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ORIGINAL ARTICLE

ENVIRONMENTAL SANITATION AND DIARRHEA IN CHILDREN AGES 12-59 MONTHS IN POJOK VILLAGE, BOJONEGORO, INDONESIA

Hubungan Sanitasi Lingkungan dengan Diare Pada Anak Usia 12-59 Bulan di Desa Pojok, Purwosari, Bojonegoro, Jawa Timur, Indonesia

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ABSTRACT

Background: Diarrhea is caused by infection, malabsorption, and food consumption. Based on the results of the Indonesian Basic Health Research (Riskesdas) in 2018, the frequency of diarrhea in Indonesian people diagnosed by health workers is 6.80%. **Purpose**: This study aimed to determine the relationship between environmental sanitation and diarrhea in children aged 12-59 months in Pojok Village, Purwosari District, Bojonegoro Regency. **Methods:** This study used analytical observations from a *Cross-Sectiononal* design. The sampling method used was total sampling. The population for this study consisted of mothers with children aged 12-59 months, as many as 24 people in the village of Pojok in the Purwosari district of Bojonegolo Regency in 2020. The statistical test used Chi-Square with computer software. **Results:** The results showed that respondents who did not have healthy latrines had a higher risk of developing diarrhea than those who had healthy latrines (PR = 2.60, 95% CI = 1.01-6.69, p = 0.02). Respondents who did not have closed SPAL had a higher risk of developing diarrhea than those who had closed SPAL (PR = 3.10, 95% CI = 1.19-8.07, p = 0.00). Respondents who did not have a closed trash can had a higher risk of experiencing diarrhea than those with a closed trash can (PR = 3.50, 95% CI = 1.40-11.79, p = 0.00).**Conclusion:** In this study, there was a significant association between healthy latrine availability, SPAL availability, and trash availability variables and the incidence of diarrhea in children aged 12-59 months in the village of the Pojok Purwosari district of Bojonegoro.

ABSTRAK

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Latar Belakang: Diare disebabkan oleh infeksi, malabsorpsi, nutrisi, dan faktor psikologis. Menurut hasil Studi Kesehatan Dasar Indonesia (Riskesdas) tahun 2018, prevalensi diare pada masyarakat Indonesia yang didiagnosis oleh para ahli medis diketahui sebesar 6,80%. **Tujuan:** Tujuan penelitian ini adalah untuk mengetahui hubungan sanitasi lingkungan dengan kejadian diare pada balita di Desa Pojok Kecamatan Purwosari Kabupaten Bojonegoro. **Metode:** Penelitian yang digunakan yaitu metode observasional analitik dengan menggunakan studi Cross Sectional. Teknik pengambilan sampel yang digunakan adalah Total Sampling. Sampel dalam penelitian ini adalah seluruh anak yang berusia 12-59 bulan sebanyak 24 anak di Desa Pojok Kecamatan Purwosari Kabupaten Bojonegoro Tahun 2020. Uji statistik menggunakan Chi-Square dengan bantuan software komputer. **Hasil:** Hasil menunjukan bahwa responden yang tidak memiliki jamban sehat mempunyai risiko lebih tinggi untuk anaknya mengalami kejadian diare dibandingkan yang mempunyai jamban sehat *(PR = 2,60, 95% CI = 1,01-6,69, p=0,02).* Responden yang tidak memiliki SPAL tertutup mempunyai risiko lebih tinggi untuk anaknya mengalami kejadian diare dibandingkan yang mempunyai SPAL tertutup *(PR = 3,10, 95% CI = 1,19-8,07, p=0,00).* Responden yang tidak memiliki tempat sampah tertutup mempunyai risiko lebih tinggi untuk anaknya mengalami kejadian diare dibandingkan yang memiliki tempat sampah tertutup *(PR = 3,50, 95% CI = 1,40-11,79, p=0,00)***. Kesimpulan:** Penelitian menunjukan bahwa terdapat hubungan yang signifikan antara variabel ketersediaan jamban sehat, ketersediaan SPAL dan ketersediaan tempat sampah dengan kejadian diare pada anak usia 12-59 bulan di Desa Pojok, Kecamatan Purwosari, Kabupaten Bojonegoro.

INTRODUCTION

Diarrhea occurs when the stool comes out in the form of a thin liquid, which occurs more than three times a day and is accompanied by blood and mucus. This infection causes diarrhea in the digestive tract, malabsorption, and nutrition. Diarrhea is a significant cause of morbidity and mortality (1). Diarrhea significantly affects all age groups and is a severe disease with a high mortality rate, especially in infants and children. Diarrhea is an environment-based disease caused by poor environmental sanitation, such as limited access to clean water, latrines that do not meet sanitation requirements, and poor septic tank systems (2). Mothers' empowerment is associated with the incidence of diarrhea in toddlers (3).

The 2017 WHO report showed that diarrhea is the second leading cause of death in toddlers worldwide, with a mortality rate of 525,000 children (4). According to the Riskesdas results for 2018, diarrhea cases in Indonesia showed that the incidence of diarrhea is based on the diagnosis of medical personnel, which is 6.80%. This figure increased from 4.50% in the 2013 Riskesdas report (5). The East Java Province is estimated to have 49,405 cases of diarrhea, and approximately 58.70% of these cases have been handled (6). Bojonegoro Regency Health Profile in 2020: There were 33,805 cases in all age groups, and 25,137 cases (74.40%) of diarrhea were detected and treated. The cases of diarrhea in toddlers is 10,944, and toddlers get 10,041 cases of diarrhea in toddlers (91.70%) (7).

Purwosari Bojonegoro Health Center data shows diarrhea is ranked 2nd out of 10 health problems in Pojok Village, Purwosari District. This study aims to look at the link between how clean the environment is and how often children ages 12–59 months get diarrhea.

METHODS

This study was conducted in Pojok Village, Purwosari District, Bojonegoro Regency, East Java, from December 2019 to January 2020, and carried out during the Field Work Practice, Faculty of Public Health, Universitas Airlangga. This study was conducted by the Medical Research Faculty of Nursing at Universitas Airlangga. This study was approved by the Ethics Committee (number 1769-Kepk).

Analytical observational research using the cross-sectional method was used. Sampling was performed using non-probability sampling techniques, namely, the saturated sampling technique. The population consisted of mothers with children aged 12-59 months living in Pojok Village, Purwosari District, Bojonegoro Regency. The study population comprised 24 respondents. Data were collected through a questionnaire and interviews with 24 mothers with children ages 12-59 months.

The dependent variable was the history of diarrhea in toddlers. The history of diarrhea in children aged 12-59 months in the last two weeks was classified into two categories: diarrhea and non-diarrhea. Independent variables were the condition of clean water sources, the availability of healthy latrines, the availability of septic tanks, the state of the wastewater (SPAL) at home, the availability of closed trash bins, and the condition of the house floor. Data for this independent variable were collected from interviews and observations of the respondents' home environment. The criteria for a source of clean water that meets the requirements are that the location is not inundated by rainwater, that it is 15 m away from the source of pollution, and that it is closed. Healthy latrine criteria include 10-15 meters of seepage from clean water sources, no insects, closed and easy-to-clean floors, closed walls, and sufficient lighting. The following characteristics of the respondents were investigated in this study: age, education, and work. Data were collected using a questionnaire through door-to-door interviews. The chi-squared test was used to analyze the data.

RESULTS

Table 1 shows that most respondents were mothers aged 20–25 years (33.33%); the final education level of respondents was high school (37.50%), and most of the respondents worked as housewives (62.50%). It also appears that the incidence of diarrhea in children aged 12-59 months was as high as 66.70%, the cleanest water facilities met the requirements of 14 people (58.30%), the unavailability of healthy latrines was as high as 15 people (62.50%), the availability of septic tanks was as high as 14 people (58.30%), SPAL conditions were not closed in houses as high as 14 people (58.30%), the inactivation of closed trash bins was as high as 16 people (66.70%), and the condition of the house floor was in the form of 12 lands (50.00%).

Tables 1
Frequency Distribution of Respondent Characteristics, Independent Variables, and Dependents

Variable	n	%
Age		
20 – 25	8	33,33
26 – 30	7	29,16
31 – 35	5	20,83
36 – 40	4	16,66
Level of education		
Elementary School	1	4,16
Middle School	8	33,33
High School	9	37,50
Diploma	4	16,66
Bachelor	2	8,33
Type of Work		
Self-employed	4	16,66
Housewife	15	62,50
Midwife	1	4,16
Teacher	3	12,50
Nurse	1	4,16
History of diarrhea		
Yes	16	66,70
No	8	33,30
The condition of clean water facilities		
Proper	14	58,30
Not proper	10	41,70
Availability of healthy latrines		
Yes	9	37,50
No	15	62,50
The state of of the wastewater at home		
Yes	10	41,70
No	14	58,30
The availability of a closed trash can		
Yes	8	33,30
No	16	66,70
House floor condition		
Land	12	50,00
Ceramics	12	50,00
Total	24	100,00

According to Table 2, respondents who do not have healthy latrines have a higher risk of developing diarrhea than those who do (PR = 2.60, 95% CI = 1.01-6.69, p = 0.002). Respondents who

did not have a closed space had a higher risk of their children experiencing diarrhea than those with a closed space (PR = 3.10, 95% CI = 1.19–8.07, p = 0.00). Respondents who did not have closed trash cans had a higher risk of their children experiencing diarrhea than those who had closed trash bins (PR = 3.50, 95% CI = 1.40–11.79, p = 0.00). Test statistics also show no relationship between clean water sources, the availability of septic tanks, or the type of floor and the incidence of diarrhea in toddlers in Pojok Village, Purwosari District, Bojonegoro Regency, with p > 0.05.

Table 2
Environmental sanitation relations and diarrhea events in children aged 12-59 months

Variable	Diarrhea incidence				Total		p	PR	95%CI
	Yes		No						
	n	%	n	%	n	%			
Clean water source conditions									
Proper	7	70.00	3	30.00	10	100	1.00	1.90	0.62–1.91
Not proper	9	64.30	5	35.70	14	100			
Availability of healthy latrines									
No	13	86.70	2	13.30	15	100	0.02	2.60	1.01–6.67
Yes	3	33.30	6	66.70	9	100			
Availability of septic tanks									
No	8	80.00	2	20.00	10	100	0.39	1.40	0.81–2.43
Yes	8	57.10	6	42.90	14	100			
Availability of wastewater									
No	13	92.90	1	7.10	14	100	0.00	3.10	1.19–8.07
Yes	3	30.00	7	70.00	10	100			
The availability of a closed trash can									
No	14	87,50	2	12,50	16	100,00	0,01	3,50	1.04–11.79
Yes	2	25,00	6	75,00	8	100,00			
House floor condition									
No	10	83,30	2	16,70	12	100,00	0,193	1,67	0.90–3.10
Yes	6	50,00	6	50,00	12	100,00			

DISCUSSION

Relationship between Clean Water Conditions and Diarrhea Events in Children Aged 12-59 Months in Pojok Village

Based on the results of the Chi-square statistical test, it is known that the p-value is 1.00. It shows that it can be concluded that there is no relationship between the condition of clean water and the incidence of diarrhea in children aged 12-59 months in Pojok Village, Purwosari District, Bojonegoro Regency.

The results of this study follow previous research by Annisa et al (8) that the p-value of the chi-square test results was 1.00, which means that the p-value was more significant than 0.05. It means there was no significant relationship between the clean water condition and the incidence of diarrhea in toddlers. This is not consistent with the findings of Diyanti et al. (9). According to this study, the chi-square test results had a p-value of 0.00. The p value was smaller than 0.05, showing a significant relationship between clean water conditions and diarrhea in toddlers.

The results of this study are supported by the theory that if a household has poor water sanitation, infectious diseases will spread. The lack of availability of clean water increases the incidence of diarrhea (10). Based on the data obtained from the observations, most respondents used wells as clean water sources. Most wells are outside the house in an open state without the cover of the well; other than that, there is no roof covering the well. Only a small proportion of respondents had good quality in their house.

Diarrhea Events and the Availability of Healthy Latrines in Pojok Village Children Aged 12-59 Months

Based on the results of the chi-square test, the p-value is (0.02) < (0.05). It can be concluded that there is a relationship between toilet conditions and diarrhea events in children aged 12-59 months in Pojok Village, Purwosari District, Bojonegoro Regency. The results of this study also showed that the condition of the toilet is a risk factor for diarrhea in children aged 12-59 months, with a PR (95% CI) value of 2.60 and an interval between 1.01 and 6.69.

The results of this study align with those of previous studies. The study revealed that the p-value generated by the chi-squared test results was 0.00, implying that the value was 0.00 < 0.05. Based on the p-value, there is a significant relationship between the availability of latrines and the incidence of diarrhea in children under five. In addition, the results of this study are also from other studies, namely, the research in (11). The study explained that children from families who do not have adequate toilet facilities have a 1.40% greater chance of experiencing diarrhea than children with a suitable type of latrine.

Healthy latrines have the following characteristics: the location of the place is not reached by pets, is easy to use and clean, does not cause odours, and has a distance of > 10 m between latrines and clean water sources, accompanied by septic tanks (12). Based on these observations, most of the respondents in Pojok Village have a latrine with a semi-permanent floor, and some are still on land, which can easily transmit microorganisms and is challenging to clean. Most people interviewed only have brick toilets and wooden walls that make it easy for dangerous animals to enter and can pollute the toilet.

Relationship between the Availability of Septic Tanks and Diarrhea in Children 12–59 Months of Age in Pojok Village

Based on the results of the Chi-square statistical test, it is known that the p-value is (0.39) > (0.05). It shows that it can be concluded that there is no relationship between the availability of septic tanks and the incidence of diarrhea in children aged 12-59 months in Pojok Village, Purwosari District, Bojonegoro Regency. The results of this study also show that the availability of a septic tank is not a risk factor for diarrhea in children aged 12-59 months because the PR value (95% CI) = 1.40 with intervals that exceed 1, namely (0.81-2.42).

This study's results align with and in accordance with previous research conducted by Melviana et al. (13), which showed that the p-value from the chi-square test was 1.00. As a result, a value of 1.00 has a value of 0.05. Based on the p-value, there is no significant relationship between the final shelter of faeces and the incidence of diarrhea in toddlers in the village of the plunge.

Stool containers that do not meet sanitation criteria can increase the number of flies and other disease vectors (14). Healthy latrines are equipped with septic tanks or gooseneck latrines (15). Gooseneck latrines (latrine geese) are latrines that follow sanitation requirements. The gooseneck is shaped like a swan's neck so that it is always filled with water, functions as a clogger so that the smell of latrines does not melt, and is valuable for preventing flies from entering the hole (16). Based on the observations of most repetitions, most of them had a toilet accompanied by a septic tank.

The Relationship between Wastewater Sewerage and Diarrhea in Children Aged 12-59 Months in Pojok Village

Based on the chi-square test results, the p-value is 0.00, which means that the p-value (0.00) < α (0.05). It can be concluded that there is a relationship between the wastewater sewer (SPAL) condition and the incidence of diarrhea in children aged 12-59 months in Pojok Village, Purwosari District, Bojonegoro Regency.. This study also showed that SPAL conditions were a risk factor for diarrhea in children aged 12-59 months because the resulting RP value (95% CI) was 3.09 with an interval of (1.19–8.07).

This study's results differ from previous research by Syah et al. (17), who stated that the p-value of the chi-square test was 0.08. It means that the p-value of 0.08 > 0.05 indicates no relationship between household waste management and the incidence of diarrhea in toddlers in the work area of the Lainea Health Center, South Konawe Regency, in 2017. The respondents already had excellent and efficient waste management.

At the time of home observation, many respondents did not have closed sewers. Instead, they dumped waste directly in an open environment. Disease carriers, microorganisms, and pathogens that cause diarrhea can live in places where wastewater is thrown away in negative and open ways. In addition, it can cause

an unpleasant odour and contaminate the surface water (18).

Diarrhea and the Availability of Covered Trash Cans in Pojok Village Children Aged 12-59 Months

Based on the results of the chi-square statistical test, the p-value is (0.01), which means that the p-value is (0.01) < α (0.05). It can be concluded that there is a relationship between the availability of closed trash bins and the incidence of diarrhea in children aged 12-59 months in Pojok Village, Purwosari District, Bojonegoro Regency. The results of this study also show that the condition of the trash can is a risk factor for diarrhea in children aged 12-59 months because the resulting RP value (95% CI) is 3.50 with an interval of 1.04–11.79.

The results of this study differ from those of previous research (19). This study shows that the p-value of the chi-square test is 0.35, which means that the p-value (0.35) > 0.05. This study's results show no significant relationship between waste management and the incidence of diarrhea among the people of Cintaraja Village. Observational data show that many families need trash cans with lids. Dirty and uncovered trash cans can be used as breeding grounds for disease vectors, microorganisms, and pathogens, which can cause diarrhea and an unpleasant odour (18).

Relationship between Floor Type and Diarrhea in Children Aged 12-59 Months in Pojok Village

Based on the results of the chi-square test, the p-value was (0.19) > α (0.05). It can be concluded that there is no relationship between floor type and the incidence of diarrhea in children aged 12-59 months in Pojok Village, Purwosari District, Bojonegoro Regency. The results of this study also show that the type of floor is not a risk factor for diarrhea in children aged 12-59 months because it has an RP value (95% CI) of 1.67 with an interval of 0.90–3.10.

The results of this study are not in line with previous research by Saputri and Astuti (20), who stated that the p-value of the chi-square test is 0.001, which means p (0.00) ≤ 0.05. This study's results show a relationship between the type of floor and the incidence of diarrhea in toddlers. Many respondents had semi-permanent floors or soil.

Soil-covered floors can cause diarrheal diseases because they serve as breeding grounds for germs and microorganisms that cause diarrhea (21). Based on the interviews and observations, most respondents had toddlers who often played on the floor of the house. It can cause germs to enter the toddler's body and reach the digestive tract, which can cause diarrhea. The floor we see is clean, but there are still germs and microorganisms on it.

CONCLUSION

There is a significant relationship between the three variables associated with the incidence of diarrhea in children aged 12-59 months in Pojok Village, Purwosari District, and Bojonegoro Regency, namely the availability of healthy latrines, closed litter water disposal (SPAL), and closed trash cans. Based on the results of the research conducted, the p-value of each variable was obtained: the availability of healthy latrines had a p-value of 0.02, the availability of covered SPALs had a p-value of 0.00, and the availability of covered waste had a p-value of 0.01. In addition, there was no significant relationship between the other three variables, namely, the condition of clean water sources, availability of septic tanks, and floor conditions, and the incidence of diarrhea in children aged 12-59 months in Pojok Village, Purwosari District, Bojonegoro Regency. The p-value of each variable was for the condition of the clean water sources. It has a p-value of 1. For the availability of septic tanks, it has a p-value of 0.39, and for floor conditions, it has a p-value of 0.19.

CONFLICT OF INTEREST

All researchers declare that there is no conflict of interest in this research.

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AUTHOR CONTRIBUTION

All the authors worked on this article and were responsible for its content. GIS: conceptualization, methodology, writing, reviewing, and editing. EA: Methodology, visualization, data curation, writing, review, and editing. Supervision. WII: Validation and Oversight.

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