

The Relationship Between Sanitation Of Premises And Equipment With The Presence Of Escherichia Coli Bacteria In Refillable Drinking Water Depots In The Working Area Of The Gemuruh Water Health Center

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ABSTRACT. According to data from the Bungo District Health Service for 2021, the number of refill drinking water depots (DAMIU) has reached 283. In the working area of the Air Gemuruh Community Health Center there are 26 DAMIU that meet the requirements, 3 (11.5%) and those that do not meet the requirements there are 88.5%. The aim of this research is to determine the relationship between sanitation of premises and equipment and the presence of Escherichia Coli bacteria at the refill drinking water depot in the Air Gemuruh Health Center work area in 2023. This research is a quantitative type with a cross sectional design. Samples were taken using the total sampling method, totaling 35 DAMIU. Univariate and bivariate analysis used Fisher's test. This study found that it could not be concluded that sanitation of premises and equipment had a relationship with the presence of Escherichia Coli bacteria in the Air Gemuruh Health Center Working Area. It is concluded that the variables of sanitation of premises and equipment cannot be concluded that there is a relationship because the data produced is constant.

Keywords : Escherichia Coli, Sanitation of Places and Equipment, DAMIU.

ABSTRAK. Menurut data Dinas Kesehatan Kabupaten Bungo Tahun 2021, jumlah depot air minum isi ulang (DAMIU) telah mencapai 283. Di wilayah kerja Puskesmas Air Gemuruh terdapat 26 DAMIU yang memenuhi syarat terdapat 3 (11,5%) dan yang tidak memenuhi syarat terdapat 88,5%. Tujuan penelitian ini untuk mengetahui Hubungan Sanitasi Tempat dan Peralatan Dengan Keberadaan Bakteri Escherichia Coli pada Depot Air Minum Isi Ulang di Wilayah Kerja Puskesmas Air Gemuruh Tahun 2023. Penelitian ini merupakan jenis kuantitatif dengan desain cross sectional. Sampel diambil dengan metode total sampling, berjumlah 35 DAMIU. Analisis univariat dan bivariat menggunakan uji Fisher.

Penelitian ini menemukan bahwa sanitasi tempat dan peralatan tidak dapat disimpulkan adanya hubungan dengan keberadaan bakteri Escherichia Coli di Wilayah Kerja Puskesmas Air Gemuruh. Disimpulkan bahwa variabel sanitasi tempat dan peralatan tidak dapat ditarik kesimpulan adanya hubungan karena data yang dihasilkan bersifat konstan.

Kata Kunci: Escherichia Coli, Sanitasi Tempat dan Peralatan, DAMIU.

INTRODUCTION

Water is an essential part of human life, about 65-70% of the total human body consists of water and is the medium through which almost every body process takes place. Losing 1-2% water causes thirst, losing 5% water can cause hallucinations, if we lose 10-15% water in the body can be fatal.¹

Based on data from the Indonesian Health profile in 2021 published through the People's Welfare Statistics, nationally shows that the most common source of water used by Indonesian households for drinking is branded bottled water or refill water 39,27%, borehole/pump 17,61%, and protected wells 15,33%.²

This does not deny the emergence of health problems if drinking water is not treated properly or poor sanitary hygiene.³ The risk of the practice of refill drinking water depots that

are not managed properly can produce water that does not meet health requirements, which is not in accordance with PerMenKes RI Number 2 of 2023 concerning the Implementation of Government Regulation Number 66 of 2014 concerning Environmental Health. People who consume contaminated water can have a negative impact on health due to the presence of various kinds of bacteria that arise through water.⁴

Unpolluted water quality parameters must meet physical requirements (color, taste and, sediment, temperature), chemical requirements (pH, hardness, iron, aluminum, organic substances, nitrates and nitrites), and biological requirements that do not contain germs such as dysentery, typhoid, cholera, and pathogenic bacteria that cause disease.⁵ In general, disorders caused by water pollution are waterborne diseases, which are diseases transmitted by drinking water that is directly contaminated with pathogenic microorganisms or substances in water.

The percentage of drinking water facilities in Bungo district that carried out supervision in 2021, there were 54,0% of drinking water facilities that met the requirements, in addition, according to data from the Bungo District Health Office in 2021, the number of refill drinking water depots (DAMIU) has reached 283 depots.⁽⁶⁾ In the working area of the Air Gemuruh Puskesmas, there are 26 depots, only 3 drinking water depots that meet the requirements with a percentage of 11,5%.

The above problems make the author interested in conducting research because this study aims to determine "The Relationship between Sanitation Hygiene and the Presence of Escherichia Coli Bacteria in Refill Drinking Water in the Working Area of the Gemuruh Water Health Center in 2023".

METHODS

This type of research is descriptive quantitative with a Cross Sectional approach method. This study conducted laboratory examinations to determine the relationship between sanitary hygiene and the presence of Escherichia coli bacteria. The research was conducted from July 2023 - August 2023. The population in this study were all refill drinking water depots in the working area of the gemuruh water health center which amounted to 35 depots. This study used total sampling, the data analysis used was univariate and bivariate analysis with the chi-square test and using the help of IBM SPSS version 21.

The data obtained was collected using a checklist sheet according to Permenkes No.43 of 2014, to determine the relationship between sanitary hygiene and the presence of Escherichia Coli bacteria.

RESULTS

Univariate Analysis

Table 1.
Frequency distribution based on research variables

Variables	Frequenc y (n)	Percentage (%)
Presence of Escherichia Coli Bacteria.		
Positive	7	20
Negative	28	80
Sanitization Plac		
Not qualified	1	2,9
Qualified	34	97,1
Sanitization Equipment		
Not qualified	6	17,1
Qualified	29	82,9
Total	35	100

Based on the data obtained from table 1. above, it can be seen that the number of refillable drinking water depots (DAMIU) that are not contaminated with Escherichia Coli bacteria is more than DAMIU contaminated with Escherichia Coli bacteria as many as 7 with a percentage of 20%.

Based on the table above, it can be seen that the hygiene of unqualified handlers outnumbered the qualified ones by 15 DAMIU with a percentage of 42,9%. Equipment sanitation of qualified DAMIU outnumbered unqualified ones by 6 DAMIU with a percentage of 17,1%.

Bivariate Analysis

Table 2.

**The Relationship between Handler Hygiene, Place Sanitation and Equipment
Sanitation with the Presence of Escherichia Coli Bacteria**

Variables	Presence of Escherichia Coli Bacteria				Total		<i>p-value</i>	PR (95%CI)
	E-coli positive		E-coli negative					
	n	%	n	%	n	%		
Sanitization Place								
Not qualified	0	0	1	100	1	100		
Qualified	7	20,6	27	79,4	34	100	-	-
Sanitization Equipment								
Not qualified	6	100	0	0	6	100		
Qualified	1	3,4	28	96,6	29	100	-	-

Based on the data obtained from table 2, it is known that DAMIU with unqualified premises sanitation were contaminated with Escherichia Coli bacteria in 0 DAMIU (0%). Meanwhile, 27 (79,4%) DAMIU with qualified sanitation were not contaminated with Escherichia coli bacteria. From the results of the bivariate test, the sanitation variables above were not analyzed further because the data were constant. Therefore, no conclusion can be drawn on the relationship between sanitation and the presence of Escherichia Coli bacteria.

In the equipment sanitation variable, 6 (100%) DAMIU with unqualified equipment sanitation were found to be contaminated with Escherichia coli bacteria, compared to 6 (100%) DAMIU with qualified equipment sanitation that were not contaminated with Escherichia coli bacteria.

DISCUSSION

1. Overview of the presence of Escherichia Coli bacteria in refillable drinking water depots.

Based on the results of laboratory tests, 7 out of 35 refill drinking water depots in Bathin III District, Bungo Regency were contaminated with Escherichia Coli bacteria.

According to PERMENKES No. 429/MenKes/Per/IV/2010 on drinking water quality requirements, one of the parameters of drinking water that can be consumed is free of

Escherchia Coli bacteria. These bacteria are commensal bacteria in the human gut, generally not pathogens that cause disease. However, if fecal Escherchia Coli is detected in the water, it indicates that the drinking water has been contaminated with human feces and may contain intestinal pathogens.⁷ The standard quality of drinking water in Indonesia has been regulated according to Indonesian National Standard No. SNI 01-3553- 2006 of the Ministry of Industry and Trade which states that the maximum limit of Escherchia Coli bacteria is 0 in 100 ml of drinking water.⁸

2. Relationship between Sanitation in Refillable Drinking Water Depots and the Presence of Escherichia coli Bacteria

Based on the results of the analysis of the sanitation variables of the 7 DAMIU contaminated with Escherchia coli bacteria, it was found that 20,6% of the DAMIU were not free from pollution and disease transmission, DAMIU that did not have access to bathrooms and latrines, DAMIU that did not have a closed trash can, DAMIU that did not have a hand washing station equipped with running water and soap, and DAMIU that did not have a well-flowing and closed waste water drain. Based on the results of the study, the location of DAMIU in Bathin III Sub-district is mostly in densely populated residential areas, roadside and shops, so that most of the locations are close to pollution, such as dust and vehicle fumes.

From the results of the Chi-Square test on bivariate analysis to determine the relationship between place sanitation and the presence of Escherichia coli bacteria in the Air Gemuruh Health Center Working Area, it cannot be analyzed further because the data is constant. So that no conclusion can be drawn about the relationship between place sanitation and the presence of Escherichia coli bacteria.

According to the Regulation of the Minister of Health of the Republic of Indonesia Number 43 of 2014 concerning Hygiene Sanitation of Drinking Water Depots, several things that must be considered for hygienic sanitation of the place are locations that are far from garbage disposal, are in areas that are free from pollution and disease transmission, the depot building is made of strong, safe, easy to clean, and easy to maintain materials. The floor of the DAM is flat, smooth, non-slip, non-cracking, non-dust-absorbing, and easy to clean, with a gentle slope for easy cleaning and no stagnant water.⁹ Access to latrines and proper sewage flow as well as closed waste facilities, handwashing stations with running water and soap are essential to ensure the hygiene of the DAM premises. The site should be free from rats, flies and cockroaches as they can contaminate and damage equipment.

Research conducted by Heny Sasmita et al. (2020) shows the results of the analysis obtained p value = 0,134 ($p > 0,05$), this means that there is no relationship between the

sanitary conditions of the place and the presence of *Escherichia coli* bacteria in refill drinking water depots.⁽¹⁰⁾ Another research conducted by Naufal Wijaya et al. (2022) The results obtained p value = 0,006 ($p < 0,05$). This shows that there is a significant relationship between the sanitation of drinking water depots and the quality of drinking water. The facts in the field also show that the location of the Refillable Drinking Water Depot is located directly adjacent to a fairly busy highway, while the requirement for the location of DAMIU is that it must be in an area that is free from environmental pollution or other areas that can cause pollution to drinking water.¹¹

3. Relationship between Equipment Sanitation in Refillable Drinking Water Depots and the Presence of *Escherichia coli* Bacteria

Sanitation of equipment that does not meet the requirements there are 6 and found the presence of *Escherichia coli* bacteria. The results of observations in this study showed that there were several drinking water depots that only turned on the Ultra Violet (UV) when they wanted to fill the water in gallons and were not used properly, gallon cleaning tools (gallon brushes) that were not suitable for use, dirty and dusty, and several drinking water depots whose drinking water quality did not meet the standard microbiological requirements according to the quality standards of drinking water requirements, and there were 3 drinking water depots that used long hoses in refilling drinking water.

From the results of the Chi-Square test on bivariate analysis to determine the relationship between equipment sanitation and the presence of *Escherichia coli* bacteria in the Air Gemuruh Health Center Working Area, it cannot be analyzed further because the data is constant. So that no conclusion can be drawn about the relationship between equipment sanitation and the presence of *Escherichia coli* bacteria.

Based on the Regulation of the Minister of Health of the Republic of Indonesia Number 43 of 2014 concerning Hygiene Sanitation of Drinking Water Depots, the production equipment used must have an SNI or ISO certificate. With filter requirements, among others, made of materials that are easy to maintain, the filter tube container must be made of food grade material. The filtered water reservoir must be protected from insect and rat infestation and not be a breeding ground for mosquitoes (larvae) and made of materials that cannot release toxic substances into the water such as food grade stainless steel and polycarbonate or poly-vinyl-carbonate coated containers.⁹ Viral bacteria and other fine particles can be filtered properly and have indicators for monitoring and repair using a micro filter tool. Disinfection does not cause radioactive effects that are harmful to public health and must be able to kill pathogenic germs in drinking water, but does not cause structural changes in drinking water.

Pumps and piping are made of materials that cannot release toxic substances into the water such as food grade stainless steel and polycarbonate or poly-vinyl-carbonate lined containers and it is recommended to use equipment that is transparent for easy monitoring.⁹

The results of this study are in line with research conducted by Erni et al. (2023) shows the results of the $p \text{ value} = 0,011 < \alpha = 0,05$, so H_0 is rejected and H_a is accepted, meaning that based on the results of this chi square test there is a relationship between the hygiene of refillable drinking water depot processing equipment and bacteriological content (*Escherichia coli*).¹² In contrast to the research of Naufal Maulana et al. (2022) showed that the results of the chi square statistical test obtained a $p \text{ value} = 0,709 (p > 0,05)$ which means that there is no significant relationship between the sanitation of Drinking Water Depot equipment and the quality of drinking water. This is because complete and good equipment can cause contamination of drinking water produced if maintenance and improper use are not carried out.¹³

Preventing bacterial contamination of machinery and equipment directly related to raw materials or final products must be cleaned and maintained regularly, Equipment plays a very important role in processing raw water into drinking water, poor equipment conditions will cause non-optimal processing.

CONCLUSION

The conclusion obtained from this study is that there are 7 refillable drinking water depots (DAMIU) out of 35 DAMIU with *Escherichia coli* bacteria. No conclusion can be drawn on the variables of premises sanitation and equipment sanitation because the data is constant.

ACKNOWLEDGMENTS

Thank you to the Head of Puskesmas Air Gemuruh Bungo Regency and Environmental Health Sanitarians who have helped this research from the initial survey to the completion of this study.

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