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Research Articles

Implementation of Hygiene and Environmental Sanitation in Under Five Years Old Diarrhea Patients at Surabaya Primary Health Center

Penerapan Higiene dan Sanitasi Lingkungan pada Pasien Diare Balita di Puskesmas Surabaya

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Abstract

Surabaya has the most cases of diarrhea in East Java, with the highest detection targets in Gading Health Center (2346 cases) and Mojo Health Center, with diarrhea cases handled by 1322 cases. This study aimed to describe hygiene and environmental sanitation in under-five diarrhea patients in the working area of SurabayaHealth Center. This study used a survey method, descriptive approach, interviews, and questionnaires in October 2019-March 2020. The results showed 62,2% of under-fives 'drinking water sources were ineligible, 86,5% of mothers' handwashing behavior wereineligible, 67,6% of the use of serving hoods were ineligible, 100% of food ripeness level were eligible, 59,5% of the distance between well and septic tank were eligible, 100% oflatrines were eligible, 89,2% of sewerages were ineligible, and 83,8% of waste disposal facilities were ineligible. This research concluded that drinking water sources, handwashing behavior, serving hoods, sewerages, and waste disposal facilities were ineligible. The problems can be solved by consuming branded gallons of water / well water or refillable water that is boiled before consumption, improving how to wash hands with soap and running water, covering food using a serving hood, use thecover to close the sewerage, and throwing the trash into the temporary shelter (TPS) as much as two times a week or less than 3x24 hours.

Keywords: under five years old, diarrhea, facilities

Abstrak

Kota Surabaya memiliki kasus diare terbanyak di Jawa Timur dengan target penemuan terbanyak di Puskesmas Gading sebanyak 2346 kasus dan Puskesmas Mojo dengan kasusdiare ditangani sebanyak 1322 kasus. Tujuan penelitian ini adalah mengetahui gambaranhigiene dan sanitasi lingkungan pasien diare balita di wilayah kerja Puskesmas Surabaya.Penelitian ini menggunakan metode survei, pendekatan deskriptif, wawancara dan kuesioner pada bulan Oktober 2019-Maret 2020. Hasil penelitian menunjukkan 62,2% sumber air minum balita tidak memenuhi syarat, 86,5% perilaku cuci tangan ibu tidak memenuhi syarat, 67,6% penggunaan tudung saji tidak memenuhi syarat, 100% kematangan makanan memenuhi syarat, 59,5% jarak sumur dengan *septic tank* memenuhisyarat, 100% jamban memenuhi syarat, 89,2%, saluran pembuangan air limbah tidak memenuhi syarat, dan 83,8% sarana pembuangan sampah tidak memenuhi syarat. Simpulan penelitian ini adalah sumber air minum, perilaku cuci tangan, penggunaan tudung saji, saluran pembuangan air limbah, dan sarana pembuangan sampah masing- masing tidak memenuhi syarat. Permasalahan tersebut dapat diatasi dengan mengonsumsiair galon bermerk/air sumur atau air isi

ulang yang direbus sebelum dikonsumsi, memperbaiki cara mencuci tangan dengan sabun dan air mengalir, menutup makanan dengan tudung saji, memasang penutup untuk saluran pembuangan air limbah, dan membuang sampah ke TPS sebanyak 2 kali dalam seminggu atau kurang dari 3x24 jam.

Kata Kunci: balita, diare, fasilitas

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INTRODUCTION

Diarrheal disease is an endemic disease in Indonesia and is a potential disease of outbreaks (KLB), often accompanied by death. In 2017, there were 21 outbreaks of diarrhea in Indonesia, spread across 12 provinces in 17 districts/cities. KLB (Kejadian Luar Biasa) is the emergence or increase in the incidence of illness or death, which is epidemiologically significant in an area within a certain period and is a conditionthat can lead to an outbreak (Kemenkes RI, 2018). In East Java, Surabaya ranks first in the most cases of diarrhea to be precise in the working area of Gading Health Center witha target number of finding 2346 cases and the working place of Mojo Health Center with 1322 cases of diarrhea handled (Dinas Kesehatan Kota Surabaya, 2019). Based on Riskesdas (2007), the age group of diarrhea with the highest prevalence was children underfive (1-4 years), specifically 16.7%, therefore this study used under-fives as research subjects.

Diarrhea is described as the occurrence of watery stools at least three times or more a day (Nemeth and Pfleghaar, 2020). The most common cause of diarrhea in under-fives is Rotavirus infection. Low awareness of hygiene and implementation of environmental sanitation was also found to be risk factors for diarrhea outbreaks (Kemenkes RI, 2011). The number of people who do not have access to clean water in cities has increased sharply in developing countries due to urbanization, so they arelooking for alternative water sources in the form of drilled wells and dug wells (Sari et al,2018). The well is not free from *E. coli* contamination if the water source is less than 10 meters away from sewage disposal facilities, waste storage, and garbage collection or disposal sites (Kemenkes RI, 2018). *E. coli* is used as an indicator of water contaminationby feces because the bacteria cannot survive long outside the intestine. *E. coli* itself is a normal flora in the large intestine. However, some strains of *E. coli* can produce toxins that can cause diarrhea (Thani et al, 2016).

The practice of promoting hygiene that is most effective as a form of overcoming diarrhea problems is washing hands properly because it can cut off the transmission of pathogens that cause diarrhea (Ndisika and Solomon, 2019). Processing food until it is ripe, washing fruits and vegetables before eating, washing tableware in a sterile manner, covering food with a serving hood have also been shown to reduce the incidence of diarrhea (Zyoud et al, 2019). The correct implementation of environmental sanitation in households is that they must have a gooseneck or embankment latrine with a lid, have a septic tank or wastewater drainage, and can be used alone or together (Kemenkes RI, 2018). A trash can with a closed condition is also essential becauseflies are said to be a vector of digestive tract diseases like damp and dirty places suchas piles of household waste (Fitri et al, 2020).

Similar research has been conducted by Suda et al. (2019) and Magdalena et al.

(2019) regarding the factors associated with the incidence of children under five. This study contributed to the discussion because it contained variables that were also discussed in this study, including the relationship between mother's knowledge, drinking water, latrines, handwashing behavior, and the cleanliness of toddler food utensils. Research by Gloria et al. (2019) also contributed to the discussion of food storage which refers to the serving hood in this study. Research by Fitri et al. (2020) reveals the relationship between contamination of well water and the incidence of diarrhea in children under five related to this study, that the distance of the wells also affects the quality of the drinking water source for toddlers when it comes from well water. The relationship between sewerage and diarrhea is also discussed in research by Langit (2016).

Researchers are interested in conducting research on the implementation of hygiene and environmental sanitation in under-five diarrhea patients at the Surabaya Primary Health Center to provide information to the public about implementing hygiene and environmental sanitation.

METHODS

This research used a survey method with a descriptive approach which was carried out in October 2019-March 2020 in Gading Health Center and Mojo Health Center working areas. This study population was under five who visit Gading Health Center and Mojo Health Center in October 2019-March 2020 and obtained 37 under-fives who had met the inclusion criteria through the purposive sampling technique**.** Researchers set specific criteria in this study, so the results are more representative of the purpose and research subjects. Therefore, the researchers determine inclusion criteria in obtaining samples, so it can be said that this research uses the purposive sampling technique. The inclusion criteria in this study were (1) under-fives aged 12-59 months, (2) Suffering from diarrhea based on the diagnosis from the doctor, (3) Coming to Gading and Mojo Health Center, (4) Mother was willing to be research subjects for interviews and home surveys.

Data collection techniques were carried out by interview and field survey. The instrument used in this study was a questionnaire. The data source used is primary data obtained through interviews and questionnaires. The data were analyzed using the IBM SPSS Statistics 25 application. The variables in this study were hygiene and environmental sanitation. Hygiene researched included drinking water sources for under-fives, mothers' handwashing behavior, use of a serving hood, and the food ripeness level. Environmental sanitation variables studied included the distance between the septic tank and the well, latrines, sewerages, waste disposal facilities. Ethics has been obtained from the KEPK Faculty of Medicine, Universitas Airlangga no. 253/EC/KEPK/FKUA/2020.

RESULTS AND DISCUSSION

Characteristics of research subjects

The descriptive characteristics of the analyzed subjects are shown in Table 1 which shows that the mean age of mothers is 32,89 ± 5,425 years, with the minimum age 21 years and the maximum age 46 years and the mean age of under-five is 23,32 ± 13,597 months, with the minimum age 12 months and the maximum age 54 months.

Table 1 shows the mean age of the mother age. Research by Haswari et al. (2019) said that there is a relationship between a mother's education and the incidence of diarrhea with a p-value of 0,000 (p-value < 0,05). Adult age will affect a more systematic frame of thinking. This level of maturity will affect their parenting, caring for their children, so that the more mature the mother's age, the more experienced she will be in caring, including in implementing hygiene and environmental sanitation, providing food intake, and maintaining children's health (Haswari et al, 2019).

Table 1. Characteristics of research subjects

	Minimal	Maximum	Mean	Standard Deviation
Mother's Age (years)	21	46	32,89	5,425
Toddler Age (months)	12	54	23,32	13,597
		Frequency	**Presentation (%)**	
Gender of Toddler				
Male		19	51,4	
Female		18	48,6	
Mother's highest Educational attainment				
Elementary School		6	16,2	
Junior High School		14	37,8	
High School		13	35,1	
Bachelor		3	8,1	
Diploma		1	2,7	
Mother's work				
Housewives		33	89,2	
Private Sector Worker		4	10,8	

Source: Primary Data, 2019

Table 1 shows that most of the mother's education level is junior high school as many as 14 (37.8%) research subjects. Most occupations of mothers of children under-five are housewives, 33 (89.2%) research subjects. Research by Sumampouw et al. (2019) and Santika et al. (2020) said that the level of education has a significant effect on diarrhea cases in children under five. The level of education is a major determining factor for the survival of children, especially those under five who cannot carry out activities independently (Omona et al, 2020). They depend on their mother or caregiver for activities such as eating, drinking, defecating, and urinating, which will havea major impact on their health if negligent.

People with low education pay less attention to or ignore environmental hygiene and sanitation behavior towards themselves and their families (Ugboko et al, 2020). People who have a higher education level prefer to work and have a greater chance of getting health information from their work environment than mothers who do not work or housewives (Ainsyah and Lusno, 2018). Therefore, it is necessary to consider providing counseling on parenting, the application of good hygiene, and environmental sanitation, especially for mothers with low education and housewives to be better prepared to educate and care for children properly (Santika et al, 2020).

Under-fives drinking water source

Table 2 shows the analysis of water sources for children under-five hygiene application. The results showed that only 14 (37,8%) under-fives consumed water that met the hygiene requirements by consuming branded gallon bottled water or drinking PDAM / well water that was boiled and 23 (62,2%) under-fives consumed water that was not meet the hygiene requirements by not boiling refill water before consumption.

Table 2. Characteristics of under-fives drinking water source

	Frequency	Presentation (%)
Under-fives Drinking Water Source		
Eligible	14	37,8
Ineligible	23	62,2
Total	37	100

Source: Primary Data, 2019

Research by Asnel and Sari (2019) said that there is a significant relationship between the drinking water source and the incidence of diarrhea with the p-value 0,003 (p-value < 0,05) and POR 4,054 (95% CI = 1,678-9,798). It means that toddlers with ineligible drinking water sources are at risk 4 times to had diarrhea than those who had eligible drinking water sources (Asnel and Sari 2019). Research by Suda et al. (2019) said that there is a significant relationship between drinking water sources for under-fives and acute diarrhea in under-fives. Safe (proper) drinking water for health is drinking water that meets physical, microbiological, chemical, and radioactive requirements (Kemenkes RI, 2018).

This study has limitations that microbiological, chemical, and radioactive examinations as required for safe (proper) drinking water for health stipulated by Kementerian Kesehatan RI were not carried out. Still, the researchers used the standards ofprevious studies which stated that the water was boiled first until it boils before consumption is an effective way to reduce the risk of diarrhea that is easily done by every individual (Dinkel et al, 2020). Boiling water is mainly carried out to refill drinking water sources prone to contamination. This statement is supported by Wahyuningsih and Karnaningroem (2019) research, which said that the total coliform test results show that 21 out of 25 refill drinking water facilities in Gubeng District Surabaya City, do not meet the standard threshold.

Research by Dewanti and Sulistyorini (2017) regarding the bacteriological quality analysis of refill drinking water in Sememi Village,Benowa District, Surabaya City shows all research subjects or owners and handlers of Refill Drinking Water Depot (DAMIU) do not wash their hands with running water and soap before filling consumer gallons of water. The results of the examination of the raw water samples at DAMIU also showed the growth of *E. coli*, but after processing, there were 2 out of 6 refill water samples that still contained *E. coli*. As for Bottled Drinking Water(AMDK), research by Monikayani et al. (2020) said that bottled drinking water is safer from the side of the Most Probable Number (MPN) test.

The technique of washing milk bottles also affects the sterilization of water that under-fives drink. Research by Lanida and Farapti (2018) said that there is a relationship between washing milk bottles and the incidence of under-five diarrhea. The risk of diarrhea in children who consume breast milk by the bottle is 1.95 times, the risk of diarrheain children who consume formula milk using bottles is 2.12 times, while the risk of diarrhea in children who consume exclusive breastfeeding, supplementary food other thanbreast milk, breastfeeding using a milk bottle, and bottle feeding formula is 1.77 times. This shows that milk bottles are very susceptible to contamination by bacteria, thereforeit is necessary to wash bottles properly (Masood, 2017).

Techniques for cleaning and storing feeding bottles in infants have been proposed by the CDC. Before washing milk bottles, mothers are required to wash their hands with soap and running water for 20 seconds. Then start rinsing the parts of the bottle under running water. Parts of baby milk bottles should not be placed in the sink during the

washing process because they have the potential to contain germs that can stick to any part of the feeding bottle. After rinsing, the bottle is placed in a basin filled with hot water and soap. Then do the rubbing of the bottles and other parts using a clean brush. The rinse is carried out again with running water and placed in a separate basin dedicated for baby food items in clean and dust-free conditions and then allowed to dry. For a better bottle sterilization process, it is recommended to boil for 5 minutes. Washing with soap and running water only physically removes germs from the bottle, whereas the boiling process is an extra step to kill more germs and extra protection from all infections (CDC, 2020). If not cleaned properly, the fat and protein content in milk will stick to the bottle and form white spots which, if allowed to accumulate for a long time and dry out, will be difficult to clean and become a breeding ground for bacteria. If bacteria enter the digestion, it will increase the risk of diarrhea (Kosapilawan et al, 2019).

Mothers' hand washing behavior

Table 3 shows the analysis of hygiene application of mothers' hand washing behavior. The results showed that only 5 (13.5%) research subjects met the hygiene requirements by washing their hands properly with the criteria of washing hands before eating, after defecating and urination, after changing under-five diapers, washing hands with running water, and always using soap.

Table 3. Characteristics of mothers' hand washing behavior

	Frequency	Presentation (%)
Mothers' Hand Washing Behavior		
Eligible	5	13,5
Ineligible	32	86,5
Total	37	100

Source: Primary Data, 2019

Alamsyah and Marianthi (2020) said that there is a relationship between the behavior of hand washing with soap with the incidence of diarrhea, with the p-value 0, 03 (p-value < 0, 05) and OR 3, 80 (95% ci 1,25-11, 50). It means that the mothers who don't wash theirhands properly have a risk of a 3, 80 times greater occurrence of diarrhea in their children than mothers who behave well (Alamsyah and Marianthi 2020). Research by Radhika (2020) said a significant relationship between mothers' hand washing behavior and cases of diarrhea in under-fives.

Research by Fuhrmeister et al. (2020) said that there are enteric bacteria, an average of 1.7% on the palms. Enteric pathogens are transmitted fecal-orally via various reservoirs, including flies, fomites, hands, soil, food, and water. Therefore, one effective way to block pathogen transmission is hand washing. The practice of washing hands properly has requirements, namely washing hands with soap and running water, carried out at least 30 seconds, and done at least before eating, after changing diapers, and after defecating (Ndisika and Solomon, 2019). Based on the interview results, respondents did not always wash their hands with running water and even used finger bowl and rarely used soap.

Research by Ndisika and Solomon (2019) said that the practice of washing hands with soap could reduce the threat of severe diarrhea by up to 48% and the likelihood of diarrhea by 47%. Even though awareness, knowledge, attitude, and practice have been carried out, the method of washing hands is not correct, the desired results will not be

achieved. This can occur because the information provided is inadequate or the mother of the under-five does not understand the information. Therefore there is a need for counseling on the importance of getting used to washing hands properly.

Use of serving hood

Table 4 shows an analysis of hygiene applications in using a serving hood. The results showed that only 12 (32,4%) research subjects had met the correct hygiene requirements by always using a serving hood or another food cover.

Table 4. Characteristics of serving hood use

	Frequency	Presentation (%)
Use of Serving Hood		
Eligible	12	32,4
Ineligible	25	67,6
Total	37	100

Source: Primary Data, 2019

Research by Gloria et al. (2019) said that there is a significant relationship between the use of a serving hood and cases of diarrhea in under-fives. Research by Yanti et al. (2018) said that there is a significant relationship between poor food management and storage and incidence of diarrhea with the p-value 0,029 (p-value < 0,05) and OR = 4,278, it means that poor food management and storage is four times more likely to be at risk of diarrhea than good food management and storage.

Food is one of the most important routes for children to be exposed to pathogens that come from feces. Exposure to pathogens from feces from both humans and animals can lead to diarrheal disease, or even continuous exposure will lead to infection without symptoms (Freeman et al, 2020). Research by Zyoud et al. (2019) said that 50% of cases of food poisoning are related to improper storage of food or reheating of food. The diarrhealdisease can occur by consuming food or water that is contaminated by infective organisms (bacteria and viruses), toxic chemicals, radioactive substances, and other harmful substances. The process of cooking, serving, and storing food greatly affects contamination by toxic chemicals or pathogens that cause disease. A good way to store food before consumption is to use a food cover or serving hood (Zyoud et al, 2019). However, the use of a serving hood presents socio-cultural challenges, including thebelief about food spoilage when covered with a serving hood (Freeman et al, 2020).

The purpose of using a serving hood as a food cover is that flying animals do not catch food, especially flies, which can transmit pathogens. Cockroaches, lizards, and mice may also approach eating a small portion of the food served and transmit pathogens as well (Zyoud et al, 2019). Hygienic food storage is defined as food inaccessible to animals, food inaccessible to young children, covered food, and fly-free food (Freeman et al, 2020). An alternative if you don't have a serving hood is to store food in a special food cabinet and always keep the cupboard and create a clean environment around the food.In addition, people can also use wire netting on windows, use curtains, or put fly-resistant adhesive paper around the food to avoid flies or other flying animals (Yanti et al, 2018).

Food ripeness level

Table 5 shows the analysis of hygiene applications of food ripeness level that are usually carried out by the research subjects. The results showed all research subjects had met the correct hygiene requirements, namely cooking the food until it is fully cooked.

Table 5. Characteristics of food ripeness level

	Frequency	Presentation (%)
Food Ripeness Level		
Eligible	37	100
Total	37	100

Source: Primary Data, 2019

Cooked food has an important role in reducing the level of bacteria in food and beverages (Fitri et al, 2020). Cooking, serving, and storing food greatly affects contamination by toxic chemicals or pathogens that cause disease. Symptoms of toxic food poisoning mostly appear within 24 hours of consuming contaminated food, while foodborne infections may not appear until 2-3 days later. Symptoms include nausea, vomiting, diarrhea, abdominal pain, headache, and fever (Zyoud et al, 2019).

Research by Fiona (2017) said that raw meat could be contaminated with certain pathogenic bacteria spores that are not easily destroyed. Therefore cooking food until it is cooked is highly recommended to destroy pathogenic bacteria in raw meat. Spores develop into vegetative cells that can reproduce rapidly in food at room temperature. Therefore, processing food until it is ripe, washing fruits and vegetables before eating, washing tableware in a sterile manner, covering food with a serving hood are believed to reduce the incidence of diarrhea due to *E. coli* infection (Zyoud et al, 2019).

CDC has appealed to prevent food poisoning with four principles, namely Clean-Separate-Cook-Chill. Cleaning is an appeal to wash hands and cooking utensils, including cutting boards and kitchen tables before, during, and after preparing food, because microorganisms can survive around the kitchen, including hands, cooking utensils, cutting boards, and tables. Fresh fruits and vegetables are also encouraged to be rinsed under running water before consumption. Then Separate is an appeal to separate raw meat, poultry, seafood, and eggs from ready-to-eat food. The use of cutting boards is also advised to separate raw materials and ready-to-eat food ingredients. The next principle is Cook, the appeal to cooking food at the right temperature to kill harmful microorganisms. Then the Chill principle is an appeal to freeze food properly. The bacteria that cause food poisoning multiply at the fastest between 4°C-60°C, so make sure the refrigerator temperature is 4°C or lower (CDC, 2020).

Research by Wainaina et al. (2020) said that norovirus is found among food handlers in densely populated, low-income, and urban areas. As many as 87% of the study participants answered, having a dirty cutting board can cause food contamination. One of the most common risk factors for norovirus infection in food makers is a lack of hand washing behavior. Increasing hand washing compliance with soap and running water can reduce and eliminate viral contamination.

Research by Sutoko et al. (2019) shows that the results of colony calculations on a cutting board have the highest average value of 7.92 CFU/cm^2 while glass has the smallest average value, namely 0.01 CFU/cm^2. The liquid residue from raw meat or poultry on the cutting board's surface has the potential to transmit pathogens to otherfoods that use the same cutting board. When the cutting board is contaminated, pathogenscan survive and multiply. Foodborne pathogens such as *Salmonella* spp*., Campylobacter*spp*., Bacillus cereus, Staphylococcus aureus*, and *Listeria monocytogenes* are found in household kitchen appliances (Deza et al, 2007).

The surface of the cutting board has scratches that cause gaps due to the pressure from the knife. The gaps make it difficult to clean the remaining food ingredients. Based on previous research, *S. aureus* and *E. coli* were able to survive on polyethylene material for a long time. Therefore, the recommended use of a cutting board is a cutting board made from closed-grained wood. Woodcutting boards are known to have porous materials that can absorb moisture quickly, so bacteria cannot grow on these surfaces (Sutoko et al, 2019). Other studies have also suggested that some woods may contain antibacterial properties, and the hygroscopic characteristics of these materials can cause bacterial drying (Deza et al, 2007).

Well distance to septic tank

The results showed that the majority of research subjects had met the environmental sanitation requirements by not having a well with a distance of <10 m from the septic tank, namely 25 (59,5%) research subjects.

Table 6. Characteristics of good distance to septic tank

	Frequency	Presentation (%)
Well Distance to Septic Tank		
Eligible	22	59,5
Ineligible	15	40,5
Total	37	100

Source: Primary Data, 2019

Research by Fitri et al. (2020) and Bangun et al. (2020) said there is a relationship between contaminated well water sources and diarrhea in under-fives. Research by Dangiran and Dharmawan (2020), which analyzed the relationship between the incidence of diarrhea and the presence of dug wells in Jabung Village, Semarang City, proved that the distribution of diarrhea was found in houses that have dug wells with bacteriological water quality that do not meet the requirements, namely >50 CFU/100 ml and distance from latrines and/or septic tanks <11 meters (Dangiran and Dharmawan, 2020).

In China, an epidemic of infectious diarrheal disease has occurred in schools due to consuming contaminated well water. The location of the well was found near a toilet or septic tank, a damaged sanitary sewer, and wastewater that spilled into the well.Broken toilets or septic tanks and sewers near water wells, improper water well construction, and a lack of sterilization facilities are the main causes of water contamination by *E. coli* (Ding et al, 2017).

The septic tank must be ≥ 10 meters from the water source to avoid contamination of *E. coli* in the feces (Kemenkes RI, 2018). Soil contamination causes contamination of clean water sources to become a good growth medium for *E. coli* and increases soil concentration (Fitri et al. 2020). In areas with high population density, the ideal10-meter distance between water sources and septic tanks seems difficult to implement due to lack of land. Another alternative can be done to overcome limited land. One of them is by knowing the direction of groundwater flow so that the direction of the flow does not lead to a well or water source, with the septic tank being free from contamination (Sidik et al. 2020). If groundwater or well water is consumed without boiling it first or not boiling, it can cause diarrhea (Fitri et al, 2020).

Latrine

The results showed all research subjects had met the environmental sanitation requirements by having latrines with the criteria that feces did not pollute the soil and

surface water, the latrines were closed, and free from unpleasant odors.

Table 7. Characteristics of latrine

	Frequency	Presentation (%)
Latrine		
Eligible	37	100
Total	37	100

Source: Primary Data, 2019

Research by Magdalena et al. (2019) said that there is a significant relationship between the type of latrine and diarrhea in children under five. The toddler who uses latrinesthat do not meet requirements had a two times greater chance of having diarrhea based on research by Sidabalok et al. (2019). Attitudes will determine a person in choosing latrine,as evidenced by Theresiana et al. (2020) with a p-value of 0,000 (p-value <0,05) and OR = 23, which means that there is a significant relationship between attitude and choice of latrine by the respondent. Respondents with positive attitudes were 23 times more likelyto choose healthy latrines than those with negative attitudes. Therefore, the community needs information about the benefits, disadvantages, and consequences obtained if the latrine used does not meet the requirements (Theresiana et al, 2020).

Under-fives can experience diarrhea even though they have a healthy latrine because the water used does not meet the requirements, namely well water that has not been tested for healthy water requirements. In addition, under-fives and mothers do not practice hygiene after defecating by washing their hands with running water and soap (Magdalena et al., 2019). A suitable method of disposal of feces is that feces should not pollute the soil and surface water because this results in soil contamination and clean water sources, becoming a good growth medium for *E. coli* (Fitri et al, 2020). The latrine must also be closed, free from odors or unsightly conditions, so as not to invite flies and other animals to transmit the pathogens that cause diarrhea. Feces should not be touched with hands directly, and when cleaning, it is also mandatory to wash hands with soap and run water (Kemenkes RI, 2018).

Sewerage

The results showed that most research subjects 33 (89,2%) did not meet the environmental sanitation requirements by having open sewerage.

Table 8. Characteristics of sewerage

	Frequency	Presentation (%)
Sewerage		
Eligible	4	10,8
Ineligible	33	89,2
Total	37	100

Source: Primary Data, 2019

Research by Langit (2016) and Ikhwan (2013) said that there is a significant relationship between sewerage and diarrhea in children under five. Research by Mirsiyanto et al. (2020) said that there is a significant relationship between sewerage and the incidence of chronic diarrhea in children under five with OR = 3,202, which means that respondents with a bad wastewater treatment system are 3.202 times more likely to

suffer from diarrhea than respondents with a good wastewater treatment system.

According to the Badan Pelatihan Kesehatan Kementerian Kesehatan (2011), sewerage is a facility in the form of excavated soil or pipes made of cement or pipe which functionsto dispose of washing water, used bathing water, dirty/other used water to the disposal site. The wastewater generally contains materials or substances harmful to health and cause an unpleasant smell that can invite disease vectors. Good sewerage is sewerage thatdoes not pollute wells or other water sources; not a breeding ground for mosquitoes, fliesand centipedes; closed tightly using a board or other non-permanent cover for easy cleaning; cannot cause accidents, especially in children; and does not interfere with the aesthetics (Kemenkes RI, 2011).

Population density has a consequence of decreasing environmental quality that can affect health, for example, the potential for water to overflow when it rains. During the interview, the researcher asked whether there was a frequent overflow of wastewater into the road and the research subjects answered the overflow occurred when it rained. Shallow sewerage that is rarely cleaned can trigger this. The environment that becomes dirty has become a preferred place for flies and mice, which are vectors of various diseases such as diarrhea (Fitri et al, 2020).

Waste Disposal Facilities

The results showed that most research subjects, as many as 31 (83.8%), did not meet the environmental sanitation requirements by having an open trash can and throwing the trash into the temporary shelter (TPS) less than two times a week or more than 3x24 hours.

Table 9. Characteristics of waste disposal facilities

	Frequency	Presentation (%)
Waste Disposal Facilities		
Eligible	6	16,2
Ineligible	31	83,8
Total	37	100

Source: Primary Data, 2019

Research by Mustika (2019) and Yuniar et al. (2020) said a significant relationship between trash cans and under-five diarrhea is said. Disposal of householdwaste, especially trash cans that are open and allowed to accumulate for over three days, cancause an odor that invites disease-transmitting vectors. Garbage must be disposed of in atemporary shelter (TPS) at least two times a week or a maximum of every 3x24 hours.

Research by Jamaluddin and Zarnila (2020) said that there is a significant relationship between waste management and the incidence of diarrhea with a p-value = 0,000 (p-value < 0,05). The act of separating and storing waste between organic and non-organic waste can reduce the risk of diarrhea because the separation and storage of organic and organic waste and properly covered will reduce the frequency of flies (Jamaluddin and Zarnila, 2020).

Garbage is closely related to public health because garbage can spread disease through vectors (Yuniar et al, 2020). Uncovered (open) trash bins invite disease-transmitting vectors into the house and reach humans. The vector can transmit diseases, such as flies perching on the trash, and can cause diarrhea. Garbage also it needs to be separated between (organic) food scraps and inorganic waste because food scraps attract lots of flies and have the potential to breed in the trash, which then flies off and land on food or drinks so it can cause diarrhea (Fitri et al. 2020). For this reason, it isnecessary to

increase public knowledge about procedures for the proper disposal of household wastewater.

CONCLUSION

It can be concluded that the drinking water source for children under five, the behavior of washing hands of mothers, the use of serving hoods, sewerages, and waste disposal facilities do not meet the requirements, only food ripeness level, the distance between the well and the septic tank, and latrines that have been qualify. The problems can be solved by consuming branded gallons of water / well water or refillable water that is boiled before consumption, improving how to wash hands with soap and running water, covering food using a serving hood, use the cover to close the sewerage, and throwing the trash into the temporary shelter (TPS) as much as two times a week or less than 3x24 hours.

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CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest.

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