



Risk Factors of Diarrhea in Toddlers at Andi Makkasau Hospital Parepare City

Astahsan Ashar^{a,1}, Makhrajani Majid^a, Ayu Dwi Putri Rusman^a

^a Faculty of Health Sciences, Universitas Muhammadiyah Parepare, Indonesia

¹accang.pegazus@gmail.com

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ABSTRACT

Diarrheal disease is a major problem in developing countries, including Indonesia. Aside from being a cause of death, diarrhea is also a major cause of malnutrition which can lead to death. Besides being caused by malnutrition, in terms of public health science, there are other factors related to the incidence of diarrhea. The dominant factors causing diarrhea in Indonesia are clean water, sanitation, and feces disposal facilities. This study aimed to determine the risk factors for diarrhea in toddlers at Andi Makkasau Hospital, Parepare City. Analytical survey research methods and case-control study designs. The sampling technique used purposive sampling. This study's sample was all children under five treated at Andi Makkasau Hospital, Parepare City, namely as many as 50 toddlers. The sample was divided into two groups, where 25 toddlers were in the case group (diarrhea), and 25 were in the control group (no diarrhea). Data analysis used the Odds Ratio (OR) test. The results obtained from the risk factors for diarrhea in toddlers are the availability of clean water (OR=1.263), hand washing habits (OR=1.658), food sanitation (OR=3.273), availability of healthy latrines (OR=17.250) and management garbage (OR=5,762). This study concludes that clean water, hand washing habits, food sanitation, availability of healthy latrines, and waste management are risk factors for diarrhea in toddlers at Andi Makkasau Hospital, Parepare City. Parents are expected to improve clean living behavior to prevent diarrheal disease in toddlers.

Keywords: diarrhea, toddlers, risk factors.

Correspondent: Astahsan Ashar

Email: accang.pegazus@gmail.com



INTRODUCTION

Diarrheal disease is a major problem in developing countries, including Indonesia. Apart from being a cause of death, diarrhea is also the main cause of malnutrition which can cause death and can cause extraordinary events (Riahi et al., 2018). Several factors that cause diarrheal disease are caused by bacteria through contamination of food and drink contaminated with feces and or direct contact with sufferers (Secombe et al., 2022). In addition, the most dominant factors contributing to diarrheal disease are water, food sanitation, family latrines, and water (Melvani et al., 2019).

Diarrheal disease is the second leading cause of death in children under five years and results in the death of around 525,000 children each year (Hodges & Kelly, 2023). Diarrhea may last several days and can result in dehydration of the water and salts necessary for survival. In the past, severe dehydration and fluid loss were the main causes of death for most people. Other causes, such as septic bacterial infection, are likely to account for an increased proportion of diarrhea-related deaths. Children who are malnourished or have compromised immunity and people living with the Human Immunodeficiency Virus (HIV) are most at risk of experiencing life-threatening diarrhea (WHO, 2017).

Based on data from the Indonesian Health Profile, in 2020, it was stated that in the group of children under five (12-59 months), the most common cause of death was diarrhea. The coverage of diarrhea sufferers in toddlers is 28.9%. The disparity between provinces for coverage of services for children with diarrhea under five is between 4.0% (North /Sulawesi) and West Nusa Tenggara (61.4%) (Rokhmah, 2022).

Mapping the number of diarrhea sufferers by district/city in South Sulawesi in 2019 shows an estimated 236,099 cases of diarrhea. As for diarrhea, 146,958 cases (62.24%) were handled, where the largest incidence was in Makassar City, with 19,592 cases being handled, while for Pare-pare City, there were 3,076 cases.

Diarrhea is a state of excretion of stool that is abnormal or not as usual. Changes that occur are changes in volume, dilution, and frequency with or without blood mucus, such as more than three times/day and in neonates more than four times/day (Ekawati et al., 2023).

The availability of clean water for the community affects public health, economic productivity, and quality of life. Health conditions depend on water quality, where water functions as a medium for spreading disease (waterborne disease) due to clean water contaminated with microorganisms (*Salmonella* sp, *Campylobacter jejuni*, *Staphylococcus aureus*, *Bacillus cereus*, *Cryptosporidium*, and *Enterohemorrhagic Escherichia coli*) (Padji & Sudarmadji, 2017).

In line with the research of Nurlila & Fua (2020), which stated that the source of drinking water is a risk factor for the incidence of diarrhea in the working area of the Langara Health Center, West Wawonii District, Southeast Sulawesi (Nurlila, 2020).

In addition to the availability of clean water, the habit of washing hands also influences the incidence of diarrhea. Following the opinion of the WHO, washing hands with soap has been shown to reduce the incidence of diarrheal diseases (Agustina, 2018). Hand washing is one of the most effective interventions to reduce the incidence of diarrhea in children. Poor hand-washing habits and behavior are closely related to increased incidences of diarrhea and other diseases. Hand washing is important in disease prevention, where good hand-washing habits affect children's health (Ambarwati & Prihastuti, 2019).

Food sanitation is closely related to hygiene and cannot be separated. Food sanitation is an effort that aims to protect food safety by breaking the chain of development of microorganisms that are a source of disease (foodborne disease). Prevention that can be done is from the process of sorting raw materials until the food is served (Hutasoit, 2020). In line with research suggests that there is food hygiene with the incidence of diarrhea at the Kalibaru Kulon Health Center, Banyuwangi Regency (Prabowo et al., 2017). Other research also suggests a relationship between food sanitation and the incidence of diarrhea in children in the Pampang Community Health Center, Makassar City (Puang, 2021).

The condition of family latrines that do not meet the requirements can cause diarrhea in toddlers. A disease arises due to interaction with each other, namely the environment, agents, and hosts. If the agent's ability increases, it can infect humans and cause disease in humans. Bad environmental changes can also lead to increased agent development. Feces disposal sites are also important sanitation facilities in influencing the incidence of diarrhea. Disposing feces that do not meet sanitary requirements can contaminate the residential environment, soil, and water sources (Rahmadani & Ridlo, 2020).

Waste management is very important to prevent disease transmission. It can reduce the incidence of infectious diseases closely related to waste. Waste management is necessary to prevent the occurrence of disease vectors and disease vectors. Correct waste management consists of the stages of collection and storage, transportation, and destruction (Nurlila, 2020).

Based on data from Andi Makkasau Hospital, Parepare City, it was found that the number of children experiencing diarrhea from January to June 2022 was 101 cases, of which 13 cases were in January, 8 cases in February, 9 cases in March, 13 cases in April, 30 cases in May and 28 in June.

In line with the research, there is a relationship between waste management and diarrhea in toddlers in the working area of the Cot Kuta Health Center, Suka Makmue District, Nagan Raya Regency (Yarmaliza & Marniati, 2017). Other research also suggests a relationship between household

waste management and the incidence of diarrhea in Taman Baru Village, Tengahan District, South Lampung Regency, Lampung Province (Ahyanti & Rosita, 2022).

Based on the background above, this study aimed to determine the risk factors for diarrhea in toddlers at Andi Makkasau Hospital, Parepare City. So this research has the benefit of providing a better understanding of the risk factors that influence the incidence of diarrhea in children under five in the region so that it can help develop more effective prevention and treatment strategies and increase public awareness of the importance of maintaining environmental hygiene and sanitation, as well as the importance of providing proper nutrition for toddlers so that it can help reduce the incidence of diarrhea in toddlers.

METHODS

This type of research uses quantitative research with the case-control study method, an analytic survey (survey) that concerns how risk factors are studied retrospectively. In other words, the effect (illness/health status) is identified now. The risk factors are identified as existing or occurring in the past (Notoatmodjo, 2018). This research was conducted at Andi Makkasau Hospital, Parepare City. The research was conducted for one month, from October 1, 2022, to October 30, 2022.

The population is a generalized area consisting of objects/subjects with certain qualities and risk factors determined by researchers to be studied and then conclusions drawn (Sugiyono, 2016). The case population in this study were all children under five who were treated at Andi Makkasau Hospital, Parepare City, namely 50 toddlers. The sample is part of the number and certain characteristics set by the researcher to be studied. The data analysis technique used in this research is the Odds Ratio test.

Research instruments are tools selected and used by researchers in their collecting activities so that they become systematic and made easier by them (Trisliatanto, 2020). The research instrument used in this study was a list of questionnaires on the availability of clean water, hand washing habits, food sanitation, availability of healthy latrines, waste management, and the incidence of diarrhea. The explanation of each questionnaire is as follows:

1. Availability of Clean Water

The clean water availability questionnaire consists of 4 statements using a Guttman scale with yes and no answer options. Answers to the questionnaire with the option yes are given a score of 1, and no is given a score of 0.

2. Hand Washing Habits

The hand washing habits questionnaire consists of 10 statements using a Likert scale with yes and no answer choices. Questionnaire answers with a choice are always given a score of 4, often given a score of 3, sometimes a score of 2, and never a score of 1.

3. Food Sanitation

The food sanitation questionnaire consists of 10 statements using a Guttman scale with yes and no answer choices. Answers to the questionnaire with the option yes are given a score of 1, and no is given a score of 0.

4. Availability of Healthy Latrines

The healthy latrines availability questionnaire consists of 5 statements using a *Guttman scale* with yes and no answer options. Answers to the questionnaire with the option yes are given a score of 1, and no is given a score of 0.

5. Waste management

The waste management questionnaire comprises six statements using a *Guttman scale* with yes and no answer choices. Answers to the questionnaire with the option yes are given a score of 1, and no is given a score of 0.

6. Diarrhea incident

The incidence of diarrhea was taken from the registration book of Andi Makkasau Hospital, Parepare City. Suppose the registration book shows a diagnosis of diarrhea. In that case, the child is said to have diarrhea. In contrast, if the registration book shows no diagnosis of diarrhea, the patient is said to be a child who does not have diarrhea.

RESULTS AND DISCUSSION

Characteristics of Mother

Table 1. Frequency Distribution of Respondents Based on Mother's Characteristics Andi Makkasau Hospital, Parepare City

Characteristics of Mother	n	%
Age (years)		
17-25	13	26.0
26-35	26	52.0
36-45	11	22.0
Education		
SD	6	12.0
Junior High School	6	12.0
Senior High School	30	60.0
DIII	3	6.0
S1	5	10.0
Work		
IRT	42	84.0
Civil Servant	1	2.0
Private employees	2	4.0
Entrepreneur	5	10.0
Total	50	100.0

Table 1 shows that of the 50 mothers, the most age characteristics were at the age of 26-35 years, as many as 26 mothers (52.0%) and at least 36-45 years old as many as 11 mothers (22.0%). Characteristics of mother's education, namely high school, as many as 30 mothers (60.0%) and the least, namely DIII, as many as three mothers (6.0%). Characteristics of mother's education, namely high school, as many as 30 mothers (60.0%) and the least, namely DIII, as many as three mothers (6.0%). Characteristics of the highest number of mothers working, namely IRT, are as many as 42 mothers (84.0%), and the least, namely civil servants, as many as one mothers (2.0%).

Characteristics of Toddlers

Table 2. Frequency Distribution of Respondents Based on Toddler Characteristics at Andi Makkasau Hospital, Parepare City

Characteristics of Toddlers	n	%
Age (years)		
2	17	34.0
3	17	34.0
4	16	32.0
Gender		
Man	26	52.0
Woman	24	48.0
Total	50	100.0

Based on Table 2 shows that out of 50 toddlers, the most age characteristics of toddlers are two years and three years, 17 toddlers (34.0%), and at least four years old, 16 toddlers (32.0%). The sex characteristics of most toddlers were 26 (52.0%) boys and 24 (48.0%) girls.

Bivariate Analysis

**Table 3. Analysis Factor Incidence of diarrheal disease in infants
 in HOSPITAL Andi Makassar City Parepare**

Research Variables	Diarrhea incident				Amount		p.s	OR	95% CI
	Case		Control		n	%			
	n	%	n	%					
Availability of clean water									
risky	7	24.0	5	20.0	11	22.0	0.733	1,263	0.330-4.837
No risk	19	76.0	20	80.0	39	78.0			
Hand Washing Habits									
Risky	6	24.0	4	16.0	10	20.0	0.480	1,658	0.405-6785
No risk	19	76.0	21	84.0	40	80.0			
Food sanitation									
risky	3	12.0	1	4.0	4	8.0	0.305	3,273	0.317-33.837
No risk	22	88.0	24	96.0	46	92.0			
Availability of healthy snacks									
Risky	23	92.0	10	40.0	33	66.0	0.000	17,250	3,307-89,970
No risk	2	8.0	15	60.0	17	34.0			
Garbage management									
Risky	11	44.0	3	12.0	14	28.0	0.027	5,762	1,363-24,362
No risk	14	56.0	22	88.0	36	72.0			
Total	25	100.0	25	100.0	50	100.0			

Based on Table 3 shows that 25 toddlers experience diarrhea, of which there are six toddlers (24.0%) whose availability of clean water is at risk and 19 toddlers (76.0%) whose availability of clean water is not at risk. Meanwhile, 25 toddlers did not experience diarrhea, of which there were five toddlers (20.0%) whose availability of clean water was at risk and 20 toddlers (80.0%) whose availability of clean water was not at risk. While the habit of washing hands is 25 toddlers, of which there are six toddlers (24.0%) whose parents' hand washing habits were at risk and 19 toddlers (76.0%) whose parents' hand washing habits were not at risk. Meanwhile, 25 toddlers did not experience diarrhea, of which there were four toddlers (16.0%) whose parents' hand-washing habits were at risk and 21 toddlers (84.0%) whose parents' hand-washing habits were not at risk.

Meanwhile, there were 25 toddlers with food sanitation, of which three (12.0%) had risky food sanitation and 22 (88.0%) whose food sanitation was not at risk. While toddlers who did not experience diarrhea totaled 25 toddlers, where there was one toddler (4.0%) whose food sanitation was at risk and 24 toddlers (96.0%) whose food sanitation was not at risk.

While the availability of healthy latrines amounted to 25 toddlers, of which there were 23 toddlers (92.0%) whose availability of healthy latrines was at risk and 2 toddlers (8.0%) whose availability of healthy latrines was not at risk. Meanwhile, 25 toddlers did not experience diarrhea, of which there were ten toddlers (40.0%) whose availability of healthy latrines was at risk and 15 toddlers (60.0%) whose availability of healthy latrines was not at risk.

While the waste management totaled 25 toddlers, of which there were 11 toddlers (44.0%) whose waste management was at risk and 14 toddlers (56.0%) whose waste management was not at risk. Meanwhile, 25 toddlers did not experience diarrhea, of which three (12.0%) had risky waste management and 22 (88.0%) whose waste management contained no content.

The Risk of Availability of Clean Water on the Incidence of Diarrhea in Toddlers

Based on research conducted at Andi Makkasau Hospital, Parepare City, shows that the availability of clean water is a risk factor for the incidence of diarrhea in toddlers at Andi Makkasau Hospital, Parepare City, with OR = 1.263, which means that parents who have clean water availability are at risk of being 1.263 times more likely for their children to experience diarrhea. Compared to parents whose availability of clean water is not at risk. This is because the water used by parents sometimes smells and is cloudy. Facilities for the availability of clean water that do not meet the requirements will have an unfavorable impact on health. At the same time, diarrhea transmission can occur through water used for daily needs. Recognizing the importance of water for humans, using water that does not meet the standard quality criteria according to its designation can cause health problems (Romeo et al., 2021).

The purpose of providing clean water is to assist in providing water that meets health requirements and monitors the quality of water for all people, both those living in urban and rural areas and increase the community's ability to supply and use clean water. In addition to being sufficient in quantity for daily life, clean water must also meet the physical, chemical, microbiological, and radioactive quality requirements (Afriani, 2017).

The results of this research align with previous studies, which state that there is a relationship between the availability of clean water and diarrhea. These two factors will interact with human behavior. Suppose the environmental factor is unhealthy due to the contamination of diarrhea-causing germs and accumulates with unhealthy behaviors, such as consuming contaminated food and drinks. In that case, it can lead to diarrhea incidents (Romeo et al., 2021).

The Risk of Hand-washing Habits Against Diarrhea in Toddlers

Based on research conducted at Andi Makkasau Hospital, Parepare City, shows that the habit of washing hands is a risk factor for the occurrence of diarrhea in toddlers at Andi Makkasau Hospital, Parepare City, with OR = 1.658, which means that parents who wash their hands are more likely to have diarrhea 1.658 times. Compared to parents whose hand-washing habits are not at risk. This is because parents wash their hands using liquid soap or antiseptics, rarely clean between the fingers, rarely clean the fingertips by connecting both hands, and rarely clean the nails when washing their hands.

This is consistent with previous research findings that indicate the risk of diarrhea in toddlers with mothers who have the habit of not washing hands is 16 times higher compared to those with mothers who have the habit of washing hands. It also aligns with the guidelines of the Indonesian Ministry of Health (Depkes RI), which state that proper hand-washing can reduce the incidence of diarrhea by 47% (Wijaya, 2012).

Hand washing is very useful for killing germs that are in the hands. Clean hands will prevent diseases such as diarrhea, dysenteric cholera, typhus, intestinal worms, skin diseases, ISPA, bird flu, or Severe Acute Respiratory Syndrome (SARS). (Burns & Lamb, 2023). By washing your hands, your hands will be clean and free of germs (Sianipar & Sijuang, 2021).

The behavior of washing hands using soap and clean running water is one of the most effective health measures compared to other health measures. Hand washing is important in preventing infection (Diantoro & Rizal, 2021).

The habit of washing hands also contributes to the incidence of diarrhea. Following the opinion of WHO (2009), washing hands with soap has been shown to reduce the incidence of diarrheal diseases. Hand washing is one of the most effective interventions to reduce the incidence of diarrhea in children. Poor hand-washing habits and behavior are closely related to increased incidences of diarrhea and other diseases. Hand washing is important in disease prevention, where good hand-washing habits affect children's health (Ambarwati & Prihastuti, 2019).

Food Sanitation Risks for Diarrhea in Toddlers

Based on research conducted at Andi Makkasau Hospital, Parepare City, shows that food sanitation is a risk factor for diarrhea in toddlers at Andi Makkasau Hospital, Parepare City, with $OR=3.273$, which means that parents who have food sanitation are at risk of being 3.273 times more likely their children to experience diarrhea, compared to other people. Parents whose food sanitation is not at risk. This is because parents do not store food ingredients in the refrigerator according to the requirements for the type of food, do not store food ingredients separately from the prepared food container, do not always use tools such as spoons to collect food, and do not take food so use tools such as spoons.

Food sanitation is one of the prevention efforts focusing on activities and actions necessary to free food and drink from all hazards that can interfere with or cause health problems. Food sanitation aims to ensure food purity, prevent consumers from getting sick, prevent the sale of food that will harm the buyer, and reduce damage or waste of food (Andayani, 2020).

A lack of family awareness causes poor food sanitation to maintain the cleanliness of the family's food, which results in the food being contaminated with bacteria which is then consumed by the family, which can eventually cause symptoms of diarrhea in the family (Setyaningsih & Diyono, 2020).

Food sanitation is closely related to hygiene and cannot be separated. Food sanitation is an effort that aims to protect food safety by breaking the chain of development of microorganisms that are a source of disease (foodborne disease). Prevention can be done by sorting raw materials until the food is served (Rahmadhani & Sumarmi, 2017).

The Risk of Availability of Healthy Latrines for Diarrhea in Toddlers

Based on research conducted at Andi Makkasau Hospital, Parepare City, shows that the availability of healthy latrines is a risk factor for diarrhea in toddlers at Andi Makkasau Hospital, Parepare City, with $OR=17,250$, which means that parents who have healthy latrines are at risk of being 17,250 times more likely for their child to experience diarrhea. Compared to parents whose availability of healthy latrines is not at risk. This is because the latrine used is less than 10 m from the kitchen, and the family sometimes closes the latrine hole after defecating.

Ownership of a latrine is included in basic sanitation, so everyone should already have a latrine; if the latrine ownership in the community is low, the things that can interfere with health will be higher. The poor condition of latrines will hurt many aspects of life, starting from the decline in the quality of the community's living environment, contamination of drinking water sources for the community, increased incidence of diarrhea, and the emergence of several diseases (Puspitasari & Nuryani, 2015).

The condition of family latrines that do not meet the requirements can cause diarrhea in toddlers. A disease arises due to interaction with each other, namely the environment, agents, and hosts. If the agent's ability increases, it can infect humans and cause disease in humans. Bad environmental changes can also lead to increased agent development. Feces disposal sites are also important sanitation facilities in influencing the incidence of diarrhea. Disposing feces that do not meet sanitary requirements can contaminate the residential environment, soil, and water sources (Rahmadani & Ridlo, 2020).

Waste Management Risks for Diarrhea in Toddlers

Based on research conducted at Andi Makkasau Hospital, Parepare City, shows that waste management is a risk factor for diarrhea in toddlers at Andi Makkasau Hospital, Parepare City with $OR = 5.762$, which means that parents whose waste management is at risk are more likely to have diarrhea 5.762 times than their children. Parents whose waste management is not at risk. This is because the area around the toddler's house has scattered garbage, the garbage that the family throws away in the house trash is not directly transported by the garbage truck, and the garbage around the toddler's house gives off an odor. The results of this research align with previous studies that indicate a significantly higher

risk of diarrhea occurrence associated with improper waste management compared to proper waste management. This is because improper waste management creates an environment conducive to breeding animals and insects (vectors) that can transmit diseases, thereby increasing the risk of diarrhea. Waste management is closely related to public health as it can harbor disease-causing microorganisms and serve as a habitat for insects that transmit diseases (Iryanto et al., 2021).

The behavior of accumulating waste for a long time around the house or throwing it into waterways causes water bodies to stagnate, and waste decomposes so that waste becomes a vector for diarrheal disease. Garbage that needs to be properly managed or disposed of indiscriminately will become a problem for public health. This can happen because waste that is not managed properly will become a hotbed of disease (Nurlila, 2020).

Waste management is very important to prevent disease transmission. It can reduce the incidence of infectious diseases closely related to waste. Waste management is necessary to prevent the occurrence of disease vectors and disease vectors. Proper waste management consists of the stages of collection and storage, transportation, and destruction (Kjær & Schaubert, 2022).

CONCLUSION

Based on the results of research on the risk factors for diarrhea in toddlers at Andi Makkasau Hospital, Parepare City, it can be concluded that the availability of clean water is a risk factor for diarrhea in toddlers at Andi Makkasau Hospital, Parepare City, the habit of washing hands is a risk factor for diarrhea in toddlers at Andi Makkasau Hospital, Parepare City. Food sanitation is a risk factor for diarrhea in toddlers at Andi Makkasau Hospital, Parepare City. The availability of healthy latrines is a risk factor for diarrhea in toddlers at Andi Makkasau Hospital, Parepare City. Moreover, waste management is a risk factor for diarrhea in toddlers at Andi Makkasau Hospital, Parepare City.

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