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RISK FACTORS FOR MALNUTRITION OF CHILDREN UNDER FIVE YEARS OLD ON THE AREA OF NANGGALO PUBLIC HEALTH CENTER PADANG WEST SUMATERA

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ABSTRACT

Background: Children under five years are quite vulnerable to a nutritional disorder. Prevalence malnutrition of children under five are still problematic in Indonesia (19.6%) including in West Sumatera with a prevalence of 21%. Nutritional status is influenced by several factors, such as economi, imunization status, infectious disease, breastfeeding history. This study is aimed to determine malnutrition of children under five years old as well as to identify the correlation between risk factors and malnutrition on the area of Nanggalo Public Health Center, Padang West Sumatera.

Methodology: The design of this study was observational analytical study with case-control research design to identify risk factors associated with malnutrition in children under five years old. The population was all children aged of under five years old at the area of Nanggalo Public Health Center. Sample was 26 malnutrition children, while the control sample was 26 normal children. Data was collected through interview and measurement. Data analysis was conducted in univariate, bivariate (chi-square test), and multivariate analyze (logistic regression analysis).

Result : According to 52 subjects of case control in the area of Nanggalo Public Health Center Padang, there was a significant association between economi (p=0.006 OR=6.107 95% CI=1.836-20.315), imunization status (p=0.002 OR=7.500 95% CI=2,181-25.795), infectious disease (p=0.002 OR=7.367 95% CI=2,163-25.093) and breastfeeding history (p=0.012 OR=5.333 95% CI=1.595-17.829) to malnutrition.

Conclusion: In this study, there was a significant correlation among the variable of economi, imunization status, infectious disease, breastfeeding history on children's malnutrition. The most dominating factor was infectious disease and immunization status.

Keywords: Malnutrition, Economi, Immunization Status, Infectious Disease, Breastfeeding History

INTRODUCTION

Malnutrition most often refers to under nutrition. Malnutrition is resulting from inadequate consumption, poor absorption or excessive loss of nutrients, but the term can also encompass over-nutrition (Abera, Dejene & Laelago, 2017).Major risk factor for death and disability worldwide is malnutrition in childhood (Tette *et al.,* 2016). Malnutrition makes a major contribution to the global disease burden, accounting for more than one third of child deaths worldwide. Malnutrition can be classified as mild, moderate or severe based on biochemistry, anthropometry (measurement of the size, weight and proportions of the human body), and clinical assessment (Picot *et al.,* 2012).

Malnutrition causes development of their full physical and mental potential. Health and physical consequences of malnourishment among children are delay in their physical growth and motor development; lower intellectual quotient (IQ), greater behavioural problems and deficient social skills, susceptibility to contracting diseases (Kandala *et al.,* 2011).

Malnutrition is a major public health problem throughout the developing world and is an underlying factor in over 50% of the 10-11 million deaths in children under 5 years of age (Kishoyian *et al.,* 2017). Malnutrition is a serious problem because it causing the deaths of 3.5 million children under 5 years old per- year in the world, as well as it is at third level in the world of the disease burden in this age group (Belaynew, Belaynew & Dube, 2014).

Child malnutrition impacts cognitive function and contributes to poverty through impeding individuals' ability to lead productive lives. In addition, child

malnutrition is estimated that more than one-third of under-five year deaths are attributable to undernutrition (UNICEF, World Health Organization & The World Bank, 2018).

According to the results of the Global Burden of Disease study 2013, about 200 deathsper 100,000 in children under five years of age are attributable to childhood malnutrition, which is 21% of total deaths in this age group. It continues to remain one of the alarming public health concerns in South Asian countries, especially Pakistan, Bangladesh and India. In Pakistan, 428 deaths per 100,000 children aged below five years are attributable to childhood malnutrition, and 96% of the children under the age of two years do not receive adequate diet recommended by the World Health Organization (WHO) *(Tariq et al.,* 2018).

In Indonesia on 2017, as many as 3.8% of toddlers (0-23 month) have poor nutritional status and 14.0% of children under five years have malnutrition. Percentage of malnutrition at the group of children under five year old (17.8%) was higher than the group of toddler (14.8%). West Sumatera is one of province in Indonesia. Prevalence of malnutrition in Sumatera Barat is 17.5% (Directorate of Community Nutrition Directorate General of Public Health Ministry of Health, 2018).

The prevalence of malnutrition in Padang city was 14.9 percent of the children between 0-5 years. Survey done in 2017 that the high case of malnutrition in Pauh sub-districts 20% an the low case of malnutrition in Lubuk kilangan Sub districts (Health Office of Padang City, 2018).

Malnutrition in Padang city study has been conducted at district level to investigate the impact of intake diet, deasese, economic, demographic and health-related determinants on high rates of malnutrition observed among under-five children. It is for this reason that this study sought to investigate the factors influencing the condition of malnutrition among children under 5 years old(Health Office of Padang City, 2018).

The UNICEF conceptual framework of the causes of malnutrition, developed by UNICEF in the 1990s, has been largely accepted as the best way to understand the different causes and different levels of causality of undernutrition. The UNICEF global approach presents an updated version of this conceptual framework to reflect the latest knowledge on the short and long-term consequences,and intergenerational effects (Kismul *et al.,* 2014). The demographic and socio-economic factors such as age of child, birth order, mothers age at birth, mothers education level, marital status as well as maternal occupation, duration of breast feeding, sanitation and mothers health seeking behaviors influence under five malnutrition (Kishoyian *et al.,* 2017).

Malnutrition during childhood is a result of a wide range of factors, most of which relate to unsatisfactory food intake or severe and repeated infections, or a combination of the two. The most frequently suggested causes of malnutrition are: poverty, low parental education, lack of sanitation, low food intake, diarrhoea and other infections, poor feeding practices, family size, short birth intervals, maternal time availability, child rearing practices and seasonality. There are also economic, social, and cultural causes of malnutrition, which underscore the close link between malnutrition (Abera, Dejene & Laelago, 2017). The reason that the focus of this study is to identify the correlation between risk factors and malnutrition on the area of Nanggalo Public Health Center, Padang West Sumatera.

METHODOLOGY

This research design is a case-control study. A case-control study is a retrospective epidemiological study used to identify factors that may contribute to a medical condition by comparing people who have the disease or condition of interest (the cases) with those who do not have the disease or condition of interest (the controls).

The population was all children aged of under five years old at the area of Nanggalo Public Health Center, Padang West Sumatera. Sampling Thechnique used is concutive sampling. the population was all children aged of under five-year-old at Padang City West Sumatera. Sample was 26 malnutrition children, while the control sample was 26 normal children. Sampling technique was taken from 11 districts area in Padang city with the highest malnutritoin number, meanwhile the control was normal children living closest to the case with similar age.

The inclusion criteria for the cases were:

1. The child had to have been residing in Padang City for at least three consecutive months prior to the time that the study was conducted.

2. Children had to be under the age of 5 years and had to have had a first-time diagnosis of moderate or severe underweight made at Padang City.

The inclusion criteria for the controls were:

1. The child had to have been residing in Padang City for at least three consecutive months prior to the time that the study was conducted

2. Children had to be under the age of 5 years and had to have never been diagnosed as suffering from moderate or severe underweight from their birth up to the time that the study was conducted.

3. A control had to have attended all the required monthly child Padang City visit from the time of his or her birth up to the time that the study was conducted.

4. A control had to be of the same age or not more than two weeks older or younger than the case.

The areas that were covered in the questionnaire included age of the child; the anthropometric measurements of the children; the socio-economic status of the guardians of the children; the household food security, including hunger of the children; the health status of the children; the breast feeding and the complementary feeding practices of the guardians of the children. For the purpose of data preparation for analysis, SPSS software Version 22.0 will be used. The use of SPSS computer program assist in the coding and entering the data that collected from survey questionnaires. Then the missing data extent will be examined and apply missing value replacement procedures. Data analysis was conducted in univariate, bivariate (chi-square test), and multivariate analyse (multiple logistic regression test).

RESULTS

This research was conducted at Nanggalo Public Health Center. The sampling technique was taken in the case group as many as 26 people and in the control group as many as 26 people. The following research results:

a. Economic Risk Factor

Table 1 : Economic characteristics and risk factors for Malnutrition

Economic	Nutritional Status				OR	95%CI	P value
	Normal (control)		Malnutrition (kasus)				
	f	%	f	%			
High	19	73.1	8	30.8	6.107	1.836-20.315	0.006
Low	7	26.9	18	69.2			
Total	26	100	26	100			

A total of 26 cases and 26 controls were willing to participate with overall response rate of 100%. In this study indicated that 18 (69.2%) of case and 7 (26.9%) of control had the low economic family. In the results of statistical tests, it was significant association between economic with malnutrition. This was found to have 6.107 times higher risk of being malnourished (p=0.006, 95%CI=1,836-20.315).

b. Imunization Status Risk Factor

Table 2 : Imunization Status and risk factors for malnutrition

Imunization Status	Nutritional Status				OR	95%CI	P value
	Normal (control)		Malnutrition (kasus)				
	f	%	f	%			
Complete	18	69.2	6	23.1	7.500	2.181-25.795	0.002
incomplete	8	30.8	20	76.9			
Total	26	100	26	100			

Children were incomplite imunization status more among malnutrition 20 (76.9%) than in normal 8 (30.8%). In the results of statistical tests, it was significant association between imunization status with malnutrition. They also tend to have 7.500 times higher risk of being malnourished (*p*=0.002 95% CI= 2.181-25.795).

c. Infectious Disease Risk Factor

Table 3: Infectious Disease and risk factors for Malnutrition

Infectious Disease	Nutritional Status				OR	95%CI	*P* value
	Normal (control)		Malnutrition (kasus)				
	f	%	*f*	%			
No	19	73.1	7	26.9	7.367	2.163-25.093	0.002
Yes	7	26.9	19	73.1			
Total	26	100	26	100			

Depicts the association of infectious disease with malnutrition, which shows that among malnutrition 19 (73.1%), as compared to 7 (26.9%) in normal. In the results of statistical tests, it was significant association between infectious disease with malnutrition. This was found infectious disease to have 7.367 times higher risk of being malnourished (p=0.002 95%CI=2.163-25.093)

d. Breastfeeding History Risk Factor

Table 4 : Breastfeeding and risk factors for Malnutrition

Breast feeding	Nutritional Status				OR	95%CI	*P* value
	Normal (control)		Malnutrition (kasus)				
	f	%	*f*	%			
Exclusive	20	76.9	10	38.5	5.333	1.595-17.829	0.012
Not exclusive	6	23.1	16	61.5			
Total	26	100	26	100			

The proportion of children who were not exclusively breastfed were higher among malnutrition 16 (61.5%), and those children who received exclusive breastfeeding were higher among normal status nutrition 20 (76.9 %).

In the results of statistical tests, it was significant association between breastfeeding with malnutrition. Breast feeding the risk of being malnourished was 5.333 (*p*=0.012, 95%CI= 1.595-17.829)

e. Determinan factors for malnutrition

In conducting multivariate analysis, bivariate selection, multivariate modeling, and interaction test between independent variables related to the dependent variable must be carried out. Bivariate analysis *p* value ≤ 0.25 there is a relationship, while multivariate analysis p value ≤ 0.05 has influence.

Table 5 : Adjusted odds ratio of risk factors for malnutrition – bivariate selection

Variable at Risk	OR	95%CI	*P* value
Economic	6.107	1.836-20.315	0.006
Imunization Status	7.500	2.181-25.795	0.006
Infectious Disease	7.367	2.163-25.093	0.002
Brestfeding history	5.333	1.595-17.829	0.012

From table 5 it is known that the variables included in the multivariate analysis are economic, Imunization Status, Infectious Disease, and brestfeding.

Table 6 : Model of Logistic Regression risk factors for malnutrition - a multivariable analysis

Variable at Risk	OR	95%CI	*P* value
Economic	2.240	0.795	0.373
Immunization Status	8.773	7.450	0.006
Infectious Disease	3.839	2.233	0.135
Brestfeding	5.363	4.360	0.037

From table 6 it can be seen that the independent variables are related to the dependent variable after multivariate tests obtained p value of each variable. If the independent variable has a *p* value ≤ 0.05 then this variable has an influence on the dependent variable. Based on the table it is known variable affect the condition of malnutrition : variable imunization status with *p* value = 0.006 and variable bresfeeding factor with *p* value = 0,037. Malnutrition affects of imunization status with OR = 8.773. This means that the imunization status will occur 8,773 times in malnutrition. Malnutrition also affects of bresfeeding factor with OR = 5.363. This means that the bresfeeding factor will occur 5.363 times in malnutrition.

DISCUSSION

Relationship of Economic with Malnutrition
One of the major reasons behind children being malnutrition can be the low economic status (1.836-20.315), as a finding of this study was that children belonging to poor families are more likely to be stunted, wasted, and underweight.

Consistent with the results from a study in Mabutsane and Bobirwa (Botswana), whose purpose it was to assess child nutrition and the household economic situation in the context of rising food prices. This study showed that the risk of malnutrition in children was lower in children with a birth weight greater than 2,500 grams and that breastfeeding exposure did not influence the risk of malnutrition (Mahgoub, Maria & Theodore, 2006).

Low economic status can contribute significantly to the poor nutritional status of mothers by restricting their access to nutrition-rich foods and that, in turn, will affect child health. Education and access to information can play a vital role in improving child health-related issues in Padang. Education and socio-economic status of the household heads, farming as an economic activity were associated with a higher risk of low height for age (stunting) and low weight for age (underweight). However, farming alone showed some borderline significance in predicting both stunting and underweight. Children from households.

Relationship of Immunization Status to with Malnutrition
A statistically significant difference was found between the immunization status of the cases malnutrition in comparison to the controls. Significantly more cases 18 (69.2%) of case and 7 (26.9%). The odds ratio also demonstrated that the cases were 7.500 (*p*=0.006) times more likely to be not complete immunized than the controls. These findings

imply that being not complete immunized is a risk factor for malnutrition in this study population.

Complete immunization was associated with malnutrition among children under-five years of age in a case-control study conducted in Nanggalo padang. This ispossibly because the children's immunity becomes weak and as a result they may frequently be attacked by diseases which consequently affect their nutrient intake and demand. Tariq *et al.,* (2018) also found that failure to a significant number of children (73.2%) had an average size at the time of birth; on the other hand, 43.8% were completely immunized.

WHO & UNICEF (2009) has reported that the children who are underweight are at an increased risk ofmortality from infectious illnesses such as diarrhea and pneumonia. Infections play a major etiological role in under nutrition because they result in increased needs and high energy expenditure, lower appetite, nutrient loss due to vomiting, diarrhea, poor digestion, malabsorption and the utilization of nutrients and disruption of metabolic equilibrium.

Relationship of infectious disease to with Malnutrition

A statistically significant difference was found between the type of diseases that the cases suffered from in comparison to those that the controls suffered from ($p<$ 0.006). This study revealed a significant association between child illness and child underweight, consistent with the findings of a study, who assessed the prevalence of malnutrition and the factors influencing the nutritional status of children below 5 years of age in a peri-urban environment in Kabarole District in western Uganda. The current study did not detect a relationship between the size of the household and the condition of child underweight (Turyashemererwa, Kikafunda & Agaba, 2009).

Significantly more cases malnutrition were attacked infectious disease by malaria (44%) and diarrhea (26%) than the controls which were 38.6% and 11.4% respectively. These findings imply that Malaria and diarrhea are risk factors for under-nutrition in this study population. The malaria parasite (plasmodium) breaks down red blood cells which are responsible for the transportation of nutrients and oxygen throughout the body for metabolism (Alexandre *et al.,* 2015). It is further pointed out that malaria attack increases energy demand in the body, decreases appetite and increases nausea. Consequently there is decreased food intake with increased energy demand and this might have caused the malnutrition in the cases.

WHO & UNICEF (2009) indicated that diarrhea attacks drain out nutrients and water from the alimentary canal before it is absorbed by the villi and used by the body. It is further indicated that a person with frequent bouts of diarrhea risks falling into the trap of malnutrition and dehydration within a short period of time if the situation is unchecked.

Relationship of breastfeeding historyor with Malnutrition

A statistically significant difference was found in the results of whether the children were being breastfed or not between the cases and the controls ($p<$ 0.012). The results from table show that significantly higher cases 16 (61.5%) not exclusive breastfeeding, and those children who received exclusive breastfeeding were higher among normal status nutrition 20 (76.9 %). The findings imply that lack of breastfeeding is a risk factor for under-nutrition in this study population. From the results, of the controls continued to breastfeed past the 2 years recommended weaning age.

Kishoyian *et al.,* (2017) also found that the study found that about 58.6% of children were underweight and that only 31.6% practices exclusive breastfeeding for the first six months. In this study, there was no significant different between males and females in relation to malnutrition.

Overall, the age adjusted nutritional status of the children was slightly better for those who were exclusively breastfed for the first 6 months compared to their counterparts who were either mixed fed or exclusively formula fed for the same period. The prevalence of wasting was 5.333 for children exclusively breastfed, mixed fed and formula fed for the first 6 months after birth, respectively, although the difference was not statistically significant.Children who were exclusively breastfed for the first 6 months after birth had lower prevalence rates of stunting than those either mixed fed or formula fed for the same period(Ansuya *et al.,* 2018).

Determinan factors for malnutrition Multivariate Analysis

The three determinants of malnutrition in children under five-year-old are imunization status and breastfeeding factor. If the independent variable has an influence on the dependent variable. Variable affect the condition of malnutrition : variable imunization (*p* value = 0.006), malnutrition affects of imunization status with OR = 8.773. This means that the imunization status will occur 8.773 times in malnutrition.Malnutrition also affects of bresfeeding

factor (0,037) with OR = 5.363. This means that the bresfeeding factor will occur 5.363 times in malnutrition. An interesting finding from our study is the association between imunization status and breasfeeding under age 5-year malnutrition. This not only confirms previous studies but also suggests that property owned by the family, as well as resources available to them, could influence the household's nutritional status.

CONCLUSION

This chapter presented the research results and discussed the research findings in relation to the literature review and research objective. Among the factors that were investigated, economi, imunization status, infectious disease, breastfeeding history). Determinant factor were found to be significantly imunization status, breasfeeding history associated with malnutrition. The following chapter provides possible explanations about the relationship between the identified risk factors and the condition of malnutrition. It concludes the research in relation to the problem statement, indicates limitations of the research, and makes recommendations for the relevant decision makers and further studies.

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