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TIME SUBMITTED	08-JAN-2021 12:04PM (UTC+0700)	CHARACTER COUNT	20013
SUBMISSION ID	1484428529		



Water, Sanitation Dan Hygiene Analysis, and Individual Factors for Stunting among Children Under Two Years in Ambon

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Abstract

Edited by: Mirko Spiroski
Citation: Hasanah U, Maria I, N, Hardianti A, Mallongi A, Syam A, W. Water, Sanitation, Hygiene Analysis, and Individual Factors for Stunting among Children Under Two Years in Ambon. Open Access Macedonian Journal of Medical Sciences. 2020 Aug 30; 8(T2):22-26. https://doi.org/10.3889/oamjms.2020.5177
Keywords: Stunting; Water; Sanitation; Hygiene
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Received: 08-Jul-2020
Revised: 19-Jul-2020
Accepted: 22-Jul-2020
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Funding: This research did not receive any financial support
Competing Interests: The authors have declared that no competing interest exists
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BACKGROUND: Nutritional problem is a problem that is still a threat in various countries around the world, one of which is stunting that occurs since the baby is in the womb and in the early period after the baby is born, but only appears after the child is 2 years old.

AIM: This study aimed to analyze the water, sanitation and hygiene (WASH), and individual factors for the incidence of stunting in children aged 7–24 months in the slums of Ambon City.

HODS: The research was an analytical observational study using a case control study design. The population in this study was all children aged 7–24 months who suffered from stunting in Ambon. The samples were 150 child with a ratio of 1:1 for the case and control groups.

RESULTS: The results showed that WASH (OR=2.7, CI 95%: 1.379–5.566) dan status Berat Badan Lahir Rendah (OR=5.1; CI 95%: 2.279–11.445) was a stunting risk factor. Meanwhile, diarrhea status (OR=2.4; CI 95%: 0.793–7.302), immunization (OR=1.4; CI 95%: 0.622–3.260), and smoking history of household members (OR=1.1; CI 95%: 0.540–2.086) are risk factors, but statistically not significant. Maternal education (OR=1.0) is not a risk factor for stunting in children aged 7–24 months.

CONCLUSION: The conclusion of this study is that the WASH condition and low birth weight status are risk factors for stunting in children aged 7–24 months in Ambon.

Introduction

Stunting is a condition of failure to thrive in children under five due to chronic malnutrition so that the child is too short for his age. The incidence of stunting in children under 5 years decreased from 198.4 million children under five (32.6%) in 2000 to 150.8 million children under five (22.2%) in 2017. Stunting in children in Asia has decreased from 38.1 % to 23.3% since 2000 [1].

Maluku is one of the priority provinces for stunting intervention. Based on the results of Basic Health Research 2018, the prevalence of stunting in Maluku was 33.7%. This figure shows a decrease from 2013, which is 45.2% [2].

In general, the causes of stunting are classified into three groups, namely, community, family, and individual. Factors at the community level that can cause stunting include: Economic systems, education systems, health systems, and sanitation and clean water systems; at the family or household level, the factors that cause stunting are inadequate quality and

quantity of food, income, number, and structure of family members, parenting, inadequate health services, and inadequate sanitation and clean water; individual/child factors that cause stunting are unequal nutritional intake, low birth weight (LBW), and health status or history of infectious diseases [3].

Environmental conditions such as water and poor sanitation are factors that underlie children's growth and development that are not optimal. Based on Torlesse *et al.* [4] research conducted in three different typologies in Indonesia, there was an interaction between household sanitation facilities and water treatment with stunting ($p < 0.007$). Among children who live in households that drink water without being treated, the odds ratio (OR) for stunting is 3 times greater than households that treat water before consumption (OR=3.47; 95% CI=1.73–7.28; $p < 0.001$). Humphrey [5] states that toilet ownership, handwashing practices with soap, and good water quality are factors that can prevent diseases that can be caused by the environment and can also reduce the risk of stunting.

Children who live in slums are a group that is vulnerable to malnutrition. Ambon City is the Capital

of the Maluku Province, which has 102.64 ha of slum spread over 15 slum areas. The prevalence of stunting in Ambon tends to fluctuate. Based on e-PPGBM data (Community Based Nutrition Recording and Reporting) in 2018, the prevalence of stunting in Ambon City is 22%. This figure shows an increase in prevalence, although not significant. Seeing these problems, researchers tried to conduct research related to the analysis of water, sanitation, and hygiene (WASH) and individual factors on the incidence of stunting in toddlers aged 7–24 months in the slums of Ambon City.

Materials and Methods

This type of research is an analytic observational study using a case-control study design. This research was carried out from November 2019 to December 2019 in Negeri Batu Merah, Ambon City. The consideration of choosing a research location in that place is because Batu Merah State is a country with a heavy slum classification in Ambon City.

The population in this study was all children aged 7–24 months who suffered from stunting in Ambon City. The sample in this study was all children aged 7–24 months who were selected to be the subject of research at the study site. Sampling in the case group was done by a probability sampling technique, whereas in the control group was done by simple random sampling. The number of samples is 150 people with a ratio of 1:1 for the case and control groups.

The data in this study consist of two, namely, primary data and secondary data. Primary data are data obtained directly by researchers through a process of direct interviews with respondents and observation. Secondary data were obtained from the Health Office and Puskesmas regarding the nutritional status of new children as well as data on the residence of children under five and other relevant secondary data sources.

The data collected were then analyzed using SPSS. Univariate analysis was performed to see the frequency distribution of the studied variables. Bivariate analysis was performed using Chi-square to see OR with the aim of knowing the risk factors of each variable.

Results

The results showed that respondents' drinking water quality was mostly low risk, both the case group (33.3%) and the control (82.7%). Similar to sanitation, 54.7% in the case group and 62.7% in the control group had sanitation with a low-risk category. Hygiene

conditions in the case group are mostly included in the high-risk category (62.7%) while in the control group as much as 62.7% in the low-risk category (Table 1).

Table 1: Frequency distribution of WASH in children under two in Ambon 2019

WASH variable	Group study		Controls (n=75)	
	Cases (n=75)		n	%
	n	%	n	%
Water				
High risk	25	66.7	13	17.3
Low risk	50	33.3	62	82.7
Sanitation				
High risk	34	45.3	28	37.3
Low risk	41	54.7	47	62.7
Hygiene				
High risk	47	62.7	28	37.3
Low risk	28	37.3	47	62.7

WASH: Water, sanitation, and hygiene.

WASH variable with the stunting event obtained OR=2.7 (95% CI: 1.379–5.566). This figure shows that the value of the lower limit (LL) and upper limit (UL) does not include a value of 1; therefore, it can be interpreted that the WASH condition with a high-risk category is 2.7 times stunted compared to the low-risk WASH condition. LL and UL values that do not include a value of 1 means that there is a significant relationship between WASH and the incidence of stunting (Table 2).

The LBW status variable obtained an OR value of 5.1 (95% CI: 2.279–11.445). This shows that babies born with LBW are at risk 5.1 times stunted compared to babies born with normal birth weight. LL and UL values that do not include number 1 mean there is a significant relationship between LBW status and stunting events (Table 2).

Table 2: Distribution of risk factors of stunting in children under two in Ambon

Variable independent	Kelompok Studi		OR	CI 95%		
	Kasus (n=75)	Kontrol (n=75)				
	n	%	n	%		
WASH						
High risk	35	46.7	18	24.0	2.7	1.379–5.566
Low risk	50	53.3	57	74.0		
Low birth weight						
Yes	33	44.0	10	13.3	5.1	2.279–11.445
No	42	56.0	65	86.7		
Diarrhea status						
High risk	70	93.3	64	85.3	2.4	0.793–7.302
Low risk	5	6.7	11	14.7		
Immunization status						
Complete	16	21.3	12	16.0	1.4	0.622–3.260
Incomplete	59	78.7	63	84.0		
Maternal education						
Low	1	1.3	1	1.3	1.0	0.61–16.289
High	74	98.7	74	98.7		
Smoking history of household members						
Smokers	50	66.7	49	65.3	1.1	0.540–2.086
Non smokers	25	33.3	26	34.7		

WASH: Water, sanitation and hygiene.

Diarrhea suffered based on calculations shows the value OR=2.4 (95% CI: 0.793–7.7302). This figure shows that children who suffer from diarrhea have 2.4 times the risk of stunting, but because the LL and UL values include a value of 1 there is no significant relationship between the status of diarrhea with the incidence of stunting (Table 2).

Immunization status shows an OR value of 1.4 (95% CI: 0.622–2.131). This means that children who have

incomplete immunization status have 1.4 times the risk of stunting compared to children with complete immunization status. UL and LL values, including one, mean that there is no meaningful relationship between immunization status and the incidence of stunting (Table 2).

The mother education variable shows the value of OR=1.0 (95% CI: 1.61–16.289). Mother's education is not a risk factor for stunting. LL and UL values that include number one indicate that maternal education does not have a significant relationship with the incidence of stunting (Table 2).

Family history of smoking received an OR=1.1 (95% CI: 0.540–2.086). This figure shows that children who live with household members who have a history of smoking are 1.1 times more likely to experience stunting compared to children who live with household members who have no smoking history. LL and UL values that include number one indicate that the smoking history of household members has no significant relationship with the incidence of stunting (Table 2).

Discussion

WASH conditions have a positive impact on the nutritional status of children. The results of this study indicate that WASH is a risk factor for stunting in Ambon City.

This study is in line with research conducted by Torlesse *et al.* [4] who got the result that children who live with poor sanitation and water treatment facilities have stunting risk 3 times. In addition, research conducted in Indonesia by Semba *et al.* [6] showed that toddlers living in homes with healthy latrines had a lower chance of suffering from stunting compared to toddlers living in homes that had inappropriate latrines.

Poor WASH conditions can potentially lead to infectious diseases that can interfere with the absorption of nutrients in the digestive process, such as diarrhea, worms, or environmental enteropathy. These infections and conditions directly affect nutritional status in a variety of ways, including loss of appetite, impairment of nutrition or malabsorption, chronic immune activation, and other responses to infections that can interfere with absorption of nutrients and energy [4]. If this condition occurs in a long time and is not accompanied by giving adequate intake for the healing process, it can lead to stunting.

LBW history is a risk factor for the incidence of stunting found in this study. The results obtained are in line with research conducted in the Philippines by Blane *et al.* [7] that babies born weighing <2.500 g are 3 times more likely to experience stunting compared to children born with normal weight. The same thing was found from the research of Rukmana *et al.* [8] who

found that LBW is a risk factor for stunting in children aged 6–24 months in Bogor City.

LBW babies are a predisposing factor for achieving growth after birth. Early growth retardation, together with suboptimal cognitive development and stunted internal organ growth, can result in low cognitive abilities and lead to a risk of chronic disease later in life [9]. The period of pregnancy up to the first 2 years of age of the child is a critical period. Growth disturbance in this period is difficult to repair, and the child has difficulty achieving optimal growth and development [10].

In LBW without congenital abnormalities, central nervous system injury, very LBW (BBLSR), and striking intrauterine growth restriction, physical growth in the first 2 years tend to approach the physical growth of a normal-born baby. However, babies with LBW rate are usually not able to pursue physical growth, especially if they experience severe chronic sequelae, do not get adequate nutrition, and an inadequate care environment. The baby will experience growth disorders marked by weight and height, not in accordance with normal criteria or standards [11].

The results of this study indicate a history of diarrheal disease is a risk factor for the occurrence of stunting, although the relationship between the history of diarrheal disease and stunting is not statistically significant. Research by Taguri [11] found that toddlers with a history of diarrhea were more at risk of stunting. The same thing was also found in the study of Semba *et al.* [6], which shows that diarrheal disease is associated with the incidence of diarrhea in children under five in rural areas of Indonesia.

Each episode of diarrhea can result in a lack of ability to absorb food essence, so if the episode is prolonged, it will have an impact on children's growth and health. If this condition occurs in a long time and is not accompanied by adequate intake of food for the healing process, eating can cause stunting [13].

The results of this study indicate that incomplete immunization status is a risk factor for stunting, although it does not have a significant relationship. Research conducted by Al-Rahmad *et al.* [14] shows similar results that toddlers who do not get complete basic immunization are 3 times at risk of experiencing stunting compared to toddlers who get complete basic immunizations. In line with research conducted in India by Dhok and Thakre [15], which obtained incomplete immunization results had a significant relationship to the incidence of stunting in infants.

Basic immunization is very important for toddler immunity. This is due to children who do not get complete immunization will experience immune disorders against infectious diseases due to decreased antibody production, which results in easy entry of germs. If a toddler does not have immunity to the disease, then the toddler will lose body energy faster

due to infectious diseases. The final impact of this problem is the failure of optimal growth in accordance with the rate of aging so that it will increase the prevalence of stunting [14].

Mother's education in this study was not a risk factor for stunting. This is because almost all parents of toddlers who become respondents have a high level of education (\geq SMA). The results of this study are in line with research conducted by Taguri et al. [12], which found that the level of education of mothers did not have a significant relationship with the incidence of stunting. A high level of education of the mother does not guarantee that the mother has sufficient knowledge about good nutrition, so it does not rule out the possibility of child experiencing malnutrition, including stunting. In addition, the results of this study found, although mothers have a high education, most mothers do not work, so this affects the economic status of the family.

Good child care is not only based on mother's education, but on how mothers understand the correct parenting so that children can avoid stunting. Similar to father education, the results of this study indicate that father education is not a risk factor for stunting. This happens because, even though fathers have high levels of education, fathers tend not to be directly involved in child care. Fathers spend more time outside the home to make a living so that care and parenting are entirely left to the mother.

This study found that the smoking history of members of the house date is a risk factor for stunting, but it is not statistically significant. A similar study conducted by Sari [16] shows the same thing, cigarette consumption of parents will be at risk of having children who have stunted 1.15 times greater than children whose parents do not consume cigarettes. Other studies show that smoking in the home is significantly related to the incidence of stunting [17], [19], [20].

Cigarette smoke parents smokers give a direct effect on growing children. Cigarette smoke interferes with the absorption of nutrients in children, which in turn will interfere with child development and development [2]. Abnormalities of leukocyte function are found in children whose parents smoke. The nicotine in cigarettes directly reacts with chondrocytes (cartilage cells) through special nicotine receptors, which causes stunted bone growth.

19

Conclusion

The conclusion of this study is that the WASH condition and low birth weight status are risk factors for stunting in children aged 7–24 months in Ambon.

Recommendation

It is recommended that there is a need for childcare education programs and community nutrition education for parents and WUS as prospective mothers by providing counseling that can be done by local village midwives, posyandu cadres, or nutrition workers from the Puskesmas area.

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