International Journal Of Health, Engineering And Technology (IJHET) *E-ISSN 2829 - 8683*
Volume 4, Number 2, July 2025, *Page. 43 - 50*
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Risk Factors Associated with the Incidence of Diarrhea in Toddlers in the Working Area of Putri Ayu Health Center, Jambi City in 2025

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Abstract

Diarrhea in toddlers is one of the main causes of death in children. The Putri Ayu Health Center area in Jambi City is the area with the highest prevalence of diarrhea cases in toddlers in Jambi City, which is (5.1%). This study aims to determine the relationship between clean water facilities, toilets, waste management, waste disposal, maternal employment status, and maternal education with the incidence of diarrhea in toddlers in the Putri Ayu Health Center area in Jambi City in 2025. This type of research is quantitative research with a cross-sectional study design. The population in this study were all mothers of toddlers in the working area of Putri Ayu Health Center, Jambi City. The sample in this study was 70 mothers of toddlers. The sampling technique used proportional random sampling. Data collection used questionnaires and observations, univariate and bivariate data analysis used the chi-square test. The proportion of diarrhea incidence was 37.1%. There was a relationship between toilets (p = 0.036, PR = 2.118), waste management facilities (p = 0.043, PR = 3.556), waste disposal facilities (p = 0.028, PR = 3.849) with the incidence of diarrhea in toddlers. There was no relationship between clean water facilities, maternal employment status, and maternal education with the incidence of diarrhea. The related variables are toilet facilities, waste management facilities and waste disposal facilities. Therefore, it is recommended to maintain the environment, both toilets, waste management and waste disposal.

Keywords: Toddlers, Diarrhea, Environment

INTRODUCTION

According to World Health Organization (WHO), diarrhea is a condition in which an individual experiences three or more bowel movements in a day, or with a frequency that exceeds normal habits. Diarrhea is included in the category of diseases originating from the environment, where its spread is closely related to environmental health conditions. According to UNICEF data, diarrhea is still considered one of the main triggers of death among toddlers. In 2021, this disease contributed to approximately 9% of the total number of toddler deaths globally. In other words, this means that around 1,200 toddlers die every day, which is equivalent to around 444,000 deaths per year. Diarrhea in Indonesia is categorized as an endemic disease that has the potential to cause an Extraordinary Event and this condition is one of the main causes of death, especially in toddlers.

Various factors cause diarrhea in toddlers, with three main factors playing a role, namely: Host, Agent, And Enviroment. Factors host namely age, gender, nutritional status, knowledge. Factors agent the causes of diarrhea are microorganisms such as bacteria, viruses and parasites.[5] While the factors environment namely the physical environment (clean water facilities, healthy toilets, waste management and waste disposal), social environment (mother's employment status, education).
Diarrhea is still a public health problem in Jambi Province, it is known that the prevalence of diarrhea in toddlers in 2022 was 910 (1.9%) and increased in 2023 to 1,388 (2.4%). From the findings of 20 Health Centers in Jambi City, the highest cases occurred in the working area of the Putri Ayu Health Center in Jambi City, namely in 2021 194 (4.2%) cases were found, in 2022 185 (4.3%) cases were found, and in 2023 219 (5.1%) cases were found.

Based on the initial survey conducted, the high incidence of diarrhea was due to hygienesanitation of local residents does not meet the requirements such as waste channels that are not made according to standards resulting in pools of wastewater around residents' homes, garbage is still found scattered in the yard area, and also the community's habitual behavior of defecating in the

river. With this background, researchers are interested in knowing the risk factors associated with the incidence of diarrhea in toddlers in the work area of the Putri Ayu Health Center, Jambi City

RESEARCH METHODS

This research is a quantitative study with an analytical observational design that applies a descriptive approach cross-sectional. The study was conducted in the working area of Putri Ayu Health Center, Jambi City from April to May 2025. The population of this study was all mothers who had toddlers in the working area of Putri Ayu Health Center, totaling 2,986 mothers, with 70 mothers of toddlers as respondents.

The independent variables in this study are clean water facilities, healthy toilets, waste management, waste disposal, maternal employment status, maternal education. While the dependent variable of this study is the incidence of diarrhea. Data were obtained by interviewing mothers of toddlers using questionnaires and observations were made. Data analysis used the test Chi-square.

RESULTS AND DISCUSSION

Univariate Analysis

Frequency Distribution of Respondent Characteristics

Table 1 Frequency Distribution of Toddler Characteristics

aracteristics of Toddlers	Frequency	Percentage
Toddler Age		
≤ 24 months	26	37.1
> 24 months	44	62.9
Gender		
Man	36	51.4
Woman	34	48.6

The results of the univariate analysis showed that most of the age group >24 months were 44 (62.9%). Most were male, namely 36 (51.4%).

Frequency Distribution of Research Variables

Table 2 Frequency Distribution of Research Variables in the Working Area of Putri Ayu Health Center, Jambi City in 2025

Variables	Frequency	Percentage
Diarrhea Incident		
Diarrhea	26	37.1
Not Diarrhea	44	62.9
Clean Water Facilities		
Does not meet the requirements	19	27.1
Meet the requirements	51	72.9
Healthy Toilet Facilities		
Does not meet the requirements	33	47.1
Meet the requirements	37	52.9
Waste Management Facilities		
Does not meet the requirements	54	77.1
Meet the requirements	16	22.9
Waste Disposal Facilities		
Does not meet the requirements	53	75.7
Meet the requirements	17	24.3

Mother's Employment Status		
Work	13	18.6
Doesn't work	57	81.4
Mother's Education		
Low educated	59	84.3
Highly educated	11	15.7

Based on the results of univariate analysis, it is known that the prevalence of diarrhea in toddlers in the working area of Putri Ayu Health Center, Jambi City reached 37.1%. In the clean water facility variable, the majority of respondents have clean water facilities that meet the requirements, namely 51 people (72.9%). In the toilet facility variable, the majority of respondents have toilets that meet the requirements, namely 37 people (52.9%). When viewed from the waste management facility variable, the majority of respondents have waste management facilities that do not meet the requirements, namely 54 people (77.1%). The wastewater disposal facility variable, the majority of respondents have wastewater disposal facilities that do not meet the requirements, namely 53 people (75.7%). As for the mother's employment status variable, it is categorized into 2 (two), namely, working and not working. The majority of respondents are those who do not work, namely 57 people (81.4%). The mother's education variable is also categorized into 2 (two) categories, namely, low education and high education. Based on the results of the study, the majority of respondents have low education, namely 59 people (84.3%).

Bivariate Analysis

The Relationship Between Clean Water Facilities and Diarrhea Incidence in Toddlers

Table 3 Relationship between Clean Water Facilities and Diarrhea Incidents in Toddlers

Clean Water Facilities	Diarrhea Incident				Amount		PR (95%CI)	P Value
	Diarrhea		Not Diarrhea					
	n	%	n	%	n	%		
Does not meet the requirements	9	34.6	10	22.7	19	27.1	1.421(0.770-2.622)	0.422
Meet the requirements	17	65.4	34	77.3	51	72.9		

The proportion of families who have access to clean water facilities according to standards is (65.4%), while the rest (34.6%) do not meet the requirements. The results of the bivariate analysis show a value p-value of 0.422 which is > from the α value (0.05). Thus, it can be concluded that the relationship between the availability of clean water facilities and the incidence of diarrhea in toddlers is not statistically significant.

The Relationship Between Toilets and Diarrhea Incidence in Toddlers

Table 4 Relationship between Latrines and Diarrhea Incidence in Toddlers

Toilet	Diarrhea Incident				Amount		PR (95%CI)	P Value
	Diarrhea		Not Diarrhea					
	n	%	n	%	n	%		
Does not meet the requirements	17	65.4	16	36.4	33	47.1	2.118(1.097-4.088)	0.036
Meet the requirements	9	34.6	28	63.6	37	52.9		

The percentage of toddlers experiencing diarrhea in the group with inadequate toilet facilities was greater (65.4%) compared to the group with adequate toilets (34.6%). Based on the results of the bivariate analysis, there was a significant correlation between the incidence of diarrhea in toddlers and the presence of toilet facilities, which showed a p-value is 0.036 smaller than the α value (0.05). With Prevalence Ratio (PR) of 2.118 (CI 95%: 1.097–4.088), toddlers from households with inadequate toilets are 2.1 times more likely to experience diarrhea.

The Relationship Between Waste Management and Diarrhea Incidence in Toddlers

Table 5 Relationship between Waste Management and Diarrhea Incidents in Toddlers

Waste management	Diarrhea Incident				Amount		PR (95%CI)	P Value
	Diarrhea		Not Diarrhea					
	n	%	n	%	n	%		
Does not meet the requirements	24	92.3	30	68.2	54	77.1	3.556(0.940-13.447)	0.043
Meet the requirements	2	7.7	14	31.8	16	22.9		

Households with inadequate waste management facilities have a higher percentage of diarrhea incidents in toddlers (92.3%) compared to households with adequate waste management facilities (7.7%). The results of the bivariate analysis showed a p-value of 0.043 which is smaller than α (0.05), which shows a significant relationship between the incidence of diarrhea in toddlers and waste management facilities. With a value of Prevalence Ratio (PR) of 3.556 (95% CI: 0.940-13.447) families with inadequate waste management facilities were 3.5 times more likely to experience diarrhea than families with adequate waste management facilities.

The Relationship Between Waste Disposal and Diarrhea Incidence in Toddlers

Table 6 Relationship between Waste Disposal and Diarrhea Incidents in Toddlers

Waste Disposal	Diarrhea Incident				Amount		PR (95%CI)	P Value
	Diarrhea		Not Diarrhea					
	n	%	n	%	n	%		
Does not meet the requirements	24	92.3	29	65.9	53	75.7	3.849(1.013-14.627)	0.028
Meet the requirements	2	7.7	15	34.1	17	24.3		

The proportion of diarrhea incidents in toddlers was recorded at (92.3%) in families who did not have adequate waste disposal facilities and only (7.7%) in families with facilities that met standards. Based on the results of the bivariate analysis, the value obtained was p-value of 0.028 which is smaller than the α value of 0.05. The results of the bivariate analysis showed a significant relationship between the condition of waste disposal facilities and the incidence of diarrhea in toddlers. The value Prevalence Ratio (PR) of 3.849 (95% CI: 1.013-14.627) shows that families with inadequate waste disposal facilities have a 3.8 times greater risk of experiencing diarrhea compared to families with adequate facilities.

Relationship between Mother's Employment Status and the Incidence of Diarrhea in Toddlers

Table 7 Relationship between Mother's Employment Status and the Incidence of Diarrhea in Toddlers

Mother's Employment Status	Diarrhea Incident				Amount		PR (95%CI)	P Value
	Diarrhea		Not Diarrhea					
	n	%	n	%	n	%		
Work	4	15.4	9	20.5	13	18.6	0.797(0.331-1.919)	0.834
Doesn't work	22	84.6	35	79.5	57	81.4		

The proportion of diarrhea incidents in toddlers of working mothers (15.4%), the percentage of toddlers experiencing diarrhea was higher in the group of mothers who did not work (84.6%). On the other hand, the p-value bivariate analysis of 0.834 is higher than α = 0.05. This shows that the incidence of diarrhea in toddlers and maternal occupation do not have a significant relationship.

Relationship between Mother's Education and the Incidence of Diarrhea in Toddlers

Table 8 Relationship between Mother's Education and the Incidence of Diarrhea in Toddlers

Mother's Education	Diarrhea Incident				Amount		PR (95%CI)	P Value
	Diarrhea		Not Diarrhea					
	n	%	n	%	n	%		
Low Education	25	96.2	34	77.3	59	84.3	4.661(0.703-30.924)	0.079
Highly Educated	1	3.8	10	22.7	11	15.7		

The proportion of diarrhea incidents in toddlers with low-educated mothers was (96.2%), while in toddlers with highly educated mothers it was (3.8%). The results of the bivariate analysis showed a

value of p-value of 0.079 which is greater than the α value (0.05), so it can be concluded that there is no significant relationship between maternal education and the incidence of diarrhea in toddlers.

Discussion

Risk Factors of Clean Water Facilities with Diarrhea Incidence in Toddlers

Based on the results of the bivariate analysis, there was no significant relationship between the incidence of diarrhea in toddlers and clean water facilities, which shows a value of p-value of 0.422 is greater than 0.05. This finding is in line with research by Apriyana Irjayanti, Maxsi Irmanto, et al (2024) which found that there was no relationship between the incidence of toddler diarrhea and clean water facilities, with a value of p-value of 0.145. Similar research conducted by Nurfachanti Fattah, Zulfahmidah, et al. (2022) with a value of p-value of 0.269 also shows that there is no significant relationship between the incidence of toddler diarrhea and clean water facilities.

However, the condition of clean water infrastructure can still affect the risk of diarrhea, because water is very important for daily activities such as bathing, washing, toilets, and drinking. Therefore, clean water sources must meet health standards so as not to be contaminated. The type of water used for routine hygiene and sanitation directly affects the likelihood of toddlers getting diarrhea. Several studies have confirmed that toddlers in households with reliable access to safe drinking water face a lower risk of diarrhea. Clean water remains the foundation of public health, because it can interfere with or facilitate the transmission of various diseases, especially diarrhea. In addition, deteriorating water quality can cause the spread of disease, considering that diarrhea-causing vectors can breed and spread through contaminated water.

Based on the research results, it was found that most people have used PDAM and only a few use wells, so the water used has met the requirements to be used as clean water. The requirements for clean water facilities include clean water facilities in the form of water (PDAM/pipe, dug wells, drilled wells), more than 10 meters from sources of pollution/latrines, and meeting the physical quality of water (colorless, odorless).

Risk Factors of Latrines with Diarrhea Incidence in Toddlers

Bivariate analysis yields values p-value of 0.036 which is close to the significance limit α (0.05) shows a significant relationship between the incidence of diarrhea in toddlers and the condition of toilet facilities. Toddlers who live in households with inadequate toilet conditions have a 2.118 times higher risk of getting diarrhea compared to toddlers who live in environments with adequate sanitation.

This finding is in line with the results of research conducted by Winarti A. Sy Pagisi and colleagues in 2023, which showed the value p-value of 0.000, these results indicate a significant relationship between the availability of toilet facilities and the incidence of diarrhea in toddlers. Another study by Fitri Rachmillah Fadmi and colleagues in 2020 also supports this finding, by obtaining a value of p-value of 0.004, which also confirms the relationship between toilet sanitation conditions and the risk of diarrhea in toddlers.

Diarrhea can spread through human waste, therefore all family members need to use a clean toilet to avoid insects that can be vectors for transmitting disease through food. Using a healthy toilet and maintaining its cleanliness can reduce the risk of diarrhea.[10] Using a clean and healthy toilet will not attract flies or insects that can transmit diseases caused by human waste, such as diarrhea and other diseases. Toilets that do not meet sanitation standards can be a source of spreading bacteria. and bacteria that cause diarrhea.

The results of the study showed a relationship between toilet facilities and the incidence of diarrhea in toddlers. Based on observations, most people have toilets that do not have septic tanks so that the waste is directly into the river, have toilets that are not equipped with complete roofs and walls and also have floors made of wood so that they are not waterproof and slippery.

Risk Factors of Waste Management with Diarrhea Incidence in Toddlers

Bivariate analysis showed a statistically significant relationship between waste management and the incidence of diarrhea in toddlers, with a p-value of 0.043 which is below the significance level

(α= 0.05). The risk of diarrhea in toddlers from families with inadequate waste management is 3.556 times higher compared to families with an effective waste management system.

The results of this study are in line with the research of Putu Natasha Arivia Candra Nugraha et al. (2021) which obtained a p-value of 0.027 which indicates a similar relationship. Likewise, research by Putu Bayu Agus Saputra et al (2024) supports the existence of this relationship, namely the value p-value of 0.041 which further strengthens the significant relationship between the quality of waste management and the incidence of diarrhea in toddlers.

Improper waste management can become a breeding ground for various pathogens and pests that attract disease-carrying flies. Waste management is a crucial aspect in maintaining environmental sustainability and public health.[16] One of the factors causing diarrhea in toddlers is improper waste management. Improper waste management makes it easy for vectors such as flies to move from piles of waste to food, thereby increasing the risk of disease transmission.

Based on the research findings, most of the waste management facilities in the respondents' homes do not meet the requirements. Many households do not have trash bin facilities, or only have trash bins that are open and not properly closed. In addition, trash is still widely dumped carelessly in the yard, which then becomes a breeding ground for pathogenic insects such as flies and cockroaches. The trash bins used are often plastic bags or sacks that are not waterproof, thus further inviting the presence of these vectors.

Risk Factors of Waste Disposal with Diarrhea Incidence in Toddlers

Bivariate analysis showed the value p-value of 0.028 which is below the significance threshold (α= 0.05), These results indicate a strong relationship between the incidence of diarrhea in toddlers and waste disposal facilities. The risk of diarrhea in toddlers in families with inadequate waste disposal facilities is 3.849 times higher than in families with good waste disposal facilities.

This finding is in line with research by Zidni Fauziyah et al (2023) which reported a significant relationship between the incidence of diarrhea in toddlers and waste disposal methods, with a p-value of 0.039. Research by Miswan, Firyanti, et al. (2023) also showed a p-value of 0.008 which further strengthens the relationship between waste disposal facilities and the incidence of diarrhea in toddlers. Effective wastewater disposal aims to remove waste from residential areas to control and prevent the growth of disease-causing organisms and the spread of infections. Poor wastewater management contributes to public health risks by facilitating the transmission of diseases, especially diarrhea, and also causes unpleasant odors and pollution of water, soil and air. Therefore, effective waste management is essential to prevent environmental pollution and wastewater from becoming a breeding ground for flies and other disease-causing microorganisms, contaminating water sources and soil, and producing undesirable odors.

The majority of respondents do not have proper waste disposal, according to research results from the Putri Ayu Health Center work area. so that wastewater often stagnates around the house. In addition, some respondents dispose of wastewater into open drains, which has the potential to increase the risk of environmental pollution and the spread of diseases, including diarrhea.

Risk Factors of Maternal Employment Status with Diarrhea Incidence in Toddlers

Bivariate analysis showed the value p-value of 0.834 which is greater than the significance threshold (α= 0.05) which shows that there is no significant relationship between the mother's employment status and the incidence of diarrhea in toddlers.

This finding is in line with the research results of Sarah Meutuah et al. (2024) who obtained a p-value of 0.928, which shows that there is no significant relationship between the mother's occupation and the incidence of diarrhea. Likewise, Inas Tri Ramadhanti et al (2022) obtained a p-value of 0.189, which shows that there is no significant relationship between maternal occupation and diarrhea in toddlers.

In theory, maternal employment can affect the incidence of diarrhea in toddlers. Mothers who do not work tend to have more time to care for their children, which can reduce the risk of diarrhea.

On the other hand, working mothers often have to hand over child care to others, so that children have a higher risk of being exposed to diseases such as diarrhea.
In this study, no significant relationship was found between the mother's employment status and the incidence of diarrhea because based on observations, most respondents were housewives, and only a small number worked.

Risk Factors of Maternal Education with Diarrhea Incidence in Toddlers

Bivariate analysis yields values p-value of 0.079, which is greater than the significance threshold (α= 0.05), indicating that there is no statistically significant relationship between maternal education and the incidence of diarrhea in toddlers. This finding is in line with the research results of Ryska Sintya Septiani et al. (2024) who reported the p-value of 0.763, which confirms that there is no significant relationship between maternal education and the incidence of diarrhea in toddlers. Likewise, Nurul Awalia et al. (2023) found a p-value of 0.892 which supports the absence of a significant relationship.

Nevertheless, maternal education remains an important factor in shaping health knowledge, attitudes, perceptions, beliefs, and assessments. Higher levels of education usually increase awareness and attention to personal hygiene and environmental hygiene. Education also enhances the learning process, making it easier to access health information from various sources such as interpersonal communication and mass media. This in turn improves health understanding and behavior.

Based on research findings, there is no significant relationship between the mother's education level and the incidence of diarrhea in toddlers, because the results of observations show that most respondents have lower secondary education and only a few have higher education.

CONCLUSION

The results of the study at Putri Ayu Health Center in Jambi City showed that there was a relationship between toilet facilities, waste management and waste disposal with the incidence of diarrhea in toddlers, but there was no relationship between clean water facilities, maternal employment status, and maternal education with the incidence of diarrhea in toddlers.

The community should provide septic tanks for the disposal of feces so as not to pollute the surrounding environment, and it is also recommended that the community provide watertight and closed waste disposal facilities.

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