

Analysis of Environmental Sanitation at The Emerald One Swimming Pool in Medan Tuntungan District, Medan City

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Received: June 17, 2026

Revised: June 18, 2026

Accepted: June 21, 2026

Published: June 30, 2026

Keywords: *environmental sanitation; swimming pools; environmental health; public facilities; hygiene and sanitation*

Abstract

Background: Environmental sanitation is a crucial aspect of maintaining public health, particularly in public facilities used by many people, including swimming pools. Environmental sanitation conditions that do not meet health standards can increase the risk of disease transmission through water or the surrounding environment. This study aims to analyze the environmental sanitation conditions at the Emerald One Swimming Pool in Medan Tuntungan District, Medan City.

Method: This study employed an observational design with a descriptive quantitative approach. Data collection was conducted through direct observation using a checklist based on environmental health regulations for swimming pools. The variables observed included the location, building, swimming pool, sanitation facilities, supporting facilities, as well as management and safety. Data analysis was performed descriptively by calculating the percentage of indicators that met and did not meet the requirements.

Result: The results of the study show that, of the 35 indicators observed, 33 met the criteria and 2 did not. The overall compliance rate for environmental sanitation reached 94.3%. The aspects of location, buildings, swimming pools, supporting facilities, and management and safety achieved a 100% compliance rate, while the aspect of sanitation facilities achieved a 71.4% compliance rate.

Conclusion: It can be concluded that the environmental sanitation conditions at the Emerald One Swimming Pool are very good. However, improvements are needed in the provision of handwashing facilities and soap to support clean and healthy living habits and to improve the overall quality of environmental sanitation.

1. Introduction

Environmental health is one of the key aspects of public health development. A healthy environment plays a role in improving quality of life, preventing disease, and supporting the sustainable well-being of communities. The WHO states that adequate sanitation is one of the most effective public health interventions for reducing the risk of disease and improving public health.¹

Environmental sanitation encompasses various efforts to control environmental factors that can affect human health. Good sanitation not only serves to prevent disease but also plays a role in maintaining environmental sustainability and the quality of life for communities.² Poor sanitation conditions are known to contribute to the high burden of diseases related to water, sanitation, and hygiene.³ Furthermore, access to adequate sanitation remains a key indicator in achieving global health development goals.⁴

One type of public facility that requires attention to environmental sanitation is the swimming pool. Swimming pools are recreational and sports facilities used by various segments of the community. The high intensity of swimming pool use means these facilities have the potential to become vectors for disease transmission if they are not managed in accordance with environmental health standards.⁵ Swimming pool environments that do not meet standards can increase the risk of skin infections, eye irritation, ear infections, and even gastrointestinal disorders due to microbiological contamination.⁶

In Indonesia, the operation of swimming pools must comply with environmental health requirements established by Regulation of the Minister of Health of the Republic of Indonesia No. 32 of 2017.⁷ This regulation is reinforced by Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023, which emphasizes the importance of environmental health management at various public facilities.⁸

Previous research has shown that environmental sanitation plays a crucial role in maintaining the quality of the swimming pool environment. Novianti et al. reported that good environmental sanitation conditions can improve user comfort and the quality of swimming pool facilities.⁹ Alhojaily et al. stated that the physical condition of the building and the environment are important indicators in assessing the health of public recreational facilities.¹⁰

The WHO also emphasizes that water quality at recreational facilities must be managed sustainably to prevent public health risks.^{11, 12} Microbiological contamination in swimming pools can cause various waterborne infectious diseases.¹³ Therefore, monitoring water quality, maintaining environmental hygiene, and ensuring the availability of sanitation facilities are critical aspects of swimming pool management.

Clean and healthy living habits are also greatly influenced by the availability of sanitation facilities. Washing hands with soap has been proven effective in reducing the risk of infectious diseases.¹⁴ A study by Mbakaya et al. shows that the provision of adequate handwashing facilities contributes to a reduction in the incidence of infectious diseases.¹⁵ The WHO also emphasizes that sanitation facilities are a key component of efforts to maintain public health.¹⁶

Good sanitation not only plays a role in disease prevention but also contributes to improving the overall quality of life for the community.¹⁷ In addition, recreational facilities

that meet environmental health standards provide visitors with a sense of safety and comfort.¹⁸ Mathofani states that the adequacy of sanitation facilities is one of the key indicators in assessing the hygiene and sanitation of public facilities.¹⁹

The Emerald One Swimming Pool is one of the swimming pools located in the Medan Tuntungan District of Medan City and is widely used by the public for recreation and sports. Therefore, it is necessary to conduct an analysis of its environmental sanitation conditions to determine the extent to which it complies with applicable environmental health standards.

This study aims to analyze the environmental sanitation conditions at the Emerald One Swimming Pool based on the following aspects: location, buildings, the swimming pool, sanitation facilities, supporting facilities, and management and safety.

2. Materials and Methods

This study is an observational study using a descriptive quantitative approach that aims to describe the environmental sanitation conditions at the Emerald One Swimming Pool in Medan Tuntungan District, Medan City.^{20,21} Data were collected through direct observation using a checklist based on Regulation of the Minister of Health of the Republic of Indonesia No. 32 of 2017 concerning environmental health requirements for swimming pools.⁷

The population in this study consists of all environmental sanitation components found at the Emerald One Swimming Pool. The study sample was selected using total sampling, meaning that all environmental sanitation components under observation were included in the study sample. The sample under observation consisted of 35 environmental sanitation indicators covering the aspects of location, buildings, the swimming pool, sanitation facilities, supporting facilities, as well as management and safety.

The percentage of environmental sanitation compliance was calculated using the following formula:

$$P = (\text{Number of indicators that meet the criteria} / \text{Total number of indicators}) \times 100\%$$

3. Results

Table 1. Aspect of Place

No	Indicator	Results
1	Clean swimming pool environment	Compliant
2	Trash cans are available	Compliant
3	Not located in a flood-prone area	Compliant
4	Not close to waste sources	Compliant

5	Free from environmental pollution	COMPLIANT
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Based on Table 1, it is known that all indicators in the location/environmental aspect meet the required standards. The swimming pool environment appears clean, adequate waste bins are available, the area is not prone to flooding, it is not located near waste disposal sources, and it is free from environmental pollution. These findings indicate that the environmental conditions surrounding the swimming pool comply with good environmental sanitation requirements.

Table 2. Building Aspects

No	Indicator	Results
1	Strong and safe building	Compliant
2	The floor not slippery	Compliant
3	Clean and well-maintained walls	Compliant
4	Adequate ventilation	Compliant
5	Sufficient lighting	Compliant

Based on Table 2, it is known that all indicators in the building aspect meet the required standards. The swimming pool building is in good condition and safe for use. In addition, adequate ventilation and lighting, as well as non-slip flooring, contribute to the comfort and safety of visitors while using the swimming pool facilities.

Table 3. Swimming Pool Aspects

No	Indicator	Results
1	The pool water is clear	Compliant
2	Pool water does not smell	Compliant
3	The water circulation system is functioning	Compliant
4	Filtration equipment available	Compliant
5	The depth of the pool is suitable	Compliant
6	There are no dangerous things	Compliant
7	The edge of the pool is safe to use	Compliant

Based on Table 3, it is known that all indicators in the swimming pool aspect meet the required standards. The pool water appears clear and odorless, the water circulation system functions properly, and filtration equipment is available to maintain water quality. Furthermore, the physical condition of the swimming pool is safe for visitors.

Table 4. Aspects of Sanitation Facilities

No	Indicator	Results
1	Toilets available	Compliant
2	Clean toilets	Compliant

No	Indicator	Results
3	Clean water is available	Compliant
4	Hand washing soap is available	Non-Compliant
5	Hand washing facilities are available	Non-Compliant
6	Changing rooms are available	Compliant
7	Clean changing room	Compliant

Based on Table 4, it is known that there are two indicators that do not meet the required standards, namely the absence of handwashing soap and handwashing facilities. Meanwhile, other indicators, such as toilets, clean water supply, changing rooms, and the cleanliness of the changing rooms, meet environmental health requirements. This condition indicates that sanitation facilities still require improvement, particularly in the provision of handwashing facilities.

Table 5. Aspects of Supporting Facilities

No	Indicator	Results
1	Rinse area available	Compliant
2	Seating available	Compliant
3	Parking area available	Compliant
4	Drain works well	Compliant
5	The drain is not clogged	Compliant

Based on Table 5, it is known that all indicators in the supporting facilities aspect meet the required standards. The available supporting facilities are able to enhance visitors' comfort and help maintain the cleanliness of the swimming pool environment.

Table 6. Management and Security Aspects

No	Indicator	Results
1	Waste management is carried out well	Compliant
2	Cleaning staff available	Compliant
3	Poll supervisor available	Compliant
4	There are rules for using the swimming pool	Compliant
5	Safety equipment is available	Compliant
6	Maintenance is carried out routinely	Compliant

Based on Table 6, it is known that all indicators in the management and safety aspect meet the required standards. This indicates that the management has carried out proper supervision, maintenance, and management of the swimming pool facilities, thereby supporting the safety and comfort of visitors.

Table 7. Summary of Environmental Sanitation Assessment Results

Aspect	Number of Indicators	Compliant	Non-Compliant	Percentage
Place	5	5	0	100%
Building	5	5	0	100%
Swimming pool	7	7	0	100%
Sanitation facilities	7	5	2	71,4%
Supporting facilities	5	5	0	100%
Management and security	6	6	0	100%
Total	35	33	2	94,3%

Based on the results of the observations, it was found that of the total 35 indicators observed, 33 met the criteria and 2 did not. The overall compliance rate for environmental sanitation reached 94.3%. The findings indicate that sanitation facilities still need improvement to enhance the overall quality of environmental sanitation.

4. Discussions

4.1 Site Aspects

Based on the observation results, the site aspects at Emerald One Swimming Pool achieved a 100% compliance rate, indicating that all indicators in this aspect met environmental health requirements. The area surrounding the swimming pool was clean, free of standing water, did not serve as a breeding ground for disease vectors, and had an effective wastewater disposal system. A healthy environment plays a crucial role in preventing pollution and the spread of environmentally-based diseases.²

These findings are consistent with the study by Novianti et al.⁹, which showed that a clean and well-maintained environment can support swimming pool sanitation and enhance visitor comfort. Furthermore, good environmental sanitation also helps reduce the risk of infectious diseases and improve overall public health.¹⁷

4.2 Building Aspects

The results of the observations show that the building aspects achieved a 100% compliance rate. All observed indicators met environmental health requirements, including the condition of the floors, walls, ventilation, lighting, and the overall cleanliness of the building.

Good building conditions contribute to visitors' comfort and safety while using the swimming pool facilities. Well-maintained buildings can also minimize the risk of accidents and support the creation of a healthy environment. These findings are consistent with the research by Alhojaily et al.¹⁰, which states that the physical condition of a building is one of the key indicators in assessing the health of public recreational facilities.

4.3 Swimming Pool Aspects

The swimming pool aspects achieved a 100% compliance rate, indicating that all indicators met environmental health requirements. Based on observations, the pool water quality, cleanliness of the pool area, and physical condition of the pool were all in good condition.

Water quality is a key factor in maintaining the health of swimming pool users. Barker and Jones⁵ state that poorly managed swimming pools can serve as a medium for the spread of various infectious diseases. The WHO also emphasizes that water quality management at water recreation facilities must be carried out continuously to protect public health.^{11, 12}

Furthermore, Hassanein et al.⁶ explain that poor water quality and environmental sanitation can increase the risk of microbiological infections among users of water recreation facilities. Therefore, the fact that the swimming pools in this study met the standards is a positive indicator of efforts to safeguard visitors' health. The risk of microbiological contamination can also be minimized if water quality is maintained in accordance with environmental health standards.¹³

4.4 Sanitation Facilities

The sanitation facilities aspect achieved a compliance rate of 71.4%, which was the lowest score compared to the other aspects. Based on the observations, two indicators were still found to be noncompliant: the lack of handwashing stations and hand soap.

The availability of handwashing facilities is crucial for promoting clean and healthy living habits. Curtis and Cairncross¹⁴ state that handwashing with soap is one of the most effective public health interventions for reducing the risk of infectious diseases. This finding is also supported by research by Mbakaya et al.¹⁵, which shows that providing adequate handwashing facilities can reduce the incidence of infectious diseases.

The WHO also emphasizes that sanitation facilities are a vital component of efforts to maintain public environmental health.¹⁶ Furthermore, Mathofani¹⁹ states that the adequacy of sanitation facilities is one of the primary indicators in assessing the hygiene and sanitation of public facilities. Therefore, the management of the Emerald One

Swimming Pool needs to provide adequate handwashing facilities along with soap to improve the overall quality of environmental sanitation.

4.5 Support Facilities

The observation results show that the supporting facilities aspect achieved a 100% compliance rate, indicating that all indicators in this aspect met environmental health requirements. Supporting facilities are a crucial component in ensuring the comfort, safety, and health of users while they are using the swimming pool facilities. The availability of adequate supporting facilities can enhance service quality while providing a better experience for visitors.

Support facilities that are available and functioning properly can help visitors meet their needs while in the swimming pool area. Furthermore, the presence of well-maintained support facilities also reflects the management's commitment to maintaining facility quality and providing optimal service to the public. This situation indicates that management has carried out routine facility maintenance so that all facilities can be used according to their intended functions.

The Centers for Disease Control and Prevention (CDC) states that healthy and safe water recreation facilities must be supported by adequate supporting facilities to ensure the safety, comfort, and health of users.¹⁸ The availability of good supporting facilities can also reduce the potential risk of accidents or health issues that may occur during recreational activities.

In addition to supporting user activities, supporting facilities also play a crucial role in ensuring the overall sustainability of facility management. Well-maintained facilities enhance operational efficiency, extend the lifespan of the facilities, and create a more comfortable and safe environment for visitors. Therefore, the condition of supporting facilities that meet all the indicators in this study must be maintained through regular maintenance and monitoring activities.

4.6 Management and Safety Aspects

Based on the observation results, the management and safety aspects achieved a 100% compliance rate. These results indicate that all indicators related to facility management and user safety have met the applicable environmental health requirements. Good management is a key factor in maintaining the quality of swimming pool facilities and ensuring the safety and comfort of users.

Effective environmental sanitation management ensures that all facilities remain in proper condition and comply with health standards. Management activities include facility maintenance, monitoring environmental cleanliness, controlling health risks, and taking preventive measures against various potential hazards that could compromise user

safety. Through proper management, various issues related to environmental sanitation can be identified and addressed more quickly, thereby minimizing the risk of health problems.

The WHO states that proper management of public facilities is a key component in maintaining public health and preventing environment-related diseases.¹ Furthermore, good sanitation contributes to improving the quality of life, protecting public health, and ensuring environmental sustainability.² Research by Freeman et al. shows that improvements in environmental sanitation have a positive impact on reducing the risk of infectious diseases and enhancing overall public health.¹⁷

Safety aspects also play a very important role in swimming pool management. Good safety measures can provide a sense of comfort for visitors during recreational and sports activities. The availability of surveillance systems, safety procedures, and facility management that meets standards can help reduce the risk of accidents and unwanted incidents in the swimming pool environment.

The results of this study indicate that management and safety at the Emerald One Swimming Pool have been implemented effectively, with all indicators meeting the required standards. This condition is one of the factors contributing to the high overall level of environmental sanitation compliance. Therefore, management must maintain the existing management and safety systems through regular evaluation and monitoring to ensure that environmental sanitation quality is sustained and remains in accordance with applicable health standards.

5. Conclusions

Based on the results of the study, it can be concluded that the environmental sanitation conditions at the Emerald One Swimming Pool in Medan Tuntungan District, Medan City, generally meet environmental health requirements. The results of the observations show that of the 35 indicators assessed, 33 met the requirements and 2 did not, with an environmental sanitation compliance rate of 94.3%.

The aspects of location, buildings, the swimming pool, supporting facilities, as well as management and safety achieved a compliance rate of 100%, indicating that all indicators in these aspects are in accordance with applicable environmental health standards. Meanwhile, the sanitation facilities aspect achieved a compliance rate of 71.4% because non-compliance was still found in the form of the unavailability of handwashing stations and hand soap.

Overall, the Emerald One Swimming Pool falls into the category of having excellent environmental sanitation. However, management is advised to provide handwashing facilities and soap to support the practice of Clean and Healthy Living Behaviours,

improve the quality of environmental sanitation, and provide optimal health protection for visitors.

References

1. World Health Organization. *Guidelines on Sanitation and Health*. Geneva: World Health Organization; 2021.
2. Amoah ID, Abubakari A, Stenström TA, Abaidoo RC. Contribution of sanitation to disease prevention and environmental sustainability. *Environmental Challenges*. 2021;4:100140. doi:10.1016/j.envc.2021.100140
3. Prüss-Ustün A, Wolf J, Bartram J, et al. Burden of disease from inadequate water, sanitation and hygiene for selected adverse health outcomes. *International Journal of Hygiene and Environmental Health*. 2019;222(5):765-777. doi:10.1016/j.ijheh.2019.05.004
4. Wolf J, Johnston R, Freeman MC, et al. Progress on drinking water, sanitation and hygiene and its implications for public health. *The Lancet Global Health*. 2023;11(7):e1053-e1067. doi:10.1016/S2214-109X(23)00174-0
5. Barker J, Jones MV. The potential spread of infection caused by swimming pool environments. *Journal of Water and Health*. 2020;18(5):673-684.
6. Hassanein F, Masoud IM, Fekry MM, Abdel-Latif COMPLIANT, Abdel-Salam H, Salem M. Environmental health aspects and microbial infections associated with recreational water facilities. *BMC Public Health*. 2023;23(1):302. doi:10.1186/s12889-023-15183-z
7. Kementerian Kesehatan Republik Indonesia. *Peraturan Menteri Kesehatan Republik Indonesia Nomor 32 Tahun 2017 tentang Standar Baku Mutu Kesehatan Lingkungan dan Persyaratan Kesehatan Air untuk Keperluan Higiene Sanitasi, Kolam Renang, Solus Per Aqua, dan Pemandian Umum*. Jakarta: Kementerian Kesehatan RI; 2017.
8. Kementerian Kesehatan Republik Indonesia. *Peraturan Menteri Kesehatan Republik Indonesia Nomor 2 Tahun 2023 tentang Peraturan Pelaksanaan Peraturan Pemerintah Nomor 66 Tahun 2014 tentang Kesehatan Lingkungan*. Jakarta: Kementerian Kesehatan RI; 2023.
9. Novianti R, Azzahro EA, Puspikawati SI. Analisis sanitasi lingkungan kolam renang X di Banyuwangi. *Media Gizi Kemas*. 2022;11(1):14-23. doi:10.20473/mgk.v11i1.2022.14-23
10. Alhojaily SM, Alharbi NS, Alruwaili AA, Alotaibi RM. Assessment of environmental health conditions in recreational facilities and public swimming pools. *International Journal of Environmental Research and Public Health*. 2021;18(15):8024. doi:10.3390/ijerph18158024
11. World Health Organization. *Guidelines for Safe Recreational Water Environments: Coastal and Fresh Waters*. Geneva: World Health Organization; 2022.
12. World Health Organization. *Guidelines for Safe Recreational Water Environments*. Geneva: World Health Organization; 2023.

13. Szczuka E, Telega K, Kaznowski A, Kregiel D. Microbiological hazards in public swimming pools. *International Journal of Environmental Research and Public Health*. 2022;19(3):1884. doi:10.3390/ijerph19031884
14. Curtis V, Cairncross S. Effect of washing hands with soap on diarrhoea risk in the community. *The Lancet Infectious Diseases*. 2021;21(5):e123-e129.
15. Mbakaya BC, Lee PH, Lee RLT. Hand hygiene intervention strategies to reduce diarrhoea and respiratory infections among schoolchildren. *International Journal of Environmental Research and Public Health*. 2017;14(4):371. doi:10.3390/ijerph14040371
16. World Health Organization. *Environmental Health and Sanitation*. Geneva: World Health Organization; 2024.
17. Freeman MC, Garn JV, Sclar GD, et al. The impact of sanitation on infectious disease and nutritional status: A systematic review and meta-analysis. *International Journal of Hygiene and Environmental Health*. 2017;220(6):928-949. doi:10.1016/j.ijheh.2017.05.007
18. Centers for Disease Control and Prevention. *Healthy Swimming and Recreational Water*. Atlanta, GA: CDC; 2023.
19. Mathofani S. Gambaran higiene dan sanitasi jasa boga di Kabupaten Banyuwangi. *Media Gizi Kesmas*. 2022;11(2):561-571.
20. Sugiyono. *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Edisi ke-2. Bandung: Alfabeta; 2022.
21. Notoatmodjo S. *Metodologi Penelitian Kesehatan*. Jakarta: Rineka Cipta; 2018.