

THE RELATIONSHIP BETWEEN PLACE SANITATION, EQUIPMENT SANITATION, AND HANDLER HYGIENE WITH COLIFORM BACTERIA AT A DRINKING WATER DEPOT IN SUKMAJAYA DISTRICT

Virdha Amartya Librianti¹, Tri Joko², Nikie Astorina Yunita Dewanti²

¹Specialization in Environmental Health, Faculty of Public Health, Diponegoro University

²Environmental Health Section, Faculty of Public Health, Diponegoro University

Jl. Prof. H. Soedarto, S.H., Tembalang, Semarang, Indonesia 50275

Email : virdhaamartya@gmail.com

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ABSTRACT

The Relationship Between Place Sanitation, Equipment Sanitation, And Handler Hygiene With Coliform Bacteria At A Drinking Water Depot In Sukmajaya District. The increasing need for drinking water consumption has caused DAM (Depot Drinking Water) treated water to become one of the popular preferences among the public. This is because the number of drinking water depots in Sukmajaya District has increased from 2019-2020, which is 33%. To have a safe status for consumption, DAM treated water must be free from Coliform content. This study aims to determine the relationship between DAM sanitation hygiene and the number of coliforms, with DAM research subjects in Sukmajaya District. The research method used was an analytical observational study using a cross-sectional approach, with variables of place sanitation, equipment sanitation, and handler hygiene from the study population of 45 DAM units with the number of samples taken as many as 31 DAM units. Using observation methods and interviews with checklist sheets guided by the Minister of Health Regulation No. 43 of 2014, the results showed that out of 31 DAMs, there were 15 (48.4%) DAMs that met the total number of Coliform, and 16 (51.6%) others did not meet the requirements of the total number of Coliform. The results showed that there was a significant relationship between equipment sanitation ($p = 0.001$); and hygiene conditions of handlers ($p = 0.001$) in the presence of coliform bacteria. While in the sanitary condition of the place ($p = 0.537$) there was no significant relationship with the presence of coliform bacteria. It can be concluded that there is a significant relationship between equipment sanitation and handler hygiene with the amount of coliform of DAM treated drinking water. On the other hand, variable sanitation place showed that there was no significant association with the amount of coliform of DAM treated drinking water.

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INTRODUCTION

Essential human needs include water, air, and food because they are needed by the body to meet basic daily human needs^[1]. Drinking water is water that has been treated with or

without treatment so that it can be directly consumed by humans, provided that the quality meets predetermined health standards^[2]. Water that can be directly consumed by humans includes refillable drinking water because it has been processed through several stages of the water purification process, either the ozonization process, irradiation with ultraviolet, or both^[3]. Parameter must be drinking water that is safe for health when consumed if it meets microbiological, chemical, physical, and radioactive requirements^[4]. A drinking water depot (DAM) is a company that manages large amounts of drinking water, not in bottles, to meet the needs of the community. Based on data from the Depok City Health Office, it was found that there was an increase in the number of drinking water depots by 33%, from 30 drinking water depots in 2019 to 45 drinking water depots in 2020.

Bottled water is less consumed by the community when compared to refillable drinking water because the price of refillable drinking water is more affordable for the community when compared to bottled drinking water^[5]. Permenkes RI No. 492 of 2010 regarding drinking water quality requirements states that the level of Coliform contamination in drinking water must be 0/100 ml^[6].

According to statistics for Depok City in 2018, refillable water makes up a higher percentage of the city's residents' daily water consumption than bore/pump well water, which is 43.99%. The data shows that the people of Depok City prefer refillable water compared to bore or pump well water for their daily drinking water consumption needs^[7]. In 2020, the Depok City Health Office will have inspected 45 refillable drinking water depots in Sukmajaya District. The results showed that of the 45 drinking water depots inspected, only 22 had met sanitary requirements. This shows the low quality of refill water depots in Sukmajaya District that meet the sanitary hygiene requirements because there are more refill water depots that do not meet the sanitary hygiene requirements, namely 23 refillable drinking water depots^[8]. In Permenkes Number 43 of 2014 concerning Sanitation Hygiene of Drinking Water Depots, it is explained that each drinking water depot is obliged to meet sanitary hygiene requirements, which include place sanitation, equipment sanitation, and handler hygiene, and ensure that the drinking water produced meets the specified quality standards or drinking water quality requirements in Minister of Health Regulation Number 429 of 2010^[9].

Because it is more practical and more affordable, the majority of people in Sukmajaya District use drinking water depot-produced water for consumption and daily needs. There are indications that refillable drinking water is less safe in various major cities in Indonesia, including in Sukmajaya District, so it is necessary to conduct a study on the relationship between sanitary hygiene and total coliform at refillable drinking water depots in Sukmajaya District. The purpose of this study was to determine the relationship between sanitary hygiene and the amount of coliforms in drinking water at the refillable drinking water depot in Sukmajaya District.

MATERIALS AND WAYS OF RESEARCH

This study is an analytical observational study with a quantitative approach where researchers try to analyze the relationship between one variable and another. The research design used is a cross-sectional study, which is a research study with observations of independent variables and dependent variables carried out simultaneously or at the same time. The variables studied were place sanitation, equipment sanitation, and handler hygiene by being given a poor category if the score <70% of the total score and a good category if the score $\geq 70\%$ of the total score, which was then associated with the number of coliforms in refillable drinking water.

The study population amounted to 45 DAM units, with the number of samples taken reaching as many as 31 DAM units and handlers at drinking water depots reaching as many as 31 respondents. The number of samples is determined based on the Slovin formula, while the sample units are determined using purposive sampling techniques. Data collection using observation methods and interviews with drinking water depot sanitation hygiene checklist

sheets guided by Permenkes No. 43 of 2014 and laboratory examinations using the Most Probable Number (MPN) method examined at the Bogor Regency Regional Health Laboratory

Data coding for the variables of sanitation of places and equipment and hygiene handlers is given the number 1 for the poor category and the number 2 for the good category, while the variable of the presence of coliform bacteria is given the number 1 for the ineligible category and the number 2 for the eligible category. The data analysis technique used is univariate analysis to obtain the characteristics of each variable in the study. At this stage, the frequency and percentage distribution of each variable tested can be determined. The next analysis technique is bivariate to analyze the relationship between the two variables to be tested. The statistical test used in this study is the chi-square test based on the degree of confidence (CL) = 95% with α set at 0.05 ($\alpha = 5\%$).

RESULTS OF RESEARCH AND DISCUSSION

Univariate Analysis

The presence of coliform bacteria in water can be seen in the following table:

Table 1. Quality of Total Coliform in Refillable Drinking Water in Sukmajaya District in 2022

Total Coliform	Frequency (Depot)	Percentage (%)
Not Eligible	16	51,6
Qualify	15	48,4
Total	31	100

In Table 1, it can be seen that as many as 15 (48.4%) drinking water depots have met the total number of coliforms, and as many as 16 (51.6%) drinking water depots have not met the total number of coliforms.

The sanitary conditions of the premises can be seen in the following table:

Table 2. Sanitation Conditions of Drinking Water Depots in Sukmajaya District in 2022

No	Assessment Components	Already		Do not	
		f	%	f	%
Environmental Conditions					
1.	Location free from pollution and transmission	31	100	0	0
2.	Free from disease-transmitting vectors (rats, flies and cockroaches)	31	100	0	0
3.	The lighting is bright enough to work, not dazzling and evenly spread out	31	100	0	0
4.	Air humidity can provide comfort support in doing work / activities	31	100	0	0
Building Construction					
5.	The building is strong, safe, easy to clean and easy to maintain	31	100	0	0
6.	The floor is waterproof, the surface is flat, smooth, not slippery, not cracked, does not absorb dust, and is easy to clean, and the slope is quite gentle	27	87,1	4	12,9
7.	The wall is waterproof, the surface is flat, smooth, not slippery, not cracked, does not absorb dust, and is easy to clean, as well as the color is light and bright	29	93,5	2	6,5

8.	The roof and ceiling must be strong, ratproof, easy to clean, do not absorb dust, flat surface, and light colored, and has sufficient height	31	100	0	0
9.	The layout consists of processing process rooms, storage, distribution / provision, and waiting rooms for visitors / consumers	4	12,9	27	87,1
10.	Ventilation ensures good air relief/exchange	19	61,3	12	38,7
Sanitation Facilities					
11.	Has access to bathroom and latrine	22	71	9	29
12.	There is a wastewater sewerage channel whose flow is smooth and closed	26	83,9	5	16,1
13.	There is a closed trash can	5	16,1	26	83,9
14.	There is a hand washing station equipped with running water and soap	7	22,6	24	77,4

In the data in Table 2, it can be seen that most of the sanitation conditions of drinking water depots are good, but there are still some that are not good, such as spatial discrepancies in drinking water depots as many as 27 (87.1%) drinking water depots, the unavailability of closed garbage cans as many as 26 (83.9%) drinking water depots, and the unavailability of hand washing stations equipped with running water and soap as many as 24 (77.4%) drinking water depots.

Table 3. Sanitation Category for Refillable Drinking Water Depots in Sukmajaya District in 2022

Category Sanitation Place	Frequency (Depot)	Percentage (%)
Not Good	11	35,5
Good	20	64,5
Total	31	100

In Table 3, it is shown that as many as 20 (64.5%) drinking water depots have good place sanitation conditions, while as many as 11 (35.5%) drinking water depots have poor place sanitation conditions.

Sanitary Conditions of Equipment can be seen in the following table:

Table 4. Sanitary Conditions of Drinking Water Depot Equipment in Sukmajaya District in 2022

2022					
Assessment Components		Already		Do not	
		f	%	f	%
Drinking Water Treatment Facilities					
1.	The equipment used is made of food tare	31	100	0	0
2.	Microfilters and disinfection equipment are in life/not expired	22	71	9	29
3.	Perform a reverse washing system (<i>back washing</i>) periodically replacing the macrofilter tube	19	61,3	12	38,7
4.	There is more than one micro filter with tiered sizes.	20	64,5	11	35,5
Raw Water Storage					
5.	Raw water reservoirs must be covered and protected from sunlight	28	90,3	3	9,7
Customer Service					
6.	Gallon containers/bottles before filling are cleaned	19	61,3	12	38,7
7.	Containers / gallons that have been filled with drinking water must be directly given to consumers	24	77,4	7	22,6

	and must not be stored at drinking water depots for more than 1x24 hours				
8.	New clean bottle caps available	31	100	0	0
Disinfection					
9.	There are sterilization equipment, in the form of ultra violet and / or ozonization and or other disinfection equipment that works and is used correctly	31	100	0	0
10.	There are gallon washing and rinsing facilities	31	100	0	0
11.	There is an enclosed indoor gallon filling facility	22	71	9	29

In Table 4, it can be seen that most of the sanitary conditions of drinking water depot equipment are good, but there are still some that are not good, such as containers or gallons before filling that are not washed first, do not carry out a reverse washing system (back washing), and do not replace macro filter tubes regularly, which is as many as 12 (38.7%) drinking water depots.

Table 5. Sanitation Category of Refillable Drinking Water Depot Equipment in Sukmajaya District in 2022

Category Sanitary Equipment	Frequency (Depot)	Percentage (%)
Not Good	10	32,3
Good	21	67,7
Total	31	100

In Table 5, it is shown that as many as 21 (67.7%) drinking water depots have good equipment sanitation conditions, while as many as 10 (32.3%) drinking water depots have poor equipment sanitation conditions.

Handler Hygiene Conditions can be seen in the following table:

Table 6. Hygiene Conditions of Drinking Water Depot Handlers in Sukmajaya District in 2022

No	Assessment Components	Already		Do not	
		f	%	f	%
Employee/Handler					
1.	Healthy and free from infectious diseases	31	100	0	0
2.	Not being a carrier of disease germs	31	100	0	0
3.	Behave hygienically and sanitistically every time serving consumers	23	74,2	8	18,5
4.	Always wash hands with soap and running water every time serving consumers	4	12,9	27	87,1
5.	Wear clean and neat work clothes	21	67,7	10	32,3
6.	Conduct regular medical check-ups at least 1 (one) time a year	4	12,9	27	87,1
7.	The operator/person in charge/owner has a certificate of having attended the drinking water depot sanitation hygiene course	12	38,7	19	61,3

In Table 6, it can be seen that most of the hygiene conditions of drinking water depot handlers are good, but there are still some that are not good, such as not washing hands first when filling drinking water and not doing health checks at least 1 (one) time a year, which is as many as 27 (87.1%) respondents, and not having a certificate of having attended the

drinking water depot sanitation hygiene course, which is as many as 19 (61.3%) respondents.

Table 7. Hygiene Category for Refillable Drinking Water Depot Handlers in Sukmajaya District in 2022

Handler Hygiene Category	Frequency (Depot)	Percentage (%)
Not Good	21	67,7
Good	10	32,3
Total	31	100

In Table 7, it is shown that as many as 10 (32.3%) drinking water depots have handlers with good hygiene conditions, while as many as 21 (67.7%) drinking water depots have handlers with poor hygiene conditions.

Bivariate Analysis

Table 8. Results of Bivariate Statistical Analysis; The Relationship of Sanitation Hygiene of Drinking Water Depots with the Presence of *Coliform Bacteria*

No	Variable	Total <i>Coliform</i>		Total (f,%)	p value
		Not Eligible (f,%)	Qualified (f,%)		
1.	Sanitation of premises				
	Not Good	7 (63,6)	4 (36,4)	11 (100)	0,537
	Good	9 (45,0)	11 (55,0)	20 (100)	
2.	Sanitary Equipment				
	Not Good	10 (100,0)	0 (0)	10 (100)	0,001
	Good	6 (28,6)	15 (71,4)	21 (100)	
3.	Hygiene Food Handlers				
	Not Good	16 (76,2)	5 (23,8)	21 (100)	0,001
	Good	0 (0)	10 (100,0)	10 (100)	

The results of statistical tests in Table 8 showed that of the 11 drinking water depots with poor sanitation conditions, 7 (63.6%) did not meet the requirements, and 4 (36.4%) qualified for the presence of *Coliform bacteria*. Meanwhile, of the 20 drinking water depots with good sanitation conditions, 9 (45.0%) did not meet the requirements, and 11 (55.0%) qualified for the presence of *coliform bacteria*. In addition, from the results of the chi-square test, results were obtained for Continuity Correction p values of 0.537 or > 0.05 , so it can be concluded that there is no relationship between the sanitary conditions of the place and the presence of *Coliform bacteria*.

The results of statistical tests on equipment sanitation showed that out of 10 drinking water depots with poor equipment sanitation conditions, 10 (100.0%) did not meet the requirements, and 0 (0%) met the requirements for the presence of *Coliform bacteria*. Of the 21 drinking water depots with good equipment and sanitation conditions, 6 (28.6%) did not meet the requirements, and 15 (71.4%) qualified for the presence of *Coliform bacteria*. In addition, from the results of the chi-square test and the results of the Fisher exact test, the p value is 0.001 or < 0.05 , so it can be concluded that there is a relationship between the sanitary condition of the equipment and the presence of *Coliform bacteria*.

The results of statistical tests on handler hygiene showed that out of 21 drinking water depots with poor handler hygiene conditions, 16 (76.2%) did not meet the requirements

and 5 (23.8%) met the requirements for the presence of Coliform bacteria. Meanwhile, of the 10 drinking water depots with good handler hygiene conditions, 0 (0%) did not meet the requirements, and 10 (100.0%) qualified for the presence of Coliform bacteria. In addition, from the results of the chi-square test and the results of the Fisher exact test, the p value is 0.001 or < 0.05 , so it can be concluded that there is a relationship between the hygiene conditions of handlers and the presence of Coliform bacteria.

Presence of Coliform Bacteria in Refillable Drinking Water

Coliform bacteria predominately contaminate the refillable drinking water that locals in Sukmajaya District consume. This is supported because the refillable drinking water depot located in Sukmajaya District has not been certified or registered with an operating permit at the Depok City Health Office. This causes supervision of refillable drinking water depot activities to not be optimal and a lack of awareness on the part of depot managers to register their depots to get a certificate of sanitary Hygiene Eligibility for drinking water depots so that depot managers can apply sanitary hygiene. Depot workers are also required to attend sanitary hygiene courses conducted by the Health Office.

Unqualified refillable drinking water can be caused by various factors, including the container where the distribution does not meet the hygiene and sanitation standards of the drinking water depot, an inadequate filtration process, or an imperfect sterilization process that uses ultraviolet (UV) light or ozonization during the process of filling water into gallons of refillable drinking water. In principle, the treatment of refillable drinking water at each manufacturer is the same, namely to remove odors, colors, tastes, harmful chemicals, and microorganisms. Refillable drinking water treatment is processed through three stages: filtration, disinfection, and filling. Filtration is intended to remove dirt and odors; disinfection aims to remove Most microorganisms and pathogenic bacteria from water^[10]. The raw water source used still contains coliform and *Escherichia coli* due to the duration of raw water circulation at the refillable drinking water depot, which is more than 3 days, causing the development of bacteria^[11].

Water is a good medium as a nesting place for disease seedlings. If the quality of drinking water does not meet the requirements, especially bacteriological quality, it can cause health problems, namely the emergence of diseases such as diarrhea. This was stated in Jayadisastra's research in 2013 showing that there is a relationship between the bacteriological presence of drinking water and the incidence of diarrhea in consumers of refillable drinking water with a p value of 0.009 or < 0.05 ^[12]. Therefore, in drinking water production activities, periodic evaluation of drinking water treatment plants is needed to improve the quality produced.

The Relationship of Place Sanitation with the Presence of Coliform Bacteria in Refillable Drinking Water

The results showed that the sanitary condition of the place at the refillable drinking water depot in Sukmajaya District was 100% qualified because it was in a location free from pollution and disease transmission and far from temporary landfills. The condition of the building is 100% qualified because the building is safe and sturdy, has a strong ceiling, and is anti-rat, but there are still 2 (6.5%) buildings that have dark and cracked walls. The condition of the floor in four (12.9%) drinking water depots does not meet the requirements, with the floor using rough plaster that does not absorb dust and even produces dust, making it difficult to clean and a source of contamination.

The layout of the drinking water depot treatment room shows that there is no division or partition between the treatment room, storage, provision, and waiting room for consumers in accordance with Minister of Health Regulation No. 43 of 2014. In addition, only 19 (61.3%) buildings are equipped with ventilation. Ventilation is very important as a place of

air exchange, so the indoor temperature is equal to the outdoor temperature. Air exchange is very important for the health of workers inside such depots^[13]. The lighting and humidity at the refillable drinking water depot all meet the lighting standard requirements according to the 2004 Decree of the Minister of Industry and Trade of the Republic of Indonesia. Good lighting is in the range of 100–200 lux. As for room humidity, it is in the range of 40%–65%. Room humidity that is not in accordance with the requirements or is at >60% or <40% can cause bacterial growth that can cause contamination of drinking water^[14].

The condition of access to sanitation facilities at 9 (29%) depots is not facilitated with bathrooms and latrines and does not have hand washing stations or hand soap, so depot officers do not wash their hands using soap when serving consumers. Handlers who do not behave cleanly and healthily, such as not washing their hands with soap when serving consumers, can cause contamination of drinking water. In addition, the condition of the wastewater sewerage at the 5 (16.1) depot is still not smooth and not closed, so that it floods the front area of the depot. A total of 26 (83.9%) depots were not equipped with bins, and there were uncovered bins.

Statistical test results Chi-Square for the sanitary relationship of premises to bacterial contamination Coliform In refillable drinking water obtained p value = 0,537 (p value > 0.05). From these results showed that there was no significant relationship between the sanitation of the place and the presence of bacteria in refillable drinking water. Bacterial contamination of drinking water can be caused by other factors that exist in the drinking water depot environment, such as temperature and radiation. Changes in the environment can also affect changes in microorganisms and are closely related to the location of drinking water depots^[15]. In addition, microbial contamination can be caused by the condition of the handler's equipment and hygiene because it has direct contact with drinking water.

This research is in line with research conducted by Mutiara Atari in 2020, which stated that there was no significant relationship between the sanitary conditions of the place and the presence of bacteria coliform on refillable drinking water in Pontianak Kota District, with a p value of 0,311 (p > 0.05). This is because not all points contained in Minister of Health Regulation Number 43 of 2014 concerning Sanitation Hygiene in Drinking Water Depots have an influence on the existence of Coliform. Several points contained in the hygiene aspect of the place may affect the quality of drinking water produced, not only bacteriological quality but also the physical and chemical quality of drinking water^[16].

Contamination of various things that can affect the quality of processed drinking water depots can be minimized by maintaining the building properly and by cleaning, maintaining, and preventing various components of the drinking water depot building.

The Relationship of Equipment Sanitation with the Presence of Coliform Bacteria in Refillable Drinking Water

As many as 9 (29%) microfilters contained in drinking water depots are over-the-life (expired) and are not routinely replaced regularly so they look dirty. Imperfect filtration can also be another factor. Filtration tubes that are not cleaned or replaced within a certain period will most likely no longer be able to filter dirt and kill bacteria from raw water^[17]. A total of 12 (38.7%) depots did not carry out reverse washing systems (back washing) and only has a microfilter of one size. Filter media replacement is carried out once every 3 months and regular cleaning is carried out almost every day. Microfilters that are generally used are with a size of 5µm. The purpose of using a tiered microfilter is so that the filtration of dirt/bacteria in raw water can run well^[18].

The container/gallon must be cleaned first before filling for at least 10 (ten) seconds and after filling a clean lid. This has not been done by 12 (38.7%) drinking water depots. Gallons that have been filled with drinking water must be given directly to consumers and must not be stored for more than 24 hours. The results showed that as many as 7 (22.6%) containers/gallons that had been filled with indirect drinking water were given to consumers and stored 1x24 hours. Storage of raw water for a long time can affect the quality

of drinking water, for example, bacteria will grow a lot and can cause bacterial contamination, so that it can affect the quality of the raw water source used^[13]. In addition, there are still found as many as 3 (9.7%) DAMs that place raw water reservoirs in places that are not protected by direct sunlight so that they can increase the risk of bacterial growth.

Sterilization equipment in the form of ultra violet and/or ozonization and/or other disinfection equipment is functioning and has been used correctly (100%). Raw water that passes ultraviolet (UV) light directly will cause bacteria to die. Ultraviolet light can kill bacteria at wavelengths of 254 nm and should be turned on during working hours or 30 minutes earlier. The ozone concentration required as a drinking water sterilizer is 0.5 ppm. The validity period or use of UV lamps is a maximum of 3 years. If it exceeds the period of 3 years, the depot owner must replace it because the UV lamp cannot work optimally. Every 1 month the UV lamp must be checked to ensure the UV lamp functions in killing bacteria in drinking water^[19].

The results of the chi-square statistical test for the relationship of equipment sanitation with coliform bacterial contamination in refillable drinking water obtained p value = 0.000 (p value < 0.05). These results show that there is a significant relationship between equipment sanitation and the presence of coliform bacteria in refillable drinking water. The amount of coliform in the water is caused by incomplete disinfection and washing and rinsing of pollutant-prone gallons. Other factors that can affect the quality of produced water are raw water, the type of equipment used, the quality of filtration and disinfection, equipment maintenance and handling of treatment and distribution of water.

The condition of sterilization equipment and disinfection at many drinking water depots is not functioning and not suitable for use, thus making bacteria in the water sources used cannot die optimally. Equipment plays a role in processing raw water into drinking water. The condition of the equipment in the drinking water treatment process that is good and meets the requirements will produce good drinking water as well. Conversely, if the processing process is less than optimal, it can cause bacterial contamination. In addition, suboptimal processing processes can also cause contamination^[5].

This research is in line with research conducted by Asmawati Badun in 2021, the results of which showed that there was a relationship between sanitation of drinking water depot equipment and the number of Coliform and Eschericia coli drinking water at a refillable drinking water depot in Kendari District with value p value = 0,014 (p value < 0.05). This condition is because the majority of depot equipment is not functioning properly according to standards such as expired microfilters are still in use and there is no rinsing of containers/gallons with production water at least 10 seconds before filling, both drinking water and raw water^[20].

But this study is not in line with the results of research conducted by Khiki Punawati in 2014 which showed that there was no relationship between sanitation of drinking water depot equipment and the number of Coliform drinking water at a refillable drinking water depot in Makassar City with value p value = 1,000 (p value > 0.05). In the study revealed one of the causes is due to other factors such as the availability of UV lamps as well as the condition of filters and microfilters^[21].

Maintenance of drinking water treatment equipment is also a cause of bacterial contamination. If the handling and treatment facilities of drinking water are not good, the quality of refillable drinking water is still in doubt because it is suspected that it can be contaminated with pathogan microbes. It is necessary to clean drinking water treatment equipment so that the water produced has a high removal efficiency and is free from bacterial contamination. In addition, in drinking water production activities, periodic evaluation of drinking water treatment plants is needed to improve the quality of water produced^[22].

The Relationship of Handler Hygiene with the Presence of Coliform Bacteria in Refillable Drinking Water

The results showed that all drinking water depot handlers were able-bodied, free from infectious diseases, and did not become carriers of germs and diseases (did not suffer from diarrhea). However, 27 (87.1%) handlers at drinking water depots do not check their health regularly. Medical examinations should be carried out by handlers periodically, at least twice a year. Handlers play a very important role in food and beverage sanitation. Depot handlers must maintain their health and be free from infectious diseases from the water^[9]. Sick handlers can be a source of disease-causing microbes that can be transferred to others through drinking water.

Drinking water depot handlers do not spit or scratch when serving consumers, but there are still 8 (18.5%) handlers who continue to smoke while serving consumers. Most handlers (32.3%) do not wear special work clothes but use daily clothes, and there are still many handlers who do not meet the hygiene requirements of handlers. In addition, as many as 27 (81.7%) handlers still ignore the behavior of washing hands with soap and running water before serving consumers. The behavior of washing hands using soap and running water can minimize the presence of Coliform bacteria because dirty hands can potentially cause pollution in the water produced^[16].

As many as 19 out of 31 handlers (61.3%) do not have a special certificate of sanitary hygiene, so there are still many handlers who do not operate equipment in accordance with the provisions, according to Indonesian Minister of Health Number 43 of 2014. There are still handlers who have a special certificate of sanitary hygiene who do not act according to the provisions because of a lack of awareness of the importance of personal hygiene caused by a lack of knowledge related to sanitary hygiene.

Statistical test results Chi-Square for the relationship of hygiene handlers to bacterial contamination in refillable drinking water obtained p value = 0,000 (p value < 0.05). These results show that there is a significant relationship between the hygiene of handlers and the presence of bacteria in refillable drinking water. The observations showed that there was direct contact during the process of filling refillable water into gallons between workers and refillable drinking water. Most handlers of drinking water depots do not wash their hands with soap when filling refillable drinking water; this can be a cause of pollution in refillable drinking water. In individual hygiene practices, aspects that are not fulfilled will have an impact on pollution, such as factors of pollution by coliform bacteria caused by dirty workers' hands, dirty workers' nails, not washing hands using soap, dirty work clothes, not using tools while working, and so on, so that workers can be a source of transmission of diseases caused by bacteria to consumers^[23]. A drinking water depot handler must work in good health, be free from various infectious diseases, maintain personal hygiene, always serve consumers by washing hands, and not smoke when facing consumers.

This is supported by the research of Yamistada et al. (2016) with a p value of 0.037. According to him, refillable drinking water depots with unqualified handler hygiene have a risk five times greater than those with qualified handler hygiene for the number of coliform bacteria in the resulting water^[24]. But this study is not in line with the results conducted by Haryudi Okta in 2016 results which showed that there was no relationship between the hygiene of drinking water depot handlers and the number of coliforms in drinking water at the refillable drinking water depot in the Diponegoro University Area, Tembalang, with a p value of 0,955 (p value < 0.05). This indicates that unqualified personal hygiene is not necessarily a risk factor for the presence of bacterial counts that exceed health standards, but there may be other risk factors that cause the presence of bacterial counts that exceed health standards^[25].

CONCLUSIONS AND RECOMMENDATIONS

The results of laboratory tests found that as many as 15 (48.4%) drinking water depots met the total number of coliforms, and as many as 16 (51.6%) drinking water depots did not meet the total number of coliforms. The results showed that there was a significant relationship between equipment sanitation and handler hygiene and the amount of drinking water coliforms at refillable drinking water depots. Meanwhile, site sanitation did not show a significant relationship with the number of drinking water coliforms at refillable drinking water depots. It is necessary to repair facilities regularly, especially microfilters and sterilizers to remove coliform bacteria in drinking water, and complete sanitation facilities that should be in depots, such as hand washing stations equipped with soap and running water. Further research needs to be done on different variables such as inspection of raw water sources, storage duration, or factors related to coliform bacterial contamination or microbiological quality in drinking water.

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