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An Assessment of Sanitation Facilities in Places of Worship in Samarinda City

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Abstrak

Tempat ibadah merupakan fasilitas umum yang digunakan secara intensif, sehingga kualitas lingkungan yang tidak memadai dapat meningkatkan risiko penularan penyakit. Pemantauan terhadap pemenuhan aspek sanitasi di tempat ibadah masih terbatas, terutama pada kawasan permukiman padat penduduk yang memiliki kerentanan lingkungan lebih tinggi. Penelitian ini bertujuan menggambarkan kondisi kesehatan lingkungan dan fasilitas sanitasi di tempat ibadah yang terletak di wilayah padat penduduk di Kota Samarinda, Indonesia. Desain penelitian menggunakan deskriptif observasional dengan daftar periksa penilaian sanitasi mencakup lokasi, kondisi bangunan, ketersediaan air bersih, pembuangan air limbah, fasilitas sampah, kondisi jamban, ventilasi, pencahayaan, serta fasilitas peribadatan. Sebanyak 20 tempat ibadah dinilai, dan data dianalisis secara deskriptif menggunakan frekuensi, persentase, dan nilai rata-rata. Hasil penelitian menunjukkan seluruh lokasi (100%) memperoleh skor ≥7000 dan memenuhi persyaratan sanitasi, dengan skor rata-rata 12.535. Aspek terbaik meliputi ketersediaan air bersih, kondisi lantai, dinding, dan ventilasi (100%). Namun, masih ditemukan kekurangan pada pencahayaan (80%), saluran air limbah tertutup (65%), dan tempat penampungan sementara sampah yang standar (50%). Secara keseluruhan, kondisi sanitasi tergolong baik, meski perbaikan pada pencahayaan dan pengelolaan sampah tetap diperlukan.

Abstract

Places of worship are intensively used public facilities, and inadequate environmental quality may heighten the risk of disease transmission. Monitoring of sanitation compliance in such facilities remains limited, particularly in densely populated residential areas with greater environmental vulnerability. This study aimed to describe environmental health conditions and sanitation facilities in places of worship situated in densely populated areas of Samarinda City, Indonesia. A descriptive observational design was applied using a sanitation assessment checklist covering location, building conditions, clean water, wastewater disposal, solid waste management, latrine conditions, ventilation, lighting, and worship facilities. A total of 20 worship places were evaluated, and data were analyzed descriptively using frequencies, percentages, and mean scores. Results showed that all sites (100%) achieved scores ≥7000, indicating compliance with sanitation requirements, with an average score of 12,535. Clean water availability, flooring, wall conditions, and ventilation were the best-performing aspects (100%). However, deficiencies were observed in lighting (80%), sealed wastewater channels (65%), and standardized temporary waste storage (50%). Overall, sanitation conditions were good, although improvements in lighting and waste management remain necessary.

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INTRODUCTION

Places of worship function not only as centers for religious practices but also as public spaces that host social, educational, and community activities. As public facilities frequently accessed by large groups, inadequate sanitation conditions may facilitate the transmission of various environmentally mediated diseases, including diarrhea, tuberculosis, and respiratory tract infections (WHO, 2018). Consequently, the location, structural condition of buildings, and availability of sanitation facilities within places of worship have the potential to become contributing factors to disease transmission, particularly in densely populated residential settings.

At the national level, Indonesia continues to face substantial sanitation challenges. According to the 2023 Indonesian Health Survey (SKI), access to proper household sanitation has reached only 69.4%, with pronounced disparities between provinces (Kemenkes BKPK, 2023). Densely populated settlements are recognized as areas with the highest vulnerability to inadequate sanitation due to limited land availability, high population density, and poorly functioning drainage and waste management systems. Evidence from studies in urban Indonesian communities indicates that residents of such dense settlements are at increased risk for environmentally related illnesses, especially diarrhea and intestinal parasitic infections (Odagiri et al., 2021). These risks are further compounded when public facilities, such as schools, traditional markets, and places of worship, are not managed with sufficient sanitation oversight.

Places of worship commonly involve mass gatherings in relatively enclosed spaces, shared ablution areas, and communal use of toilets and waste disposal facilities. When these facilities are inadequate or poorly maintained, the risk of disease transmission may increase. A recent study at the Al-Falah Grand Mosque in Jambi found that although most sanitation facilities met regulatory standards, waste management remained a significant concern (Putri Tamara et al., 2024). Similarly, a study of church sanitation in Central Java revealed that several churches failed to meet environmental health requirements, particularly regarding waste management practices and the absence of closed garbage bins (Deswita Fitriani et al., 2023). These findings highlight persistent sanitation gaps across various types of worship facilities.

Samarinda, one of the major urban centers in East Kalimantan, faces its own sanitation-related challenges. Rapid population growth, the spread of densely populated settlements along riverbanks, and seasonal flooding contribute to environmental degradation and sanitation problems within the city (Dinkes Kota Samarinda, 2024; Mulyono, 2016) These conditions not only affect residential neighborhoods but also extend to public infrastructure, including places of worship that serve daily or weekly congregations. Despite these challenges, studies focusing specifically on the environmental health

and sanitation conditions of places of worship in Samarinda remain scarce. Existing research in Indonesia has largely concentrated on household environmental health, while systematic assessments of worship facilities, particularly those located in high-density urban areas, are limited.

Given this research gap, the present study aims to provide a comprehensive overview of the environmental health conditions of places of worship situated in densely populated areas of Samarinda City. The findings are expected to generate valuable insights into the physical condition of buildings, the adequacy of sanitation facilities, and the availability of supporting infrastructure. Ultimately, this study is intended to inform local governments, managers of places of worship, and community stakeholders in designing effective sanitation improvement programs, thereby promoting healthy, safe, and comfortable worship environments for all congregants.

METHOD

A descriptive observational study with a case-study approach was conducted in March 2025 in densely populated residential areas of Samarinda, Indonesia. The study focused on mosques and churches located within these high-density neighborhoods. The research population comprised all places of worship in the study area, from which 20 facilities were purposively selected based on accessibility, population density, congregation size, and representation of worship facility types. Data were collected through direct observation and structured interviews with facility managers. The assessment employed the standardized sanitation inspection checklist for places of worship issued by the Port Health Office, Directorate General of Disease Prevention and Control, under the Regulation of the Indonesian Ministry of Health.

The evaluation covered structural components, including location, outdoor environment, flooring, walls, roofing, ceilings, fencing, lighting, ventilation, and worship equipment, as well as sanitation facilities such as clean water supply, wastewater disposal systems, solid waste bins, toilets, and urinals. Each component was scored according to predefined indicators and weighted as specified in the guideline. Data were analyzed descriptively using frequency distributions, percentages, and sanitation score calculations. A facility was classified as meeting sanitation standards if its total weighted score was ≥7,000 and considered non-compliant if the score was <7,000.

RESULT AND DISCUSSION

The assessment of building components and sanitation facilities in 20 places of worship showed variations in compliance with environmental health standards in several indicators. Detailed findings for each component, including location, structural condition, cleanliness, ventilation, lighting, and availability of worship equipment, are presented in Table 1.

Table 1. Results of the Assessment of Worship Venue Components

No	Building Components and Facilities	Frequency (n)	Percentage (%)
1	**Location**		
	Not located in a flood zone	16	80.0
	In accordance with management planning	20	100.0
2	**Environment / Yard**		
	Clean and well-organized	20	100.0
	Drainage system works well	19	95.0
	No standing water	18	90.0
3	**Flooring**		
	Clean	19	95.0
	Strong, waterproof, and smooth surface	20	100.0
	Non-slip	20	100.0
4	**Walls**		
	Clean	20	100.0
	Surfaces that are constantly in contact with water are waterproof	20	100.0
	Light-colored	20	100.0
5	**Roof**		
	No leaks / sturdy	20	100.0
	Not possible	20	100.0
6	**Ceiling**		
	Minimum height from floor: 2.5 m	20	100.0
	Strong	20	100.0
	Light-colored	19	95.0
7	**Fence**		
	Strong	19	95.0
	Well-maintained	20	100.0
8	**Lighting**		
	Sufficiently Bright	16	80.0
9	**Ventilation**		
	There is equipment to regulate air circulation.	20	100.0
	The air in the room feels comfortable.	20	100.0
10	**Worship equipment available**		
	Clean and neatly arranged	17	85.0
	Sufficient for people performing worship	20	100.0

Table 1 shows that the sanitation conditions of places of worship are good. Almost all components meet environmental health requirements, such as location in accordance with management (100%), clean environment (100%), and floors, walls, roofs, and ceilings that are strong and well-maintained (≥95%). Ventilation is considered optimal in all places of worship (100%), making the air comfortable, although lighting is still limited in some places (80%). Meanwhile, the availability of worship equipment is sufficient (100%), but the cleanliness and tidiness of the equipment

still need to be improved, as only 85% meet the requirements.

The results of the study show that, in general, the sanitation conditions of places of worship are in the good category. This can be seen from all components of the building structure, environment, and sanitation facilities, most of which meet environmental health requirements. In terms of buildings, places of worship are not located in flood-prone areas (80%) and all comply with planning regulations (100%). The condition of the yard and drainage is also well maintained, although 10% of places of worship still have standing water that has the potential to become a breeding ground for disease vectors. A study by Respati & Feriandi (2020) in Bandung shows that standing water and the condition of containers contribute to high larval breeding rates, especially in open containers filled with rainwater. These findings indicate that even the smallest amount of standing water, including in the wudu area, courtyard, or around the place of worship building, must be given serious attention as part of vector-based disease prevention efforts (Respati & Feriandi, 2020).

From a physical building perspective, almost all indicators were met, including the condition of the floors, walls, roofs, ceilings, and fences, which were strong, clean, and waterproof. This is in line with building environmental health standards that emphasize the importance of hygienic physical construction to support the comfort and safety of worshipers (Permenkes, 2017). However, natural lighting remains an aspect that needs attention, as only 80% of places of worship are considered sufficiently bright, while the remaining 20% are still not bright enough. Research shows that insufficient lighting can cause minor accidents and psychological disturbances to the comfort and solemnity of activities (Muclish et al., 2022).

Table 2. Assessment Results of Sanitation Facilities in Places of Worship

No	Sanitation Facilities Components	Frequency (n)	Percentage (%)
1	**Clean Water**		
	Available in sufficient quantities	20	100.0
	Meets physical requirements	20	100.0
	Water for ablution flows through special faucets	20	100.0
2	**Wastewater Disposal**		
	Water flows smoothly	20	100.0
	Watertight sewage pipes and closed system	13	65.0
3	**Trash Bins**		
	Available in sufficient quantities	15	75.0
	Trash bins are made of strong, rust-resistant, waterproof, and closed materials	17	85.0
	Qualified waste collection sites are available	10	50.0
4	**Toilets and urinals**		
	Clean and odor-free	18	90.0

Waterproof flooring, sloped toward the drain	20	100.0
Separate toilets for men and women	19	95.0

Table 2 illustrates the condition of sanitation facilities in places of worship. The availability of clean water is classified as very good, with all places of worship (100%) having sufficient water, meeting physical requirements, and equipped with special taps for wudu. In terms of wastewater disposal, although all water flows smoothly, only 65% have watertight drains and closed systems. The availability of trash bins shows varying results, with 75% providing sufficient quantities, 85% using strong and closed materials, but only 50% having qualified trash collection points. For toilet and urinal facilities, most are considered to meet standards, with 90% being clean and odor-free, 100% having waterproof floors, and 95% separating men's and women's toilets.

In terms of sanitation facilities, the availability of clean water in all places of worship is excellent, with adequate supply, physical quality that meets standards, and the use of special faucets for wudu in line with the findings of a study of churches in Semarang that emphasized the importance of design and water pressure to support effective wudu practices (Santosa et al., 2020). However, only 65% of waste disposal facilities use closed and watertight channels. This condition indicates that most waste facilities are still open, which has the potential to become a source of environmental pollution and health risks. Drainage systems that are not properly designed or maintained can become a pathway for the spread of pathogens and trigger outbreaks of infectious diseases (Blom, 2015).

Waste management in several places of worship shows limitations. Although 85% of trash bins meet the requirements (strong, rust-resistant, waterproof, and closed), only 50% of places of worship have temporary storage sites (TPS) that meet the requirements. The absence of adequate TPS can cause waste to accumulate in the areas surrounding places of worship, creating an environment that is not only visually unpleasant but also a potential breeding ground for disease vectors such as flies and rats. Similar conditions were found in informal settlements in Tanzania, where poor waste management contributed to an increase in vector-borne diseases such as diarrhea, malaria, and dengue fever (Kitole et al., 2024). Research by Tohit et al. (2019) confirms that piles of solid waste are ideal breeding grounds for vectors, especially flies and mosquitoes, thereby increasing the risk of vector-borne disease transmission in densely populated areas and public facilities (M.T et al., 2019).

Most toilet facilities meet the requirements of being clean, odor-free (90%), and separated between men and women (95%). Clean and odor-free toilet conditions are important indicators of basic sanitation, as the accumulation of waste and poor ventilation can potentially cause the release of harmful gases, increase discomfort, and reduce

toilet usage compliance (Lee & Tham, 2021). In addition, the separation of toilet facilities between men and women provides a sense of security, privacy, and comfort, especially for women, and has been proven to increase the use of sanitation facilities in public spaces (Bhakta et al., 2024). Thus, toilet cleanliness and separation not only support environmental health aspects but also support comfort, safety, and the sustainability of healthy sanitation behavior in places of worship.

Table 3. Place of Worship Scores

Criteria for Places of Worship (Score)	n	%	Maximum	Minimum	Average
Does not meet requirements (<7000)	0	0.0	13400	11000	12535
Meets requirements (≥7000)	20	100.0			

The score analysis in Table 3 shows that all places of worship (100%) met sanitation requirements, scoring ≥7000, with scores ranging from 11,000 to 13,400 and an average of 12,535. This places all worship facilities in the "good" to "excellent" sanitation category. These results reflect strong management practices and community engagement in maintaining environmental health within worship spaces. Nevertheless, the areas requiring improvement, lighting adequacy, stagnant water control, wastewater channel integrity, and the establishment of proper waste collection points, represent critical components of comprehensive sanitation standards. Addressing these issues will require coordinated efforts involving facility managers, congregational users, and local government support in the form of supervision and infrastructure facilitation.

Overall, the results indicate that while sanitation in places of worship is generally strong, targeted improvements in wastewater management, lighting, and solid-waste handling are essential to achieving fully compliant and sustainable environmental health conditions. Continuous monitoring, empowerment of facility managers, and structured training in sanitation management can enhance long-term compliance and reduce environmental health risks in these high-use public settings.

CONCLUSION

The sanitation conditions of places of worship in densely populated areas of Samarinda City were found to be generally well maintained, with all facilities achieving sanitation scores ≥7000, indicating compliance with key environmental health standards. Structural and environmental components, including location, cleanliness, building integrity, ventilation, and clean water access, were largely adequate in supporting a healthy worship environment. However, sustaining these conditions requires continuous maintenance by facility managers, enhanced technical support

from local authorities in wastewater and solid waste management, and active participation from congregants in maintaining environmental hygiene. Strengthening these collaborative efforts is essential to ensure long-term sanitation quality in places of worship and to support progress toward national and global sanitation targets aligned with the Sustainable Development Goals.

REFERENCES

Bhakta, A., Mansuri, A., Jaiswal, J., & Iyer, M. (2024). The need of the hour: Providing water in shared toilet facilities for menstrual hygiene management in urban India. *Journal of Water, Sanitation and Hygiene for Development*, *14*(2), 113–121. https://doi.org/10.2166/WASHDEV.2024.265

Blom, K. (2015). Drainage systems, an occluded source of sanitation related outbreaks. *Archives of Public Health*, *73*(1), 1–8. https://doi.org/10.1186/S13690-014-0056-6/TABLES/1

Deswita Fitriani, A., Berliana Putri, A., Fajrin Kamal, F., & Andarie Febri Nurul Huda, L. (2023). Gambaran Fasilitas Sanitasi Gereja di Jawa Tengah. *Journal Occupational Health Hygiene and Safety*, *1*(2), 136–142. https://doi.org/10.60074/JOHHS.V1I2.8758

Dinkes Kota Samarinda. (2024). *Profil Kesehatan 2023 Kaltim*. https://dinkes.kaltimprov.go.id/

Kemenkes BKPK. (2023). *SKI 2023 Dalam Angka - Badan Kebijakan Pembangunan Kesehatan | BKPK Kemenkes*. https://www.badankebijakan.kemkes.go.id/ski-2023-dalam-angka/

Kitole, F. A., Ojo, T. O., Emenike, C. U., Khumalo, N. Z., Elhindi, K. M., & Kassem, H. S. (2024). The Impact of Poor Waste Management on Public Health Initiatives in Shanty Towns in Tanzania. *Sustainability 2024, Vol. 16, Page 10873*, *16*(24), 10873. https://doi.org/10.3390/SU162410873

Lee, M. C. J., & Tham, K. W. (2021). Public toilets with insufficient ventilation present high cross infection risk. *Scientific Reports*, *11*(1), 20623. https://doi.org/10.1038/S41598-021-00166-0

M.T, N. F., Hassan, N. A., Farhan R, M., M.A, E., & Rus, R. M. (2019). Solid Waste: Its Implication For Health And Risk Of Vector Borne Diseases. *Journal of Wastes and Biomass Management*, *1*(2), 14–17. https://doi.org/10.26480/JWBM.02.2019.14.17

Muclish, A. F., Purwaningtyas, E. K., & Setiyowati, E. (2022). *Standar pencahayaan pada masjid untuk perilaku khusyu' sebagai bentuk aktualisasi diri*.

Mulyono, D. (2016). Analisis Karakteristik Curah Hujan Di Wilayah Kabupaten Garut Selatan. *Jurnal Konstruksi*, *12*(1). https://doi.org/10.33364/KONSTRUKSI/V.12-1.274

Odagiri, M., Thomas, A., Listyasari, M., Mills, F., Bain, R. E. S., Muhammad, Z., Slaymaker, T., Mardikanto, A., Gultom, A., Indiyani, A., Rangkuti, H., & Willetts, J. (2021). Safely managed on-site sanitation: A national assessment of sanitation services and potential fecal exposure in Indonesia. *International Journal of*

Environmental Research and Public Health, *18*(15), 8204. https://doi.org/10.3390/IJERPH18158204/S1

Permenkes. (2017). *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*.

Putri Tamara, Isra Rizki, Ahmad Deno, & Zuli Rodhiyah. (2024). Evaluasi Penerapan Sanitasi Di Tempat Wisata Agama. *Lingkar: Journal of Environmental Engineering*, *4*(2), 24–36. https://doi.org/10.22373/LJEE.V4I2.2801

Respati, T., & Feriandi, Y. (2020). Breeding places of mosquito larvae and pupae in Bandung City. *Journal of Physics: Conference Series*, *1469*(1), 012119. https://doi.org/10.1088/1742-6596/1469/1/012119

Santosa, S., Suhartono, E., Fahdiyat, L., & Pertiwi, Z. P. (2020). Evaluation Of Clean Water Supply Systems Of Darul Hikmah Mosque In Politeknik Negeri Semarang. *Wahana Teknik Sipil: Jurnal Pengembangan Teknik Sipil*, *25*(1), 20–31. https://doi.org/10.32497/WAHANATS.V25I1.1915

WHO. (2018). Guidelines on sanitation and health. In *WHO Publication*. World Health Organization. https://www.who.int/publications/i/item/9789241514705