International Journal of Basic and Applied Science 10 (4) (2022) 154-162

Published by: IOCSCIENCE

International Journal of Basic and Applied Science

Journal homepage: www.ijobas.pelnus.ac.id

Depot Sanitation, Hygiene, and Analysis of Total Microba Control in Refilled Drinking Water in the Barus District

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Article Info

Article history:

Received Jan 28, 2022
Revised Feb 20, 2022
Accepted Mar 23, 2022

Keywords:

Sanitation Hygiene,
Drinking Water Depot,
Coliform.

ABSTRACT

Water is the most important requirement for life. People would prefer to refill their drinking water to satisfy their needs because it is easier and more efficient. It is important to implement hygiene and sanitation measures at drinking water depots if the drinking water produced is to be healthy and safe. Contamination of water can occur if drinking water depots are not kept clean and sanitary. The research used is a descriptive study conducted in the Barus District, with the goal of providing a description of the depot's hygiene and sanitation, as well as laboratory analysis to identify the total contamination of coliform bacteria in the Barus District's Refill Drinking Water Depot. According to the Minister of Health of the Republic of Indonesia no 43 in 2014. None of the drinking water depots in Barus district met the physical qualifying requirements. The exam resulted in a score of 70 or higher. and the results of laboratory tests on the bacteriological quality of drinking water replenished with all coliform-contaminated drinking water samples that exceeded the quality satandard. As a result, the depot owner should turn on the disinfection equipment when starting work and always pay attention to building sanitation, employee hygiene and maintaining drinking water treatment equipment to prevent contamination of drinking water.

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1. INTRODUCTION

Water is the most basic requirement for all living beings. Water deficiency in living things can be dangerous or even cause death. Water provides numerous benefits to human life, including drinking, cooking, bathing, and washing, among others. One of the inescapable demands for water is drinking [1] [2]. According to Basic Health (Riskesdas) 2018 research, 46.5 percent of Indonesian households use more than 100 liters of water per person per day. In other words, 53.5 percent of households still do not have access to clean water that meets their needs [3].

The water that is consumed must be clean, healthy, safe, and legal. When it comes to addressing drinking water needs, the quality of the water must be taken into account. The standards for drinking water quality up to supervision must be in line with Regulation No. 492/MENKES/PER/IV/2010 of the Minister of Health of the Republic of Indonesia [4]. The Drinking Water Depot (DAM), in this case, is required to follow the technical provisions in the Guidelines for Good Production Methods for Drinking Water Depots in the Decree of the Minister of Industry and Trade of the Republic of Indonesia Number 651/MPP/Kep/10/2004 concerning the technical requirements for drinking water depots. as well as commerce [5].

The high demand for drinking water motivates the emergence of various drinking water businesses, both bottled drinking water (AMDK) and refilled drinking water (AMIU). The increasing demand for drinking water, especially in urban areas, has encouraged the growth of the Bottled Drinking Water Industry (AMDK) and refilled drinking water depots (DAMs) that are ready to serve the community. Bottled drinking water (AMDK) generally has received a recommendation from the supervisory agency from the Food and Drug Administration (BPOM) which of course has implemented the Indonesian National Standard (SNI) (SNI 01 -3553-2006) in the management of drinking water so that it is not contaminated with substances or substances. materials that endanger the health of the body [6].

In Indonesia, drinking water depots have been branded as producing low-quality water. The presence of E. coli in drinking water samples implies that the water could be contaminated with pathogenic bacteria that cause digestive problems such as diarrhea. Diarrhea is just one of the many disorders that can be brought on by contaminated drinking water [7].

There are problems about water quality. The drink refill indicator indicates that the water management drink refill is not at its full capacity. Sanitation, hygiene operators, disinfection equipment quality, water flow rate, operator conduct, and water packaging are all factors that might affect the quality of drinking water. The adequacy of many determinants is insufficient. This can lead to E. coli and total coliform contamination, which is harmful to people's health [7] [8].

Drinking water depot is a business that manages raw water into drinking water and sells it directly to consumers. The existence of drinking water depots is currently very much in demand because the price is relatively cheaper than other bottled drinking water. According to the 2014 Regulation of the Minister of Health, sanitation is a health effort to reduce or control risk factors that cause contamination or contamination originating from places, equipment and handlers of drinking water and facilities used for processing, storing and processing drinking water so that it is safe for consumption [9].

According to the Regulation of the Minister of Health of the Republic of Indonesia No. 43 of 2014 concerning Sanitation Hygiene for Drinking Water Depots, it is stated that the community needs to be protected from the risk of water-borne diseases due to consuming drinking water that does not meet quality standards and sanitation hygiene requirements. That based on the considerations as intended, it is necessary to apply the Regulation of the Minister of Health concerning Hygiene Sanitation of Drinking Water Depots [10].

Indicators of microbial contamination of drinking water are coliform and Escherichia coli (E. coli). Coliform is a group of bacteria that is used as an indicator of the presence of sewage pollution. Coliforms in water indicate the possibility of enteropathogenic and/or toxigenic microbes.bacteria Coliform such as Escherichia coli are derived from the feces of humans and warm-blooded animals. The treated water of the Drinking Water Depot must be free from the total content of Coliform and E. Coli [11].

The number of refill drinking water depots in Barus District is six depots. The owner of the drinking water depot is the most responsible person in the drinking water depot business. Therefore, the owner must know the sanitation hygiene of the drinking water depot which includes place variables, raw water source equipment, and handlers [12].

Based on the results of research in the Barus District, most people currently use refilled drinking water for consumption. Because it doesn't need to be cooked, the price is cheap, you get coupons,

and there is delivery service, so you don't have to bother waiting anymore. Some drinking water depots are located close to the highway so that the surrounding environment is littered with dust, which means the water is at risk of being contaminated with bacteria due to the location, presentation, and open packaging. This can harm the health of consumers, and the origin of the water source is unknown.

2. RESEARCH METHOD

This type of research is a Laboratory tests for analytical qualitative research compared to water quality standards. The samples for this research are refilled drinking water samples taken from the depot in Barus District, namely six samples of drinking water.Primary data was obtained by direct observation at the location using an observation sheet guided by the Minister of Health Regulation No.43/MENKES/PER/IV/2014 concerning DAM Sanitation Hygiene and data obtained from laboratory examination results regarding the presence or absence of total coliform in refilled drinking water

3. RESULT AND DISCUSSION

3.1. Hygine Sanitation

a. Location & Distance of Raw Water Sources

Table 1
Location & Distance of Raw Water Sources Drinking Water Depots in Barus District

No	Name of Depot	Owner	Location of Raw Water Source	Distance from Water Source	Building Size (M^2)
1	ZW	Fauji	Tapioca Mountains Water	6 Km	12
2	TW	Topic	Tapioca Mountain Water	6 Km	16
3	MW	Masril Matia Rambe, SE	Water Tapioca Mountains	6 Km	32
4	AW	Yusuf	Tapioca Mountains Water	5 Km	75
5	A&EW	Rudi	Tapioca Mountains Water	4.5 Km	16
6	NW	Nanda	Tapioca Mountains Water	5 Km	12

Based on table 1 it is known that in general the source of raw water for Drinking Water Depots (DAM) comes from from Tapioca Mountains Water, Sosorgadong sub-district to be processed into drinking water. The distance of the depot from the nearest water source is 4.5 Km and the building area of the water depot is 12 m2, 16 m2, 32 m2 and 75m2.

According to research conducted at the location of the drinking water depot business, there are some drinking water depot locations that are not yet free of pollution sources. Because most of the drinking water depots in Barus District are close to the highway, a lot of road dust gets into the processing room. The spread of germs or contamination of microorganisms through dust can occur. Bacteria penetrate and adhere to the depot owner's equipment. At the study area, it was also discovered that there was a depot immediately next to the water flow that had a lot of waste heaps, which might be a cause of pollution.

The DAMIU requirement requires buildings to be free of contamination from landfills and waste accumulation of old items, as well as harmful (B3) and other suspicious places that can pollute water [13]. The mineral layer of the soil penetrated determines the quality of spring water. Spring water is normally of good quality, hence it is commonly utilized as a source of drinking water. If raw water input depots are not limited, they will eventually have an impact on the local ecology [14].

b. Sanitary Hygiene Places for Drinking Water Depots

Table 2
Sanitary Hygiene Places for Drinking Water Depots in Barus District

No	Places	Eligible	Not Eligible	Total
1	Location free from pollution and disease transmission and disease transmission	3	3	6
2	Strong building, safe, easy to clean and easy to maintain	4	2	6
3	The floor is waterproof, the surface is flat, smooth, not slippery, does not crack, does not absorb dust, and is easy to clean, and the slope is quite gentle	5	1	6
4	The walls are waterproof, the surface is flat, smooth , not slippery, not cracked, does not absorb dust, and easy to clean, as well as bright and bright colors	5	1	6
5	Roofs and ceilings must be strong, anti-rat, easy to clean, do not absorb dust, flat surface, and light in color, and has a sufficient height	5	1	6
6	Spatial planning consists of room for processing, storage, distribution/supply, and waiting room for visitors/consumers	0	6	6
7	The lighting is bright enough to work, not dazzling and spread evenly	6	0	6
8	Ventilation ensures good circulation/air exchange	0	6	6
9	Air humidity can provide support for comfort in doing work/activities	6	0	6
10	Have access to bathrooms and latrines	1	5	6
11	There is a sewerage that isflow is smooth and closed	1	5	6
12	There is a closed trash can	0	6	6
13	There is a hand washing area equipped with running water and soap	4	2	6
14	Free from rats, flies and cockroaches	3	3	6

Based on table 2 above, it can be seen that most of the depots, namely 3 (three) depots whose locations are free from pollution, and 1 (one) depot, do not meet building requirements. Generally, drinking water depots, namely 6 depots, do not have closed trash cans. and 6 (six) depots that do not meet the ventilation requirements. There are 5 (five) depots that do not meet the requirements for sewerage, bathrooms, and latrines. And 3 (three) depots that do not meet the requirements are free from rats, flies, and cockroaches.

Processing raw water into water drinks necessitates the use of equipment. The equipment in the drinking water treatment process is in good working order and meets the requirements, ensuring that good drinking water is produced [15]. Refilling drinking water stations must have access to sanitation facilities such as a handwashing station with running water, soap, and sewerage, appropriate trash cans and closed sewerage for filthy water (waste), and the provision of restrooms [16].

c. Sanitary Hygiene Equipment for Drinking Water Depots

Table 3
Sanitary Hygiene Equipment for Drinking Water Depots in Barus district

No	Equipment	Meets requirements	Does not meet requirements	Total
1	Equipment used is made of food grade ingredients	6	0	6
2	Microfilters and disinfection equipment are still in use / not expired	5	1	6
3	Raw water reservoirs must be closed and protected	6	0	6
4	Gallon containers / bottles are cleaned before filling	6	0	6
5	Containers / gallons filled with drinking water must be given immediately to consumers and should not be stored in the	6	0	6

No	Equipment	Meets requirements	Does not meet requirements	Total
	DAM for more than 1x24 hours			
6	Performing a reverse washing system (*backwashing)* periodically replacing the macro filter tube	5	1	6
7	There is more than one micro filter (μ) with a tiered size	5	1	6
8	Theresterilization equipment, in the form of ultra violet and or ozonation and or other disinfection equipment that functions and is used properly	6	0	6
9	There are washing and rinsing bottles (gallons)	6	0	6
10	There is a bottle filling facility (gallons) in a closed room	6	0	6
11	A new clean bottle cap is available	6	0	6

Based on table 3, it can be seen that in general, all depot equipment, namely 6 depots, meets the requirements such as using equipment from food tare materials, microfilters and disinfection equipment have not expired, raw water reservoirs are closed and protected, containers/gallons filled with drinking water are given directly to consumers, there is no depot that stores gallons, performs a reverse washing system, and periodically replaces macro filter tubes.

Generally, five water depots have more than one micro filter (μ) equipment with a tiered size. There is sterilization equipment that can still function and can be used properly by the drinking water depot owner, and generally, drinking water depots have four depots available for bottle washing and washing facilities. bottle filling in a closed room and cleaning bottle caps. Environmental sanitation conditions, which claim that the supervision of the physical, biological, social, and economic environment can have an impact on human health, where the beneficial environment is greatly improved and enhanced while the harmful environment is rectified or removed, This could endanger public health [17].

d. Handlers of Sanitary Hygiene at the Drinking Water

Table 4
Handlers of Sanitary Hygiene at the Drinking Water Depot in Barus

No.	Handlers	Meet the Requirements	Not Meet the Requirements	Total
1	Healthy and free from infectious diseases	6	0	6
2	Do not become carriers of disease germs	0	6	6
3	Hygiene and sanitation behavior when serving consumers	6	0	6
4	Always wash your hands with soap and running water every time you serve consumers	0	6	6
5	Use clean and neat work clothes	6	0	6
6	Conduct regular health checks at least 1 (one) time a year	0	6	6
7	Operator / Person in Charge / Owner have a certificate having attended a drinking water depot hygiene sanitation course	1	5	6

Based on table 4 it can be seen that generally all the handlers, namely 6 healthy people, 6 (six) people do not have evidence of a rectal swab examination that guarantees not to be carriers of disease germs, do not wash their hands properly soap and running water every time they serve consumers, have never carried out regular health checks and 1 (one) person does not there are handlers who take a drinking water depot hygiene sanitation course.

Most of the handlers, namely 5 people, behaved hygienically when serving consumers, such as not smoking and scratching body parts at work and more touchers, namely 6 people in neat and

clean work clothes. Drinking Water Depot handlers who aren't concerned with sanitation cleanliness can use Drinking Water Refill to keep in touch with AMIU throughout the service process. In addition, there was a trash can without a cover in the observations, which allowed flies to fly from the trash can at a distance of 500 meters.

One of the risk factors for E. coli contamination in drinking water is poor personal hygiene. Personal hygiene can be defined as a person's positive behavioral attempts to live a clean and healthy life. Employee health parameters, particularly those related to the manufacturing process, must always be in good health, free of injury, disease, skin, or other items that could pollute the water. PHBS criteria and understanding of staff hygiene and sanitation, such as handwashing before work and the fact that employees are not permitted to eat, smoke, spit, or engage in any other behavior that could contaminate drinking water [18] [19].

The handler is a person who performs drinking water purification at DAM using various machines and equipment. Employees at DAM must be familiar with the water treatment technique. Employees in the beverage processing industry cannot be just anyone. Because drinking water is not a pathogen-transmitting medium. To ensure that drinking water is processed and safe to drink, it must be completely free. As a result, employees/drinking water processors must be in good health and water treatment must be clean [20] [21].

e. Feasibility Assessment of Sanitary Hygiene Refill Drinking Water Depots

Table 5
Feasibility Assessment of Sanitary Hygiene Refill Drinking Water Depots in Barus District

No	Depot	Weight	Description
1	ZW	42	Not eligible
2	TW	37	Not eligible
3	MW	55	Not eligible
4	AW	48	Not eligible
5	A&EW	46	Not eligible
6	NA	33	Not eligible

Based on table 5, it can be seen that all depots, namely 7 depots, did not meet the physical fitness requirements. This can be seen from the weight of the assessment obtained between 46 and 61. While the inspection score requirement reaches 70 or more, it is declared to meet the physical fitness requirements, while the value 70 is declared not to meet the physical fitness requirements.

According to the balanced assessment of drinking water depots, all 6 (six) drinking water depots fail to meet the requirements. Because many drinking water depots still do not follow sanitation hygiene principles, such as the lack of sanitation facilities, such as water and soap to wash hands before working, all depots do not meet the physical fitness requirements. Turn off the UV lamp (ultra violet) and the RO system (reserved osmosis) because they are vital in the coliform bacteria killing procedure. The state of the handlers who do not fulfill the criteria, who do not conduct regular health checks at least once a year, and who have never attended a depot hygiene course. The drinking water depot's location and equipment are partially ineligible. It also lacks covered trash cans, and Furthermore, some depots lack access to restrooms and latrines.

The objects not fulfilled by drinking water depot owners causes all depots to fall short of the standard value set by the Minister of Health in RI No. 43 of 2014 concerning Hygiene Sanitation of Drinking Water Depots, which states that if the inspection value reaches 70 or more, it is declared to meet the physical fitness requirements, whereas if the inspection value falls below 70, it is declared that the physical fitness requirements have not been met, and the entrepreneur is held responsible. Because the overall inspection value is 70 or ranges from 33 to

55, the weighing results from all depots are declared not to meet the physical eligibility requirements.

The rise of the drinking water depot business has not been accompanied by the competent authorities' hygiene and sanitation supervision of the business, namely the Sibolga City Health Service and the Sibolga Environmental Service, so there are still drinking water depot entrepreneurs who do not pay attention to the quality of the drinking water produced by their business. This may have an impact on the health of those who drink the depot's drinking water.

3.2. Microbiological Quality Analysis of Drinking Water Refill

Table 6
Analysis of Microbiological Quality in Refillable Drinking Water Samples in Barus District

No.	Code Sample	Unit	Analysis Results	Quality Standard	Description
			Total Coliform		
1	ZW	Total/100mL	12.10	0	Not eligible
2	TW	Total/100mL	11.26	0	Not eligible
3	MW	Total/100mL	10.29	0	Not eligible
4	AW	Amount/100mL	9.12	0	Not eligible
5	A&EW	Total/100mL	12.27	0	Not eligible
6	NA	Total/100mL	14.18	0	No meet the requirements

Based on table 4.6, it can be seen that all drinking water samples did not meet the microbiological quality requirements for total *coliform*. According to the Minister of Health of the Republic of Indonesia's Decree No.492/MENKES/PER/IV/2010, the total quantity of coliform bacteria in a water sample shall be 0/100 ml.

The presence of E. coli is a health problem because of the nature of this bacterium, which has also become resistant to some existing antibiotics. E. coli is one of the gram-negative rods that can cause problems with health such as diarrhea [22] [23]. Water sources that exist in nature generally contain bacteria. The number and types of bacteria differ according to the place and conditions that affect them. Therefore, water used for daily needs must be free from pathogenic bacteria. Drinkable water must meet the government's physical requirements, which are chemical, radioactive, and microbiological. Microbiologically, one of the requirements for safe drinking water is the absence of Escherichia coli in 100 mL[16] [24].

This contamination can be harmful to one's health. Most people prefer to refill their drinking water since it is inexpensive and convenient, but they are unaware that some DAMs have been polluted with bacteria. Consumers choosing quality DAM have a lack of information about the quality of replenished drinking water. DAM owners must be able to offer consumers with information about the state of their equipment, operator cleanliness, and the quality of refilled drinking water. At the time of filling the water, this information must be recorded and accessible to all consumers [25].

4. CONCLUSION

Based on the results of the research that has been carried out, it can be concluded that, All drinking water depots in Barus District do not meet the physical feasibility requirements in accordance with the Regulation of the Minister of Health of the Republic of Indonesia No. 43 of 2014.

All drinking water produced by the Drinking Water Depot in Barus District contains bacteria which exceeds the drinking water quality standard in accordance with the Minister of Health RI No.492 Menkes/per/iv/2010, namely 0 MPN/100 mL, of which Depot ZW is 12.10 MPN/100 mL, Depot TW is 11.26 MPN/100 mL, and Depot MW is as much as 10.29 MPN/100 mL, 9.12 MPN/100 mL, A&EW Depot, and 14.18 MPN/100mL NW Depot

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