intakes. In this study, energy intake was divided into two categories; deficit, if the energy intake was less than 70% of Indonesian Recommended Nutrient Allowances (RNA), and adequate if the energy intake of the children was 70 – 110% of RNA.

Next, Carbohydrate, fat, protein, zinc, vitamin A, and iron intakes were also divided into two categories; deficit if the mentioned nutrients intakes were less than 80% of RNA, and adequate if the intakes were 80 – 110% of RNA (Health Minister of Republic Indonesia, 2013). A 24 hours recall questionnaire from Cheah et al. was used in the assessment of intake of carbohydrates, energy, fat, protein, iron, vitamin A, and Zinc (Cheah et al., 2009).

Occurrence of infectious diseases: this variable was divided into two categories; presence, if the children had Acute Respiratory Infections (ARI) and/or diarrhea, and absence, if

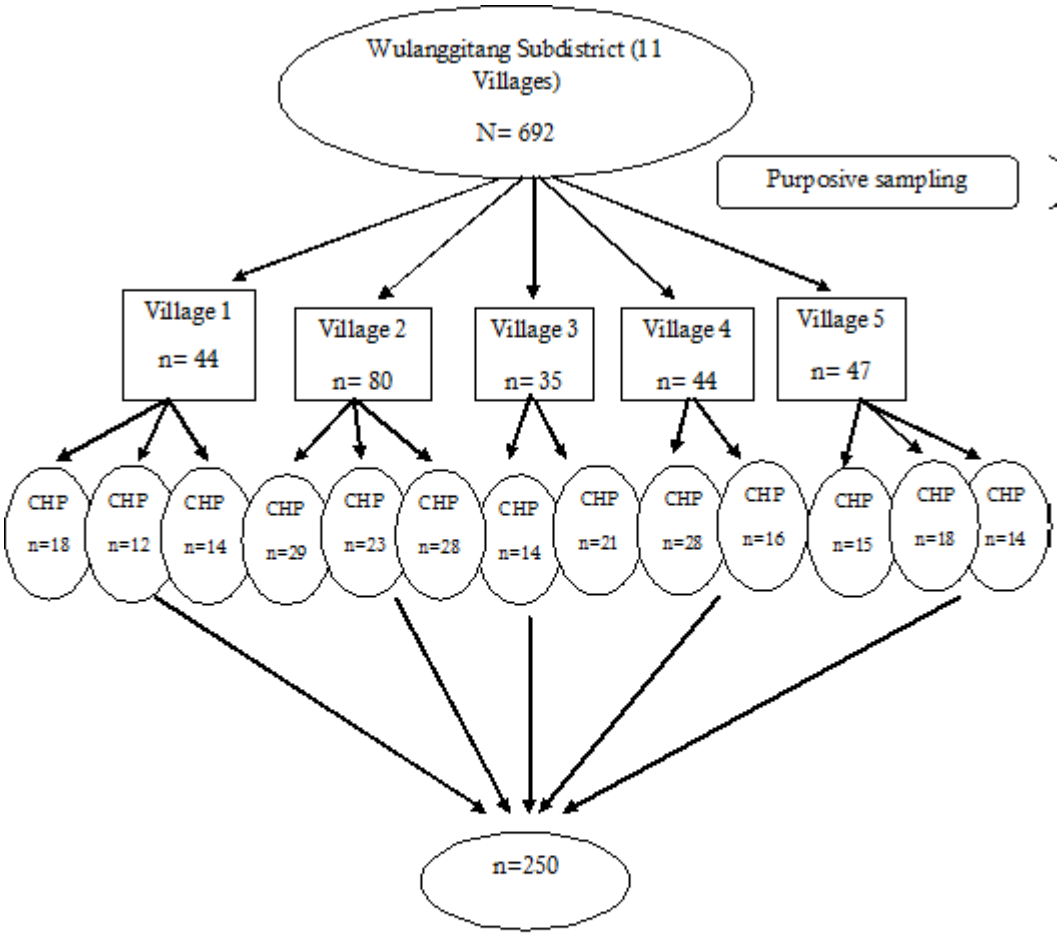

Figure 1 Sampling diagram of the study

the children had no ARI and/or diarrhea in the last six months.

Frequency of infectious diseases: the mothers were asked about how many times the children experienced ARI and/or diarrhea. This variable was divided into two categories; 0 to 3 episodes of ARI and/or diarrhea and more than/equal 4 episodes of ARI and/or diarrhea. The occurrence and frequency of infectious diseases were assessed using a questionnaire. The questions were shown in table 1.

Age of introduction of complementary foods: this variable was measured by questionnaire and was divided into two categories; not appropriate if the mothers started feeding solid food for the children before or over the age of six months, and appropriate if themothers started feeding solid food at the six months. Mothers were asked, "At what age did you start feeding solid food other than milk?".

Table 1. The questions of occurrence and frequency of infectious diseases variables

No	Questions
1	Has the child had diarrhea (the passage of three or more loose or liquid stools per day or more frequent passage than is normal) in the last 6 months?
2	If yes, how many times the child experienced diarrhea in the last 6 months?
3	Has the child had acute respiratory infections (breathing faster than usual with short and quick breaths, cough or fever) in the last 6 months?
4	If yes, how many times the child experienced acute respiratory infections in the last 6 months?

Table 2. The questions of handwashing behavior variable

No	Questions
1	Do you wash your hands with soap before handling foods?
2	Do you wash your hands with soap before preparing the foods?
3	Do you wash your hands with soap before feeding the child?
4	Do you wash your hands with soap after going to the toilet?
5	Do you wash your hands with soap after cleaning child's feaces and urine?
6	Do you wash your hands with soap after taking out the trash?
7	Do you wash your hands with soap after touching animals?
8	Do you wash your child's hands with soap after playing?
9	Do you wash your child's hands with soap before meals?

Hand washing practices: children and mothers' activities in cleaning their hands at the key times with soap and running water. The behavior of mothers and children's handwashing was assessed using a modified questionnaire of Hand Washing Behavior Questionnaire (HWBQ) from Rismawan (Rismawan, 2013). The items of the questionnaire were shown in table 2. A 3-point Likert-type scale was ranging from 0 points for "never practice", 1 point for "some time", and 2 points for "all the time practice". This variable was divided into two categories; not proper if the score was less than 18, and proper handwashing practice if the score was equal to 18 (the total score).

Data collection

Five villages in rural communities were selected purposively as representative villages from the study area. These villages were selected since the village has a high rate of malnutrition. Before the data collection, the researcher met the Head of PHC to explain the objective and plan of the study. Data collection was conducted in all community health posts (13) in these 5 villages. The researcher contacted health care providers who took responsibility for selected integrated health posts. This study used questionnaires of socio-demographic, dietary intakes, diseases, child care practices, and anthropometric measurements with a face-to-face interview. The researcher collected the data with two data collectors who are undergraduate nurses. Data collection was carried out from August to September 2015.

The researcher approached the mothers by self-introduction and established a relationship. The approach was made when the mothers in the community health posts. The researcher explained the study objective and the study plan to the mothers. Two hundred and fifty mothers signed in the informed consent to indicate that they were willing to participate in the study. Finally, the questionnaire was read to the mothers, and the research coordinator filled in the answers.

Statistical analysis

Descriptive statistic was used to describe characteristics of respondents. Factors influencing nutritional status were determined by multivariate binary logistic regression. Testing of binary logistic regression assumption was conducted to ensure no violation of multicollinearity. Multicollinearity problems were not found when all independent variables were examined together since the standard errors of beta coefficients were less than 2 (SE = 0.46–0.62). The enter method of binary logistic regression was used in this study. All predictors or independent variables were analyzed simultaneously. The value of Chi-square for Hosmer-Lemeshow was 4.15 with a significant level of 0.84. This means that the model was a good model.

RESULTS AND DISCUSION

Characteristics of respondents and descriptive statistics of occurrence, frequency of infectious disease, and handwashing practice

Table 3. Characteristics of respondents and descriptive statistics of occurrence, frequency of infection disease, and handwashing practice (n = 250)

Variables	Frequency	Percentage
Age of the mothers, years (range, mean±SD)	17-56) 31.72±6.99	-
Marital status		
Married	225	90.0
Unmarried	20	8.0
Widowed	5	2.0
Employment status		
Unemployed	195	78.0
Employed	55	22.0
Education level		
Elementary school	116	46.4
Junior high school or above	134	53.6
Number of children (range, mode±SD)	(1-11) 2±1.84	-
Age of the children, months (range, mean±SD)	(24-60) 39.12±10.63	-
Occurrence of diarrhea		
Presence	89	35.6
Absence	161	64.4
Occurrence of Acute Respiratory Infection (ARI)		
Presence	97	38.8
Absence	153	61.2
Frequency of diarrhea (range, median±SD)	(0-5) 1±1.12	-
Frequency of ARI (range, median±SD)	(0-6) 1±1.63	-
Handwashing practice (range, mean±SD)	(7-18) 13.84±3.19	-

Out of 250 respondents, the average age of mothers was 31.72 (standard deviation ± 6.99). Children in this study were born from mothers aged 17 years to 56 years. Next, most mothers (90.0%) were married. Further, more than half of mothers were graduated from junior high school or above (53.6%), unemployed (78.0%), and the mothers in this study most frequently had 2 children (standard deviation ± 1.84). In this study, the mean age of children was 39.12 months (standard deviation ± 10.63) (table 3). This study also showed that more than one-third of the children had malnutrition (40.4%).

Table 3 also showed that out of 250 respondents, 35.6% of children suffered from diarrhea in the past six months with episode one time. Next, 38.8% suffered from an acute respiratory infection in the past six months with episode one time. Next, the average score of mother and child handwashing practice was 13.84 (standard deviation ± 3.19).

Factors influencing nutritional status

Binary logistic regression revealed that energy intake, protein intake, the occurrence of diseases, the frequency of diseases, and the age of introduction of complementary foods were significant factors that influence nutritional status in the rural community of Indonesia. These factors have an influence on the nutritional status of about 72% (Nagelkerke's R square of 0.72). The logistic equation of nutritional status was as follow:

Nutritional status = - 6.40 + 2.19 (*energy intake*) + 1.94 (*protein intake*) + 1.86 (*occurrence of diseases*) + 1.79 (*frequency of diseases*) + 3.54 (*age of introduction of complementary foods*)

Table 4 showed that the strongest predictor was the age of introduction of complementary foods (OR 34.55). The risk of being malnourished by 34.55 times occurs in the

Table 4. Factors influencing nutritional status of children aged 2-5 years old (n = 250)

Method = Enter	B	SE	Wald	Exp (B)	p-value
Energy intake	2.19	0.53	17.12	8.99	0.00
Carbohydrate intake	0.50	0.53	0.91	1.66	0.33
Protein intake	1.94	0.51	14.16	6.95	0.00
Fat intake	0.79	0.52	2.35	2.22	0.12
Vitamin A intake	0.38	0.48	0.62	1.47	0.42
Iron intake	0.89	0.46	3.60	2.43	0.05
Zinc intake	0.26	0.49	0.28	1.30	0.59
Occurrence of infectious diseases	1.86	0.51	12.90	6.45	0.00
Frequency of infectious diseases	1.79	0.56	10.03	6.00	0.00
Age of introduction of complementary foods	3.54	0.62	32.01	34.55	0.00
Hand washing practice	0.97	0.54	3.14	2.63	0.07
Constant	- 6.40	0.93	47.00	0.02	0.00

Nagelkerke *R square* = 0.72 (72%)

The *Chi-square for Hosmer-Lemeshow* = 4.15 *with significant level* = 0.84

children who have started to be given food at the age before and after six months compared to children who are given food at the age of 6 months. The second predictor was energy intake (OR 8.99). Children with deficit energy intake had an 8.99 times higher risk of stunting, underweight, and wasting compared to children who have sufficient energy intake. Next, protein intake was the third predictor (OR 6.95). Children with deficit protein intake had a 6.95 times higher risk of malnutrition than children with adequate protein intake. The fourth predictor was the occurrence of infectious diseases (OR 6.45). Children who have experience of illness over the past six months had a 6.45 times higher risk of malnourished than children who have no experience of illness (acute respiratory infection and/or diarrhea). Lastly, the frequency of infectious diseases was the fifth predictor (OR 6.00). Children who have a frequency of acute respiratory infection and diarrhea ≥ 4 times in the last 6 months had a higher risk of 6.00 times being malnourished compared to children who have a frequency of 0-3 times episodes of diseases.

Based on the results, energy intake, protein intake, occurrence and frequency of infectious diseases, and age of introduction of complementary foods were significant factors that influence nutritional status. The risk of being malnourished occurs in the children who have started to be given food at the age before and after six months compared to children who are given food at the age of 6 months. Synapse growth in the prefrontal brain consumes a lot of energy during the first two years of the child. Additionally, the child is becoming more active. Therefore, exclusive breastfeeding is no longer meeting all nutritional needs. Good complementary foods that are rich in energy, protein, and micronutrient (particularly iron, zinc, and vitamin A) should be given at the age of six months to compensate for the nutritional needs. There are kinds of foods that containing iron, zinc, and vitamin A such as cow's milk, lean meats, meat, fish, chicken, whole-grain bread, whole-grain cereals, molasses, liver, butter, and eggs (United Nation Children's Funds, 2015). Based on the Health Minister of Indonesia, the recommended daily allowances of vitamin A, iron, and zinc for infants 7-11 months are 400 μg/day, 7 mg/day, and 220 μg/day, respectively (Department of Health of Indonesia, 2013). Next, the age of introduction of complementary foods as a significant predictor of nutritional status was consistent with the UNICEF conceptual framework that shows a direct link between child care practices and malnutrition. Adequate child care practices, in this case, the age when children are given complementary food

for the first time can improve nutritional status. This finding was similar to the result of the study which reported that the age at which children were given complementary foods for the first time was a predictor of malnutrition. Children who were given complementary food before the age of 6 months had a higher risk of suffering from malnutrition than children who were given complementary food at the age of 6-8 months (Meshram et al., 2015). A cohort study by Schack-Nielsen et al. also showed that later introduction of complementary feeding (spoon-feeding, vegetables, meat, and firm) was related to lower body mass index (Schack-Nielsen et al., 2010).

The second and the third predictors of nutritional status in this study were energy and protein intake. The results showed that energy and protein intake were the most important factors of dietary intake. This result could be related to children who are in active and fast growth stages (2-5 children years old) (Department of Health of Indonesia, 2014). During the 3rd, 4th, and 5th years of life, the children are gain in weight and height at approximately 2.0 kg and about 8-6 cm/1 year, respectively (World Health Organization, 2020). Therefore, the energy and protein needs in this period will increase. Adequate energy intake is important to compensate the energy needs of the children who highly active at this age and to meet the children's growth needs. Additionally, children in this group also need protein for the synthesis of new muscles and maintenance of body tissues (Department of Health of Indonesia, 2014).

The findings were in line with older studies which showed that energy and protein intake were significant predictors of malnutrition (Lian et al., 2012; Wong et al., 2014).

This research showed that dietary intakes such as carbohydrate, iron, vitamin A, and zinc intakes were not significant predictors of nutritional status. The possible reasons for the findings were as follows: Firstly, almost every household has sufficient access to foods that contain the above-mentioned essential nutrients. Secondly, the local government provides nutritional programs such as free complementary foods provision for malnourished children and vitamin A provision for 6-59 months children (Health Department of East Flores District, 2014). Therefore, these factors may not necessarily result in malnutrition compared to the other risk factors such as energy and protein intake, the occurrence of diseases, frequency of diseases, and age of introduction of complementary foods that influenced nutritional status. These findings were in line with an older study by Wolde et al. which showed carbohydrate intake was not a significant predictor of underweight and stunting among children (Wolde et al., 2015).

The fourth and fifth predictors of malnutrition in this study were the occurrence and frequency of infectious diseases. Children who suffered from an acute respiratory infection and/or diarrhea over the past six months had a higher risk of malnourished than children who did not suffer from diseases. The present study also revealed that children with ≥ 4 times episodes of diseases in the past six months were more likely to have malnutrition. The results of this study could be attributed to the age of children. Children at this age (2–5 years old) together with their mothers have increased exposure to the outside environment, which increases the susceptibility of children to infectious diseases (Department of Health of Indonesia, 2014). These statements were supported by the finding that more than half of the children in this study suffered from diseases in the past six months. These findings were consistent with previous studies which showed that morbidity status and frequency of a child's illness (fever/diarrhea/flu) were significant predictors for childhood malnutrition (Meshram et al., 2015; Wong et al., 2014). A previous study by Meshram et al. showed that children who suffer from diseases have a higher risk of malnutrition than children who do not suffer from diseases (Meshram et al., 2015). Wong et al. also found that children who are sick every month have a higher risk of malnutrition than children who are sick once in 2 months and once in more than 3 months (Wong et al., 2014).

However, another study in Ethiopia revealed that the frequency of illness is not a significant predictor of malnutrition (Degarege et al., 2015).

Furthermore, this study revealed that handwashing practice was not a predictor of nutritional status after controlling all independent variables. The possible reasons for this finding were as follows: Firstly, clean water is available to the people in this area. The local government provides clean water for all villages; secondly, the majority of the participants had an adequate intake of iron, vitamin A and zinc which are essential to maintain an effective immune system (Betan et al., 2016; Demissie & Worku, 2013; Health Department of East Flores District, 2014). When the children have an effective immune system, they are less likely to develop infectious diseases, which are related to malnutrition (United Nation Children's Funds, 2015); lastly, the relationship between handwashing practice and nutritional status was weak.

As a result, the variable with a weak relationship will be rejected when taking into account the effect of the other variables with a more strong relationship on malnutrition. The result of this study was in concordant with an older study that showed that personal hygiene including handwashing practice was not a significant predictor of nutritional status (Wong et al., 2014). Handwashing, although not a predictor in the current study, is an important factor in preventing malnutrition in previous studies (Degarege et al., 2015; Rah et al., 2015; Shrestha et al., 2020; Gizaw & Worku, 2019). Rah found that handwashing practice is a significant predictor of malnutrition in India. Children whose mothers/caregivers practice handwashing have a lower occurrence of malnutrition than those whose mothers/caregivers do not practice handwashing (Rah et al., 2015). A study in Ethiopia also revealed that the presence of a handwashing facility is a significant predictor of malnutrition (Degarege et al., 2015). Accessibility of mothers to clean water and toilet facility may be the reason for the presence of the relationship in the previous study.

CONCLUSION

This study indicated that the strongest predictor of nutritional status was the age of introduction of complementary foods followed by energy intake, protein intake, the occurrence and frequency of infectious diseases. Based on the findings, health workers need to promote the appropriate time for giving the children complementary foods. Moreover, children who have experience of illness over the past six months should receive the appropriate treatment such as adequate dietary intakes during illness to maintain nutritional status. The result of this study could be used as evidence-based to provide the health training program related to nutritional status to prevent the occurrence of malnutrition among children 2-5 years old in rural communities. Based on the results of this study, further research is needed to examine the influence of other factors such as child feeding practice and maternal knowledge about feeding and care during illness with nutritional status.

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