Jurnal Kesehatan Lingkungan
Vol. 12 No. 3
DOI: 10.20473/jkl.v12i3.2020.154-162
ISSN: 1829 - 7285
E-ISSN: 2040 - 881X
Journal Home Page: https://e-journal.unair.ac.id/JKL
ORIGINAL RESEARCH Open Access

PROCESSING SYSTEM AND EVALUATION MICROBIOLOGICAL QUALITY OF DRINKING WATER FOUNTAIN IN SURABAYA CITY

Dian Novitasari[1]*

[1]Environmental Health Departement, Public Health Faculty, Airlangga University, Surabaya, 60115, Indonesia

Corresponding Author*:
dian.novitasari-2016@fkm.unair.ac.id

Article Info

Submitted : 2 May 2020
In reviewed : 1 June 2020
Accepted : 13 July 2020
Available Online : 31 July 2020

Keywords : *Drinking water fountain, water quality, microbiological quality, water*

Published by *Fakultas Kesehatan Masyarakat Universitas Airlangga*

Abstract

Introduction: *Drinking water fountain (KASM) is one of the innovations of the Regional Drinking Water Company (PDAM) Surya Sembada Surabaya City to provide drinking where the location is in various public facilities. Health problems in people who consume KASM water can occur when the quality of water is not eligible. Unsafe drinking water can interfere with health and can cause waterborne disease. The purpose of writing this article is to identify the processing system and analyze the quality of water microbiology of KASM.* ***Method:*** *This type of research was a descriptive observational with case design report. Subject of study was drinking water fountain (KASM) was one of the innovations of the Regional Drinking Water Company (PDAM) Surya Sembadin the city of Surabaya. The data used was secondary data on 13 samples of KASM locations originating from the PDAM Surya Sembada Surabaya City and various literature. The method of data analysis used is qualitative.* ***Result and Discussion:*** *Water treatment in each KASM unit is an advanced process of water treatment plant (IPAM) PDAM Surya Sembada City of Surabaya. A series of water treatment processes through several equipments, consisting of: pressure tank, basin, low and high pressure switch, booster pump, radar, tank container, UV lamp, RO, Flow Reject, remineral, hexagonal, post-carbon, 1 micron catridge, GAC, 5 micron Catridge, and solenoid. Results of the evaluation of the microbiological quality of KASM based on the data quality Report water in January 2019-January 2020 indicates that the total parameters coliform at 13 point location 4.69% are not eligible, while for the parameter fecal coliform 100% qualified drinking water quality.* ***Conclusion:*** *monitoring of water quality, processing system, and sanitation need to be applied regularly to provide safe drinking water for the community.*

INTRODUCTION

Water is essential for the lives of all living beings, but many people do not have access to clean and safe drinking water and are free from bacterial infections transmitted by water. According to the Central Statistic Agency (BPS), the percentage of households who have access to water resources service in East Java in 2019 amounted to 43.38%. The city of Surabaya recorded 10.08% of households have access to a decent source of drinking water and the rest is not feasible (1).

The quality of drinking water should be observed and should continue to be monitored periodically so as not to cause health problems for people who consume. Bacteria, which is one of the parameters in Regulation of Ministry of Health Republic Indonesia No. 492/ MENKES/2010 about Quality Requirements of Drinking Water is directly related to health. The presence in drinking water as an indicator signifies contamination in water. The content limit of coliform is recommended in drinking water 0/100 ml samples (2). Drinking water that is free of bacteria, is proof that water is bacteriological safe.

Safe drinking water, sanitation and hygiene are essential for human health and well-being. Unsafe drinking water can interfere with health and may cause water-borne illness. One of the diseases transmitted by water is diarrhea. According to WHO, diarrhea is the leading cause of child mortality and morbidity in the world largely sourced from contaminated food and water. In 2017, 780 million people all over the world do not have access to decent drinking water and 2.5 billion do not have proper sanitation. Diarrhea due to widespread infections throughout the developing world (3).

Efforts to keep environmental sanitation are important. Because if less sanitation it will increase the risk of someone exposed to diarrhea. One of them is the quality of drinking water source. The quality of the source of drinking water used by households with toddlers in East Java has not been good enough and the risk of being infected with diarrhea is still high. Households with a source of drinking water derived from bottled/ refill water, tap water, wells water, and springs water at risk of 4.174, 3.562, 3.828, and 3.723 times contracted diarrhea compared to those originating from the open shelters (4).

Drinking water fountain (KASM) is a public facility that provides free and high-quality access to the public that has been there since the early bronze age (5). KASM has many benefits such as easy to find in various locations, easy to use, and can be used by all ages (6). In addition, users who want to consume KASM do not need to spend costs, thereby saving the cost of purchasing drinking water (7). Therefore KASM can be an alternative drinking water that can be consumed in addition to bottled water.

One of the cities in Indonesia that has implemented tap drinking water facility is Surabaya City under the auspices of Regional Drinking Water Company (PDAM) Surya Sembada City of Surabaya. PDAM Surya Sembada Surabaya City is one of the regional owned enterprises (BUMD) which must implement Corporate Social Responsibility (CSR) as described in Laws of Indonesia No. 40 year 2007. KASM is one of the innovation of the CSR program "Bina Lingkungan" PDAM Surya Sembada Surabaya City which has been operating since 2009. KASM is one form of PDAM service to provide water facilities that are ready to be drunk where the location is located in various public facilities. Benefits will be felt when the KASM is properly treated and spared from bacterial contamination. The user also needs to safeguard it by not damaging the public facilities (8).

The existence of KASM in Surabaya City is very helpful in the case of drinking water. Nowadays KASM distribution in the city of Surabaya increasingly expanding. Until now the number of KASM has been built as much as 30 spots. These spots are scattered in public facilities such as parks, government offices, schools, health facilities, rusun (low-cost appartement building), and mosques. Some consumers have a positive perception with the KASM program, feel the benefits of their existence, quality, and installation. However, some people about 76.92% KASM users still doubt the quality of KASM because the community is still worrying about some things like raw materials as well as lack of promotion and information about its use which makes visitors prefer to drink drinking water in the packaging than the water KASM (9). KASM is a public facility where everyone can use it. Because it can be used freely, good hygiene behaviour is needed to prevent bacterial contaminants from being detrimental to other users, so the quality control of KASM water needs to be done routinely. The purpose of writing this article is to identify the processing system and analyze the quality of water microbiology of KASM.

METHOD

This type of research was a descriptive observational with case report design. Subject of study was KASM in the city of Surabaya with the number of samples to be analyzed as much as 13 location points. The collection of secondary data comes from the PDAM Surya Sembada Surabaya City in January 2019-January 2020 as well as from various literature. Data retrieval

took place in February to April 2020. The method of data analysis used was qualitative. The data that has been obtained is then identified and described in the results. The KASM water treatment system described begins the processing process until it can be consumed by the user. Secondary data related to the microbiological quality of KASM water were presented in the table in the form of average results per month. Based on the data was then evaluated in a way compared to the prevailing regulation, Regulation of Ministry of Health Republic Indonesia No. 492/MENKES/2010 about Quality Requirements of Drinking Water. The microbiological parameters to be compared are a total of coliform and fecal coliform which is an indicator that indicates there is contamination in the water that could potentially cause health problems one of them is a disease that attacks the digestive tract system. In addition, discussed health risks when the quality of water microbiology is not qualified drinking water quality.

RESULT

Drinking Water Fountain Processing System (KASM)

Figure 1 describes the water treatment system in each KASM unit which is an advanced process of the water treatment plant (IPAM) PDAM Surya Sembada Surabaya City. A series of water treatment processes through several equipments, consisting of pressure tanks, basin, low and high pressure switch, booster pump, radar, tank sump, UV lamp, RO, Flow Reject, remineral, hexagonal, post-carbon, 1 micron catridge, GAC, 5 micron Catridge, and solenoid.

Water derived from the advanced process of IPAM processing comes with solenoid assistance. Solenoid serves as a tool to open and close the drains sourced from water storage tubs to other water reservoirs, which need automatic faucets that will work when obtaining an electrical voltage (10). Then pass the 5 micron catridge (No. 17), GAC (No. 16), and 1 micron Catridge (No. 15). The 5 micron Catridge serves fine-grained solids (suspended) particles of up to 5 microns. The GAC to absorb odors, filtering organic contaminants, trihalomethane and pesticides and their derivatives. 1 Micron Catridge to filter smaller contaminants up to 1 micron size. Next will be withdrawn with the Booster Pump to enter the RO process.

In the process of RO, mineral absorption, solid substance, and contaminants are dissolved in water. Higher concentrations of water will be low concentration direction. Dirt and hazardous materials will be discarded. Larger particle-sized micromaterials cannot pass through filtration, including minerals such as calcium and magnesium. That means the minerals contained in the water results of RO process very little, while the minerals are needed for general health and Dental Health (11). The number of bacteria falling on the RO system is higher than that of UV. This is due to the RO system that has the least pores compared to other filters are 0.0001 microns (bacteria 0.2 to 1 micron and viruses 0.2-0.4 microns) (12). However, KASM uses RO and UV systems for maximum results.

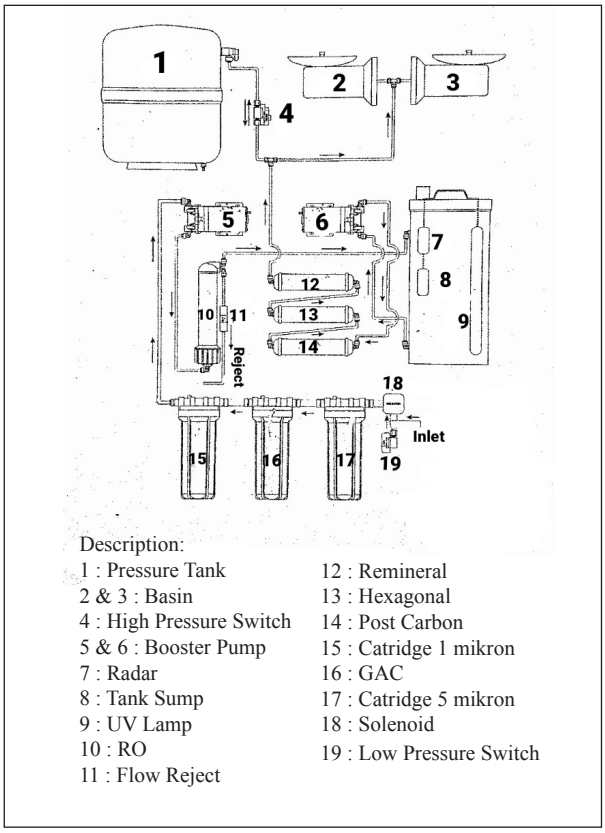

Figure 1. Diagram of Processing flow KASM
Source: PDAM Surya Sembada Document City of Surabaya

KASM uses RO and UV systems as a limiting amount of fluids coming out of the faucet so that the discharge of water is not too large there is a flow reject (No. 11). The way it works by adjusting the water velocity is incoming so that the water filtration results clearer (13). Then the water that has gone through the RO process will go into the container tank (No. 8). The water level setting system can occur due to radar. Besides being equipped with radar, the reservoir tank is also equipped with UV lamp to kill microorganisms.

UV lamp (No. 9) in KASM processing system serves to kill microorganisms that exist in water before consumed by humans. UV rays are effective to destroy the arrangement of nucleic acids in the body of microorganisms. When the core material of cell (RNA/DNA) contact with UV rays, the microorganisms in the water will die because the microorganisms cannot perform its main function.

After passing the RO process, the water will then be streamed to Post Carbon (No. 14) to filter organic contaminants, and the chemical pollutants and their derivatives. In this process the natural flavors of water can return because organic contaminants and pollutants have been reduced. It then passes the process of increased oxygen content in the hexagonal (No. 13) and the addition of minerals into the water (No. 12). In this process, pH has been improved because there are magnesium oxide resin and still must comply with the quality requirements of drinking water in Regulation of Ministry of Health Republic Indonesia No. 492/MENKES/2010 about Quality Requirements of Drinking Water, which is a maximum of 500 mg/liter. The phenomenon is due to increased mineral ions, in this case magnesium ions as a side result of the addition of certain mineral resins (14). Water that has been through the remineral process will be separated between water and air in the pressure tanks (No. 1). If the user presses the faucet, then the pressure switch (No. 4) which is the sensor to read the pressure of the system will transmit the electrical signal and immediately reported to the pressure tanks. Once the sensor is received from the pressure switch, the pressure in the pipe will drop and the pressure tank helps the water in the basin to exit. The Basin is a water container that has been through the process in KASM equipment and ready for user consumption.

Quality Control of KASM Water Microbiology

Water quality control of KASM PDAM Surya Sembada Surabaya City is conducted on weekdays (Monday-Friday) with respect to the reference according to Regulation of Ministry of Health Republic Indonesia No. 736/MENKES/2010 about the Procedures for Monitoring Drinking Water Quality and Regulation of Ministry of Health Republic Indonesia No. 492/MENKES/2010 about Quality Requirements of Drinking Water. The quality of water tested for each weekday is key parameters, turbidity, pH, temperature, organic, TDS, and microbiology. In addition to internal supervision, PDAM Surya Sembada Surabaya City also conducted an external test to the Jakarta Health office and the Technical Centre for Environmental Health and Disease Control, Ministry of Health Republic Indonesia, Surabaya.

Table 1. Distribution of Test Results on Average Total Coliform (MPN/100) KASM Water

Location	Total Test Result Coliform (MPN/100ml)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
SMPN 29 Surabaya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SMKN 5 Surabaya	0.00	0.43	1.00	0.00	2.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ITS	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UNAIR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00
PDAM Pusat	0.00	0.00	1.00	2.20	0.00	0.00	0.00	0.38	0.00	0.00	0.00	0.50	0.00
SMPN 19 Surabaya	0.80	5.83	3.67	4.20	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00
Pondok Pesantren Assalafi Al Fitrah	0.00	0.00	0.75	1.40	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.00
SMPN 41 Surabaya	0.00	0.43	0.00	0.00	8.67	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00
Rumah Air	0.00	0.57	0.00	0.00	1.33	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00
Taman Bungkul	0.00	0.00	0.00	0.75	0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Terminal Bratang	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Siola	3.00	-	-	1.00	3.67	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taman Mundu	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: PDAM Surya Sembada Document City of Surabaya

Table 1 describes the total distribution of coliform test results at 13 locations of KASM based on the secondary data PDAM Surya Sembada Surabaya City in January 2019-January 2020 (15). Table 1 explains that according to the total parameters coliform 3 locations always maintain the quality. Because the results do not display the requirements in effect according to Regulation of Ministry of Health Republic Indonesia No. 492/MENKES/2010 about Quality Requirements of Drinking Water. The location in Junior High School (SMPN) 29 Surabaya, Institue of Technology Sepuluh November (ITS), and Airlangga University (UNAIR), while in other locations there are still found coliform bacteria. Once it is known that the quality does not meet, the laboratory section will report to the maintenance operator to make repairs and checks of the equipment.

Table 2 describes the total compatibility percentage of coliform analyzed by Regulation of Ministry of Health Republic Indonesia No. 492/MENKES/2010 about Quality Requirements of Drinking Water. The

overall total sample for the total test of coliform at 13 KASM locations in January 2019-January 2020 showed 789 with the total sample did not meet showed 37 (4.69%). The location with the highest eligible (MS) percentage at SMPN 29 Surabaya, ITS, and UNAIR amounted to 100%. Location with the highest unqualified percentage (TMS) at SMPN 19 Surabaya amounted to 13.6%.

Table 2. Percentage of Conformity Requirements of KASM Water Samples

Location	Total Sample	MS (%)	TMS (%)
SMPN 29 Surabaya	61	100.0	0.0
SMKN 5 Surabaya	67	94.0	6.0
ITS	55	100.0	0.0
UNAIR	56	100.0	0.0
PDAM Pusat	63	93.7	6.3
SMPN 19 Surabaya	66	86.4	13.6
Pondok Pesantren Assalafi Al Fitrah	63	93.7	6.3
SMPN 41 Surabaya	62	93.5	6.5
Rumah Air	70	95.7	4.3
Taman Bungkul	60	96.7	3.3
Terminal Bratang	59	96.6	3.4
Siola	37	89.2	10.8
Taman Mundu	70	98.6	1.4

Source: PDAM Surya Sembada Document City of Surabaya

Table 3 describes the distribution of the results of fecal coliform testing at 13 locations KASM based on the secondary data of the PDAM Surya Sembada Surabaya City in January 2019-January 2020. Table 2 explains that based on the coliform fecal parameter of 100% KASM water get the Criterion “MS” which means it has fulfilled the requirement limit of drinking water according to Regulation of Ministry of Health Republic Indonesia No. 492/MENKES/2010 about Quality Requirements of Drinking Water.

DISCUSSION

The treatment of raw water into drinking water through physical, chemical and/or biological processes in accordance with the Regulation of Ministry of Public Works and Housing Republic of Indonesia No.26/PRT/M/2014 about Standard Operational Procedure of Water Supply System Management (16). KASM Water treatment has been physically fulfilled because the filtration process in the Catridge is 5 micron and 1 micron. Chemical processes occur in the GAC, post carbon, hexagonal, remineral, RO, and UV. It is necessary to check and replace periodically to ensure the appliance is functioning properly for the processing to go perfectly. Due to the less-than-perfect processing can cause pollution in the processing process (17).

Table 3. Distribution Results of Average Fecal Coliform (MPN/100) KASM Water

Location	Test Result *Fecal Coliform* (MPN/100ml)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
SMPN 29 Surabaya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SMKN 5 Surabaya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ITS	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UNAIR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00
PDAM Pusat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SMPN 19 Surabaya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pondok Pesantren Assalafi Al Fitrah	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SMPN 41 Surabaya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rumah Air	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taman Bungkul	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Terminal Bratang	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Siola	0.00	-	-	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taman Mundu	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: PDAM Surya Sembada Document City of Surabaya

KASM water quality control is carried out internally by the laboratory owned by the PDAM itself and externally. This has been in accordance with Regulation of Ministry of Health Republic Indonesia No. 492/MENKES/2010 about Quality Requirements of Drinking Water, stating that the quality control of drinking water internally is a surveillance carried out by drinking water organizers to ensure water quality, analysis of laboratory test results, recommendations and follow-up. In addition in accordance with article 4 paragraph 2 stating that the quality control of the external drinking water is an oversight conducted by the district health office/city or by the Port Health Office (PHO) specifically for the working area of PHO.

Special and routine supervision is needed to monitor water quality tap drinking water. Quality control of

drinking water is done to prevent bacterial contamination in drinking water. Due to the results of the research conducted at several public schools in Morrinhos, Golas, Brazil on the quality of bacteriological water and the detection of antibiotic resistance genes on KASM water, among the 89 positive samples (49.44%) showed contamination by coliform fecal and the remainder as much as 50.56% of the samples contaminated by other bacteria (18). It proves that it is possible that drinking water can be contaminated by bacteria including KASM water.

The results of the microbiological quality evaluation of KASM indicate that there is still a discrepancy in the total parameters coliform. However, not found fecal bacteria coliform on KASM water. The presence of coliform in drinking water indicates the presence of pathogenic organisms in water. Drinking water tainted by coliform bacteria risk increasing the presence of other pathogenic bacteria (19). The results of other research conducted in Gambir sari Surakarta on the existence of coliform in water refill stations concluded that from the results of the samples tested, amounting to 81.8% of drinking water indicated coliform bacteria. The indications of coliform bacteria can be influenced by the raw source which already contains coliform, the disinfection/sterilisation system that is not functioning properly, hygiene and sanitation officers, processing processes, and conditions of the place (20).

One of the causes of contaminant propagation can occur due to consumer personal hygiene as a habit. Based on the results of the research conducted in the Tembalang Sub-district of Semarang on the quality of microbiology and drinking water content is refilled that there is a meaningful relationship between hygiene with microbial contamination in water refill satations (P = 0,035) (21). One of the benefits of hand washing is being able to remove bacteria that stick to the hand. Washing your hands will be more effective when using soap to make it more effective in killing bacteria. Handwashing can be done by all circles because it is a preventive measure, but effectively lowers the disease one of them is diarrhea. Based on research conducted in Malang district on the behavior of Handwashing in school age children showed that there was a meaningful relationship between washing hands with diarrhea (P = 0,000). The better the behavior of washing someone's hands, the incidence of diarrhea is getting lower (22).

Based on the direct observation results KASM in the city of Surabaya shows that some users are still found that do not wash their hands before using KASM. Poor personal hygiene behaviour will cause negative impact to other users. Hand wash can be done by running water or using a liquid hand sanitizer if the location is not available hand washing facilities. Because according to research conducted on student nursing level I College of Health Sciences (STIKES) of Bali, the percentage in lowering the bacterial number of hand washing using a liquid hand sanitizer is superior to using liquid antiseptic soap, hand sanitizer gel and hand sanitizer liquid, and water flowing (23). However, it is different from the research conducted in the Dr. H. Abdul Moeloek hospital Bandar Lampung City which stated that hand washing using antiseptic soap more effectively kills germs in hand than hand sanitizer. Antiseptic hand wash soap is able to reduce the germ figures up to 73%, while hand sanitizer by 60% (24).

Maintenance of essential facilities and infrastructure is done in order to be used maximally for users. For example, is the availability of hand washing tools that often support the user's behaviour to wash hands before using KASM. Hand washing facilities should also be equipped with hand soap. The presence of hand-washing soaps is an important aspect of turning off microbes on hand. Hand-washing soaps are the most important part of the process of turning off microbes and removing dirt on the hands. Results of a multivariate analysis on research conducted in the district Maulafa Kupang about the microbial contamination of *Escherichia coli* and a total coliform on refill drinking water indicates an influence between sanitation and microbial contamination. Ineligible sanitation increases the risk of microbial pollution rather than qualified sanitation (OR = 0.14) (25). Therefore, the cleanliness around the KASM needs to be guarded. One is to ensure the absence of dirt in the cup, the presence of vectors and rodent.

Currently, KASM has routinely applied supervision of both water quality and processing system. Coliform indicates maintenance effectiveness, assessing the level of cleanliness, integrity of the distribution system and the potential state of biofilms (26). Other sources of pollutants such as garbage and animal debris are also factors that can affect the amount of bacteria in the water (27). KASM is in a public and open location. Contaminants such as garbage, leaves, and dust can contaminate water. As an effort to anticipate the presence of dirt in the water, PDAM Surya Sembada Surabaya City has provided a cover mounted on the roof of KASM.

One of the health problems due to unqualified microbiological qualities is diarrhea. The way of transmission and source of diarrhea is most likely due to the presence of coliform bacteria. Research conducted in the work area Puskesmas Lamper Tengah Semarang City regarding the type of source, bacteriological quality, personal hygiene with the incidence of diarrhea in infants

showed that there is a meaningful relationship with P = 0.001 (p < 0, 5) between bacteriological quality with the incidence of diarrhea in infants (28). Where, bacteriological qualities that do not meet the risky requirements of 2.2 times suffer from diarrhea than are qualified. Based on research conducted in Sememi Village, Benowo District, Surabaya regarding bacteriological quality of refill drinking water shows that people affected by diarrhea consume drinking water derived from water refill stations so it is possible that respondents suffer from diarrhea because the quality of water is not qualified (29). Therefore, if microbiological contaminants are found in the water of the KASM, it is necessary to be handled by cleaning and repairing the equipment. If the means of drinking water less hygienic can potentially cause diarrhea (30).

Six recommendations to reduce health problems related to drinking water fountain to drink to improve public access to safe drinking water, including: comprehensive monitoring and testing, development and application of standard protocols for the maintenance, repair, and replacement of KASM equipment, extensive national efforts to replace the distribution and the old piping system with modern piping, increased types and functions of KASM, increased number of KASM , and communication efforts (31).

The first and crucial step is monitoring and testing all public water tap drinking water, with top priorities given to schools and parks where a large number is used by small children and other vulnerable users, such as pregnant women (31). However, it is recommended that routine monitoring and testing be performed at all points of location to prevent contamination in the KASM water. Because contamination in water can be harmful to people consuming.

The second step is the development and application of standard protocols for the maintenance, repair, and replacement of KASM equipment (31). Americans with Disabilities Act (ADA) has requirements for the specifications of ready to drink water faucet, including the altitude of bursts, location, and water flow. The Environmental Protection Agency (EPA) offers best management guidelines and practices to keep KASM clean. Five recommendations from the EPA include daily cleansing and routine flushing to remove sediment or stagnant water, a systematic comprehensive schedule, cleaning, repair, and adequate maintenance and ensuring the water pressure remains large.

The third step is to make extensive national efforts to replace the distribution and the old piping system with modern piping (31). The program aims to remove lead, copper, and sources of microbial contamination in drinking water. In Indonesia, the unity of Indonesian Drinking Water Company (PERPAMSI) can cooperate with all PDAM in Indonesia to replace the distribution channel that has been too long.

Step four by increasing the type and function of the KASM installation filter can reduce the health risks of KASM connected to the pipes whose system is old (31). The system in the old KASM may contain lead and/or copper parts that should be replaced.

The fifth step is to increase the number of KASM (31). Currently KASM water system has not spread evenly throughout the district/city in Indonesia. Increasing numbers are expected to help improve city water access in public places and reduce bottled water due to the system being applied is requiring to bring its own containers thereby lowering economic and environmental costs. In addition, the design of KASM location placement should be considered, which is close location, easy to reach, easily visible, location marker, location information, water quality status, attractive form, size of faucet height, floor design security, and fulfillment facilities for disabled (6).

The final step is to make a communication effort. Communication can be done at the city level, school, district park, and others responsible for the fountains to rebuild public confidence in KASM.

ACKNOWLEDGEMENT

The author thanked the PDAM Surya Sembada City of Surabaya, the writing adviser and various parties who have helped so that the scientific article can be missed.

CONCLUSION

KASM processing system distributed by the installation of drinking water Treatment (IPAM) PDAM Surya Sembada City of Surabaya consists of the processing of physics and chemical that signifies already in accordance with the Regulation of Ministry of Public Works and Housing Republic of Indonesia No.26/PRT/M/2014 about Standard Operational Procedure of Water Supply System Management. The supervision of KASM Water microbiology quality is in accordance with the standard that is implemented routinely both internally and externally. However, personal hygiene users at the time of using KASM should be taken care of by washing hands with running water and soap or hand sanitizer. PDAM Surya Sembada Surabaya City also need to socialize the benefits, ways of use, and water quality so that people do not hesitate to consume KASM as an effort to contribute to reduce plastic waste. In addition, environmental sanitation around KASM needs to be cleaned regularly to keep it clean and free of germs.

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