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Research Paper

The Role of Sanitation and Hygiene in Skin Diseases in Wetlands: A Study Case from Indonesia

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Abstract
Poor environmental sanitation and inadequate personal hygiene in wetland settlements increase the risk of skin diseases, as water sources often serve as transmission pathways for pathogens. Despite the crucial role of water, sanitation, and hygiene (WASH) in disease prevention, research on its specific impact on skin health in wetland communities remains limited. This study aimed to examine the association between individual characteristics, environmental sanitation, and personal hygiene with skin disease complaints among residents of Dusun 3, Sungai Lebung Ulu Village, Ogan Ilir, Indonesia. A cross-sectional study was conducted with 94 respondents aged 16 years, selected through simple random sampling. Data were collected using structured questionnaires and analyzed using univariate and bivariate analysis with the Chi-square test. The results showed that 27.7% of respondents reported skin disease complaints. A significant association was found between access to clean water and skin disease complaints (p = 0.000, PR = 2.300, 95% CI). However, no significant associations were observed for age (p = 0.140), gender (p = 1.000), education level (p = 0.336), employment status (p = 0.888), toilet usage (p = 0.558), bathing habits (p = 0.456), handwashing with soap (p = 1.000), or clothing change habits (p = 0.811). The findings highlight that reliance on contaminated water sources significantly increases the risk of skin diseases, emphasizing the urgent need for improved water sanitation infrastructure. Public health interventions should focus on increasing community awareness and access to clean water to reduce skin disease prevalence in wetland settlements.

Keywords
clean water, environmental sanitation, personal hygiene, public health, skin diseases, wetland settlement

1. INTRODUCTION

Access to sanitation and hygiene plays a crucial role in preventing infectious diseases and improving public health. The sixth goal of the Sustainable Development Goals (SDGs) emphasizes universal access to sanitation and clean water by 2030, particularly in vulnerable communities where access remains limited (Arora and Mishra, 2022). Environmental sanitation refers to efforts to control physical environmental factors that may negatively impact human health, physical development, and overall well-being (Fattah, 2018). However, many regions, especially in developing countries, still struggle with inadequate sanitation infrastructure and poor hygiene practices, which are significant public health concerns (Okesanya et al., 2024).

Among various health risks associated with poor sanitation, skin diseases have emerged as a growing concern, particularly in wetland settlements. Wetlands can act as both a resource and a risk, as they provide essential water and nutrition while simultaneously serving as breeding grounds for disease-causing microorganisms and invertebrates (Zerbo et al., 2021). Contaminated water in these areas can act as a transmission pathway for viruses, bacteria, and fungi, leading to various skin conditions. Moreover, inadequate personal hygiene-such as infrequent handwashing, poor bathing habits, and improper clothing hygiene—exacerbates the risk of microbial infections and skin irritation (Radila, 2022).

Despite the well-established link between poor sanitation and infectious diseases, limited research has specifically examined the impact of sanitation and hygiene on skin disease prevalence in wetland communities. While previous studies have explored waterborne diseases (Shayo et al., 2023), gastrointestinal infections (Gebru et al., 2023), and vector-borne illnesses (Anthonj et al., 2019) associated with inadequate sanitation, the specific burden of skin diseases in wetlands remains underexplored. This gap is particularly relevant as wetland settlements are often characterized by persistent exposure to contaminated water (Şener, 2023), poor drainage systems (Sadeghi et al., 2024), and inadequate waste disposal (Hotaiba et al., 2024), all of which

contribute to skin health issues. Understanding the relationship between environmental sanitation, personal hygiene, and skin diseases in such environments is crucial for designing effective intervention strategies.

In Indonesia, skin diseases are among the most commonly reported health conditions. According to the 2015 Indonesia Health Profile (RI, 2016), skin diseases ranked third among the ten most frequently treated conditions in hospitals, accounting for 192,414 total visits, with 122,076 new cases and 70,338 follow-up visits. In Palembang, skin diseases ranked among the top ten prevalent illnesses, with 31,808 cases in 2017 and 73,600 cases in 2018, making it the fourth most reported condition (Palembang, 2019). Similarly, in Ogan Ilir Regency, 14,995 cases of allergic and infectious skin diseases were reported in community health centers in 2011 (OI). The high prevalence of skin diseases has been linked to poor environmental sanitation, inadequate hygiene practices, and low water quality (Asgedom et al., 2025). A recent study by (Heryanto et al., 2024) found a significant association between hand and nail hygiene, skin cleanliness, access to clean water, and waste disposal with the occurrence of skin diseases, highlighting the urgent need for targeted public health interventions.

Ogan Ilir Regency, which consists of extensive lowland swamp areas, presents unique environmental challenges. The region comprises 65% dry land and 35% wetland, with frequent flooding that affects water quality and sanitation (OI, 2022). Dusun 3 in Sungai Lebung Ulu Village is a wetland settlement where residents primarily rely on well and river water, both of which become contaminated during the rainy season. Observations indicate that water sources turn murky, brownish, and are filled with debris and organic matter, making them unsuitable for consumption or hygiene purposes. Due to seasonal flooding lasting four to six months, residents continue to use river water for daily activities such as bathing, washing, defecation, and waste disposal. Some community members also depend on the river for fishing, increasing their direct exposure to potentially hazardous water sources. Commonly reported health complaints in this area include scaly skin, itching, flu-like symptoms, pain, and diarrhea, suggesting a potential link between environmental sanitation, hygiene behaviors, and skin disease prevalence (OI).

This study aims to analyze the relationship between environmental sanitation, personal hygiene, and the prevalence of skin disease complaints among residents in the wetland settlement of Dusun 3, Sungai Lebung Ulu Village, Pemulutan Selatan District, Ogan Ilir. By addressing the gap in existing literature, this study seeks to provide evidence-based insights that can inform sanitation policies and public health interventions tailored to wetland communities.

2. METHOD

2.1 Study Design

This study employed a quantitative approach with an analytic cross-sectional design to investigate the association between individual characteristics, environmental sanitation, personal hygiene, and the prevalence of skin disease complaints. The cross-sectional design was chosen to simultaneously assess both risk factors and health outcomes in a defined population at a single point in time. The research was conducted in Dusun 3, Sungai Lebung Ulu Village, a wetland settlement located in the Pemulutan Selatan District, Ogan Ilir Regency, South Sumatra, Indonesia. Data collection was carried out from January to July 2024.

2.2 Population and Sampling

The target population consisted of all residents in Dusun 3, Sungai Lebung Ulu Village, who were aged 16 years or older. A total sample of 94 respondents was selected using a simple random sampling technique. A sampling frame was created by listing all eligible residents. Each resident was assigned a unique number, and participants were then selected randomly using a computer-generated number list to ensure that every individual had an equal and independent chance of being included in the study. The inclusion criterion was being a resident aged 16 years who provided informed consent. Exclusion criteria were individuals who were temporarily away during the study period or were unable to communicate effectively.

2.3 Data Collection and Variables

Data were collected by trained enumerators using a structured questionnaire. The questionnaire was administered face-to-face to ensure all questions were understood correctly by the respondents. The instrument was pre-tested on 10 individuals with similar characteristics in a neighboring village to ensure its validity and clarity before full implementation. The variables measured in this study were as follows: • Dependent Variable: Skin disease complaints, a binary variable categorized as "Yes" if the respondent reported experiencing symptoms such as persistent itching, rashes, scaly skin, or sores in the last month, and "No" if they did not. • Independent Variables: 1. Demographic Characteristics: Included age (categorized as 16–25 years and >25 years), gender (male/female), education level (categorized as lower education for elementary/junior high school and higher education for high school/bachelor), and occupation (unemployed vs. employed). 2. Environmental Sanitation: This was assessed through observation and questions regarding access to clean water (categorized as 'Meets Requirements' for protected sources like piped water or protected wells, and 'Does Not Meet Requirements' for unprotected sources like rivers) and toilet usage (categorized as 'Meets Requirements' for private, sanitary latrines, and 'Does Not Meet Requirements' for shared or unsanitary facilities like open defecation). 3. Personal Hygiene: This

was measured based on self-reported practices, including bathing habits (good: 2 times/day vs. poor: <2 times/day), handwashing with soap at critical times (good vs. poor), and clothing change habits (good: changing clothes daily and after getting wet vs. poor).

2.4 Data Analysis

The collected data were processed and analyzed using IBM SPSS Statistics, version 30. The analysis was conducted in two stages: 1. Univariate Analysis: Descriptive statistics were used to calculate frequencies and percentages for all variables (demographic, environmental sanitation, personal hygiene, and skin disease complaints) to describe the characteristics of the study population. 2. Bivariate Analysis: The Chi-square test was used to determine the statistical association between each independent variable and the dependent variable (skin disease complaints). The Prevalence Ratio (PR) with a 95% Confidence Interval (CI) was calculated for significant associations to measure the strength of the relationship. A p-value of < 0.05 was set as the threshold for statistical significance.

2.5 Ethical Considerations

This study received ethical approval from the Ethics Committee of the Faculty of Public Health, Sriwijaya University. Written informed consent was obtained from every participant before data collection began. Respondents were informed about the study's purpose, procedures, and their right to withdraw at any time without penalty. All personal data were anonymized and kept confidential to protect the privacy of the participants.

3. RESULTS

This section presents the findings in a clear and systematic manner using appropriate tables and illustrations to enhance clarity. All statistical test results are accurately presented and easy to interpret.

A total of 94 respondents participated in the study. The majority were aged >25 years (80.8%), while 19.1% were between 16–25 years. The proportion of female respondents (60.6%) was slightly higher than males (39.4%). Regarding education level, most respondents (85.1%) had lower education (elementary or junior high school), while only 14.9% had completed higher education. Additionally, 79.8% of respondents reported having a source of income, whereas 20.2% were unemployed. This distribution indicates that a significant portion of the respondents had some form of employment, either fixed or informal.

The environmental sanitation conditions in the study area showed several deficiencies. Only 48.0The environmental sanitation conditions in the study area showed several deficiencies. Only 48.0% of respondents had access to clean water sources that met health standards, while 48.0% relied on unsafe water. Toilet usage was also suboptimal, with 91.0% of respondents using sanitation facilities that did not meet proper standards. Waste management and wastewater disposal were entirely inadequate, with 100% of respondents reporting improper waste disposal practices.

Personal hygiene habits varied among respondents. While 84.0% reported good bathing habits, only 9.0% regularly washed their hands with soap, and 65.0% had poor clothing hygiene. These findings highlight gaps in hygiene practices that could contribute to skin disease prevalence.

Among the respondents, 26 individuals (27.7%) reported experiencing skin disease complaints, while 68 respondents (72.3%) did not. This indicates that more than a quarter of the population faced dermatological issues, suggesting potential environmental or behavioral risk factors.

Chi-square analysis revealed a significant association between access to clean water and skin disease complaints ($p = 0.000$, PR = 2.300, 95% CI). Respondents relying on unsafe water sources had a notably higher prevalence of skin diseases. However, no significant associations were found for other variables, including age ($p = 0.140$), gender ($p = 1.000$), education level ($p = 0.336$), employment status ($p = 0.888$), toilet usage ($p = 0.558$), bathing habits ($p = 0.456$), handwashing with soap ($p = 1.000$), or clothing hygiene ($p = 0.811$).

These findings suggest that while demographic and personal hygiene factors do not directly influence skin disease complaints, environmental sanitation—particularly access to clean water—plays a crucial role. This highlights the urgent need for improved water infrastructure and sanitation interventions in wetland communities.

4. DISCUSSION

This study examined the association between individual characteristics, environmental sanitation, and personal hygiene with skin disease complaints among residents of a wetland settlement in Dusun 3, Sungai Lebung Ulu Village, Ogan Ilir. The findings highlight the crucial role of environmental and behavioral factors in shaping skin health in communities reliant on river water for daily activities.

The study found no significant relationship between age and skin disease complaints ($p = 0.140$), indicating that skin health risks in this population are not strongly influenced by age-related physiological changes. This aligns with previous research suggesting that environmental exposure plays a more dominant role in dermatological conditions than demographic characteristics (Sundas et al., 2024). Similarly, gender did not significantly correlate with skin disease complaints ($p = 1.000$). This result suggests that both men and women in wetland settlements experience similar environmental exposures, particularly through daily interactions with river water. This finding is consistent with previous study, who reported that gender-related differences in skin disease prevalence diminish when exposure levels are equal (Lagacé et al., 2023). However, further qualitative research could explore whether cultural norms

Table 1. Characteristics of Respondents

Variable	Frequency	Percentage (%)
Age		
16 - 25 years	18	19.1
> 25 years	76	80.8
Gender		
Male	37	39.4
Female	57	60.6
Education Level		
Higher Education (High School -Bacelor)	14	14.9
Lower Ecuation (Elementary - Junior High School)	80	85.1
Occupation		
Unemployed (no income)	19	20.2
Employed (fixed or non-fixed income	75	79.8

Table 2. Characteristics of Respondents

Variable	Frequency	Percentage (%)
Clean Water Source		
Meets Requirements	48	51.1
Does Not Meet Requirements	46	48.9
Toilet Usage		
Meets Requirements	3	3.0
Does Not Meet Requirements	91	91.0
Waste Management		
Meets Requirements	0	0.0
Does Not Meet Requirements	94	100.0
Wastewater Disposal System		
Meets Requirements	0	0.0
Does Not Meet Requirements	94	100.0

related to hygiene and skincare contribute to variations in skin disease severity.

Education level was also not significantly associated with skin disease complaints (p = 0.336). While higher education is often linked to better health awareness (Zajacova and Lawrence, 2018), this study suggests that structural limitations—such as lack of access to clean water—may prevent individuals from practicing optimal hygiene despite their level of education. These findings echo previous studies showing that knowledge alone does not always translate into healthier behaviors when infrastructural barriers exist (Subramaniam et al., 2022).

The absence of a significant relationship between occupation and skin disease complaints (p = 0.888) suggests that occupational exposure is not a primary determinant of skin health in this community. Unlike industrial or agricultural workers exposed to specific chemical irritants (de Assis et al., 2021), the primary risk factor appears to be communal water use rather than occupational hazards.

A significant relationship was found between access to clean water and skin disease complaints (p = 0.000, PR = 2.300, 95% CI). Respondents who relied on unsafe water sources had a notably higher prevalence of skin diseases. This supports findings by (Prüss-Ustün et al., 2019), who identified a similar association between inadequate water quality and dermatological conditions. Contaminated water can serve as a reservoir for bacteria, fungi, and other pathogens, increasing the risk of skin infections (Kanamori et al., 2016). The presence of organic and chemical pollutants in wetland water sources further exacerbates these risks (Anthonj et al., 2019).

Contrary to expectations, latrine use was not significantly associated with skin disease complaints (p = 0.558). While open defecation is a known risk factor for waterborne diseases (Ekhoragbon, 2024), its direct link to skin infections may be mitigated by other hygiene practices (Manetu and Karanja, 2021), such as the use of antibacterial soap. Previous studies have also found mixed results regarding the role of latrine access in skin disease prevalence, suggesting that other factors—such as bathing water quality—may

Table 3. Characteristics of Respondents

Variable	Frequency	Percentage (%)
Bathing Habits		
Good	84	84.0
Poor	10	10.0
Handwashing with Soap Habits		
Good	9	9.0
Poor	85	85.0
Clothing Change Habits		
Good	29	29.0
Poor	65	65.0

Table 4. Characteristics of Respondents

Variable	Frequency	Percentage (%)
Skin Disease Complaints		
Experiencing Skin Disease Complaints	26	27.7
Not Experiencing Skin Disease Complaints	68	72.3

have a stronger influence (Adhikari et al., 2023).

Waste management and wastewater disposal were entirely inadequate among respondents, yet statistical analysis could not establish their association with skin disease complaints due to data homogeneity. However, previous research has highlighted the role of stagnant water and poor drainage in fostering bacterial and fungal growth, which can contribute to dermatological conditions (Naidoo et al., 2023). Future studies should employ environmental sampling to directly measure microbial contamination in households with different waste disposal practices.

Bathing habits were not significantly associated with skin disease complaints ($p = 0.456$). This finding suggests that while bathing frequency is important, water quality may be a more critical factor in determining skin health. The previous study have similarly reported that frequent bathing with contaminated water does not necessarily reduce the risk of skin infections (Lin et al., 2022).

No significant relationship was found between handwashing with soap and skin disease complaints ($p = 1.000$). This contradicts some public health literature emphasizing hand hygiene in disease prevention (Mouajou et al., 2022) (Akinsulie et al., 2024). However, the lack of association may stem from the fact that handwashing primarily prevents gastrointestinal infections rather than skin conditions. Further investigation into specific hygiene behaviors and their dermatological effects is warranted.

Changing clothes habits did not significantly correlate with skin disease complaints ($p = 0.811$). While maintaining clean clothing is generally recommended for skin health, exposure to contaminated water likely overrides this protective behavior. These findings align with studies indicating that external environmental factors often outweigh personal hygiene practices in determining dermatological health risks (Manetu and Karanja, 2021).

4.1 Interpretation of Key Findings

This study reveals that individual characteristics such as age, gender, education, and occupation do not have a significant correlation with skin disease complaints. In contrast, environmental factors—particularly access to clean water—are strongly associated with the occurrence of skin diseases. These results underscore the importance of environmental determinants over demographic characteristics in influencing skin health within this community.

4.2 Comparison with Previous Studies

The significant relationship between clean water sources and skin disease complaints aligns with prior studies which identified a similar correlation between inadequate water sources and dermatological issues ((Prüss-Ustün et al., 2019) (Palma et al., 2015). The contamination of river water with household waste, including feces and other pollutants, creates an environment conducive to bacterial growth, increasing the risk of skin diseases (Irda Sari et al., 2018). However, unlike some studies that found a link between education and health awareness (Grech and Grech, 2021) (Komolafe et al., 2020), this study did not establish a significant relationship between education level and skin complaints. This discrepancy may stem from the community's reliance on river water due to limited access to clean water infrastructure, regardless of educational background.

Table 5. Association Between Various Factors and Skin Disease Complaints

Variable	Skin Disease Complaints				Total		*p*-value	PR 95% CI
	Yes	%	No	%	n	(%)		
Age Group								
16-25 years	2	11.1	16	88.9	18	100	0.140	0.271 (0.058-1.273)
> 25 years	24	31.6	52	68.4	76	100		
Gender								
Female	16	28.1	41	71.9	57	100	1.000	0.949 (0.375-2.399)
Male	10	27.0	27	73.0	37	100		
Education Level								
Higher Education (High School-Bacelor)	2	14.3	12	85.7	14	100	0.336	0.336 (0.081-1.872)
Lower Education (Elementary-Junior High S.)	24	30.0	56	70.0	80	100		
Occupation								
Unemployed	6	31.6	13	68.4	19	100	0.888	0.788 (0.264-2.354)
Employed	20	26.7	55	73.3	75	100		
Clean Water Source								
Meet Requirements	0	0.0	48	100	48	100	0.000	2.300 (1.654-3.198)
Does Not Meet Requirements	26	56.5	20	43.5	46	100		
Latrine Usage								
Proper Latrine	0	0.0	3	100	3	100	0.558	1.400 (1.229-1.594)
Improper Latrine (IL)	26	28.6	65	71.4	91	100		
Bathing Habits								
Good	22	26.2	62	73.8	84	100	0.456	1.879 (0.484-7.287)
Poor	4	40.0	6	60.0	10	100		
Handwashing with Soap								
Good	2	22.2	7	77.8	9	100	1.000	1.377 (0.267-7.105)
Poor	24	28.2	61	71.8	85	100		
Clothing Change Habits								
Good	9	31.0	20	69.0	29	100	0.811	0.787 (0.301-2.059)
Poor	17	26.2	48	73.8	65	100		

4.3 Limitations and Cautions

Despite its contributions, this study has certain limitations. First, the homogeneity of the data for variables such as waste management and wastewater disposal prevented a more detailed statistical analysis. Second, self-reported data on personal hygiene practices may introduce response bias, as participants might overstate their adherence to hygiene practices. Additionally, external factors such as climate conditions and seasonal variations were not controlled, which may have influenced the prevalence of skin complaints.

4.4 Recommendations for Future Research

To address these limitations, future research should incorporate a larger and more diverse sample size to allow for more comprehensive statistical analyses. Longitudinal studies could also provide deeper insights into the seasonal variations in skin disease prevalence. Furthermore, integrating microbiological analysis of water samples with epidemiological data would enhance the understanding of specific pathogens contributing to skin diseases. Collaboration with public health authorities to improve access to clean water and sanitation facilities should also be explored to mitigate the risks identified in this study.

5. CONCLUSION

This study examined the relationship between individual characteristics, environmental sanitation, and personal hygiene with skin disease complaints among residents of the wetland settlement in Dusun 3, Sungai Lebung Ulu Village. The findings indicate that the majority of respondents were over 25 years old, predominantly female, with low educational attainment (elementary to junior high school level), and employed in various occupations.

Chi-square analysis revealed a significant association between clean water sources and skin disease complaints ($p = 0.000$), highlighting the crucial role of water quality in skin health. However, no significant relationship was found between latrine use and skin disease complaints ($p = 0.558$), suggesting that other environmental or behavioral factors may mitigate the effects of inadequate sanitation.

In terms of personal hygiene, there was no significant association between bathing habits (p = 0.456), handwashing with soap (p = 1.000), or changing clothes habits (p = 0.811) with skin disease complaints. This indicates that while hygiene practices are important, the quality of water used for these activities may play a more critical role in determining dermatological health outcomes.

Similarly, no significant relationship was observed between individual characteristics—age (p = 0.140), gender (p = 1.000), education level (p = 0.336), and employment status (p = 0.888)—and skin disease complaints. This suggests that demographic factors alone are not primary determinants of skin health in this community.

Based on these findings, improving access to clean water should be prioritized as a key intervention for reducing skin disease complaints. Future research should incorporate microbiological analysis of water sources to better understand pathogen exposure and its effects on skin health. Additionally, public health initiatives focusing on infrastructure improvements and water sanitation programs may offer more effective strategies for mitigating dermatological risks in wetland settlements.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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