

The Relationship Of Clean Water And Environmental Sanitation To The Incident Of Diarrhea: Systematic Review

Dewi Rahmadani Siregar*, Abdul Razak, Elsa Yuniarti, Linda Handayuni

Environmental Science Study Program, Padang State University Graduate School, Padang, Indonesia

*Corresponding author: dewarahmadani000@gmail.com

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Abstract

Indonesia is one of the developing countries that experiences diarrhea problems. This is because of its high morbidity and mortality. Diarrhea is an endemic disease that has the potential to cause Extraordinary Events (KLB) which are often accompanied by death in Indonesia. Most diarrheal diseases can be prevented through safe drinking water and adequate sanitation and hygiene. This study aims to determine the relationship between environmental sanitation and the incidence of diarrhea in toddlers. This research uses a systematic review method (Systematic Review) which is a research method for identifying, evaluating, and interpreting research results that are relevant to a particular research topic, or phenomenon that is the focus of the research. The results of this research show that there is a relationship between environmental sanitation such as the physical quality of water, ownership of a toilet, type of floor in the house, and the incidence of diarrhea. It is hoped that after this research is carried out, mothers and health policy stakeholders such as the health department and community health centers can improve residential environmental health programs to have physically clean water quality and good environmental sanitation.

Keywords: *Environmental Sanitation, Diarrhea, Toddlers, Systematic Review*

INTRODUCTION

Diarrhea is still a health problem in Indonesia for all age groups, especially in children under five years (toddlers). According to the World Health Organization (WHO), diarrhea is ranked second as the cause of death of children under five in the world. Every year, diarrhea kills 525,000 children under five and causes 1.7 million children to suffer from diarrhea worldwide. In Indonesia, according to the 2007 Basic Health Research (Riskesmas), diarrhea is the highest cause of death in 31.4% of infants and 25.2% of toddlers of all causes of death in infants and toddlers. A study of health problems based on the life cycle in 2011, carried out by the Health Research Agency in 15 districts/cities, found that deaths due to diarrhea were 17.4% in babies and 13.3% in toddlers. Based on BPJS data, it is known that there were 344,528 cases of diarrhea in 2017 and 243,983 cases of diarrhea in 2018.

High diarrhea morbidity and mortality are generally caused by contaminated

water and food sources. In the world, there are 780 million individuals who have limited access to adequate drinking water and 2.5 million have limited access to adequate sanitation. A portrait of sanitation in Indonesia from the results of the environmental health risk assessment (EHRA) study in 2012-2013 found that there were still 76.6%, 20.9% of non-functional toilets and toilets (MCK) facilities, 49.5% of unsanitary toilets, 49.5% not using clean, protected water 42.5%, not washing hands with soap at 5 important times 81.5%.

According to the World Health Organization (WHO), diarrhea is a disease characterized by changes in the shape and consistency of stool from soft to liquefied and an increase in the frequency of defecation that is more than usual, namely 3 or more times a day which may be accompanied by vomiting or bloody stool . Diarrhea is the excretion of feces with increased frequency (three times a day) with changes in the consistency of the

feces to become soft or watery, with or without blood/mucus in the feces (Iryanto, 2021).

Most diarrheal diseases can be prevented through safe drinking water and adequate sanitation and hygiene (WHO, 2017). Environmental factors related to diarrhea include the availability of drinking water, use of latrines, and disposal of household waste (Dharmayanti & Tjandrarini, 2020). The incidence of diarrhea in children is caused by various factors such as environmental sanitation and community behavior. Environmental sanitation is a health effort to prevent disease transmission by paying attention to environmental risk factors such as family latrines and clean water. Human behavior shows the health of the community (Kurniawan, 2021).

Sanitation according to the World Health Organization (WHO) is an effort that monitor several physical environmental factors that influence humans, especially things that influence the effects, damage, physical development, health and survival. Basic sanitation is the minimum environmental and health requirement that every family must have to meet their daily needs. Basic home sanitation is a public health measure that focuses on managing various environmental factors that may or may affect human health. The living environment greatly influences the occurrence and spread of diarrheal disease. The impact of poor hygiene can affect the quality of the community's environment, pollute community drinking water sources, and increase the transmission of environmentally related diseases such as diarrhea (Hamijah, 2021). Sanitation is an effort to reduce the number of disease germs in the environment so that human health is maintained perfectly. Environmental sanitation is essentially an optimum environmental condition or condition so that it has a positive effect on optimum health status (Savitri, 2022).

The various facts above show that diarrhea is still a problem both in the world and in Indonesia. Diarrhea can affect all age groups. Diarrhea is often considered a common disease with various myths

accompanying it, this shows that public knowledge is still low. Diarrhea can be prevented by controlling diarrhea risk factors such as safe drinking water, good hygiene and sanitation. Comprehensive efforts with cooperation from various parties to reduce morbidity and mortality rates need to be carried out more intensively.

Materials and Study Design

This type of research is research that uses a systematic review method. Kitchenham (2004) states that a systematic review is a method in research to identify, evaluate, and interpret research results that are relevant to a particular research topic, or phenomena that are the focus of the research. A systematic review is carried out by reviewing scientific articles in a structured and planned manner.

The literature search was carried out in December 2023. Data sources include Pubmed.gov, Science Direct, and Google Scholar. Apart from that, articles are searched using the Publish or Parish search engine. The databases searched included articles published in 2023-2018. A literature search was carried out using keywords related to environmental sanitation, diarrhea and toddlers without language restrictions. The following keywords were used in the search of all databases: "Environmental Sanitation", "Diarrhea", and "Toddlers".

This research uses four inclusion criteria, namely, research with the title the relationship between environmental sanitation and the incidence of diarrhea, then the criteria are articles written in Indonesian and in the period 2023-2018.

METHOD

The stages of literature collection refer to the *Preferred Reporting Items for Systematic Review and Meta-Analysis* (PRISMA) guidelines. This stage consists of four activities, namely article identification, article screening, article eligibility and article acceptance. At the article identification stage, this is done by searching article sources on the internet (*article searching*) or sources in other

literature. Next, at the article screening stage, duplicate articles are filtered and a feasibility assessment process is carried out on the articles by extracting information from the title and abstract of each article. Eligible articles are those that are relevant to the research questions and objectives of this systematic review. Then, at the article acceptance stage, articles are determined that meet the specified inclusion criteria and are suitable for use for synthesis quantitative. Acceptance is carried out by reading the entire content of the article (Liberati *et al.*, 2009).

Information and data obtained from literature extraction results are then synthesized without carrying out meta-analysis or qualitative synthesis (*Synthesis Without Meta-analysis, SWiM*). Qualitative synthesis is carried out by summarizing research results comprehensively and narrating the results descriptively.

RESULTS AND DISCUSSION

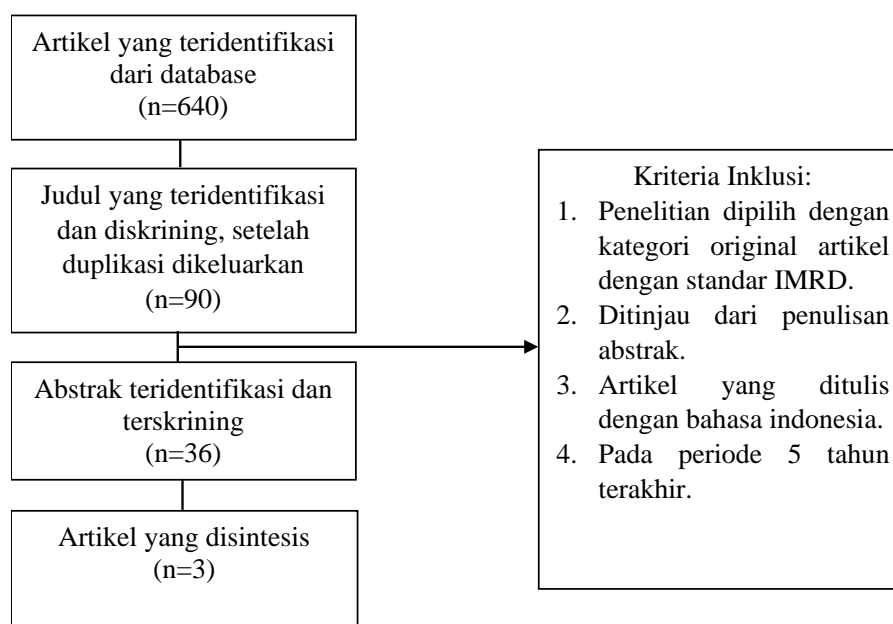


Figure 1. Article selection process.

Table 1. Summary description of data from included studies

Title	Author/Year	Method	Results
The Relationship between Environmental Sanitation and Mother's Knowledge on the	(DP, Wicaksono, 2022)	The method used in this research is this research method is an analytical observational research with a cross sectional approach. Using a	The relationship between clean water supply facilities and the incidence of diarrhea in children under five shows the results of this study. Bivariate tests using statistical

Incidence of Diarrhea in Toddlers in the Working Area of the Mataraman Community Health Center, Banjar Regency		sample of 82 respondents. Research steps include questionnaires and observation sheets, interviews, and data analysis using the chi-square test	tests produced the value of the knowledge variable (p-value = 0.012), the value of the clean water variable (p-value = 0.015), and the average variable. availability of trash cans. value (p-value = 0.026). Community health centers are encouraged to increase public health promotion, especially for mothers, through diarrhea education, as well as expanding knowledge and environmental cleanliness regarding diarrhea in babies so that the incidence of diarrhea can be reduced.
The Relationship between Environmental Sanitation and the Incidence of Diarrhea in Toddlers	(Siti Hamijah, 2021)	The method in this research is the Cross Sectional method, where the independent variables and dependent variables are examined by measurement at the same time with the aim of finding out whether or not there is a relationship between the variables. The analysis carried out in this research was univariate data to determine the frequency distribution, bivariate analysis to determine the relationship between variables, and bivariate analysis using the chi-square test.	Based on the incidence of diarrhea, 30 respondents (37.0%) experienced diarrhea from 81 respondents. Based on incidents of physical water quality that did not meet the requirements, 45 respondents (55.6%). Based on latrine ownership, 50 respondents (41.7%) did not have a latrine. Based on the type of floor in the house, 49 respondents (60.5%) were not waterproof. The results of the research show that there is a relationship between physical water quality (p-value 0.000), toilet ownership (p-value 0.000), type of house floor (p-value 0.004) with the incidence of diarrhea in toddlers. It is hoped that the puskesmas can make improvements related to clean water facilities, healthy latrine facilities and improve residential environmental sanitation programs with the aim of having physically clean water quality.
The Relationship between Clean Water and Environmental Sanitation and the Extraordinary Event of Diarrhea	(Wa Ode Rona Freya, 2022)	The research method used is univariate and bivariate analysis. This research uses a cross-sectional study with the dependent variable, namely the presence of diarrhea outbreaks in all villages in West Java; as	The results of the research show that several variables have a significant relationship with the presence of diarrhea outbreaks, including sources of drinking water (p-value = 0.01361), places for bathing/washing water (p-value = 0.005177), use of

well as independent variables related to clean water and environmental sanitation, such as sources of drinking water, sources of water for bathing/washing, rubbish dumps, places for bathing/washing water, use of defecation facilities, and final disposal of feces. defecation facilities (p-value = 4.119e-05), and landfill (p-value = 8.889e-05). Meanwhile, variables that did not have a significant relationship with the presence of diarrhea outbreaks were water sources for bathing/washing (p-value = 0.18) and rubbish dumps (p-value = 0.52)

DISCUSSION

Clean water supply

Regulation of the Minister of Health of the Republic of Indonesia Number 416/MENKES/PER/IX/1990, clean water is water used for daily needs whose quality meets health requirements and can be drunk immediately after cooking. Clean water facilities must meet health requirements so that they do not experience pollution and the direct or indirect spread of diseases called water borne diseases or water related diseases. The source of clean water comes from a dug well, must have walls and a well rim, have a waste water drainage channel, be located more than 10 meters from rubbish bins and livestock pens

Results of research conducted by Siti Hamijah, 2021: There were fewer physical water qualities that met the requirements, namely 36 respondents (44.4%) and 45 respondents (55.6%) had physical water quality that did not meet the requirements. The statistical results show a p-value = 0.000 \geq 0.05, meaning that it can be concluded that there is a relationship between the physical quality of clean water and the incidence of diarrhea in toddlers.

Furthermore, Wa Ode Rona Freya's research, 2022, shows that the clean water sources in this research are drinking water sources and water sources for bathing/washing. The source of drinking water that is most often chosen by the majority of village/subdistrict communities is refillable water in 1520

villages/subdistricts (25.52%), wells in 1479 villages/subdistricts (24.83%), drilled wells/pumps in 1313 villages/subdistricts (22.04 %), and springs in 1071 villages/sub-districts (17.98%). Based on pvalue = 0.01 < 0.05, it is known that drinking water sources have a significant relationship with the presence of diarrhea outbreaks.

Toilet Ownership

The condition of a latrine can be said to meet the requirements if it meets several predetermined requirements, including having a distance of >10 meters from a water source, having a septic tank, being free from vectors, having an easy-to-use stand, being easy to clean, being free from odors, and not polluting the ground surface. Latrine conditions that do not meet the requirements will pollute the environment from human waste and become a medium for transmitting pathogenic microorganisms that cause diarrhea. To reduce and prevent diarrhea in toddlers, it is necessary to minimize pollution by increasing knowledge of the dangers of pollution by increasing knowledge of the dangers of fecal pollution for health. You can also carry out latrine maintenance by always diligently cleaning the latrine floor 2-3 times a week so that the latrine is clean, there is no visible dirt, does not allow water to pool on the latrine floor, there are no vectors that breed in the latrine building, there are no scattered rubbish, sufficient water available, soap and cleaning tools available, and immediately repairing the latrine if any part is damaged

The results of research conducted by Siti Hamijah, 2021 show that there is a relationship between the condition of toilets and the incidence of diarrhea in toddlers, where the results of testing using Chi Square show a p-value = $0.000 \leq 0.05$, which means there is a relationship between ownership of toilets and the incidence of diarrhea in toddlers. The results of the analysis obtained an OR value of 5.614 (CI 95% 297-15.031), meaning that respondents who had toilets could prevent diarrhea compared to respondents who did not have toilets at the OKI Community Health Center in 2019.

Garbage dump

results of research conducted by Wa Ode Rona Freya, 2022 The most widely used waste disposal sites are pits (collected in pits and then burned) in 3330 villages/kelurahan (55.90%) and rubbish bins (which are then transported) in 1701 villages (28.55 %). The relationship between waste disposal sites and the presence of diarrhea outbreaks is not significant as seen from p-value = $0.52 > 0.05$. Likewise, the relationship between each type of waste disposal site and the presence of outbreaks of diarrhea is compared with other types of waste disposal sites.

Condition of Fecal Water Drains

Human feces is another important problem that can cause diarrhea. Improper disposal of feces can contaminate water and soil (Saleh & Rachim, 2014). One effort to overcome the feces problem is the use of healthy latrines in every home. A healthy latrine is a place to defecate that has a squat toilet/gooseneck seat and a proper place to store feces (Kosasih & Indiani, 2022).

Research conducted by Wa Ode Rona Freya, 2022 shows that the relationship between the use of defecation facilities is significant and the presence of diarrhea outbreaks, seen from the p-value = $0.00 < 0.05$. The four types of defecation facilities were also tested for their relationship to the presence of diarrhea outbreaks compared to other types of

defecation facilities, for example individual latrines compared to a combination of the three other types of defecation facilities. Based on a p-value < 0.05 , it is known that the four types of defecation facilities have a significant relationship with the presence of diarrhea outbreaks.

in the form of images (GIF, JPG, etc).

CONCLUSIONS AND SUGGESTIONS

Conclusion

From the 3 studies described above, it can be concluded that there is a significant relationship between the provision of clean water, ownership of latrines and rubbish dumps and the condition of feces disposal and the incidence of diarrhea in toddlers. In this literature review, there are also causes of poor environmental sanitation, such as inadequate clean water facilities, inadequate toilet conditions, and poor household waste disposal sites.

Suggestion

It is hoped that community health centers and health services in Indonesia can make improvements related to clean water facilities, healthy latrine facilities and increase residential environmental health programs with the aim of having physically clean water quality. as well as holding outreach regarding the importance of structured environmental sanitation throughout Indonesia. It is hoped that with these policies and recommendations, the incidence of diarrhea which is deadly to children under five will decrease drastically or even become non-existent in Indonesia for the sake of Indonesia's golden generation.

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