

Analysis Of Microbiological Quality in Community-Based SPAM (Drinking Water Supply Systems) in The City Of Blitar Based On A Monitoring System

Yuniana Amalia Hayati¹, Ukik Agustina²

Institut Ilmu Kesehatan STRADA Indonesia

*Corresponding author: yunirazka17@gmail.com

ABSTRACT

Water is a natural resource that has a very important function for human life. The aim of this research is to analyze the effect of monitoring on the microbiological quality of community-based SPAM (Drinking Water Supply System) in Blitar City. The design of this research is quantitative observational research with a cross sectional approach with the focus of the research directed at analyzing the effect of supervision on microbiological quality in community-based SPAM (Drinking Water Supply Systems) in Blitar City. The total population was 22 respondents and the sample was 21 respondents taken using the Simple Random Sampling technique. The findings showed that the majority of respondents had less supervision in the category of 18 respondents (86%). Apart from that, the majority of community-based SPAM (drinking water supply systems) have microbiological quality in the category of not meeting the requirements, as many as 18 respondents (86%). Based on the results of the Logistic Regression analysis, it shows that the p-value is $0.000 < 0.05$, so H1 is accepted so it is concluded that there is an influence of supervision on the microbiological quality of community-based SPAM (Drinking Water Supply System) in Blitar City. It is hoped that respondents will improve supervision to be even better in accordance with applicable regulations in order to ensure the quality of existing SPAM drinking water is suitable for consumption.

Keywords: Microbiology, SPAM, Society

INTRODUCE

Water is a natural resource that has a very important function for human life. In order to improve welfare and quality of life, water is the main factor and basic capital in development. Human needs for water are very complex, including for drinking, cooking, bathing, washing (various types of laundry) and so on (Soemirat, 2014).

The average water requirement in Indonesia is 60 liters per capita per day, which includes 30 liters for bathing, 15 liters for washing, 5 liters for cooking, then 5 liters for drinking, and 5 liters for other things. This condition is influenced by the dry season, where the need for water decreases along with the decline in existing water supplies (Junaedi, 2014). Meanwhile, the proportion of water in the body reaches around 70% of body weight and is located in very vital parts of the body. The proportion of water in the brain is around 90%, the heart is 75%, the lungs are around 86%, the liver is 86%, the kidneys are 83%, the muscles are 75%, the blood is 90%, the bones are 22%, and in the teeth it is around 75% (Amirta, 2007). Lack of water can cause dehydration and the possibility of illness and even death (Junaedi, 2014).

The importance of water as a compound that cannot be replaced in human survival requires a balanced ecosystem as an effort to maintain the condition of water in life. As the human need for housing continues to increase and the selling price of wood becomes

increasingly attractive, it is inevitable that the felling of trees will result in the ecosystem being far from balanced. Not only does cutting down trees have an impact on increasing the heat of the air due to the lack of shade from plants, the flow of springs also decreases so that they are not said to be dead (Frederiksen, 2010).

Water quality can be viewed from a physical, chemical and bacteriological perspective. According to the Republic of Indonesia Minister of Health Regulation No.492/Menkes/Per/IV/2010, the physical requirements are that drinking water is odorless, tasteless, colorless and not cloudy. The bacteriological requirements for drinking water must not contain bacteria, while chemically the water must not contain toxic chemical compounds and each substance dissolved in water has certain permissible limits. The main problem is that poor drinking water quality will have an impact on health. Water can spread disease. Water is a good medium for bacterial life, for example *Escherichia coli* bacteria.

In Blitar City, since 2010, an independent Drinking Water Supply System (SPAM) has been built which provides clean water for the community by processing swamp water into clean water (Nugroho, 2018). The design and construction process of Water Treatment Plants and their distribution systems is carried out in a self-managed manner by adapting the Conventional Water Treatment Plant (PDAM) system. Experiment after experiment was carried out autodidactically to perfect the SPAM. To maintain the quality of drinking water consumed by the community, monitoring of water quality was carried out at community-based SPAMs in Blitar City and it was discovered that the results of water sampling tests at 3 SPAM points were 100% stated to exceed the quality standards for microbiological drinking water requirements where sample 1 total coliform was 10/150. ml, sample 2 total coliform results were 150/100 ml and sample 3 total coliform results were 15/100 ml so it does not comply with RI Minister of Health Regulation No.492/Menkes/Per/IV/2010, namely total coliform bacteria and *e. coli* amounting to 0 counts / 100 ml sample. Since the beginning of the construction of the community-based SPAM (Drinking Water Supply System) in Blitar City, there has never been any monitoring either internally or externally so it is not in accordance with Minister of Health Regulation No. 736/Menkes/Per/VI/2010 concerning Procedures for Monitoring Drinking Water Quality.

Based on the conditions above, the author is interested in researching the analysis of microbiological quality in community-based SPAM (drinking water supply systems) in Blitar City based on the monitoring system carried out.

METHODS

In this research, researchers used a quantitative analytical design with a cross sectional approach, namely a study to study the dynamics of the correlation between risk factors and effects, by approaching, observing or collecting data at one time (point time approach), meaning, each subject The research is only observed once and measurements are made on the subject's character status or variables at the time of the examination. This does not mean that all research subjects were observed at the same time (Soekidjo, 2012). This research will analyze the effect of monitoring on the microbiological quality of community-based SPAM (Drinking Water Supply System) in Blitar City.

RESULT

1. Characteristics Supervision

Table 1 Frequency distribution of respondents based on supervision of respondents in the community-based SPAM (drinking water supply system) in Blitar City which was carried out on 3-16 July 2022 with a total of 21 respondents.

Criteria	Frequency	Percent (%)
Enough	3	14%
Not enough	18	86%
Total	21	100.00%

Based on table 1 above, it is known that the majority of respondents had less supervision in the category of 18 respondents (86%).

2. Microbiology Quality Characteristics

Table 2 Frequency distribution of respondents based on microbiological quality in community-based SPAM (drinking water supply system) in Blitar City which was held on 3-16 July 2022 with a total of 21 respondents

Criteria	Frequency	Percent (%)
Qualify	3	14%
Not eligible	18	86%
Total	21	100.00%

Based on table 2 above, it is known that the majority Community-based SPAM (drinking water supply system). 18 respondents (86%) had microbiological quality in the category that did not meet the requirements.

3. Statistical Test Results

Table 3 Results of logistic regression analysis analysis of microbiological quality in community-based SPAM (drinking water supply system) in Blitar City based on the monitoring system implemented which was held on 3-16 July 2022 with a total of 21 respondents

No	Variable	Sig	Constant
1	Supervision	0,000	0,000

Based on the results of the Logistic Regression analysis, it shows that the p-value is $0.000 < 0.05$, so H1 is accepted so it is concluded that there is the influence of monitoring on the microbiological quality of community-based SPAM (Drinking Water Supply System) in Blitar City.

DISCUSSION

A. Supervision of Community-Based SPAM (Drinking Water Supply System) in Blitar City

The research results showed that the majority of respondents had less supervision in the category of 18 respondents (86%). Meanwhile, 3 respondents (14%) had adequate supervision. The research results show that the majority of Community-Based SPAMs in Blitar City have a person responsible for managing SPAM sustainability, but only 2 SPAMs (10%) are equipped with legality, namely an Institutional Decree ratified by the Subdistrict. For monitoring activities, none of the Community Based SPAMs in Blitar City are equipped with written SOPs. Most of the Community-Based SPAMs in Blitar City carry out internal supervision but this is not carried out routinely, supervision is carried out if problems occur in the field such as reports of leaks, cloudy water quality, etc. Not all Community-Based SPAMs in Blitar City carry out laboratory water quality checks, nor do they provide a budget for regular water quality monitoring. In the implementation of Community-Based SPAM in Blitar City, most of the residents have been involved and there are efforts or commitment from residents to maintain the sustainability of SPAM, including by carrying out routine fees, regular maintenance, etc.

Supervision can be understood as a process to ensure that organizational and management goals can be achieved. This concerns ways of making activities according to plan. This understanding shows that there is a very close relationship between planning and supervision (Yohannes, 2016).

Control or supervision is a function in functional management that must be carried out by each leader of all units/work units regarding the implementation of work or employees who carry it out in accordance with their respective main tasks. Thus, supervision by leadership, especially in the form of built-in control, is a managerial activity carried out with the aim of preventing irregularities in carrying out work. Whether or not a deviation or error occurs during the execution of work depends on the employee's ability and skill level. Employees who always receive direction or guidance from their superiors tend to make fewer mistakes or deviations compared to employees who do not receive guidance (Kadarisman, 2013).

To achieve drinking water quality in accordance with the requirements stipulated based on statutory regulations, internal and external monitoring must be carried out. Internal control is supervision carried out by drinking water operators to ensure that the quality of the drinking water produced meets the requirements, which means supervision carried out by officers/supervision units established within the drinking water operator organization itself. This supervisory officer/unit acts on behalf of the leadership of the organization. This supervisory officer/unit is tasked with collecting all data and information required by the organization. Data on progress and setbacks in work implementation. The results of this supervision can also be used to assess leadership policy. For this reason, sometimes leaders need to review the policies/decisions that have been issued. On the other hand, leaders can also take corrective actions towards drinking water management.

External supervision means supervision carried out by the District/City Health Service or by the KKP specifically for the KKP work area. Drinking water monitoring activities include sanitation inspections, water sampling, water quality testing, analysis of laboratory examination results, recommendations and follow-up.

B. Microbiological Quality in Community-Based SPAM (Drinking Water Supply System) in Blitar City

The research results showed that the majority of community-based SPAM (drinking water supply systems) had microbiological quality in the category of not meeting the requirements, as many as 18 respondents (86%). Meanwhile, 3 respondents (14%) of community-based SPAM (drinking water supply system) had microbiological quality in the qualifying category.

Water is vital for human life on this earth. Human water can only last for a maximum of 3 days. In the human body there are around 50-80 fluids (Soputan, et al, 2019).

Along with population growth, the need for water is seen in terms of quantity and quality, which influences many factors, including culture, economics, education, environmental awareness, water availability, and season/weather. The average per capita need for clean water of the Indonesian population is not yet known, estimates of clean water needs often use figures of around 125-150 liters/person/day (Anonymous, 2018).

The results of Brenda's research (2017), regarding the description of total coliforms in the clean water of PDAM Minahasa Kawangkoan unit, show that 13 PDAM water does not meet the total coliform requirements according to Minister of Health Regulation No. 416 of 1990, namely exceeding 0/100 liters of water.

Based on the Regulation of the Minister of Health of the Republic of Indonesia Number 492 of 2010 concerning Drinking Water Quality Requirements, drinking water that is safe for health to consume is water that meets physical, microbiological, chemical and radioactive requirements. To fulfill this, there needs to be external and internal supervision. The external supervision referred to is supervision carried out by the Regency/City Health Service or by the KKP specifically for the KKP work area, while internal supervision is carried out by drinking water operators to ensure that the quality of the drinking water produced meets the specified requirements.

C. The Effect of Monitoring on Microbiological Quality in Community-Based SPAM (Drinking Water Supply System) in Blitar City

Based on the results of the Logistic Regression analysis, it shows that the p-value is $0.000 < 0.05$, so H1 is accepted so it is concluded that there is the influence of monitoring on the microbiological quality of community-based SPAM (Drinking Water Supply System) in Blitar City.

Water is a natural resource that has a very important function for human life. In order to improve welfare and quality of life, water is the main factor and basic capital in development. Human needs for water are very complex, including for drinking, cooking, bathing, washing (various types of laundry) and so on (Soemirat, 2014).

The average water requirement in Indonesia is 60 liters per capita per day, which includes 30 liters for bathing, 15 liters for washing, 5 liters for cooking, then 5 liters for drinking, and 5 liters for other things. This condition is influenced by the dry season, where the need for water decreases along with the decline in existing water supplies (Junaedi, 2014). Meanwhile, the proportion of water in the body reaches around 70% of body weight and is located in very vital parts of the body. The proportion of water in the brain is around 90%, the heart is 75%, the lungs are around 86%, the liver is 86%, the kidneys are 83%, the muscles are 75%, the blood is 90%, the bones are 22%, and in the teeth it is around 75% (Amirta, 2007). Lack of water can cause dehydration and the possibility of illness and even death (Junaedi, 2014).

The importance of water as a compound that cannot be replaced in human survival requires a balanced ecosystem as an effort to maintain the condition of water in life. As the human need for housing continues to increase and the selling price of wood becomes

increasingly attractive, it is inevitable that the felling of trees will result in the ecosystem being far from balanced. Not only does cutting down trees have an impact on increasing the heat of the air due to the lack of shade from plants, the flow of springs also decreases so that they are not said to be dead (Frederiksen, 2010).

Drinking water is water that has gone through a processing process or without a processing process that meets health requirements and can be drunk directly. Water quality can be viewed from a physical, chemical and bacteriological perspective. According to the Republic of Indonesia Minister of Health Regulation No.492/Menkes/Per/IV/2010, the physical requirements are that drinking water is odorless, tasteless, colorless and not cloudy. Bacteriological requirements for drinking water must not contain bacteria, while chemically the water must not contain toxic chemical compounds and each substance dissolved in water has certain permissible limits.

To ensure the quality of drinking water in the Community-Based SPAM (Drinking Water Supply System) in Blitar City, monitoring efforts need to be made so that drinking water is always available in safe quantities, both quantity and quality and is beneficial for human life. The aim of monitoring is to avoid the possibility of contamination of the quality of drinking water before it is distributed to the public, in this case the quality of drinking water is maintained both in terms of microbiological and chemical quality in accordance with applicable laws and regulations, namely the Republic of Indonesia Minister of Health Regulation No. 492/Menkes/Per/IV/ 2010 concerning Drinking Water Quality Requirements, so that the public as consumers can avoid diseases/health problems that originate or are transmitted through drinking water in Community-Based SPAM (Drinking Water Supply System) in Blitar City. The main problem is that poor drinking water quality will have an impact on health. Water can spread disease. Water is a good medium for the life of pathogenic bacteria, for example *Escherichia coli* bacteria.

CONCLUSION

1. Most of the respondents had less supervision in the category of 18 respondents (85%).
2. Most of the Community-based SPAM (drinking water supply system). 18 respondents (85%) had microbiological quality categories that did not meet the requirements.
3. There is the influence of monitoring on the microbiological quality of community-based SPAM (Drinking Water Supply System) in Blitar City

REFERENCES

- Anwar Musadad, D. 1998. "Pengaruh Air Gambut Terhadap Kesehatan Dan Upaya Pemecahannya." *Media Penelitian Dan Pengembangan Kesehatan* 8.
- Arisandi, Riza, Mochamad Arief Soendjoto, and Dharmono Dharmono. 2019. "Keanekaragaman Familia Poaceae Di Kawasan Rawa Desa Sungai Lumbah, Kabupaten Barito Kuala." *EnviroScientiae* 15 (3): 390. <https://doi.org/10.20527/es.v15i3.7433>.
- Astria, Fanny, Mery Subito, and Deny Wiria Nugraha. 2014. "Rancang Bangun Alat Ukur Ph Dan Suhu Berbasis Short Message Service Gateway, Universitas Tadulako, Sulawesi Tengah." *Jurnal Mektrik* ISSN 2356-4792 1 (1): 47–55.
- Chandrawidjaya, Robertus. 2001. "Air Segar Untuk Penduduk Di Daerah Rawa Dengan Metode Menara Berlipat." *Jurnal Keilmuan Dan Aplikasi Teknik* 2
- Gasim, Muhammad Barzani, B S Ismail, Ekhwan Toriman, Sujaul Islam Mir, and Tan Choon Chek. 2007. "A Physico-Chemical Assessment of the Bebar River, Pahang,

- Malaysia.” *Global Journal of Environmental Research* 1(1) (1): 7–11.
- International Organization for Standardization. 2016. *Water Quality — Determination of Turbidity —Part 1:Quantitative Methods*. Vol. 2016. Switzerland.
- Kementerian Pekerjaan Umum dan Perumahan Rakyat Republik Indonesia. 2015. *Peraturan Menteri Pekerjaan Umum Dan Perumahan Rakyat Republik Indonesia Nomor 29/PRT/M/2015 Tentang Rawa*.
- Nicola, Fendra. 2015. “Skripsi: Hubungan Antara Konduktivitas, TDS (Total Dissolved Solid) Dan TSS (Total Suspended Solid) Dengan Kadar Fe²⁺ Dan Fe Total Pada Air Sumur Gali.” Jember. [http://repository.unej.ac.id/bitstream/handle/123456789/65672/Ainul Latifah-101810401034.pdf?sequence=1](http://repository.unej.ac.id/bitstream/handle/123456789/65672/Ainul%20Latifah-101810401034.pdf?sequence=1).
- Nugroho, Edi. 2018. “Mengenal Inovasi Desa Jejangkit Timur Di Batola, Dan Daftar Seluruh Desa Di Batola - Banjarmasin Post.” 2018. <https://banjarmasin.tribunnews.com/2019/05/06/kalselpedia-mengenal-inovasi-desajejangkit-timur-di-batola-dan-daftar-seluruh-desadi-batola>.
- Peraturan Menteri Kesehatan Nomor 492 Tahun 2010 tentang Persyaratan Kualitas Air Minum.
- Peraturan Menteri Kesehatan Nomor 736 Tahun 2010 tentang Tata Laksana Pengawasan Kualitas Air Minum.
- Peraturan Menteri Pekerjaan Umum dan Perumahan Rakyat Republik Indonesia Nomor 27 Tahun 2016 tentang Penyelenggaraan Sistem Penyediaan Air Minum.
- Rumapea, Nurmidia. 2009. “Tesis: Penggunaan Kitosan Dan Polyaluminium Chloride (PAC) Untuk Menurunkan Kadar Logam Besi (Fe) Dan Seng (Zn) Dalam Air Gambut.” Medan.
- Said, Nusa Idaman. 2008. *Teknologi Pengolahan Air Minum: Teori Dan Pengalaman Praktis*. Pusat Teknologi Lingkungan, Deputi Bidang Teknologi Pengembangan Sumberdaya Alam. Badan Pengkajian Dan Penerapan Teknologi. 1st ed. Jakarta: Pusat Teknologi Lingkungan, Deputi Bidang Teknologi Pengembangan Sumberdaya Alam. Badan Pengkajian dan Penerapan Teknologi.
- Situmorang, M. 2007. *Kimia Lingkungan*. Medan: FMIPA-UNIMED.
- Suhendra, and Ari Rianto. 2017. *Karakteristik Dan Teknik Pengolahan Air Gambut*. 1st ed. Jakarta: Cakrawala Budaya.
- Suhendra, Dipo Satryo, Irnawati Marsaulina, and Devi Nuraini Santi. 2013. “Analisis Kualitas Air Gambut Dan Keluhan Kesehatan Pada Masyarakat Di Dusun Pulo Gombut Desa Suka Rame Baru Kecamatan Kuala Hulu Kabupaten Labuhan Batu Utara Tahun 2012.” *Jurnal Lingkungan Dan Keselamatan Kerja* 9 (4): 43–50.
- Wandriviel, Rido, Netty Suharti, and Yuniar Lestari. 2012. “Kualitas Air Minum Yang Diproduksi Depot Air Minum Isi Ulang Di Kecamatan Bungus Padang Berdasarkan Persyaratan Mikrobiologi.” *Jurnal Kesehatan Andalas* 1 (3): 129–33. <https://doi.org/https://doi.org/10.25077/jka.v1.i3.p%25p.2012>.