

Analysis of the Relationship between Environmental Sanitation and the Incidence of Diarrhea in Toddlers at the Khairani Siregar BPM Clinic, Batu VI Housing Complex, Simalungun Regency

Sri Rahma Friani¹, Yeni Trisna Purba², Nor Riza³

¹²³ Program Studi Kebidanan, Fakultas Kesehatan, Universitas Efarina, Indonesia

Article Info

Article history:

Received April 20, 2024

Revised May 09, 2024

Accepted May 22, 2024

Corresponding Author:

Sri Rahma Friani

Efarina University, Indonesia

Email:

rahma.friani@gmail.com

ABSTRACT

Diarrhea is still a health problem and a cause of death in toddlers. Poor environmental sanitation can affect the high incidence of diarrhea. According to the World Health Organization (WHO) in 2021 diarrhea is the second leading disease that causes death in toddlers and causes 525,000 toddlers to die each year. The research design used was correlational analytic with a cross-sectional approach. The population in this study were mothers who had toddlers who experienced diarrhea at BPM Khairani Perumnas Batu VI, Simalungun Regency, totaling 38 people. The sampling technique was total sampling. Data collection was carried out by filling out questionnaires and data analysis using univariate analysis and bivariate analysis with the Chi-Square statistical test. From the results of the study, it was obtained based on drinking water sources that the Chi-Square test results were obtained with a P value of 0.001 (<0.05). Based on the ownership of toilets, the Chi Square test results showed a p-value = 0.002 (≤ 0.05) and based on the type of house floor, the p-value = 0.002 (≤ 0.05). It can be concluded that there is a significant relationship between drinking water sources, family toilet ownership and type of house floor with the incidence of diarrhea in toddlers. It is hoped that health workers will further maximize health programs, one of which is regarding increasing public knowledge, especially mothers who have toddlers, about environmental sanitation to prevent the incidence of diarrhea in toddlers.

Keywords: Environmental sanitation, Diarrhea, Toddlers

This article is licensed under a [Creative Commons Attribution-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-sa/4.0/).



1. INTRODUCTION

Diarrheal disease remains a leading cause of morbidity and mortality. Diarrhea affects nearly every geographic region of the world and all age groups, but the most severe form of the disease, with high mortality, is found primarily in infants and young children. In North America, children suffer from diarrhea more than 12 times per year [1], diarrhea causes 15-34% of all deaths, or approximately 300 deaths per year [2].

According to the WHO [3] nearly 1.7 billion cases of diarrhea occur in children, with a mortality rate of approximately 525,000 among toddlers each year. In Indonesia, the number of diarrhea cases in 2017 was 60 million cases per year. In 2018, the number of toddlers with diarrhea in Indonesia was 255,909 cases, and the number of cases treated in health facilities was 42,747 cases [4].

According to the World Health Organization (WHO), diarrhea is the second leading cause of death in children under five, killing 525,000 each year [5]. Most deaths from diarrhea are due to dehydration, or significant fluid loss, and also due to contaminated food and water sources. 780 million people lack access to improved drinking water, and 2.5 billion lack improved sanitation. Infectious diarrhea is widespread throughout developing countries [6].

Based on the Indonesian Ministry of Health [7] the number of diarrhea cases in Indonesia is 60 million cases every year. In 2018 in Indonesia the number of diarrhea sufferers was 255,909 cases and the number of sufferers served in health facilities was 42,747 cases [8]. Sanitation is a state or condition that can affect health, especially regarding human waste and infections that are specifically related to drainage, disposal of waste and garbage from

households, sanitation has an important role in realizing a healthy home and as a support to prevent various environmental-based diseases [9].

Many factors directly and indirectly contribute to diarrhea, including the agent, host, environment, and behavior. The most dominant environmental factors are clean water supply and fecal disposal facilities, both of which interact with human behavior [10]. If the environment is unhealthy due to contamination with diarrheal germs and combined with unhealthy human behavior, diarrhea can easily spread [11].

Based on data obtained from the Khairani BPM Clinic, diarrhea is the most common case among toddlers visiting the clinic. Based on the above description, researchers were interested in analyzing the relationship between environmental sanitation and diarrhea among toddlers at the Khairani BPM Clinic in Perumnas Batu VI, Simalungun Regency [12].

2. METHOD

The research design used was correlational analytic with a cross-sectional approach [13]. The population in this study were 38 mothers who had toddlers who had experienced diarrhea at the BPM Khairani Perumnas Batu VI, Simalungun Regency [12]. The sampling technique used was total sampling [14]. Data collection was carried out by filling out a questionnaire and data analysis using univariate analysis and bivariate analysis with the Chi-Square statistical test [15].

3. RESULTS AND DISCUSSION

Univariate Analysis

Based on the incidence of diarrhea, it was found that the majority of respondents (23 respondents) experienced diarrhea, while the minority (15 respondents) did not experience diarrhea [16].

Bivariate Chi-Square Analysis

Based on the drinking water source, it is known that the majority of toddlers with diarrhea did not meet the requirements (18 respondents (85.7%)), and a minority met the requirements (3 respondents (14.3%)). Based on the results of the study above, the Chi-Square test results were obtained with a P value of 0.001 (<0.05) [17]. These results indicate a relationship between the source of drinking water consumed and the incidence of diarrhea in toddlers at the Khairani BPM Clinic, Simalungun Regency [18].

Based on family toilet ownership, it is known that of the toddlers with diarrhea, the majority of their families do not have a toilet, as many as 16 people (88.9%) more than those who have a toilet, 2 people (11.1%). The results of the Chi Square test show a p-value = $0.002 \leq 0.05$, meaning the conclusion is that there is a relationship between toilet ownership and the incidence of diarrhea in toddlers at the Khairani BPM Clinic, Simalungun Regency [19].

Based on the type of house floor, it is known that in toddlers with diarrhea, the majority of the type of house floor did not meet the requirements (88.9%), and a minority met the requirements (11.1%). The statistical results show a p-value = $0.002 \leq 0.05$, meaning that the conclusion is that there is a relationship between the type of house floor and the incidence of diarrhea in toddlers at the Khairani BPM Clinic, Simalungun Regency [20].

DISCUSSION

The Relationship between Drinking Water Sources and the Incidence of Diarrhea in Toddlers

Based on the source of drinking water, it is known that of the 38 respondents, the majority of toddlers with diarrhea did not meet the requirements of drinking water sources of 18 respondents (85.7%) and the minority met the requirements of 3 respondents (14.3%) [21]. Based on the results of the study above, the results of the Chi-Square test were obtained with a P value of 0.001 (<0.05). These results indicate a relationship between the source of drinking water consumed and the incidence of diarrhea in toddlers [22].

The primary source of drinking water is one of the most important sanitation facilities related to diarrhea. Some infectious germs that cause diarrhea are transmitted through the fecal-oral route [23]. They can be transmitted by ingesting fluids or objects contaminated with feces, such as drinking water, fingers, and food prepared in pans washed with contaminated water [24].

The results of Zubir's research [25] research on risk factors for acute diarrhea in children aged 0-35 months (Toddlers) in Bantul Regency. The results showed that the source of drinking water used was related to the occurrence of acute diarrhea with a p value <0.05 and a prevalence ratio of 3.10 [26]. From the results of this study, it turned out that 26.7% had used PAM facilities and protected water sources as the main source of water for the family. From this analysis, it was found that 73.3% of toddlers and their families used unprotected water sources, but the percentage of diarrhea in toddlers from families who used water from unprotected water sources was quite large, namely 61.7%.

Another research result that is in line with Wibowo's [14] research concluded that there is a significant relationship between the incidence of diarrhea and the type of drinking water source [9].

The Relationship between Toilet Ownership and the Incidence of Diarrhea in Toddlers

Based on family toilet ownership, it is known that of the toddlers with diarrhea, the majority of their families do not have a toilet, as many as 16 people (88.9%) more than those who have a toilet, 2 people (11.1%). The results of the Chi Square test show a $p\text{-value} = 0.002 \leq 0.05$, meaning the conclusion is that there is a relationship between toilet ownership and the incidence of diarrhea in toddlers at the Khairani BPM Clinic, Simalungun Regency [27].

Zubir's [28] research concluded that, in addition to drinking water sources, fecal disposal sites are also important sanitation facilities that influence the incidence of diarrhea. Disposing of feces that does not meet sanitation standards can contaminate residential environments, soil, and water sources [29]. From a contaminated environment, feces accumulate through unhealthy human behavior, such as not washing hands properly after working or playing in the dirt (for children), and through food and drink, it can cause diarrhea [23].

The availability of latrines reduces environmental fecal pollution and reduces the possibility of mechanical vector access to diarrhea-causing organisms, thereby reducing diarrheal disease [30].

The results of this study are also in line with the research of Wibowo et.al (2004) which concluded that there is a significant relationship between the incidence of diarrhea and the place of disposal of feces.

The Relationship between Floor Type and the Incidence of Diarrhea in Toddlers

Based on the type of house floor, it is known that in toddlers with diarrhea, the majority of the type of house floor did not meet the requirements (88.9%), and a minority met the requirements (11.1%). The statistical results show a $p\text{-value} = 0.002 \leq 0.05$, meaning that the conclusion is that there is a relationship between the type of house floor and the incidence of diarrhea in toddlers at the Khairani BPM Clinic, Simalungun Regency [31].

The results of this study align with those of Rahadi [32]. who concluded that floor type is associated with diarrhea. This is because many floors are still made of earth, which can create dirty spaces and become breeding grounds for microorganisms, easily absorbing water that may contain microorganisms [33].

4. CONCLUSION

Based on the results of research conducted at the BPM Khairani Clinic, the following conclusions can be drawn: There is a relationship between drinking water sources and the incidence of diarrhea in toddlers. There is a relationship between family toilet ownership and the incidence of diarrhea in toddlers. There is a relationship between the type of house floor and the incidence of diarrhea in toddlers.

REFERENCES

- [1] M. P. Olortegui *Et Al.*, "Astrovirus Infection And Diarrhea In 8 Countries", *Pediatrics*, Vol 141, No 1, Jan 2018, Doi: 10.1542/Peds.2017-1326.
- [2] I. Maliga, R. Rafi'ah, A. Lestari, H. Hasifah, En N. A. Sholihah, "Analysis Of Basic Environmental Health Facilities Associated With Risk Factors Of Diarrhea Among Toddlers", *J. Kesehat. Masy.*, Vol 18, No 2, Bll 274–282, Nov 2022, Doi: 10.15294/Kemas.V18i2.35376.
- [3] F. Qiu *Et Al.*, "Adenovirus Associated With Acute Diarrhea: A Case-Control Study", *Bmc Infect. Dis.*, Vol 18, No 1, Bl 450, Des 2018, Doi: 10.1186/S12879-018-3340-1.
- [4] N. A. Lalasati, "Sustainable Sanitation For Small Island Cities". 2022, [Online]. Available At: <https://Frw.Studenttheses.Ub.Rug.Nl/Id/Eprint/4006>.
- [5] N. Anggraini En D. Purnamawati, "Relationship Between Environmental Sanitation And The Incidence Of Diarrhea In Toddlers In The Work Area Of The Cirendeu Health Center, South Tangerang City In 2022", *Muhammadiyah Int. Public Heal. Med. Proceeding*, Vol 3, No 1, Bl 488–496, 2023.
- [6] A. Getachew *Et Al.*, "Diarrhea Prevalence And Sociodemographic Factors Among Under-Five Children In Rural Areas Of North Gondar Zone, Northwest Ethiopia", *Int. J. Pediatr.*, Vol 2018, Bll 1–8, Jun 2018, Doi: 10.1155/2018/6031594.
- [7] L. Cameron, C. Chase, S. Haque, G. Joseph, R. Pinto, En Q. Wang, "Childhood Stunting And Cognitive Effects Of Water And Sanitation In Indonesia", *Econ. Hum. Biol.*, Vol 40, No September 2020, Bl 100944, 2021, Doi: 10.1016/J.Ehb.2020.100944.
- [8] F. Chassagne, J.-F. Butaud, F. Torrente, E. Conte, R. Ho, En P. Raharivelomanana, "Polynesian Medicine Used To Treat Diarrhea And Ciguatera: An Ethnobotanical Survey In Six Islands From French Polynesia", *J. Ethnopharmacol.*, Vol 292, Bl 115186, Jun 2022, Doi: 10.1016/J.Jep.2022.115186.
- [9] W. M. Manetu, S. M'masi, En C. W. Recha, "Diarrhea Disease Among Children Under 5 Years Of Age: A Global Systematic Review", *Open J. Epidemiol.*, Vol 11, No 03, Bll 207–221, 2021, Doi: 10.4236/Ojepi.2021.113018.
- [10] A. Iryanto, T. Joko, En M. Raharjo, "The Relationship Between Environmental Sanitation Risk Factors And

- The Incidence Of Diarrhea In Children Under Five In Pauh District, Padang City”, *Int. J. Heal. Educ. Soc.*, Vol 4, No 11, Bll 1–17, 2021, Doi: <https://doi.org/10.1234/Ijhes.V4i11.199>.
- [11] N. Indarti, R. Rostiani, T. Megaw, En J. Willetts, “Women’s Involvement In Economic Opportunities In Water, Sanitation And Hygiene (Wash) In Indonesia: Examining Personal Experiences And Potential For Empowerment”, *Dev. Stud. Res.*, Vol 6, No 1, Bll 76–91, Jan 2019, Doi: 10.1080/21665095.2019.1604149.
 - [12] Y. Otsuka, L. Agestika, Widyarani, N. Sintawardani, En T. Yamauchi, “Risk Factors For Undernutrition And Diarrhea Prevalence In An Urban Slum In Indonesia: Focus On Water, Sanitation, And Hygiene”, *Am. J. Trop. Med. Hyg.*, Vol 100, No 3, Bll 727–732, Mrt 2019, Doi: 10.4269/Ajtmh.18-0063.
 - [13] A. Rehana, R. J. Setiabudi, S. Sulistiawati, En M. R. Wahyunitisari, “Implementation Of Hygiene And Environmental Sanitation In Under Five Years Old Diarrhea Patients At Surabaya Primary Health Center”, *J. Ilm. Kesehat.*, Vol 3, No 1, Bll 1–15, Apr 2021, Doi: 10.36590/Jika.V3i1.99.
 - [14] F. I. Davik, “Evaluasi Program Sanitasi Total Berbasis Masyarakat Pilar Stop Babs Di Pukesmas Kabupaten Probolinggo”, *J. Adm. Kesehat. Indones.*, Vol 4, No 2, Bl 107, 2022, Doi: 10.20473/Jaki.V4i2.2016.107-116.
 - [15] U. Umiati, “The Relationship Between Environmental Sanitation With The Event Of Diarrhea In Toddlers”, *J. Eduhealth*, Vol 12, No 1, Bll 1–8, 2021.
 - [16] A. A. Iryanto, T. Joko, En M. Raharjo, “Literature Review : Faktor Risiko Kejadian Diare Pada Balita Di Indonesia”, *J. Kesehat. Lingkungan*, Vol 11, No 1, Bll 1–7, Apr 2021, Doi: 10.47718/Jkl.V11i1.1337.
 - [17] G. Mulatu *Et Al.*, “Association Of Drinking Water And Environmental Sanitation With Diarrhea Among Under-Five Children: Evidence From Kersa Demographic And Health Surveillance Site, Eastern Ethiopia”, *Front. Public Heal.*, Vol 10, Bl 962108, Nov 2022, Doi: 10.3389/Fpubh.2022.962108.
 - [18] D. D. Anggoro, I. Sumantri, Y. S. Sari, H. R. Sunoko, En R. Bicer, “Sanitation And Challenges In Sustainable Urban Water Management”, In *Aip Conference Proceedings*, 2023, Vol 2667, No 1, Bl 100003, Doi: 10.1063/5.0112372.
 - [19] D. P. Kurniawati, S. Y. Arini, I. Awwalina, En N. A. Pramesti, “Poor Basic Sanitation Impact On Diarrhea Cases In Toddlers”, *J. Kesehat. Lingkungan*, Vol 13, No 1, Bl 41, 2021.
 - [20] S. Shine, S. Muhamud, S. Adanew, A. Demelash, En M. Abate, “Prevalence And Associated Factors Of Diarrhea Among Under-Five Children In Debre Berhan Town, Ethiopia 2018: A Cross Sectional Study”, *Bmc Infect. Dis.*, Vol 20, No 1, Bl 174, Des 2020, Doi: 10.1186/S12879-020-4905-3.
 - [21] F. P. S. Indah, T. Cardiah, A. Rahmat, K. Sulandjari, A. Andiyan, En N. Hendayani, “Effect Of Community-Based Total Sanitation Program With Diarrhea Incidents In Toddler At Communities Near Rivers”, *Mater. Today Proc.*, Vol 63, Bll S349–S353, 2022.
 - [22] H. S. Rugo *Et Al.*, “The Characterization, Management, And Future Considerations For Erbb-Family Tki-Associated Diarrhea”, *Breast Cancer Res. Treat.*, Vol 175, No 1, Bll 5–15, Mei 2019, Doi: 10.1007/S10549-018-05102-X.
 - [23] S. Dwi Wahyuni, Z. Husnina, L. Sulistyorini, En R. Azizah, “Analysis Of Sanitation And Diarrhea Factors With The Incidence Of Stunting In Indonesia”, *J. Kesehat. Lingkungan. J. Dan Apl. Tek. Kesehat. Lingkungan*, Vol 21, No 2, Bll 303–316, Jul 2024, Doi: 10.31964/Jkl.V21i2.664.
 - [24] C. Nicoletti *Et Al.*, “Increasing Latrine Sales Among Poor Households In Rural Cambodia Using Targeted Subsidies: A Randomized Control Trial”, *J. Water, Sanit. Hyg. Dev.*, Vol 12, No 11, Bll 782–791, 2022, Doi: <https://doi.org/10.2166/Washdev.2022.184>.
 - [25] A. I. Lubis, Khairunnas, E. S. Putri, En T. Muliadi, “Determinant Analysis Of Open Defecation With Stunting Incidence In Aceh Singkil District”, *Morfai J.*, Vol 3, No 1, Bll 72–77, Apr 2023, Doi: 10.54443/Morfai.V3i1.511.
 - [26] B. Hailu, W. Ji-Guo, En T. Hailu, “Water, Sanitation, And Hygiene Risk Factors On The Prevalence Of Diarrhea Among Under-Five Children In The Rural Community Of Dangila District, Northwest Ethiopia”, *J. Trop. Med.*, Vol 2021, No 1, Bll 1–7, Aug 2021, Doi: 10.1155/2021/2688500.
 - [27] E. Ø. Eriksen *Et Al.*, “Post-Weaning Diarrhea In Pigs Weaned Without Medicinal Zinc: Risk Factors, Pathogen Dynamics, And Association To Growth Rate”, *Porc. Heal. Manag.*, Vol 7, No 1, Bl 54, Des 2021, Doi: 10.1186/S40813-021-00232-Z.
 - [28] A. Ernawati, “Gambaran Penyebab Balita Stunting Di Desa Lokus Stunting Kabupaten Pati”, *J. Litbang Media Inf. Penelitian, Pengemb. Dan Iptek*, Vol 16, No 2, Bll 77–94, Des 2020, Doi: 10.33658/Jl.V16i2.194.
 - [29] N. E. Soboksa, “Associations Between Improved Water Supply And Sanitation Usage And Childhood Diarrhea In Ethiopia: An Analysis Of The 2016 Demographic And Health Survey”, *Environ. Health Insights*, Vol 15, Bl 11786302211002552, Jan 2021, Doi: 10.1177/11786302211002552.
 - [30] E. Susanti, “Risk Factors For Diarrhea Cases In Communities Living Along Deli River, North Sumatera”, *J. Epidemiol. Public Heal.*, Vol 04, No 01, Bll 47–54, 2018, Doi: 10.26911/Jepublichealth.2019.04.01.06.
 - [31] S. Mebrahtom, A. Worku, En D. J. Gage, “The Risk Of Water, Sanitation And Hygiene On Diarrhea-Related Infant Mortality In Eastern Ethiopia: A Population-Based Nested Case-Control”, *Bmc Public Health*, Vol 22, No 1, Bl 343, Des 2022, Doi: 10.1186/S12889-022-12735-7.
 - [32] M. B. Ullah *Et Al.*, “Factors Associated With Diarrhea And Acute Respiratory Infection In Children Under

- Two Years Of Age In Rural Bangladesh”, *Bmc Pediatr.*, Vol 19, No 1, B1 386, Des 2019, Doi: 10.1186/S12887-019-1738-6.
- [33] J. Saha, S. Mondal, P. Chouhan, M. Hussain, J. Yang, En A. Bibi, “Occurrence Of Diarrheal Disease Among Under-Five Children And Associated Sociodemographic And Household Environmental Factors: An Investigation Based On National Family Health Survey-4 In Rural India”, *Children*, Vol 9, No 5, B1 658, 2022.