Jurnal Hurriah: Jurnal Evaluasi Pendidikan dan Penelitian
Hurriah Journal: Journal of Educational Evaluation and Research
Volume 6, No. 2 (2025) PP 956-964

Jurnal Hurriah: Jurnal Evaluasi Pendidikan dan Penelitian
Hurriah Journal: of Educational Evaluation and Research

Journal homepage: https://academicareview.com/index.php/jh
E-ISSN: 2774-8472 I P-ISSN: 2774-8480 I DOI : 10.56806

Association Between Personal Hygiene, Clean and Healthy Living Behavior (PHBS), and Scabies Incidence Among Students of Pondok Pesantren Darussalamah

Arif Setiajaya[1,*], Annisaa Siti Zulaicha[2], Natalina[1] ,Nurika Septa Ardiani[3] ,Bambang Prasetio[3]

[1] Department of Environmental Engineering, Malahayati University, Bandar Lampung.
[2] Cosmetic Engineering Study Program, Institut Teknologi Sumatera, Lampung Selatan.
[3] Department of Environmental Engineering, Institut Teknologi Sumatera, Lampung Selatan.

ARTICLE INFO

Article history:
Received June 2025
Received in revised from June 2025
Accepted July 2025
Available online July 17, 2025

Keywords:

Personal hygiene; PHBS; Scabies

ABSTRACT

Scabies, caused by the mite Sarcoptes scabiei var. hominis, is a contagious skin disease often found in densely populated environments like dormitories, prisons, and Islamic boarding schools. This study investigates the relationship between personal hygiene, Clean and Healthy Living Behavior (PHBS), and the incidence of scabies among students at Darussalamah Islamic Boarding School. The examined variables include skin cleanliness, hand and nail hygiene, towel hygiene, genital hygiene, clothing cleanliness, and bed and linen hygiene. Using total sampling, all students participated, with data collected through observation, interviews, and questionnaires, analyzed via the chi-square test. Results showed 82.6% of students experienced scabies, with significant associations found between personal hygiene variables and scabies incidence, except for environmental cleanliness (p-value = 0.069). The study provides two primary and two alternative strategies to prevent scabies outbreaks, emphasizing the importance of improving hygiene practices to reduce the disease's prevalence in such settings.

1. Introduction

Skin health is a critical aspect of maintaining human well-being, particularly in communal environments such as Islamic boarding schools (*pondok pesantren*). The skin, as the body's outermost organ, serves as a protective barrier against pathogenic microorganisms and harmful substances. Maintaining skin cleanliness, as part of personal hygiene, is essential in preventing infectious diseases, including scabies, a highly contagious skin condition caused by the mite Sarcoptes scabiei var. hominis. Scabies is characterized by intense itching, especially at night, and lesions in skin folds, and it spreads easily in densely populated environments with poor sanitation and inadequate hygiene practices, such as sharing towels, clothing, or bedding. Islamic boarding schools, which serve as both educational and residential facilities, are particularly vulnerable to scabies outbreaks if Clean and Healthy Living Behavior (PHBS) is not properly implemented. Future research should further

[*] *Corresponding author.*
E-mail address: arifsetiajaya@malahayati.ac.id

https://doi.org/10.56806/ *jh.v6i2.268*

investigate the relationship between hygiene practices and scabies in high-density religious boarding schools to develop targeted prevention strategies.

In the daily practices of students (santri), the implementation of Clean and Healthy Living Behavior (PHBS) continues to face significant challenges, particularly in maintaining the cleanliness of personal items and the dormitory environment. Previous research has highlighted that communal living environments, such as boarding schools, are particularly susceptible to the spread of infectious diseases like scabies due to shared facilities and inadequate hygiene practices (Muafida et al., 2017; Asyari et al., 2023). At Darussalamah Islamic Boarding School, several students have reported symptoms of scabies, including intense nighttime itching and the appearance of spots in skin fold areas, which align with findings from earlier studies that emphasize the role of poor personal hygiene and shared use of items like towels and clothing in scabies transmission (Thean et al., 2019). Observations and questionnaire results revealed that 82.6% of respondents experienced scabies symptoms, with many still frequently sharing bathing equipment and clothing, further supporting the need for improved hygiene interventions in such settings.

This phenomenon highlights that low awareness and inconsistent implementation of personal hygiene and Clean and Healthy Living Behavior (PHBS) significantly contribute to the rising incidence of scabies in boarding schools (Rahmah, 2023). Research by Setiajaya et al. (2023) underscores that public attitudes and awareness directly influence environmental sanitation quality; individuals with greater concern for cleanliness tend to maintain better hygiene practices, thereby reducing the risk of environmentally transmitted diseases like scabies, especially in crowded settings such as Islamic boarding schools. Specifically, PHBS practices in this context include regular bathing, proper laundering of clothes and bedding, avoiding sharing personal items, and maintaining dormitory cleanliness. Studies on personal hygiene behavior emphasize that socio-cultural factors, education, and awareness shape these practices, affecting disease prevention outcomes. Therefore, evaluating the relationship between personal hygiene behaviors and PHBS implementation in this setting is crucial to developing effective, culturally appropriate interventions to reduce scabies transmission.

This study aims to identify the implementation of personal hygiene and PHBS among students at Darussalamah Islamic Boarding School and to analyze its correlation with the incidence of scabies. The results are expected to serve as a foundation for formulating more effective educational and preventive strategies, and to encourage school administrators to foster a stronger culture of cleanliness for the health and well-being of all residents.

2. Methodology

2.1 Data and Location

This study employed an analytical observational method with a cross-sectional approach, which involves collecting data from all participants at a single point in time to examine relationships between variables. A total sampling technique was used, including all 46 students (santri) residing at Darussalamah Islamic Boarding School in Bandar Agung Village, Central Lampung. Data were collected using structured questionnaires and pre-designed observation sheets. The observed variables included personal hygiene aspects such as cleanliness of skin, hands, towels, and genital areas, as well as Clean and Healthy Living Behavior (PHBS) variables like cleanliness of clothing, bedding, and the surrounding environment. Scabies symptoms were also assessed, including nighttime itching, skin rashes, bumps or blisters, and the presence of small tunnels caused by the scabies mite. The Chi-Square test analyzed the relationship between hygiene variables and scabies incidence. Additionally, the Multiple Criteria Utility Assessment (MCUA) method—a decision-making

tool that evaluates and prioritizes intervention areas based on multiple criteria—was applied to identify the most critical hygiene factors for targeted prevention efforts.

3. Results

3.1 Personal Hygiene and PHBS

This study aimed to examine the influence of personal hygiene behavior and Clean and Healthy Living Behavior (PHBS) on the incidence of scabies among students at Darussalamah Islamic Boarding School. A total of 46 students participated in the study, with data collected through questionnaires and observations to assess hygiene practices and scabies symptoms. The findings revealed that a majority of the students, 38 individuals (82.6%), reported experiencing symptoms of scabies, while only 8 students (17.4%) did not show any symptoms. These results are summarized in Table 1.

Table 1 Data on the frequency distribution of scabies complaints among students

Description	Percentage (%)	Validity	Frequency
Scabies	82.6	VALID	38
No Scabies	17.4	VALID	8
Total	**100.0**	**VALID**	**46**

3.2 Personal Hygiene and Scabies

The data collected in this study demonstrate a strong association between personal hygiene and the incidence of scabies within Islamic boarding school environments. Among the 46 students surveyed. Among the 37 students categorized as having poor personal hygiene, 36 (97.3%) exhibited symptoms of scabies, while only 1 (2.7%) did not. Conversely, among the 14 students with good personal hygiene, only 2 (14.3%) showed scabies symptoms, whereas 7 (50.0%) did not. The total number of students reporting scabies symptoms was 38 (82.6%), compared to 8 (17.4%) without symptoms. The Chi-Square test yielded a p-value of 0.000, indicating a statistically significant association between personal hygiene and scabies incidence. These results strongly suggest that poor personal hygiene is closely linked to a higher risk of scabies infection in this population. These findings suggest that inadequate personal hygiene substantially increases the risk of scabies transmission. Key factors contributing to poor personal hygiene among students include infrequent bathing, failure to wash hands with soap after defecation or urination, and the habitual sharing of towels, clothing, and personal bathing items. The situation is further exacerbated by the lack of adequate handwashing facilities, such as sinks and soap, in communal areas like toilets and classrooms. These results are consistent with previous studies, which have also identified poor personal hygiene as a significant risk factor for scabies in boarding school settings. Furthermore, access to proper sanitation facilities, including clean water and soap, has been highlighted as a critical element in maintaining personal hygiene and preventing the spread of contact-based skin diseases such as scabies. The relationship between personal hygiene and the incidence of scabies is detailed in Table 2.

Table 2 Relationship between Personal Hygiene and Incidence of Scabies

Personal Hygiene	Scabies (Yes)	Scabies (No)	Total	p-value
Poor	36	1	37	0.000
Good	2	7	14	0.000
Total	38	8	46	0.000

3.3 Clean and Healthy Living Behavior (PHBS) and Scabies

The findings of this study reveal that Clean and Healthy Living Behavior (PHBS) has a significant influence on the incidence of scabies, alongside personal hygiene. Among the 34 respondents categorized as having poor PHBS, 32 individuals (94%) were found to have scabies, while only 2 (6%) did not. In contrast, of the 12 respondents with good PHBS, 6 individuals (50%) exhibited symptoms of scabies, while the remaining 6 (50%) did not. This brings the total to 46 respondents, consistent with prior sections. Statistical analysis using the Chi-Square test yielded a p-value of 0.001, indicating a statistically significant relationship between PHBS and scabies incidence. Poor PHBS in the boarding school environment is characterized by habits such as failing to regularly sun-dry bedding (e.g., mattresses, pillows, and blankets), infrequent washing of bed sheets, reusing unwashed clothing, and sharing garments among students. These behaviors, combined with overcrowded living conditions and limited sanitation facilities, create an environment conducive to the spread of Sarcoptes scabiei, the mite responsible for scabies. Handayani and Fitria (2022) identified poor PHBS as a key determinant of skin disease outbreaks in densely populated environments. Similarly, Setiajaya et al. (2023) emphasized that collective behavior in maintaining environmental cleanliness is critical for the success of infectious disease prevention efforts (see Fig. 1).

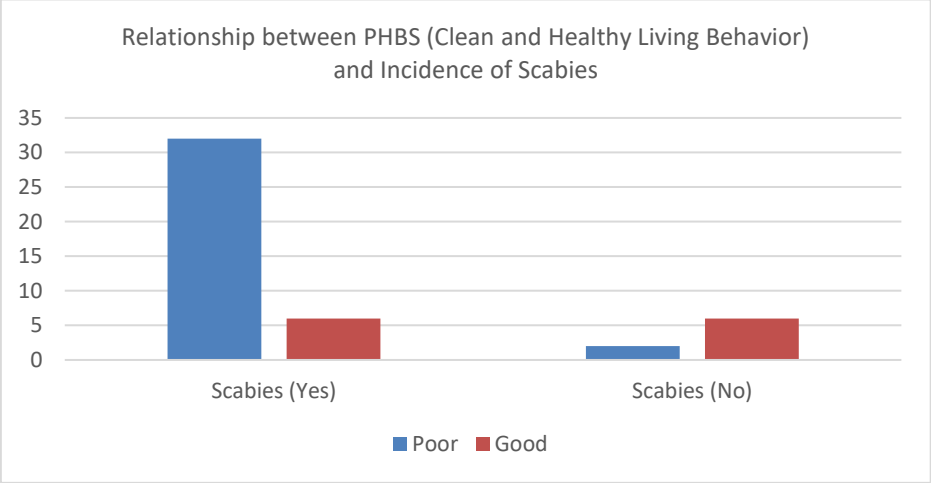

Fig. 1 Relationship between PHBS (Clean and Healthy Living Behavior) and Incidence of Scabies

The inadequate implementation of Clean and Healthy Living Behavior (PHBS) is evident in several unhygienic practices observed among students. These include the failure to regularly air out bedding materials such as pillows, blankets, and mattresses, as well as the infrequent washing of bed sheets. Additionally, many students continue to wear clothing that has not been properly laundered and engage in the sharing of garments with peers. Such behaviors significantly increase the risk of transmitting Sarcoptes scabiei, the mite responsible for scabies. These findings highlight the critical need for improved hygiene practices and access to adequate sanitation facilities to mitigate the spread of scabies in communal living environments. Figure 2 illustrates the frequency distribution of personal hygiene habits among the respondents, as follows:

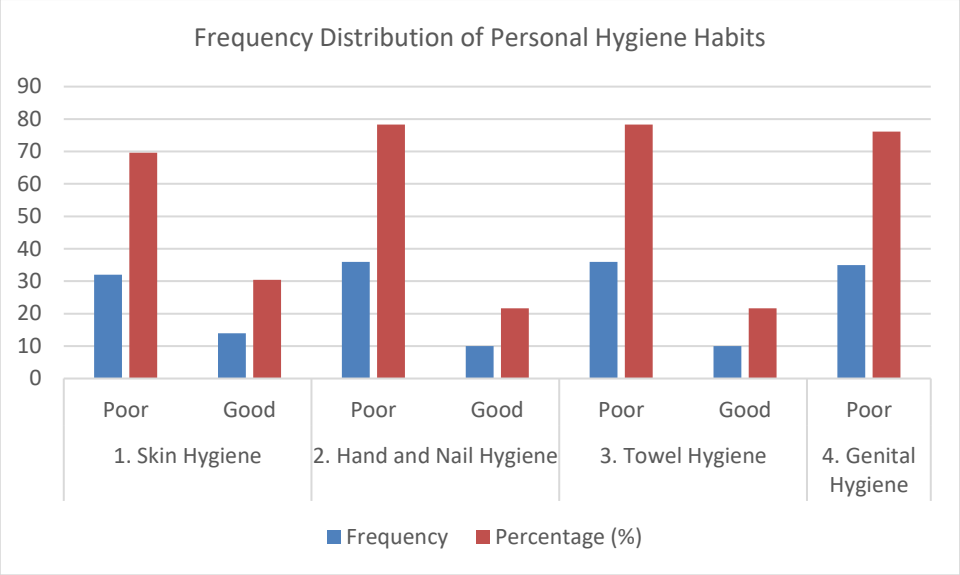

Fig. 2 Frequency Distribution of Personal Hygiene Habits

3.4 Environmental Cleanliness

Although environmental cleanliness is one of the indicators of Clean and Healthy Living Behavior (PHBS), the results of this study indicate that this variable does not have a statistically significant relationship with the incidence of scabies in the Islamic boarding school (p-value = 0.069). This suggests that environmental cleanliness, as measured in this study, does not directly contribute to the variation in scabies cases. However, the regression coefficients provide further insight into the relative strength of the variables. Personal hygiene had a higher standardized beta coefficient compared to environmental cleanliness, indicating that personal hygiene exerts a stronger influence on scabies incidence. This means that improvements in personal hygiene practices, such as regular bathing, maintaining clean hands and nails, and avoiding the sharing of personal items, are likely to have a more substantial impact on reducing scabies cases than interventions focused solely on environmental cleanliness. These findings underscore the importance of prioritizing personal hygiene education and practices in scabies prevention efforts (see Table 3).

Table 3 Coefficient Test Results

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	Std. Error
	B	Beta			
(Constant)	0.167	–	1.350	0.184	0.123
Clean and Healthy Living Behaviour	0.167	0.193	1.897	0.065	0.088
Personal hygiene	0.667	0.698	6.854	0.000	0.097

Furthermore, Environmental cleanliness is often overlooked, yet it plays a critical role in public health by indirectly contributing to the spread of disease vectors, including the mites responsible for scabies. An unclean environment, combined with poor sanitation facilities, facilitates the transmission of pathogens through indirect contact, particularly when personal hygiene practices are inadequate (Utami, 2020). Field observations at Darussalamah Islamic Boarding School revealed a low level of environmental hygiene awareness. Specific issues included careless waste disposal by students, the absence of trash bins in public areas such as toilets and classrooms, and a waste management system that relied solely on open burning behind the school, with no waste separation

or structured disposal procedures. These observations are reflected in Figure 3, which illustrates the distribution of PHBS-related behaviors among students, highlighting the need for improved environmental hygiene and sanitation practices to mitigate the spread of scabies, as follows:

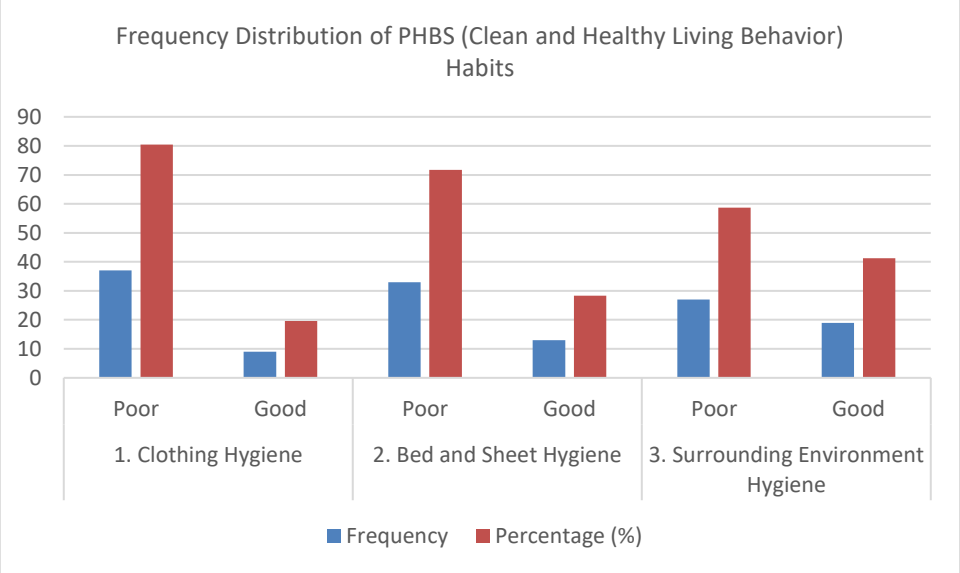

Fig. 3 Frequency Distribution of PHBS (Clean and Healthy Living Behavior) Habits

Environmental neglect, particularly in the form of inadequate sanitation and waste management, serves as a significant risk factor for the indirect transmission of infectious diseases, including scabies. Poor sanitation creates conditions that facilitate the survival and spread of various pathogens and disease vectors, as highlighted by Setiajaya et al. (2024), who found that the absence of proper waste management infrastructure leads to waste accumulation and heightened environmental health risks, especially when not supported by community education and adequate facilities. Similarly, Zulaicha et al. (2024) emphasized that improper waste control and deficient environmental sanitation can degrade environmental quality and increase the burden of skin diseases linked to polluted surroundings. These findings are consistent with broader public health evidence indicating that poor sanitation is closely linked to the transmission of a range of infectious diseases, as it enables indirect contact with contaminated surfaces and fomites, thereby increasing the risk of outbreaks in densely populated settings such as boarding schools. Although this study did not find a direct statistical association between environmental cleanliness and scabies incidence, the conceptual and preventive importance of maintaining a clean environment remains clear. Effective sanitation and waste management are essential components of disease prevention strategies, as they reduce the opportunities for indirect transmission of pathogens and support overall community health.

3.5 Regression Analysis and MCUA

Regression analysis was conducted to determine the extent to which the combined influence of personal hygiene and Clean and Healthy Living Behavior (PHBS) variables affects the incidence of scabies at Darussalamah Islamic Boarding School. The analysis yielded an Adjusted R^2 value of 0.631, indicating that approximately 63.1% of the variability in scabies incidence among students can be explained collectively by the two independent variables: personal hygiene and Clean and Healthy Living Behavior (PHBS). This suggests a strong explanatory power of the model, while the remaining 36.9% of variation is attributable to other factors not included in the study, such as room density,

ventilation, and individual immune responses. The Adjusted R^2 is particularly useful here as it accounts for the number of predictors in the model, providing a more accurate measure of fit than the standard R^2 by penalizing unnecessary variables. Examination of the standardized beta coefficients reveals that personal hygiene exerts a stronger effect on scabies incidence compared to PHBS, indicating that improvements in personal hygiene behaviors may have a greater impact on reducing scabies risk within this population. Table 4 Shows MCUA Matrix for Problem Priority of Causes of Scabies Skin Disease Incidence at Darussalamah Islamic Boarding School, as follows:

Table 4 MCUA Matrix for Problem Priority of Causes of Scabies Skin Disease Incidence at Darussalamah Islamic Boarding School

Criteria	**Weight (%)**	**Poor Skin Hygiene**	**Poor Hand & Nail Hygiene**	**Dirty Towel Hygiene**	**Poor Genital Hygiene**	**Poor Clothing Hygiene**	**Dirty Bedding Hygiene**	**Poor Environmental Hygiene**
-	-	S	S×B	S	S×B	S	S×B	S
Severity	30	3	0.9	2	0.6	2	0.6	2
Problem Magnitude	25	3	0.75	4	1.0	3	0.75	3
Trend	15	2	0.3	2	0.3	2	0.3	3
Level of Urgency	20	3	0.6	3	0.6	3	0.6	3
Availability of Resources	10	2	0.2	1	0.1	2	0.2	2
Total (B × S)	**100**		**2.75**		**2.6**		**2.45**	-
Priority			**5**		**2**		**3**	-

Table 4 presents the results of the Multiple Criteria Utility Assessment (MCUA) method, a decision-making tool used to evaluate and prioritize intervention options based on multiple factors simultaneously. MCUA integrates both qualitative and quantitative criteria to provide a comprehensive ranking of alternatives, helping decision-makers identify the most impactful areas for action when faced with complex problems involving several conflicting objectives. In this study, the MCUA method was applied to determine priority interventions for scabies prevention by assessing the relative influence of various hygiene-related factors. The analysis identified the top priorities as routine education on personal hygiene practices—such as regular bathing, maintaining clean hands and nails, and avoiding sharing personal items—provision of adequate handwashing facilities equipped with soap and running water, and improved waste management alongside enhanced environmental cleanliness. These prioritized interventions offer a structured and evidence-based approach to effectively reduce scabies incidence in the boarding school setting. The Regular programs for washing and sun-drying bedding materials such as mattresses and bed sheets, which have been shown to significantly correlate with the prevention of mite infestation. These findings are consistent with Rahmah (2023), who emphasized that awareness of personal hygiene is a dominant factor in scabies cases within Islamic boarding schools. When students engage in poor hygiene practices such as sharing towels or sleeping on damp bedding that is not sun-dried the risk of contracting scabies increases significantly.

Furthermore, the study by Setiajaya et al. (2023) on sanitation and clean water supports this conclusion, stating that the implementation of clean behavior heavily depends on both the availability of facilities and community knowledge about the importance of environmental hygiene. This implies that both technical aspects (e.g., infrastructure) and non-technical aspects (e.g., education) must go hand in hand. In addition, the research by Zulaicha et al. (2024) on water pollution and household chemicals highlighted that poor environmental hygiene could become a breeding ground for skin infection pathogens. Therefore, environmental sanitation and household wastewater management should not be overlooked in the effort to prevent infectious skin diseases such as scabies.

4. Conclusions

The study on the relationship between personal hygiene and Clean and Healthy Living Behavior (PHBS) with the incidence of scabies among students at Pondok Pesantren Darussalamah was successful. The results demonstrate a significant association between both personal hygiene and PHBS practices and the occurrence of scabies. Students exhibiting poor personal hygiene—such as infrequent bathing, sharing personal hygiene items, and neglecting environmental and bedding cleanliness—are more vulnerable to scabies infections. Among the variables studied, personal hygiene emerged as the most dominant factor influencing scabies incidence, supported by strong significance in both bivariate and multivariate analyses. Therefore, enhancing awareness and providing targeted education on clean and healthy living behaviors within the boarding school environment are essential strategies to effectively reduce the spread of contagious skin diseases like scabies.

Acknowledgments

The author would like to express sincere gratitude to Institut Teknologi Sumatera, especially the Environmental Engineering Study Program, along with all lecturers and staff who have provided academic support throughout the completion of this final project. Special thanks are extended to Mr. Arif Setiajaya, S.T., M.Si., and Mrs. Annisaa Siti Zulaicha, S.Pd., M.Si., as academic advisors, for their scientific guidance, motivation, and valuable suggestions from the initial stages to the completion of this research. The author also deeply appreciates the support of all parties at Pondok Pesantren Darussalamah for granting permission, providing data, and participating in the research questionnaire. May this contribution offer meaningful academic benefits for the development of environmental health in similar institutions.

References

1. Ardiani, N. S. (2024). Hubungan Perilaku Personal Hygiene dan PHBS terhadap Kejadian Penyakit Kulit Skabies di Pondok Pesantren Darussalamah. Institut Teknologi Sumatera. https://doi.org/10.33366/nn.v4i1.1472
2. Asyari, A. F. Y., Nisa, H., & Stiyono, S. (2023). Hubungan personal hygiene dan sanitasi lingkungan dengan kejadian skabies di wilayah kerja Puskesmas Salawu Kabupaten Tasikmalaya. Kesehatan Komunitas Indonesia, 19(1), 1–16. https://doi.org/10.37058/jkki.v19i1.6844
3. Falaguna, B., Mufti, A. A., Kurnianingtyas, E., & Setiajaya, A. (2024). Studi timbulnya dan komposisi sampah di kawasan wisata Kota Bandar Lampung (Studi Kasus: Kedai Gunung Balau). Jurnal Industri Berkelanjutan dan Optimalisasi Lingkungan, 6(1), 13–18. https://doi.org/10.36441/seoi.v6i1.2286
4. Fadhilah, A., Maulidiyah, N., & Rizki, D. A. (2023). Intervensi kesehatan lingkungan berbasis PHBS dan dampaknya terhadap penyakit kulit di pesantren. Jurnal Kesehatan Masyarakat, 15(2), 87–94. https://doi.org/10.63004/mcm.v2i4.434
5. Handayani, S., & Fitria, N. (2022). Hubungan PHBS dengan skabies di lingkungan pesantren. Jurnal Promotif, 10(1), 65–70.

6. Muafida, N., Santoso, I., & Darmiah, D. (2017). Hubungan personal hygiene dengan kejadian skabies pada santri Pondok Pesantren Al Falah Putera Kecamatan Liang Anggang. Jurnal Health Science and Prevention, 1(1), 1–9.
7. Putri, D. K., Fadhilah, A., & Maulidiyah, N. (2021). Personal hygiene santri dan kejadian skabies di pondok pesantren. Jurnal Kesehatan Masyarakat, 17(3), 112–120. https://doi.org/10.36086/jsl.v2i2.1308
8. Rahmah, F. (2023). Hubungan personal hygiene terhadap kejadian scabies di Pondok Pesantren Al-Mukmin Ngruki Sukoharjo tahun 2023. Continuous Medical Education, 185–197.
9. Rahmah, F. (2023). Hubungan personal hygiene terhadap kejadian skabies di Pondok Pesantren Al-Mukmin Ngruki Sukoharjo. Jurnal Epidemik, 6(1), 56–62.
10. Rahmawati, H., & Aziz, F. (2018). Lingkungan fisik pesantren dan risiko penyakit kulit. Jurnal Kesehatan Komunitas, 4(2), 95–100. https://doi.org/10.14710/ jkli.23.2.153-161
11. Saragih, R. (2021). Faktor-faktor yang berhubungan dengan skabies pada santri. Jurnal Ilmiah Kesehatan, 5(2), 134–140. https://doi.org/10.31004/prepotif.v6i3.5633
12. Setiajaya, A., Praja, T. T., Wardani, D. W. S. R., Iryani, D. A., & Wahono, E. P. (2023). Evaluasi partisipasi masyarakat dalam program air minum dan sanitasi berbasis masyarakat. Jurnal Kesehatan Lingkungan: Jurnal dan Aplikasi Teknik Kesehatan Lingkungan, 21(2), 134–142. https://doi.org/10.14710/politika.5.2.2014.99-113
13. Setiajaya, A., Praja, T. T., Wardani, D. W. S. R., Iryani, D. A., & Wahono, E. P. (2023). Evaluasi partisipasi masyarakat dalam program air minum dan sanitasi berbasis masyarakat. Jurnal Kesehatan Lingkungan, 12(2), 34–42. https://doi.org/10.14710/politika.5.2.2014.99-113
14. Song, C. (2020). Gambaran perilaku cara menjaga kesehatan dan kebersihan kulit, rambut, kuku di Komunitas Sahabat Anak Grogol, Jakarta Barat periode Februari 2020. Jurnal Kedokteran, 1(1), 1–12. https://doi.org/10.51574/hayyan.v1i3.2452
15. Thean, L. J., Engelman, D., Kaldor, J., & Steer, A. C. (2019). Scabies: New opportunities for management and population control. Pediatric Infectious Disease Journal, 38(2), 211–213. https://doi.org/10.1097/inf.0000000000002211
16. Utami, R. (2020). Sanitasi lingkungan dan dampaknya terhadap penyakit berbasis lingkungan. Jurnal Kesehatan Lingkungan, 12(3), 122–130. https://doi.org/10.47575/jpkm.v6i1.690
17. Yusuf, H., Maulana, D., & Sari, A. P. (2019). Determinan personal hygiene pada remaja di lingkungan pesantren. Jurnal Promosi Kesehatan Indonesia, 14(2), 98–104. https://doi.org/10.33221/jikm.v9i04.733
18. Zulaicha, A. S., Buhani, Nuralita, A. R., & Setiajaya, A. (2024). Sintesis karbon aktif dari cangkang Elaeis guineensis Jacq dan dimodifikasi dengan magnetit (AC-Fe_3O_4) sebagai adsorben ion logam limbah Pb(II) di perairan. Prosiding Konferensi AIP, 2970(1), 060036. https://doi.org/10.14710/teknik.v42i3.36031
19. Zulaicha, A. S., Istomi, A. R., Satria, H., & Artika, E. (2024). Kajian parameter pencemaran perairan musim kemarau dan musim hujan terhadap indeks pencemaran Sungai Mesuji, Lampung, Indonesia. Jurnal Hasil Kimia, 13, 101906. https://doi.org/10.14710/jil.20.1.22-29
20. Zulaicha, A. S., Nusantari, C. S., & Setiajaya, A. (2024). Fungsionalisasi pelapisan karbon aktif magnetit dengan agen silane sebagai penyerap bahan pewarna kristal violet dan metil orange. Analit: Kimia Analitik dan Lingkungan, 9(2), 56–67.