



ENVIRONMENTAL HEALTH INSPECTION OF PUBLIC FACILITIES AND SANITATION AT PASAR RAHMAT SAMARINDA

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Article history: Received: 30-05-2026, Revised: 23-06-2026, Accepted: 30-06-2026

ABSTRACT

Background: Traditional markets play an essential role in food distribution and community livelihoods in Indonesia; however, inadequate sanitation and poor environmental conditions remain persistent public health challenges. Pasar Rahmat in Samarinda City is one of the busiest traditional markets in East Kalimantan, yet comprehensive environmental health assessments based on national standards are limited. This study aimed to evaluate sanitation conditions and environmental parameters at Pasar Rahmat in accordance with Minister of Health Regulation No. 17 of 2020.

Methods: This study employed a descriptive observational design using direct field observations, interviews, and environmental measurements. Sanitation conditions were assessed using a standardized checklist, while environmental parameters included lighting intensity, air temperature, relative humidity, and particulate matter concentrations (PM_{2.5} and PM₁₀). Measurements were conducted at several locations within the market and analyzed descriptively by comparison with applicable environmental health standards.

Results: The sanitation assessment indicated that only a small proportion of the required sanitation indicators were fulfilled. Environmental measurements showed inadequate lighting in most areas, air temperatures and humidity levels exceeding recommended limits, and elevated PM_{2.5} and PM₁₀ concentrations, particularly on the first floor of the market.

Conclusion: Pasar Rahmat does not meet healthy market standards and presents potential environmental health risks for traders and visitors, underscoring the need for improved sanitation infrastructure, environmental management, and routine monitoring.

KEYWORDS: Public Facilities; Traditional Market; Environmental Health Inspection; Environmental Parameters; Healthy Market

1. Introduction

Traditional markets play a vital role in food distribution and community livelihood, particularly in developing countries such as Indonesia (Ghatak et al., 2023). Nationally, more than 16,000 traditional markets serve as the primary source of fresh food for surrounding communities; however, a 2020 national survey by the Indonesian Ministry of Health found that among 448 markets evaluated across 28 provinces, only just over 10% met established health and sanitation standards (WHO, 2024). These markets are frequently characterized by inadequate building maintenance, poor waste management, dysfunctional drainage

systems, and insufficient access to clean water and handwashing facilities — all of which are directly linked to increased risk of foodborne and environmentally mediated disease transmission (Herwianti & Wijayanti, 2023; Fikri & Prameswari, 2024; Izwara et al., 2024).

Market sanitation in Indonesia is governed by Minister of Health Regulation (Permenkes) No. 17 of 2020 on Healthy Markets, which requires a minimum compliance score of 70% across all sanitation indicators (Ministry of Health of the Republic of Indonesia, 2020). Prior studies have consistently demonstrated widespread non-compliance: Fikri and Prameswari (2024) recorded only 56,24% at Pasar Margahayu, Bandung, while Herwianti and Wijayanti (2023) found the majority of 30 traditional markets in Semarang City fell short of required sanitation facility standards. Poor sanitation conditions, compounded by inadequate WASH (Water, Sanitation, and Hygiene) infrastructure, substantially elevate the risk of cross-contamination in food products and pathogen transmission to consumers and vendors alike (WHO, 2022; WHO & UNICEF, 2023). Traditional markets have also been identified as potential hotspots for zoonotic pathogen spillover, particularly where live animals are traded under conditions lacking adequate sanitation oversight (Ghatak et al., 2023; Lamatokan et al., 2023).

Beyond biological risks, physical environmental parameters including illumination intensity, temperature, humidity, and indoor air quality are equally critical to market health assessment. Long-term exposure to particulate matter, particularly PM_{2.5} and PM₁₀, has been consistently associated with increased risks of cardiovascular morbidity and mortality as well as respiratory diseases among exposed populations (Sun et al., 2023; Guo et al., 2023). Indonesia's national air quality standards set 24-hour limits of 25 µg/m³ for PM_{2.5} and 70 µg/m³ for PM₁₀, thresholds that many traditional market areas are reported to exceed due to poor ventilation and high vendor activity (Fikri & Prameswari, 2024). Low food hygiene knowledge and practice among vendors further compounds these risks, with studies linking poor hygiene behaviors to contamination by *Salmonella* spp., *Escherichia coli*, and *Staphylococcus aureus* in market food products (Putri et al., 2023; Pangesti & Wijayanti, 2023; Ministry of Health of the Republic of Indonesia, 2022).

Pasar Rahmat in Samarinda City, East Kalimantan, is one of the busiest traditional markets in the region, yet no comprehensive environmental health assessment using standardized instruments has previously been conducted there. This study therefore aimed to evaluate the sanitation conditions of Pasar Rahmat based on the indicators stipulated in Permenkes No. 17 of 2020, alongside measurement of key environmental parameters including illumination intensity, air temperature, relative humidity, and particulate matter concentrations (PM_{2.5} and PM₁₀). The findings are intended to provide an evidence-based foundation for policy recommendations to improve market sanitation and protect the health of vendors, consumers, and the surrounding community.

2. Methods

This study employed a descriptive observational research design using a field survey approach. The study was conducted at Pasar Rahmat, Samarinda City, East Kalimantan, Indonesia, on 2 May 2026. The descriptive observational design was selected to provide a comprehensive overview of the environmental health conditions of the market through direct observation, interviews, and environmental parameter measurements without manipulating the study variables. Data collection was carried out through several methods. First, direct field observations were conducted to assess the physical and sanitation

conditions of the market, including environmental cleanliness, solid waste management, drainage conditions, ventilation systems, lighting conditions, and the activities of traders and visitors.

Second, direct interviews were conducted with traders, market managers, and visitors using interview guidelines and simple questionnaires to obtain information regarding market cleanliness, environmental comfort, and community perceptions of environmental health conditions within the market. Environmental parameter measurements were performed at three designated locations representing different market activities. Location 1 was situated in the wet market area, including stalls selling fresh meat and seafood products. Location 2 was located on the second floor in the grocery section, where basic food commodities and daily necessities were sold. Location 3 was located in the clothing section, which consisted primarily of apparel and textile vendors.

Air quality measurements were conducted using $PM_{2.5}$ and PM_{10} meters or an air quality monitor to determine the concentrations of particulate matter in the market environment. Light intensity was measured using a lux meter, while temperature and relative humidity were measured using a dust detector equipped with environmental sensors. The collected data were analyzed descriptively by comparing the measurement results with applicable environmental health standards. Concentrations of $PM_{2.5}$ and PM_{10} were compared with the World Health Organization (WHO) Air Quality Guidelines and the Indonesian ambient air quality standards. Temperature and relative humidity measurements were compared with the indoor environmental health standards stipulated in the Regulation of the Minister of Health of the Republic of Indonesia Number 2 of 2023 concerning Environmental Health Regulations. Light intensity measurements were compared with the illumination standards for public facilities and workplaces recommended by the Ministry of Health of the Republic of Indonesia and the relevant Indonesian National Standards (SNI). The comparison of measurement results with these standards was intended to identify the environmental conditions of Pasar Rahmat and evaluate their potential impacts on public health.

3. Result

The sanitation inspection results indicated that several components of Pasar Rahmat met the environmental health requirements, including building conditions, clean water facilities, and the availability of toilets and handwashing facilities. However, deficiencies were identified in environmental cleanliness, waste management practices, drainage conditions, and vector control measures. Environmental measurements showed variations in $PM_{2.5}$ and PM_{10} concentrations, lighting intensity, temperature, and relative humidity across different market floors, with several parameters exceeding the recommended environmental health standards.

3.1 Observation Results of Market Sanitation

Based on the observation results, most sanitation conditions at Pasar Rahmat had fulfilled several healthy market sanitation requirements. The market building was generally well maintained, and environmental cleaning activities were conducted daily. Market roads and corridors appeared relatively clean, and no standing water was observed on the market floors.

In the kiosk and stall areas, the condition of the selling spaces was considered clean without visible accumulation of garbage or decaying waste. Food and fresh produce selling

areas had been equipped with handwashing facilities containing running water and soap. Food commodities were grouped according to their types, and cooling facilities such as ice or refrigeration were available for storing fish, meat, and poultry products.

Sanitation facilities, including temporary waste disposal sites, toilets, and drainage systems, were available and functioned adequately. Waste bins were provided in both kiosks and market stalls, including separation between wet and dry waste. Wastewater drainage channels were constructed from cement materials, and water flow within the drainage system appeared smooth without blockage.

Regarding vector control, routine spraying activities for flies, mosquitoes, cockroaches, and rats were conducted periodically. No domestic animals were found roaming within the market area, and flies were not observed around ready-to-eat food selling locations.

Market traders and employees had also implemented clean and healthy behaviors, such as using personal protective equipment, avoiding smoking during selling activities, refraining from spitting carelessly, and washing hands using water and soap after handling food products.

3.2 Environmental Parameter Measurement Results

Table 1 presents the environmental parameter measurements and their comparison with applicable environmental health standards at the three observation locations in Pasar Rahmat, Samarinda City.

Table 1. Comparison of Environmental Parameter Measurements with Applicable Standards at Pasar Rahmat, Samarinda City

Parameter	Standard	Location 1 (Wet Market: Meat and Seafood Area)	Location 2 (Second Floor: Grocery Area)	Location 3 (Clothing Area)	Compliance Status
Light intensity (lux)	≥ 60 lux	13	65	9	Only Location 2 complied
Temperature (°C)	18–30°C	31,48	31,60	31,52	All locations did not comply
Relative humidity (%)	40–60%	79,1	79,2	73,6	All locations did not comply
PM _{2,5} (µg/m ³)	≤ 25 µg/m ³	37	29	24	Locations 1 and 2 did not comply; Location 3 complied
PM ₁₀ (µg/m ³)	≤ 70 µg/m ³	113	96	102	All locations did not comply

Table 1 presents the environmental parameter measurements and their compliance with applicable environmental health standards at the three observation locations in Pasar Rahmat, Samarinda City. The highest light intensity was recorded at Location 2 (grocery area) at 65 lux, which met the minimum standard of 60 lux. In contrast, Location 1 (wet market area) and Location 3 (clothing area) showed very low lighting levels of 13 lux and 9 lux, indicating suboptimal lighting conditions that may affect visibility and overall hygiene monitoring activities within these areas.

Air temperature across all locations ranged from 31,48°C to 31,60°C, exceeding the recommended standard of 18–30°C, while relative humidity ranged from 73,6% to 79,2%,

both of which indicate persistently warm and humid environmental conditions. Such conditions are consistent with typical wet market environments, particularly in areas with high organic waste exposure such as meat and seafood sections, which can accelerate microbial growth and odor generation.

For air quality parameters, PM_{2.5} concentrations ranged from 24 to 37 µg/m³, where Locations 1 and 2 exceeded the recommended threshold of 25 µg/m³, while Location 3 remained within acceptable limits. PM₁₀ concentrations ranged from 96 to 113 µg/m³ and exceeded the standard of 70 µg/m³ across all locations, with the highest levels consistently observed at Location 1 (wet market area). This pattern reflects the influence of intense trading activity, organic waste handling, and limited ventilation in high-density trading zones.

When related to the physical conditions of the market, particularly in the wet market area, the combination of elevated humidity, poor air quality, and organic waste exposure indicates a potentially favorable environment for the survival and proliferation of disease vectors such as flies and rodents. Although vector and rodent control activities are reported to be conducted periodically, the persistence of unsatisfactory environmental conditions suggests that these control measures may not yet be fully effective or consistently sustained.

Based on these findings, the wet market area in particular may present a higher potential risk for zoonotic disease transmission compared to other sections, especially if sanitation practices and waste management are not adequately maintained. However, this interpretation should be considered in conjunction with observational findings and not solely based on environmental measurements.

**Table 2. Sanitation Assessment Results of Pasar Rahmat, Samarinda City
Based on Healthy Market Indicators**

Assessment Component	Number of Indicators	Indicators Met	Indicators Not Met	Status
Market building conditions and maintenance	10	2	8	Not compliant
Environmental cleanliness	5	1	4	Not compliant
Waste management facilities	7	1	6	Not compliant
Drainage and wastewater management	6	1	5	Not compliant
Toilet facilities	5	2	3	Not compliant
Clean water facilities	4	4	0	Compliant
Food vendor sanitation and hygiene	8	1	7	Not compliant
Vector and rodent control	4	0	4	Not compliant
Handwashing facilities	4	1	3	Not compliant
Parking area conditions	4	1	3	Not compliant
Total	57	14	43	Not compliant

Table 2 shows the sanitation assessment results of Pasar Rahmat, Samarinda City, based on 57 healthy market indicators. Overall, only 14 indicators (24,6%) met the required standards, while 43 indicators (75,4%) did not comply, indicating that the market has not yet achieved the criteria of a healthy market. The highest level of compliance was observed

in clean water facilities, where all four assessed indicators met the required standards. Partial compliance was identified in market building conditions, environmental cleanliness, toilet facilities, handwashing facilities, and parking areas, although most indicators within these components remained unsatisfactory. Conversely, waste management facilities, drainage and wastewater management, food vendor sanitation and hygiene, and vector and rodent control demonstrated substantial deficiencies, with the majority of indicators failing to meet the established standards. These findings suggest that improvements are particularly needed in environmental sanitation management and hygiene infrastructure to support a healthier market environment.

4. Discussion

Pasar Rahmat, Samarinda City, met only 14 out of 57 sanitation indicators (24,6%), indicating that overall market sanitation conditions remain far below the healthy market standard. Deficiencies were identified across nearly all assessment components, including market building maintenance, waste management, drainage systems, toilet facilities, food vendor hygiene, and vector control. These findings are consistent with and further supported by evidence from traditional markets across Indonesia. The majority of traditional markets have been shown to fail healthy market requirements under Permenkes No. 17 of 2020, particularly in waste management, sanitation facilities, and handwashing stations (Herwianti & Wijayanti, 2023). Inadequate drainage and the absence of wastewater treatment facilities have similarly been identified as dominant factors driving unhealthy environmental conditions in traditional markets elsewhere (Fikri & Prameswari, 2024). Extending beyond physical infrastructure, low food hygiene practices among vendors have been consistently linked to increased risk of biological and chemical food contamination, including pathogenic bacteria such as *Salmonella* sp., *E. coli*, and *Staphylococcus aureus* (Putri et al., 2023; Lamatokan et al., 2023). Poor waste management practices, as observed in this study, have likewise been shown to directly elevate vector density and environmental pollution risk in market settings (Arafat et al., 2024; Nasution & Siregar, 2022). Furthermore, traditional food markets in developing countries have been identified as hotspots for zoonotic disease spillover, particularly when sanitation and vector control programs are absent (Ghatak et al., 2023). However, a notable disparity exists with studies conducted in West Sumatra, where some traditional markets retained functioning handwashing facilities, suggesting that sanitation conditions vary considerably across regions and reflect differences in local governance capacity (Gusti & Iqbal, 2023).

The convergence of poor physical sanitation and deteriorated environmental parameters at Pasar Rahmat carries substantial public health implications for vendors, visitors, and the surrounding community. Stagnant drainage and unmanaged waste create favorable breeding conditions for disease vectors such as mosquitoes, flies, and rodents, elevating the risk of both vector-borne and foodborne disease transmission (Nasution & Siregar, 2022; Ghatak et al., 2023). Beyond biological risks, the elevated PM_{10} concentrations exceeding $70 \mu g/m^3$ across all floors, and $PM_{2.5}$ on the first floor surpassing $25 \mu g/m^3$, pose a chronic respiratory health risk particularly for vendors exposed daily over prolonged periods, with long-term particulate exposure associated with increased incidence of asthma, bronchitis, pneumonia, and cardiovascular disease (Gusti et al., 2025; Binmahfoudh et al., 2023). Compounding these risks, the near-total absence of WASH infrastructure undermines even basic disease prevention, given that access to safe water, clean sanitation, and

handwashing facilities constitutes a fundamental pillar of public health protection in public spaces (WHO, 2022). Taken together, these conditions indicate that Pasar Rahmat poses a compounding environmental health burden that extends well beyond individual sanitation deficiencies (Kemenkes RI, 2022).

Despite these meaningful contributions, this study has several limitations that warrant acknowledgment. Environmental parameter measurements were conducted at a single point in time, which may not fully capture diurnal or seasonal variation in exposure conditions. The sanitation assessment relied solely on observational checklists without microbiological sampling of surfaces or food products, limiting the ability to directly establish links between physical sanitation conditions and actual pathogen presence. Additionally, incomplete market profile data including the total number of vendors and stalls constrained the representativeness of vendor hygiene behavior observations. These limitations may affect the generalizability of findings to other traditional markets and should be considered when interpreting the results.

Building on these insights, future research should prioritize longitudinal environmental monitoring across different seasons and times of day to obtain a more comprehensive picture of exposure risk. Microbiological studies examining surface contamination and airborne pathogens in food vendor areas would provide critical evidence linking physical sanitation deficiencies to actual foodborne and zoonotic disease risk (Ghatak et al., 2023). Intervention studies evaluating the effectiveness of structured sanitation training and infrastructure improvements on vendor hygiene compliance are equally warranted (Putri et al., 2023; Nafita et al., 2022). Additionally, exploring the role of market governance structures including vendor associations and health authority inspection routines in sustaining sanitation improvements would contribute meaningfully to evidence-based healthy market policy across Indonesia (Kemenkes RI, 2022).

5. Conclusion

This study concludes that the sanitation conditions of Pasar Rahmat, Samarinda City, do not meet the healthy market standards as regulated in Minister of Health Regulation No. 17 of 2020. The sanitation assessment showed that only a limited number of indicators were fulfilled, while environmental parameter measurements revealed inadequate lighting, high temperature and humidity, and particulate matter (PM_{2.5} and PM₁₀) concentrations exceeding national quality standards. These findings indicate that Pasar Rahmat presents potential environmental health risks for traders and visitors, highlighting the need for immediate improvements in sanitation infrastructure, environmental management, and routine monitoring to protect public health.

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