

Risk Factors of Stunting Case On Children Aged 24-59 Months In Slums of Makassar City

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Abstract: Generally, less of nutrition is a major factor that causing disease in children. Stunting is a children growth disorder which is indicated by a short body condition until below minus two of standard deviations (<-2SD) based on the nutritional status chart of Child Growth Standard, from WHO. Stunting is a measure of chronic malnutrition, especially toward under-five children in developing countries.

The aims of this research is to find out the risk factors of stunting in children aged 24-59 months after controlling the other variables in the slums of Makassar City in 2018. The type of this research is analytic observational with case control design. The number of samples in this research consisted of 72 case groups on children under five with stunting which is selected based on exhaustive sampling technique, and 72 control groups on children under five with no stunting (normal) selected based on simple random sampling method. The analysis in this research consisted of bivariate data analysis using Odds Ratio with $\alpha = 0,05$ and multivariate data analysis using logistic regression test.

Based on the results of the analysis, researcher found several variables that are at risk of affecting stunting, namely: the number of household members (OR = 3.182, 95% CI: 1.602-6.320), household income (OR = 2.00, 95% CI: 1,020-3,922), non-exclusive breastfeeding (OR = 5,519, 95% CI: 2,703-11,271), and history of infectious diseases (OR = 7,857, 95% CI: 3,732-16,540). The history of infectious diseases is the most influential variable on the occurrence of stunting (OR = 9,860 CI 95%: 4,015-24,217).

Keywords : Stunting, Risk Factors, Slum Area.

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I. INTRODUCTION

In the globalization era, nutritional problems are the main cause of disease in children¹. There are three main indicators used to determine malnutrition namely *stunting*, *underweight*, and *wasting*. Stunting is a problem of chronic malnutrition caused by lack of nutrient intake in a long time due to the provision of food that does not comply with the nutritional needs. According to WHO 2013, stunting is a condition where the child's height is too short. Stunting or too short by age is the height under minus two of standard deviations (<-2SD) from the *Child Growth Standard table*².

In 2016 there were 22.9% or 154.8 million of children under five with stunting, while in Asia were 87 million³. Indonesia is the fifth largest country with stunting sufferer in the world, it is recorded about 37.2% (nearly 9 million) children under five suffering from stunting based on Basic Health Research data in 2013⁴. According to the Nutritional Status Monitoring of Indonesia (PSG) in 2017, nationally it is recorded that 29.6% of children under five suffering from stunting in Indonesia⁵, meanwhile according to PSG results by South Sulawesi Provincial Health Office in 2017 recorded that there were 34.8% suffering from stunting in South Sulawesi⁶.

Stunting caused by many factors where these factors are relate to each other. There are 3 main factors that cause stunting, namely: 1) unbalanced food intake (with related to the content of nutrients in foods namely carbohydrates, proteins, fats, minerals, vitamins and water); 2) a history of low birth weight (LBW); and 3) a history of the disease. Generally, the cause of a stunting can be grouped into 3 levels i.e. Community level, household (family), and the individual. At the community level, cause factors of stunting occurrences are consist of economic system, education, health, and system of sanitation and clean water. At the level of the household (family), cause factor of stunting occurrences is consist of the quality and quantity of food that inadequate, parenting pattern of eat toward children, health services, sanitation and water supply which is inadequate, income level, number of members and the structure of the family. At the individual level, the cause factors of stunting occurrences are influenced by the household level, where children aged under 5 years suffered a condition of unbalanced food intake, low birth weight (LBW), and poor health status⁷.

In 2017, the prevalence of stunting in Makassar was recorded at 25.2%⁸. The high of this prevalence mostly are caused by the existence of several slum areas in the suburban of Makassar City. From the data release of Makassar City Health Office in 2018, the highest prevalence of stunting in 2017 is in the working area of Rappokalling Public Health Center, which recorded as 25.4%. Public health center Rappokalling consists of four working areas based on the category of heavy slum, namely sub-district of Rappokalling, Tammua, Tallo and Buloa. These four of sub-district, according to the Mayor Decree of Makassar no. 050.05/1341/Kep/IX/2014 about the determination of slum location of Makassar City in 2014 included in heavy slum category⁹. The highest prevalence of stunting cases among children aged 24-59 months was in Rappokalling sub-district that is 21.3%⁸.

Health professional have to manage urban slums where the region tends to be neglected so that it becomes the main source of health problems in a wider spectrum. The difficulty of detecting spectrum, burden and the cause of the disease is a condition which is caused by: 1) the natural environment of the slums; 2) the unique behavioral, cultural and social factors of the slum population. The Lack of data about slum causing both government and private sectors be inappropriate in target and unrealistic in its allocation in health service¹⁰.

Based on the high number of stunting occurrence in urban slum areas of Makassar, the researcher formulated several indicators of problems which consist of: 1) number of household members; 2) household income; 3) non-exclusive breastfeeding ; 4) history of infectious diseases; 5) immunization status. Are these five indicators at risk for stunting occurrence in slum areas of Makassar?

II. METHODS

This study used case-control study design with observational analytic type. This research was conducted in the working area of Rappokalling Public Health Center of Makassar which representing 4 slums in Makassar city from February to April 2018. The criteria of case inclusion in this study were the children aged 24-59 months who had a height according to the age with z-score <-2 standard deviation (stunting) in Rappokalling sub-district, and recorded in register book of nutritional status monitoring of Rappokalling Public Health Center in Makassar on month December 2017. The criteria of control inclusion in this study were the children aged 24-59 months which living in the research areas with criteria height/age \geq -2SD from the WHO standard which is recorded in the register book of Nutrient Status Monitoring of Rappokalling Public Health Center in December 2017.

Respondents in this study is the mother or caregiver of children under five that chosen to be sampled. Sampling in the case group was done by exhaustive sampling technique, that is taking sample roundly. While in the control group is done by random sampling technique with simple random sampling, which matching age with health care and information center station (Posyandu)/RT area previously has done. With amount of sample were 72 case groups and 72 control groups. Data were analyzed by descriptive analysis, where bivariate analysis using chi-square and multivariate analysis using variable logistic regression. As for which will be analyzed multivariately are the variables which has value of $p < 0.25$ in bivariat analysis stunting accident relationship.

III. RESULT

The socio-demographic characteristics of children under five in table 1. explains that most of the case group and control group were male, that is 51.4% and 52.8%. Under-five children who suffering stunting the most is the age of 24-28 months, which is recorded as 25.0%. Most of the case group (88.9%) and control group (86.1%) will firstly visit the Public Health Center (Puskesmas) as a place for medicating. Infectious diseases that are mostly suffered by children under five are acute respiratory infections (ARI), where in the case group recorded 27.8% and control group recorded 15.3%. Most of fathers in the case and control groups worked as laborer, 55.6% and 44.4%, while most of mothers in both case and control groups worked as housewives or non-working, 90.3% and 81,9%. The giving of colostrum or very first breast milk which yellowish-colored in the case and control group was also very high at 83.3% and 91.7%.

The results of bivariate test in table 2. explains that children under five who have a large number of family members (> 4 person) risked 3,182 times suffering from stunting than children under five who have a sufficient number of family members (\leq 4 person). Families who have household income under the regional minimum wage (UMR) are risked 2 times of having children with stunting than the households who have a household income equal to or above the regional minimum wage (UMR). Children under five who are not exclusively breastfed are 5,519 times suffering from stunting compared with the children who given exclusive breastfeeding. Children under five who have a history of infectious diseases are 7,857 times risked suffering from stunting than the children without a history of infection. Immunization status is not a risk factor for stunting accident in slums of Makassar city.

The multivariate test results in table 3. explains that the variable which risk the most for stunting case is history of infectious diseases with OR = 9,860 (95% CI: 4,015-24,217). The results of this statistical test concluded that the history of infectious diseases was significantly risked for stunting cases by 9.86 times.

Table 1. Socio-Demographic Characteristics of Children Under Five in Slums of Makassar City

Characteristics	Study Group			
	Case (n: 72)		Control (n: 72)	
	N	%	N	%
Gender				
Female	35	48,6%	34	47,2%
Male	37	51,4%	38	52,8%
Age (month)				
24-28	18	25,0%	18	25,0%
29-33	16	22,2%	16	22,2%
34-38	9	12,5%	9	12,5%
39-43	3	4,2%	3	4,2%
44-48	10	13,9%	10	13,9%
49-53	7	9,7%	7	9,7%
54-59	9	12,5%	9	12,5%
Medication Place of Child				
Public Health Center	64	88,9%	62	86,1%
Non-Public Health Center	8	11,1%	10	13,9%
Infectious Diseases (last 3 months)				
Not Sick	21	29,2%	55	76,4%
DHF	1	1,4%	0	0%
Diarrhea	17	23,6%	3	5,6%
Diarrhea and ARI	9	12,5%	2	2,8%
ARI	20	27,8%	11	15,3%
Roseola Infantum	2	2,8%	0	0%
Thypus	2	2,8%	0	0%
Father's Job				
Non-Working	1	1,4%	0	0%
Services/Ojek/Bentor	6	8,3%	18	25,0%
Entrepreneur	18	25,0%	13	18,1%
Labor	40	55,6%	32	44,4%
Private Employees	7	9,7%	9	12,5%
Mother's Job				
Non-Working	65	90,2%	59	81,9%
Working	8	9,8%	13	18,1%
Colostrum Giving				
Yes	60	83,3%	66	91,7%
Not	12	16,7%	6	8,3%

Source: Primary Data, 2018

Table 2. Bivariate Analysis of Stunting Risk Factors in Under 24-59 Month Children in Slums of Makassar City

Independent Variabel	Study Group				OR	CI 95%
	Stunting		Not Stunting			
	N	%	N	%		
Number of Household Members						
Much (> 4 Persons)	50	69,4%	30	41,7%	3,182	1,602-6,320*
Enough (≤4 Persons)	22	30,6%	42	58,3%		
Household income Below The Standard of Regional Minimum Wage						
Yes	48	66,7%	36	50,0%	2,000	1.020-3,922*
No	24	33,3%	36	50,0%		
Non-Exclusive Breastfeeding						
Yes	51	70,8%	22	30,6%	5,519	2,703-11,271*
No	21	29,2%	50	69,4%		
History of Infectious Disease						
Sick	51	70,8%	17	23,6%	7,857	3,732-16,540*
Not Sick	21	29,2%	55	76,4%		
Status of Immunization						
Incomplete	14	19,4%	8	11,1%	1,931	0.755-4,936
Complete	58	80,6%	64	88,9%		

*significant variables (Source: Primary Data, 2018)

Table 3. Multivariate Analysis of Stunting Risk Factors in Under 24-59 Month Children in Slums of Makassar City

Research Variables	B	Wald	Sig.	OR	CI 95%	
					LL	UL
Number of Household Member (1)	1,467	10,440	0,001*	4,337	1,781	10,559
Non-Exclusive Breastfeeding (1)	2,112	20,496	0,000*	8,265	3,312	20,622
History of Infectious Disease (1)	2,288	24,917	0,000*	9,860	4,015	24,217
Constant	-2,982	29,368	0,000	0,051		

*significant variables

IV. DISCUSSION

Low conditions of socio-economic are associated with children under five nutritional status, in this research the number of household members and household income according to bivariate analysis is a statistically significant risk factor for stunting in the slums of Makassar city. Children under five who have a large number of family members (> 4 person) are more risked of stunting than the children under five who have enough family members. This research is in line with research conducted in Mozambique who reported that the number of family members who live in the house with the category of many (> 5 person) is risk factor of stunting¹¹. a research which conducted in Ethiopia also reported that household with 5-7 family members were associated with stunting occurrence¹². According to Chaudhury (2012), the large number of family members will determine the availability of food in the family, the increasing number of household members will cause food in the household not distributed well for each family member which will have an impact on nutrition¹³.

This research reported that household income is a risk factor for stunting occurrence in the slums of Makassar city. These results are consistent with the results of a research in Bangladesh (2011) and also in Ethiopia (2014) which states that low socio-economic status is a risk factor for stunting occurrence toward children under five^{12,14}. Countries with lower to middle income levels have an impact on retardation of linear growth or stunting which is thought affected 34% of children under 5 years¹⁵. Research toward children aged 2-3 years in Semarang states that the low economic status is associated with the families limitations in fulfilling the needs of nutrients both macro and micro¹⁶.

Low economic status of a family will affect the quality and quantity of food which consumed by the family, thus it will increase the risk of stunting toward the children under five. Foods obtained will usually be less varied and few in number, especially in nutrients that work for the growth of children such as protein, vitamin and mineral sources, thus increasing the risk of malnutrition, this limitedness will increase the risk of stunting on children under five¹⁷. The socio-economic status of the family can also fix the level of education, employment and health services, which will have a positive impact on the children's nutritional status¹⁸.

The history of exclusive breastfeeding supports future nutritional improvements. The pattern of Parenting towards exclusive breastfeeding could affect the nutritional status of children under five¹⁹. The results of this research indicate that mother who did not provide exclusive breastfeeding to their child is a risk factor for stunting. Inappropriate timing in providing several types of complementary food toward children may affect nutritional status, this is because the digestive system and immunity of the children were immature yet. In several researches also showed that mother who do not give exclusive breastfeeding to their children is a risk factor for stunting in children under five, otherwise exclusive breastfeeding by mother will help to maintain the nutrients balance of the children, so it could drive child to a normal growth²⁰.

A research conducted by Fikadu in Ethiopia shows that children who are not exclusively breastfed are at risk of stunting¹². According to Gibney (2009), breast milk also has other benefit, that is improving child's immunity against disease. Based on research, breastfeeding may decrease the frequency of diarrhea, chronic constipation, gastrointestinal disease, respiratory tract infection, and ear infections. Therefore, during child's breastfeeding it is important to give them breast milk and avoid them from foods that have not been digested properly by the body. Indirectly, breast milk also has an effect on the nutrition status of children²¹.

Lack of breastfeeding in conjunction with early provision of complementary foods (before first 6 months) may increase the risk of stunting in early childhood²². In this research, the giving of colostrum toward children tends to be homogeneous. Colostrum in breast milk contains humoral and cellular immunity which can protect baby, especially for those in developing countries which high risk of infection²³.

Infectious disease is one of the direct causal factors that affect nutrient status of children under five⁷. This research showed that children under five who have a history of infectious diseases have a risk for stunting compared with children under five who have no history of infectious diseases. Similar results obtained from research of Dewi Chandra (2016) which shows that children who have a history of infectious diseases will be followed by the increased of stunting²⁴.

In the last three months, children in stunting group were more have a history of infectious diseases than the children in normal group. Frequently the children under five suffering from infectious diseases in a long

time, not only affects the weight but also affects the linear growth. Infection also has an effect on energy deficiency, protein, and other nutrients due to the decreased of appetite, so that food intake is reduced²⁵.

Diarrhea and Acute Respiratory Infection (ARI) are the most common diseases were experienced by children under 24-59 months in slum, this is in line with a research conducted by Paudel R (2013) in Nepal, that diarrheal infectious diseases are 4.18 times risky of experiencing stunting²². Poor environmental and sanitation factors are the major cause of infectious diseases (Diarrhea and Acute Respiratory Infection), although most families use protected water sources such as tap water and gallon or bottled water, but to get the tap water they could only connect the pipes manually from one house to another. Poor sanitation system in slums can lead to the increasing of infectious disease transmission. In developing countries, infectious diseases in children are important health problems and known that it could affect the child's growth²⁵.

The results of this research indicates that the immunization status is not a risk factor for stunting on children under five in the slums of Makassar city. This is in line with a research which conducted by Bentian (2015) that the immunization status of children under five is not a risk factor for stunting on kindergarten child in Sangihe regency, North Sulawesi²⁶. The results of Anisa's research (2012) about the factors that related to stunting occurrence on children under five in Depok, where there is no relationship between immunization status and stunting. Not all of the common infections which occur on children can be immunized as a preventive action²⁷. Therefore, complete basic immunization toward children does not guarantee the children free from another infectious diseases.

The proportion of children which not immunized is more potential in experiencing all types of malnutrition than immunized, especially measles immunization. This because after being infected with measles, the child will become susceptible toward other infections such as diarrhea diseases which can result in malnutrition²⁷. Other research also shown that incomplete immunization status has a significant relation with stunting in children aged under 5 years^{11,28}. Basically, the provision of immunization in children has an important goal is to reduce the risk of childhood morbidity (mortality) and mortality (death)²⁹. Basically, the provision of immunization on children has an important goal, that is to reduce the risk of childhood morbidity (illness) and mortality (death). Immunization status in children is one of indicator that servicing of health professional is presence. Therefore, parents are expected to intensively visiting the health center to ensure the immunization status which will help them improve another nutritional problems and expected to give a long-term positive effect on nutritional status of children³⁰.

To reduce the occurrence of stunting in Rappokalling sub-district, it is necessary to follow-up the policies that have been made before by implementing the Presidential Regulation (Perpres) No. 42 Tahun 2013 about the national movement of accelerated nutrition improvement³¹. The results of this study expected a serious effort in the handling of stunting nutritional problems on the early age, even within the first 1000 days of child birth, which these period is a gold period in the prevention of stunting growth. The serious efforts that can be done are as follows: 1) Intervention Program with pregnant mother as the target is done through the provision of iron folate supplementation of at least 90 tablets, providing support to pregnant mother to perform examination of pregnancy at least 4 times in pregnancy period, giving them Tetanus Toksoid (TT) immunization, supplementary food, and provide them mosquito net and medication for them with positive of malaria; 2) Interventions Program with the target breastfeeding mother and baby aged 0-6 months by providing them childbirth assistance by health professional, early breastfeeding initiation (Inisiasi Menyusui Dini: IMD), promotion of exclusive breastfeeding including explanations of colostrum (individual and group counseling), basic immunization, growth-develop monitoring child on a regular basis every month, and appropriate treatment of sick baby; 3) Interventions Program targeting breastfeeding mother and baby aged 7-23 months by motivating mother to continue breastfeeding their child until 23 months of age and accompanied by the provision of complementary foods of breastfeeding, providing them worm medication, zinc supplementation, doing a preventing and medication toward diarrhea. In addition to 3 previous programs, there are several another programs, including: 1) Program of Supplemental Food Feeding (Pemberian Makanan Tambahan: PMT) of children under five malnourished by Ministry of Health (Kemenkes) through Public Health Center (Puskesmas and Posyandu); 2) Planned Family (Keluarga Berencana: KB) Program needs to be improved to hold down the number of household members.

V. CONCLUSION

The number of family members who live in a same house with much category of members, parent income under the Regional Minimum Wage, non-exclusive breastfeeding and history of infectious diseases are the risk factors of stunting in slums of Makassar city. From the most influential factors toward stunting, after doing the multivariate test with other variables, it was found that the history of infectious diseases as the most risk factors of stunting occurrence in slums of Makassar. Immunization status also is not a risk factor of stunting in the slums of Makassar city.

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