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Original Article

Environmental Sanitation and Scabies Incidence among Santri in Islamic Boarding School in Jember Regency

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ABSTRACT

Background: Scabies, caused by the Sarcoptes scabiei mite, remains a significant public health concern, particularly in densely populated environments such as Islamic boarding schools. This study aims to explore the environmental sanitation and the incidence of scabies among santri in Islamic boarding schools in Jember**.**

Methods: This quantitative study employed cross-sectional approach to capture dependent and independent variable at the same time. The dependent variable was scabies incidence, and independent variable was environmental sanitation. The scabies was identified toward observing the lesion on the skin and conducting burrow ink test. The Islamic boarding school was divided and clustered into two group, namely Khalafi (modern) and Salafiyah (conservative). The data was analyzed by univariately**.**

Results: The incidence of scabies among santri in Khalafi and Salafiyah in Jember is 46.07% and 25.81%, respectively. The dormitory density is in high level category, the sanitation facility in both Khalafi and Salafiyah is low (score <10) with the result of environmental sanitation does not meet requirements.

Conclusions: This finding indicates that poor sanitation level was identified in Islamic boarding schools in Jember, where a high scabies incidence was found. Therefore, Health Office of Jember need to establish regular health inspection and initiate the *pesantren* health post in Islamic boarding school in order to prevent the transmission for the disease. In addition, the religious leader should allocate a budget for the provision of sanitation facilities.

Keywords: *scabies, sanitation, Islamic boarding school, khalafi, salafiyah*

INTRODUCTION

Scabies is a skin infection caused by the mite *Sarcoptes scabiei*, which burrows into the outer layer of the skin, leading to intense pruritus, particularly during the night. This mite is transmitted through direct physical contact or via shared personal items such as clothing and towels. Scabies commonly occurs in densely populated environments with poor sanitation, such as boarding schools and Islamic boarding institutions (*pesantren*), where personal and environmental hygiene is often suboptimal. (Aziz Setiawan, Qomaruddin and Sulistyowati, 2024). According to the World Health Organization (WHO), scabies is a parasitic skin disease caused by *Sarcoptes scabiei* var. *hominis*. It is prevalent worldwide, particularly in low- and middle-income countries. The most vulnerable populations include children and the elderly residing in densely populated environments with poor sanitation.
(WHO, 2023).

Globally, the highest prevalence of scabies occurs in regions with hot tropical climates, particularly in communities facing poverty and limited access to healthcare services. The Western Pacific region bears a significant disease burden, including countries such as Papua New Guinea, Fiji, and the Solomon Islands, where entire provinces are endemic to scabies. More severe complications of scabies can include secondary skin infections like impetigo, which may progress to more serious conditions such as glomerulonephritis or rheumatic fever. According to 2023 data from the World Health Organization (WHO), scabies is one of the most significant dermatological issues worldwide, with an estimated 200

million people infected at any given time (WHO, 2023). This disease is highly prevalent in countries with tropical climates and low economic status, particularly among children and the elderly. Prevalence rates vary, with some pediatric populations in high-risk areas exhibiting rates as high as 50%. The World Health Organization (WHO) also notes that scabies can lead to severe complications, including septicemia, rheumatic heart disease, and kidney disorders, especially in resource-limited populations (Mda, 2023). Recently, scabies was designated by the World Health Organization (WHO) as a neglected tropical disease in the WHO 2021–2030 roadmap to end neglect in order to achieve the Sustainable Development Goals (Nasution and Asyary, 2022).

Scabies remains a significant health issue in Indonesia, particularly in densely populated environments such as Islamic boarding schools (pesantren). According to data from the Ministry of Health, scabies is one of the most common contagious skin diseases in areas with poor hygiene and high population density, including pesantren and dormitories. Studies conducted in various pesantren have shown that poor personal hygiene practices, overcrowded living conditions, and inadequate sanitation are the primary factors contributing to the spread of scabies (Amin and Haswita, 2023). According to research conducted at the Hidayatullah Islamic boarding school in Samarinda, there have been 25 reported cases of scabies within the last six months (Imaniar, Sedionoto and Susanti, 2022). The prevalence of scabies among the Indonesian, particularly in Islamic boarding schools (*pesantren*), has shown an increase due to suboptimal sanitation conditions. In 2016, the prevalence of scabies ranged from 4.60% to 12.95% of the total population of 261.6 million. By 2020, this prevalence had risen, ranging from 5.6% to 12.9% (Rosmawati, Sopiah and Rosyda, 2023).

The incidence of scabies in Indonesia, particularly in Islamic boarding schools, is often influenced by inadequate sanitation conditions. The communal lifstyle In Islamic Boarding Schools facilitates the transmission, particulary students living in dormitories (Jaliya et al., 2024). Study on scabies found varying prevalence rates. A study conducted at Pondok Pesantren Matholiul Huda Al Kautsar in Pati found that 39 out of 46 students (84.8%) were affected by scabies. The study demonstrated a significant relationship between poor environmental sanitation practices and the prevalence of scabies, with a p-value of 0.029 ($p < 0.05$) (Mayrona *et al.*, 2018). Based on research conducted at a modern Islamic boarding school in Pekanbaru, it was found that knowledge of personal hygiene, skin hygiene, nail hygiene for both hands and feet, waste management, drainage systems, and the provision of clean water are all associated with skin diseases at the Modern Al-Kautsar Islamic Boarding School in Pekanbaru (Rasyid *et al.*, 2024). According to another study conducted at Pondok Pesantren X in Ilir Timur II District, Palembang, in 2023, a total of 27 respondents (38.57%) reported experiencing cases of scabies (Septalita *et al.*, 2024). Therefore, this study aims to explore environmental sanitation and the incidence of scabies among students at Islamic boarding schools (pesantren), with data analyzed according to the type of Islamic boarding school, namely *khalafi* (modern) and *salafiyah* (conservative).

METHODS

This study was an quantitative study. The study design employed a cross-sectional approach, where independent and dependent variable data were collected at a single point in time. The research was conducted in Mayang Sub-district Jember Regency, East Java. Data were collected in 2016 from three Islamic boarding schools, comprising two *khalafi* (modern) boarding schools and one *salafiyah* (conservative) boarding school.

Scabies Identification

The identification of scabies cases among students was performed by a trained health worker, who conducted examinations on skin lesions and utilized the burrow ink test technique.

Population and Sample

Based on Dihni (2022), the total Islamic boarding school in Jember was highest in East Java Province with 611 schools. The population of active students residing in the dormitories of Islamic boarding schools in Mayang District, Jember Regency, was included in this study. There are 19 Islamic boarding schools registered in Mayang District (Kemenag, 2015), and based on preliminary studies, 17 boarding schools met the criteria of having students residing in the dormitories provided by the caretakers or kyai. The number of khalafi and salafiyah boarding schools in Mayang District, Jember Regency, is 14 (1,226 students) and 3 (172 students), respectively. Sample size calculation was performed using Slovin's formula, resulting in a total sample of 151 respondents or students, with a distribution of 89 students from khalafi boarding schools and 62 from salafiyah boarding schools. The cluster random sampling was performed, in which Three selected boarding schools were used to measure the level of sanitation, consisting of 1 khalafi and 2 salafiyah boarding school. The names of the Islamic boarding schools have been anonymized, with the salafiyah boarding school referred to as Salafiyah A and Salafiyah B, and the khalafi boarding schools referred to as Khalafi A.

Variables

In this study, scabies cases are the dependent variable. The independent variable consists of environmental sanitation. Environmental sanitation refers to the level of cleanliness in the surroundings of the Islamic boarding school, including the following facilities: 1) clean water, 2) toilets, 3) wastewater disposal systems, and 4) waste disposal facilities, as well as the density of occupancy in the provided dormitories. The development of the observation sheet for environmental sanitation refers to the Indonesian Minister of

Health Decree No. 1429 of 2006 concerning Guidelines for the Organization of Environmental Health in Schools. The environmental sanitation variables are presented in Table 1 as follows:

Table 1. Environmental Sanitation Variables

Variable	Element	Description
Sanitation Facility	Clean water Score: Max: 3 Min : 0	a. Water Availability (minimum 15 liters per person per day): Score 1: Yes Score 0: No b. Water Physical Quality (no odor/taste/color): Score 1: Yes Score 0: No c. Distance from Well/Clean Water Source to Contaminant Source (minimum 10 meters): Score 1: Yes Score 0: No
	Toilet Score: Max:7 Min: 0	a. Separation from Other Areas: Score 1: Yes Score 0: No b. Separation Between Male and Female Facilities: Score 1: Yes Score 0: No c. Minimum Proportion of Toilets: 1-9 people: 1 toilet 10-19 people: 2 toilets 20-29 people: 3 toilets 30-39 people: 4 toilets 40-49 people: 5 toilets 50-60 people: 6 toilets Addition of 1 Toilet for Every 10 Additional People: Score 1: Yes Score 0: No d. Cleanliness of Toilets: Score 1: Yes Score 0: No e. Toilet Floor Free of Standing Water: Score 1: Yes Score 0: No f. Presence of Ventilation: Score 1: Yes Score 0: No g. The bathing facilities do not serve as breeding grounds for mosquitoes.: Score 1: Yes Score 0: No
	Wastewater disposal systems Score Max: 5 Min: 0	a. Separated from Wastewater Disposal Areas: Score 1: Yes Score 0: No b. Waterproof and Closed: Score 1: Yes Score 0: No c. Water in the Drainage System (SPAL) Flows Smoothly: Score 1: Yes Score 0: No d. Drainage System (SPAL) Does Not Cause Pollution: Score 1: Yes Score 0: No e. Wastewater is Disposed of into a Septic Tank and Then Infiltrated into the Ground: Score 1: Yes Score 0: No
	Waste disposal facilities Score Max: 3 Min: 0	a. Each Room/Dormitory Equipped with Covered Trash Bins: Score 1: Yes Score 0: No b. Availability of Waste Collection Points (TPS) from All Rooms: Score 1: Yes Score 0: No c. Placement of Waste Collection Points (TPS) at Least 10 Meters from Classrooms/Dormitories: Score 1: Yes Score 0: No
Dormitory Occupancy Density	Density Score 1: > 4,5 m^2/person Score 0: ≤ 4,5 m^2/person	Occupancy Density Levels: Meets Requirements: 1 Does Not Meet Requirements: 0

Sanitation facilities have a total minimum and maximum score of 0 and 18, respectively. The category determination is based on the Likert method, where sanitation facilities are categorized as high if they have a score of 10–18, and low if the score is 0–9. Furthermore, dormitory occupancy density is classified as meeting requirements if it is greater than 4.5 m² per person, and as not meeting requirements if it is less than 4.5 m² per person. The environmental sanitation of Islamic boarding school met the requirement standard if sanitation facility and dormitory density in high category.

Analysis

Data were analyzed univariately, whereby the researcher described the level of environmental sanitation present in both khalafi and salafiyah Islamic boarding schools.

RESULTS

The selected Khalafi and Salafiyah Islamic boarding school in the study are located in Mayang Sub-district, Jember Regency. Mayang sub-district consist of 7 village, namely Seputih, Sidomukti, Sumber Kejayan, Tegalrejo, Tegalwaru, Mayang and Mrawan. Based on preliminary studies, the total santri in Khalafi A is 123 students and Salafiyah (A and B) is 166 students.

The prevalence of scabies among santri in khalafi and salafiyah Islamic boarding schools in Mayang District is presented in Table 2.

Tabel 2 The prevalence of scabies among *santri*

Islamic Boarding School	Scabies Case (%)
Khalafi	41 (46,07%)
Salafiyah	16 (25,81%)

Based on the Table 2, it was found that the prevalence of scabies in the khalafi boarding schools is higher than that in the salafiyah boarding school, with respective percentages of 46.07% and 25.81%.

The environmental sanitation in the Khalafi and Salafiyah boarding schools, namely Khalafi A, Khalafi B, and Salafiyah A, is presented in Table 3. The level of environmental sanitation in this study is measured through the sanitation facilities, which include clean water, toilets, wastewater disposal systems (SPAL), waste disposal facilities, and the occupancy density in the dormitories, based on the Indonesian Minister of Health Decree No. 1429 of 2006 concerning Guidelines for the Organization of Environmental Health in Schools.

Table 3. The Environmental Sanitation Criteria in Islamic Boarding Schools

No	Environmental Sanitation	Islamic Boarding School		
		Khalafi A	Salafiyah A	Salafiyah B
	Clean water			
1	Water Availability (minimum 15 liters per person per day)	No	Yes	Yes
2	Water Physical Quality	No	No	No
3	Distance from Well/Clean Water Source to Contaminant Source (minimum 10 meters)	No	Yes	No
	Toilet			
1	Separation from Other Areas	Yes	Yes	Yes
2	Separation Between Male and Female	Yes	Yes	Yes
3	Minimum Proportion of Toilets	No	No	No
4	Cleanliness of Toilets	No	Yes	Yes
5	Toilet Floor Free of Standing Water	Yes	No	No
6	Presence of Ventilation	Yes	Yes	Yes
7	The bathing facilities do not serve as breeding grounds for mosquitoes.	Yes	No	No
	Wastewater disposal systems			
1	Separated from Wastewater Disposal	No	No	No
2	Areas Waterproof and Closed	No	No	No
3	Water in the Drainage System (SPAL) Flows Smoothly SPAL	Yes	Yes	Yes
4	Drainage System (SPAL) Does Not Cause Pollution	Yes	Yes	Yes
5	Wastewater is Disposed of into a Septic Tank and Then Infiltrated into the Ground	No	No	No
	Waste disposal facilities			
1	Each Room/Dormitory Equipped with Covered Trash Bins	No	No	No
2	Availability of Waste Collection Points (TPS) from All Rooms	Yes	Yes	No
3	Placement of Waste Collection Points (TPS) at Least 10 Meters from Classrooms/Dormitories	Yes	No	No
	Minimum Room/Dormitory Density: 1 person > 4.5 m²	No	No	No

Table 4 presents the results of the observations on the variables related to the environmental sanitation of the Islamic boarding schools, indicating the presence of these variable components within the boarding school environment. Generally, based on the table, it can be observed that the quality of water, the proportion of toilets, the separation of wastewater disposal systems (SPAL) from stormwater drainage, the waterproof and enclosed nature of the SPAL, the disposal of wastewater into septic tanks, the presence of trash bins in each room or dormitory, and the occupancy density in the dormitories do not meet the criteria established by the Indonesian Minister of Health Decree No. 1429 of 2006. Furthermore, Table 4 indicates that the level of sanitation present in the khalafi boarding school (Khalafi A) and the salafiyah boarding schools (Salafiyah A and Salafiyah B) is low.

Table 4. The Environmental Sanitation Levels in Islamic Boarding Schools

Islamic Boarding School	Sanitation		Criteria
	Sanitation facility	Dormitory Density	
Khalafi A	9 (Low)	0 (High)	Does Not Meet Requirements
Salafiyah A	9 (Low)	0 (High)	Does Not Meet Requirements
Salafiyah B	7 (Low)	0 (High)	Does Not Meet Requirements

DISCUSSION

As visualized on Table 2, the scabies incidence in Khalafi is higher than Salafiyah (46.07% Vs 25.81%). According to Jaliya et al (2024), the prevalence rate of scabies in Islamic boarding school is varying. Study from Dzikrurrohman et al (2024), scabies incidence in Al-Aziziyah Islamic boarding school found high with 60%. Jaliya et al (2024) found low scabies incidence in Kebon Jambu Al Islamy pesantren with 7%.

The environmental sanitation level is presented in Table 3 and 4. Based on the table, the sanitation facility and dormitory density is low both khalafi and salafiyah, which is

classified into does not meet requirements in environmental sanitation.

Factors contributing to the high prevalence of scabies in developing countries are associated with poverty, which correlates with poor hygiene, limited access to clean water, and overcrowded living conditions. High population density and frequent physical contact between individuals facilitate the transmission of scabies mites. However, this differs from the findings of Desmawati, *et.a*l (2015), whose study concluded that environmental sanitation did not have a significant relationship with the incidence of scabies among students in Islamic boarding schools.

The environment is a key factor influencing human health. According to the Kamus Besar Bahasa Indonesia, sanitation refers to efforts to establish and maintain a favorable state in the field of health, particularly public health. According to Notoatmodjo, (2010), environmental health is an optimal environmental condition that positively impacts achieving optimal health status. WHO (2015) highlights that hygiene and sanitation in facilities play a crucial role in public health. Research has shown a significant relationship between personal hygiene and environmental sanitation in the incidence of scabies in Islamic boarding schools (Andika *et al.*, 2023).

Based on the results of the observations, it was found that three Islamic boarding schools in Jember Regency (Khalafi A, Salafiyah A, and Salafiyah B) did not meet the environmental sanitation requirements. This is due to the sanitation scores at each school were below the minimum threshold of 10, which is necessary to fulfill environmental sanitation criteria. The observations revealed that the clean water sources used for bathing and washing at these boarding schools came from rivers, leading to poor physical water quality. The river water is stored or channeled into large containers for use. These findings align with Ma'rufi, (2005) who explained that the clean water needs for bathing, washing, and toilets in most Islamic boarding schools in Lamongan Regency are supplied from untreated river water.

Interviews revealed that the availability of clean water at Khalafi A was lower compared to the other boarding schools. This was attributed to the small capacity of the water storage tanks, the greater distance from the water source, and the school's location on higher ground compared to the others. Regarding the distance between the wells or clean water sources and contaminants, Salafiyah A met the criteria of having a minimum distance of 10 meters. Maintaining a sufficient distance between contaminants and clean water sources is crucial in preventing contamination and ensuring the safety of the clean water supply.

The environmental sanitation facilities, particularly the toilets, at the three Islamic boarding schools were found to be inadequate based on the WC proportion variable. Additionally, the cleanliness of the toilets at Khalafi A was lower than at the other boarding schools. Regarding the Wastewater Disposal Facilities (SPAL), none of the three boarding schools met the necessary criteria. The SPALs were not separated from rainwater drainage, were neither watertight nor sealed, and wastewater was not disposed of in septic tanks and absorbed into the soil. A study has demonstrated a significant relationship between improper wastewater drainage and the incidence of skin diseases (p-value = 0.028, PR = 1.7) (Malau, et.al, 2024). Another study found that, based on multivariate analysis, the most significant risk factors included family room ventilation (p-value < 0.0001, adjusted OR = 6.34), SPAL (p-value = 0.02, adjusted OR = 2.51), and the presence of disease vectors (insects) (p-value = 0.007, adjusted OR = 2.44) (Malau, et.al, 2024).

The waste disposal facilities at the three Islamic boarding schools in this study were found to be inadequate. None of the classrooms or dormitories at the schools had proper waste bins, and Salafiyah B did not have a temporary waste disposal site, instead practicing open dumping. In contrast, Salafiyah A had a temporary waste disposal site made from sturdy, watertight materials. Regarding dormitory overcrowding, both the Khalafi and Salafiyah boarding schools exhibited high population density. None of the dormitories met the required standard of > 4.5 m² per person. The densities at Khalafi A, Salafiyah A and Salafiyah B were 1.25 m²/person, 3 m²/person, and 1 m²/person, respectively. This issue of overcrowding is strongly linked to scabies transmission. According to Ma'rufi, (2005), dormitories with high occupancy (less than 8 m² for two people) showed a scabies prevalence of 71.4%, compared to a prevalence of 45.2% in dormitories with lower occupancy. A study conducted at Pondok Pesantren Asy-Syadzili 4 in Gondanglegi, Malang, found that all rooms and halls, with an average occupancy density of 0.9 m² per person, did not meet the recommended standards. Similarly, a study in Nusa Tenggara Barat revealed that 71.4% of respondents lived in overcrowded dormitories, which had a statistically significant correlation with scabies incidence (Tajudin *et al.*, 2023; Dzikrurrohman *et al.*, 2024). Another study conducted at Pondok Pesantren Dadali Dinillah in Tasikmalaya found that overcrowded dormitories were associated with a 2.5-fold higher risk of scabies (p value = 0.04) compared to dormitories that met the occupancy standards (Kamaludin, 2022). These findings emphasize the importance of addressing dormitory overcrowding as a key factor in preventing scabies outbreaks.

One critical aspect of environmental sanitation is the provision of clean water. Water is essential for human survival, and it must meet health quality standards (Indriani et al., 2021). Ma'rufi (2005) explains that access to clean water is a key factor in maintaining proper sanitation in bathrooms, which plays a significant role in the transmission of scabies among students in Islamic boarding schools (ponpes). This is because scabies is classified as a water-borne disease, linked to the cleanliness of water used for washing body parts during bathing.

The availability of clean water is crucial for effective bathroom sanitation and has a direct impact on scabies

transmission in boarding schools, as scabies is a disease closely related to clean water requirements (Husna & Maryanti, 2023). Furthermore, Ma'rufi (2005) found that bathroom sanitation, room occupancy density, and humidity levels are associated with the incidence of scabies. Consistent with Ma'rufi's findings, Wijaya (2011) reported a significant relationship between environmental sanitation and the occurrence of scabies in Pondok Pesantren Al-Makmur Tungkar in Lima Puluh Kota District. Several factors can influence the occurrence of scabies, including the provision of clean water, environmental factors, and living conditions, such as population density (Afnita et al., 2023). Therefore, the provision of clean water is a significant factor that has a meaningful relationship with the incidence of scabies in Islamic boarding schools.

The study has limitation, namely the analysis is performed only univariately, in which further research examining with advance analysis is necessary. Additionally, the study examining personal hygiene, healthy behavior, and nutritional status is vital for further research.

CONCLUSIONS

The prevalence of scabies in khalafi boarding schools is higher than in salafiyah boarding schools, with prevalence rates of 46.07% and 25.81%, respectively. Additionally, research on the environmental sanitation levels of the boarding schools shows that the sanitation in both the khalafi (Khalafi A) and salafiyah (Salafiyah A and Salafiyah B) boarding schools is poor. Therefore, interventions are necessary to ensure that these boarding schools meet environmental sanitation standards to reduce the occurrence of scabies in Islamic boarding school.

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