Analysis of Factors Associated with the Incidence of Skin Diseases in the Community of Indralaya District

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Article Information	ABSTRACT
	Introduction: Human skin, as the body's primary protective barrier, is highly vulnerable to infections, particularly in tropical regions with poor sanitation. In Indralaya District—a humid wetland area with substandard environmental conditions—these factors elevate the risk of skin diseases. This study investigates the environmental determinants associated with skin disease incidence in the region. **Methods:** This cross-sectional analytical study involved 100 purposively selected residents of wetland areas in Indralaya District. Data were analyzed using SPSS with univariate and bivariate methods, applying the Chi-Square test to assess associations between social-environmental factors and skin health. **Results:** The statistical test results indicated a significant relationship between environmental factors and the incidence of skin diseases. Clean water sources from the river (p-value = 0.000), untreated drinking water sources (p-value = 0.001), type of latrine (p-value = 0.002), wastewater disposal through a septic tank (p-value = 0.001), and wastewater drainage into the river (p-value = 0.036), as well as waste disposal habits (p-value = 0.000), were all associated with an increased risk of skin diseases. However, the distance of latrines from clean water sources (p-value = 0.782) and housing density (p-value = 0.726) did not show significant associations. **Conclusion:** Poor environmental sanitation and the use of contaminated water are significantly linked to the incidence of skin diseases. Public education and improved sanitation infrastructure are essential for disease prevention.

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INTRODUCTION

The most extensive part of the human body is the skin, which forms and covers the entire body. Therefore, the skin serves as the first layer that perceives external stimuli such as touch, pain, and various environmental factors (Nuraeni, et al., 2016). If skin health is not

properly maintained, various skin diseases may arise. Therefore, it is essential to maintain skin hygiene and health from an early age to prevent these issues. Skin disorders occur due to dysfunction in skin components or layers, leading to structural damage that can affect anyone and appear on different parts of the body. Skin diseases can significantly impact an individual's appearance and daily activities. Although often considered non-severe due to their low mortality rate, untreated skin diseases can spread widely and become difficult to treat (Putri, Furqon, and Perdana 2019)

It is estimated that skin disorders affect approximately 900 million people worldwide at any given time (WHO 2018). Skin infections remain a significant public health issue, with data from previous studies in 2019 reporting around 4.86 billion new cases of skin and subcutaneous diseases globally (95% UI: 4.68–5.06 billion). Fungal (34%) and bacterial (23%) skin diseases were the leading contributors to these new cases. The burden of these diseases is reflected in the total Disability-Adjusted Life Years (DALYs), which reached 42.88 million years, with 98,522 deaths recorded in the same year, where bacterial skin infections accounted for approximately 72% of total mortality (Yakupu et al. 2023).

Countries with lower GDP per capita tend to have a high burden of infectious skin diseases such as scabies, fungal infections, and leishmaniasis, whereas contact dermatitis and psoriasis are more common in countries with higher GDP. As a middle-income country, Indonesia faces a dual burden of infectious and inflammatory skin diseases, exacerbated by urbanization, population density, limited access to healthcare, and poor sanitation. Consequently, Indonesia ranks 29th in Asia in contributing to the transmission of skin diseases (Urban et al. 2021). In tropical countries such as Indonesia, skin diseases are among the most frequently occurring health problems, with bacterial, viral, fungal, or parasitic skin infections being the most prevalent in tropical regions and resource-limited areas (WHO, 2023). One of Indonesia's major skin diseases is leprosy, with 14,376 new cases reported in 2023, indicating that the country has yet to achieve its leprosy elimination target (Kementrian Kesehatan 2024). The Indonesian Health Profile in 2018 also recorded 115,000 outpatient visits related to skin diseases, with 64,557 new cases detected (Ginting et al. 2024). These figures highlight the need for more effective health interventions to reduce the burden of skin diseases in Indonesia.

Skin disorders are generally triggered by various factors, including climate, environmental conditions, lifestyle, residential settings, allergic reactions, and more. Infectious skin diseases are more prevalent in resource-poor regions, while skin cancers such as melanoma are more commonly found in resource-rich areas. Household density and access to clean water significantly influence the prevalence of skin diseases in impoverished areas (Seth et al. 2017). Additionally, environmental factors, particularly sanitation, have a major impact on skin disorders. Environmental sanitation reflects the health status of a region, encompassing housing conditions, community behavior, and the availability of sanitation facilities, including waste disposal systems, access to clean water, waste management, and garbage processing (Ginting et al. 2024).

Previous studies have indicated that poor personal hygiene and environmental sanitation are significantly associated with a high incidence of skin diseases in areas where the population frequently experiences skin-related health issues (Aswanda, Iskandar, and Desreza 2023). Hand and nail hygiene, skin cleanliness, the availability of clean water, and waste disposal facilities all correlate positively with the incidence of skin diseases at UPTD Puskesmas Sekar Jaya (Sonia et al. 2024). Another study conducted in Teluk Sentosa Village, Labuhanbatu Regency, found a significant relationship between personal hygiene, environmental sanitation, and skin disease complaints. Respondents who maintained good personal hygiene and lived in areas with adequate sanitation reported fewer skin problems,

whereas those with poor personal hygiene and inadequate environmental sanitation experienced more frequent skin disease complaints (Ginting et al. 2024). A study in Lingkungan VI, Belawan Bahari Subdistrict, examining the association between clean water sources, water usage frequency, and duration of water use with skin disease complaints, demonstrated that these three factors had a significant impact on skin-related health issues (Nanda, et al. 2024).

South Sumatra is one of the provinces in Indonesia with a vast area of wetlands. According to the latest data collected by the Indonesian National Carbon Accounting System, South Sumatra has approximately 1,262,000 hectares of wetland areas (Kementerian Lingkungan 2012). Indralaya District, located in South Sumatra, comprises extensive wetlands, including swamps, rivers, and floodplains that are frequently inundated. The district consists of 20 villages, five of which are located in wetland areas: Sakatiga Seberang Village, Indralaya Mulya Village, Sakatiga Village, Tanjung Agung Village, and Tanjung Sejaro Village. This geographical condition results in a humid environment with characteristic wetland vegetation, such as water hyacinths and other aquatic plants. Many residents in the wetland areas of Indralaya rely on natural resources for daily activities, including fishing and water collection. However, the water used by some villagers is often considered unsuitable for washing, bathing, or drinking. This situation poses health risks, including an increased likelihood of skin diseases (Suryani 2016). Based on this background and problem identification, this study aims to examine the factors associated with the incidence of skin diseases among the community in Indralaya District.

LITERATURE REVIEW

Skin health issues in the community are influenced by environmental sanitation and human behavior. Skin diseases arise from the interaction between environmental transmission media and human activities. The sanitation system includes toilet conditions, drainage systems, and other factors that protect public health. Poor sanitation, including inadequate clean water sources, poor housing conditions, and the presence of disease vectors, is a major risk factor for skin health problems (Zahtamal dkk., 2022).

An unhealthy environment, particularly poor sanitation and low water quality, has negative effects on skin health, leading to bacterial or fungal infections. A study by Rahayona et al. (2024) found that areas near landfill sites often become sources of health problems due to contamination, including skin diseases. Therefore, maintaining proper sanitation and a clean environment is essential for preventing skin diseases.

Community involvement in maintaining environmental cleanliness and personal hygiene has proven to be effective. Research by Hidayat et al. (2023) demonstrated that community participation in environmental health initiatives improves overall health quality. Raising public awareness about the importance of hygiene can reduce the incidence of skin diseases and enhance general well-being.

Health education through community-based programs is essential for improving skin health management skills. A study by Rohim (2024) found that educational programs involving direct community participation were more effective in promoting health awareness. Preventing skin diseases requires a comprehensive approach, including government intervention to provide proper sanitation infrastructure and adequate access to clean water (Handayani, Dhewi, and Anggraeni 2023).

METHOD

This study employs an analytical observational approach with a cross-sectional design to analyze the relationship between social and environmental factors and the incidence of skin diseases in Indralaya District, Ogan Ilir Regency, South Sumatra Province. The study population consists of working-age individuals (15–64 years) and elderly individuals (>65 years) living in wetland areas, including rivers, swamps, and rice fields, across six villages: Sakatiga Seberang, Indralaya Mulya, Tanjung Agung, Tanjung Sejaro, and Sakatiga. Due to the lack of local data, the total population is unknown. Consequently, this study adopts a non-probability sampling approach using purposive sampling. The sample size was calculated using Lemeshow's formula for an estimated 10% prevalence rate, resulting in a minimum required sample of 100 respondents.

The inclusion criteria for this study were individuals residing in wetland areas, those at risk of environmentally related health issues, those capable of effective communication, and those who provided informed consent to participate. Individuals who did not reside in wetland areas or had communication impairments were excluded from the study (exclusion criteria).

Data collection was conducted over three days through structured interviews using a questionnaire filled out directly by the researchers to ensure data consistency and accuracy. The questionnaire was systematically designed to explore social and environmental factors influencing skin irritation incidence. The dependent variable in this study was skin disease (irritation), while the independent variables included clean water sources, drinking water sources, toilet type, toilet waste disposal system, toilet distance from clean water sources, wastewater drainage type, household density, and waste disposal practices. The questionnaire was divided into several sections aimed at identifying correlations between these variables and respondents' health conditions, with a primary focus on describing skin health status, daily hygiene practices, and the environmental conditions in wetland areas.

The collected data were analyzed using SPSS software with two types of analysis: univariate and bivariate. The Chi-square test was used to assess the statistical relationships between independent and dependent variables, identifying significant correlations with skin irritation incidence. The data processing stages included editing, coding, data entry, and tabulation to generate descriptive statistics, including frequencies and percentages. The study findings are presented in tables, accompanied by in-depth interpretations, offering a comprehensive understanding of the contribution of social and environmental factors to skin irritation incidence in the wetland areas of Indralaya District.

RESULT AND DISCUSSION

To provide an overview of the distribution of respondent characteristics based on the studied variables, the univariate analysis results are presented in Table 1. These data serve as the foundation for understanding the patterns and distribution of variables that may influence the incidence of skin diseases in Indralaya District.

Based on Table 1, the study results indicate that the residents of Indralaya District primarily use river water (50%) and well water (50%) as their source of clean water. For drinking water, the majority slightly prefer refilled drinking water (52%) over unprotected water that is later boiled (48%). Most households have private latrines (90%), with wastewater disposal systems mainly consisting of soak pits (88%). Additionally, 58% of latrines are located less than 10 meters from the clean water source used. A significant portion of the community (59%) still disposes of wastewater directly into the river.

Regarding household density, the majority meet the established standard of at least 8 square meters per person (67%). However, waste disposal habits indicate that most residents do not dispose of waste daily but instead collect it before eventual disposal (61%). Furthermore, the study findings reveal that 54% of the population in Indralaya District have experienced skin diseases, while 46% have not. The identification of skin diseases was conducted by asking residents about symptoms they had experienced in the past six months, including wounds, itchy or painful rashes, peeling skin, cracked or dry skin, skin discoloration, pigmentation changes, and tissue loss.

Table 1. Univariate Analysis Table

Variable	Category	Frequency (n)	Percentage (%)
Source of Clean Water	River Water	50	50
	Well Water	50	50
Sources of Drinking Water	Unprotected Water	48	48
	Refilled Drinking Water	52	52
Household Toilet Type	Public Toilet	10	10
	Private Toilet	90	90
Toilet Waste Disposal System	Soak Pit	88	88
	Septic Tank	12	12
Distance Between Toilet and Clean Water Source	< 10 m	42	42
	> 10 m	58	58
Type of Wastewater Disposal System (SPAL)	Directly to the River	59	59
	Public Drainage	41	41
Household Density	Overcrowded	33	33
	Adequate	67	67
Waste Disposal Habit	Not Daily	61	61
	Daily	39	39
Skin Disease Complaints	Yes	54	54
	No	46	46

The chi-square test results showed a p-value of 0.000 for clean water sources, indicating a significant relationship with the incidence of skin diseases. According to Table 2, among 100 respondents, 43 (79.6%) who used river water as their clean water source reported skin disease complaints, while 7 (15.2%) did not. In contrast, 11 respondents (20.4%) who used well water reported skin disease complaints, whereas 39 (84.8%) did not. The statistical test for drinking water sources yielded a p-value of 0.001, also indicating a significant association with skin disease complaints (Table 2).

Table 2. Relationship Between Water Sources with Skin Disease Complaints

Water Source	Skin Disease Complaints				P Value
	Yes (n = 54)	%	No (n = 46)	%	
Source of Clean Water					
River Water	43	79.6	7	15.2	0.000
Well Water	11	20.4	39	84.8	
Sources of Drinking Water					
Unprotected Water	34	63	14	30.4	0.001
Refilled Drinking Water	20	37	32	696	

The study results indicate a significant relationship between household latrine type and skin disease complaints (p-value < 0.05), specifically 0.002. Based on the analysis, all

respondents (100%) who used public latrines, including pit latrines, experienced skin disease complaints, whereas respondents who used household latrines had a lower proportion of complaints, at 48.6% (Table 3).

Table 3. Relationship Between Household Latrine and Skin Disease Complaints

Household Latrine	Skin Disease Complaints				P Value
	Yes (n = 54)	%	No (n = 46)	%	
Household Toilet Type					
Public Toilet	10	100	0	0	0.002
Private Toilet	44	48.6	46	41.4	
Toilet Waste Disposal System					
Soak Pit	42	47.5	46	52.3	0.001
Septic Tank	12	100	0	0	
Distance Between Toilet and Clean Water Source					0.782
< 10 m	22	52.4	20	47.6	
> 10 m	32	55.2	26	44.8	

Table 4. Relationship Between Household Wastewater Disposal and Skin Disease Complaints

Household Wastewater Disposal	Skin Disease Complaints				P-value
	Yes (n = 54)	%	No (n = 46)	%	
Type of Wastewater Disposal System (SPAL)					0.036
Directly to the River	37	62.7	22	37.3	
Public Drainage	17	41.5	24	58.5	

A statistical test using the chi-square method with a confidence level of 95% (α = 0.05) yielded a p-value of 0.036 for the type of household wastewater disposal system (SPAL), indicating a significant relationship between wastewater disposal and skin disease complaints. According to Table 4, out of 100 respondents (100%), 17 respondents (41.5%) who used improper drainage systems, such as random disposal or public drains, experienced skin disease complaints, while 24 respondents (58.5%) using the same disposal system did not report any complaints. Additionally, 37 respondents (62.7%) who disposed of wastewater directly into rivers experienced skin disease complaints, whereas 22 respondents (37.3%) who also used river disposal did not experience any skin-related issues.

Table 5. The Relationship Between Household Density and Complaints of Skin Diseases

Household Density	Complaints of Skin Diseases				P-value
	Yes (n = 54)	%	No (n = 46)	%	
Household Density					
Overcrowded	17	51.5	16	48.5	0.726
Adequate	37	55.2	30	44.8	

The statistical test results for household density conditions yielded a p-value of 0.726, indicating no significant relationship between household density and the occurrence

of skin diseases. Based on Table 5, it was found that 37 respondents (55.2%) whose household density met the requirement of less than or equal to 8 square meters per person reported complaints of skin diseases. Meanwhile, 17 respondents (51.5%) whose household density did not meet the requirement, exceeding 8 square meters per person, also reported skin disease complaints.

Table 6. Relationship Between Waste Disposal Habits and Skin Disease Complaints

Waste Management	Skin Disease Complaints				P-value
	Yes (n = 54)	%	No (n = 46)	%	
Waste Disposal Habit					
Not Daily	48	78.7	13	21.3	0.000
Daily	6	15.4	33	84.6	

Statistical test results for waste disposal habits obtained a p-value = 0.000, indicating a significant relationship between waste disposal habits and the incidence of skin diseases. Based on Table 6, it was found that 6 respondents (15.4%) who disposed of waste daily reported experiencing skin disease complaints, whereas 48 respondents (78.7%) who did not dispose of waste daily experienced skin disease complaints.

Relationship Between Water Sources with Skin Disease Complaints

This study aligns with research by Fitria and Hayani (2021) which found a relationship between clean water sources and the incidence of skin diseases. Their study in Bantan Timur Village reported a statistical test result of p-value = 0.000, supporting the significant association between clean water availability and skin diseases. This finding is consistent with Table 2, which shows a p-value = 0.000 (p < 0.05), reinforcing the significant relationship between clean water and skin disease complaints (Fitria and Hayani 2021). Additionally, this study is supported by Ritonga and Putra (2023), which found that water quality is also related to the incidence of skin diseases. A study conducted in Dayah Amal, East Aceh Regency, reported a chi-square statistical test result of p = 0.000 < α = 0.05.

According to the Indonesian Ministry of Health Regulation No. 32 of 2017, water used for sanitation and hygiene must meet specific quality standards to be safe for daily activities such as bathing, brushing teeth, washing food, eating utensils, and clothes. Hygiene and sanitation water must meet environmental health quality standards, including physical, biological, and chemical aspects (Menteri Kesehatan Republik Indonesia 2017). High-quality water must meet physical requirements such as being colorless, tasteless, and odorless. Limited access to clean water, particularly for personal hygiene, can lead to various health disorders, including skin diseases and eye infections (Fitria and Hayani 2021).

Based on observations, most residents in Indralaya District still use river water for daily activities, which can negatively impact skin health. Observations indicate that the river water used by the community has been polluted by household waste, with some residents stating that their household waste is directly discharged into the river, which is later reused for washing and bathing. This practice is a contributing factor to the incidence of skin diseases in Indralaya District. Many residents also reported that the river water they use sometimes has an unpleasant odor and contains small particles, yet they do not take any measures to purify the water for daily use.

Among 100 respondents, 34 respondents (63%) who consumed boiled well or river water reported skin disease complaints, whereas 14 respondents (30.4%) who used the same sources with boiling did not report skin complaints. Conversely, 20 respondents (37%)

who consumed refillable drinking water reported skin disease complaints, while 32 respondents (69.6%) who drank refillable water did not experience skin disease complaints. The analysis results indicate a significant relationship between drinking water sources and the incidence of skin diseases, with a p-value of 0.001. Communities using untreated raw water sources such as well and river water have a higher risk of experiencing skin disease complaints than those using refillable drinking water, which generally has better quality. However, this study contrasts with previous research, where drinking water sources did not show a significant relationship with skin disease incidence (Zahtamal et al. 2022).

Contaminated water, when consumed, can cause various diseases, including skin diseases, due to the presence of harmful substances that may infect the skin internally. A study in Bangladesh found a significant relationship between arsenic exposure through drinking water and an increased risk of skin lesions, even at concentrations below 100 µg/L. Observed skin lesions included dark patches, rough skin, and hyperkeratosis (skin thickening), which are considered negative health effects of long-term arsenic exposure (Argos et al. 2011). Another study also reported that arsenic levels in drinking water were significantly associated with skin lesions, with respondents exposed to high arsenic levels having a 6.49 times greater risk than those with low arsenic levels. Symptoms included itching, redness, small bumps resembling corn, and a burning sensation spreading across the body (Oka, Kusnoputranto, and Wulandari 2017).

Arsenic exposure through drinking water is a major source of arsenic poisoning worldwide. Contaminated groundwater is frequently used for consumption, particularly in areas with limited clean water sources (Chung, Yu, and Hong 2014). his finding is consistent with observations in Indralaya District, where residents utilize groundwater, such as well water, for drinking, exposing them to the risk of arsenic contamination. Previous studies reported that shallow groundwater concentrations of arsenic could exceed the safe limits established by WHO and Indonesian standards (0.01 mg/L) due to geological activities in the area (Afifah and Notodarmojo et al. 2018). Similarly, water used for hygiene and sanitation must comply with quality standards to prevent health risks. The Ministry of Health's regulation specifies that arsenic levels in drinking water should not exceed 0.01 mg/L (Kementerian Kesehatan 2023). Additionally, observations revealed that well water in the area is also contaminated by household wastewater drainage, which frequently overflows during heavy rain, increasing the risk of skin disease transmission.

Previous research has stated that household activities in riverbank areas contribute to waste containing heavy metals, pesticides, fungicides from agricultural activities, livestock feed residues containing chemicals, used oil disposal, leftover paint, household and vehicle batteries (accumulators), and household electronic waste (Mabuat et al. 2017). These factors also increase the risk of skin diseases, which are exacerbated by the lack of efforts to improve water quality, awareness of sanitation importance, and education on hygiene and proper water treatment practices.

Relationship Between Household Latrine and Skin Disease Complaints

The study results indicate a significant relationship between household latrine type and skin disease complaints. These findings suggest that the type of latrine used by households significantly influences the risk of skin disease complaints. Respondents using public toilets were at a much higher risk of experiencing skin disease complaints than those using household latrines. This study contributes new insights to the literature on the relationship between sanitation facilities and skin diseases, as previous studies have shown no significant association between latrine type and skin diseases (Zahtamal et al. 2022).

In this context, the type of latrine indirectly affects skin diseases, as using public

toilets can exacerbate exposure to environmental contamination. Direct disposal of feces into the river leads to direct exposure to water contaminated with bacteria, viruses, or parasites from fecal matter, which can cause skin infections. Moreover, public toilets tend to be unsanitary since uncovered waste disposal can serve as a breeding ground for insects or pathogenic microorganisms, potentially triggering skin problems such as itching, rashes, or infections. Public toilets are often poorly maintained and not cleaned regularly, increasing the risk of contamination transmission from one user to another, especially due to high user density.

Additionally, the latrine disposal system also shows a significant relationship with skin disease complaints (p-value = 0.001). Similar to previous findings, this study differs from earlier research that reported no significant relationship between latrine disposal systems and skin diseases (Zahtamal et al. 2022). All respondents (100%) who used a septic tank system reported skin disease complaints, while only 47.5% of those using a soak pit system reported such complaints. This may be due to poorly maintained or substandard septic tanks that still contribute to environmental contamination. Respondents using soak pits showed a lower proportion of skin disease complaints (47.5%) compared to those using septic tanks. However, there is still a risk, as soak pits can lead to wastewater infiltration into the soil, potentially contaminating nearby clean water sources. The use of private latrines with a more controlled disposal system is generally more hygienic and limits direct contact with waste, thereby reducing the risk of skin diseases.

The study results also show that the distance between latrines and clean water sources does not have a significant relationship with skin disease complaints (p-value = 0.782). Of the 100 respondents, 22 individuals (52.4%) who had latrines situated within 10 meters of a clean water source reported experiencing skin disease symptoms, whereas the remaining 20 individuals (47.6%) did not report such issues. Conversely, among respondents with latrines >10 meters away, 32 (55.2%) reported skin disease complaints, and 26 (44.8%) did not. Although the proportion of respondents experiencing skin disease complaints was slightly higher in the group with latrines >10 meters away, the difference was not statistically significant to support an association between latrine distance and skin disease complaints.

This study contributes to identifying safe latrine types and disposal systems as preventive measures against skin disease complaints. Observations revealed that people with access to private latrines and enclosed disposal systems reported fewer skin disease cases than those relying on river latrines or public toilets. Latrine type and latrine disposal systems indirectly influence skin diseases. These two variables are essential criteria for healthy latrines, aiming to prevent contamination of sanitation and drinking water sources and soil pollution. Therefore, public health programs can direct resources toward improving sanitation infrastructure in high-risk areas, such as providing proper household latrines and enclosed disposal systems. Furthermore, these findings can guide government policies in establishing sanitation standards in rural areas and encourage communities to transition to safer and healthier latrines. Contact with contaminated water or environments can be a primary trigger for skin diseases. Improving sanitation and personal hygiene remains the most effective preventive measure.

Relationship Between Household Wastewater Disposal and Skin Disease Complaints

This study aligns with previous research by Malau, Naria, and Indirawati (2024) which found a significant relationship between SPAL and skin disease complaints. Their study, conducted in Kampung KB Bagan Dusun XVI, Percut Deli Serdang, reported a chi-square test p-value of 0.001 (<0.05), confirming the association between wastewater

disposal and skin disease incidence. The study also found that many residents still lacked proper drainage systems due to their reliance on stilt houses above rivers. Furthermore, behavioral habits, such as direct disposal of wastewater into rivers, have been a long-standing practice (Nanda, Hasibuan, et al. 2024). Similar conditions were observed in Indralaya District, where wastewater disposal practices were comparable.

According to Lestari (2022), wastewater serves as a breeding ground for pathogenic microorganisms, mosquito larvae, and insects, which may contribute to disease transmission. Poorly managed wastewater disposal increases the risk of multiple diseases, yet many communities neglect its importance, assuming it to be a low priority. As a result, stagnant wastewater accumulates around residential areas, creating an unhygienic environment that fosters disease vectors and facilitates the spread of infectious diseases.

Wastewater Management System is one of the key pillars of the Community-Based Total Sanitation (STBM) program initiated by the government. Household wastewater generated from activities such as washing, bathing, cooking, and toilet use can cause environmental pollution if not properly managed in terms of collection, channeling, and treatment. Poor wastewater management can lead to various health problems, particularly skin diseases. The habit of discharging wastewater directly into rivers contaminates water sources, increasing the risk of skin disorders, particularly among vulnerable groups such as children and the elderly. Additionally, inadequate wastewater management can lead to soil contamination and promote the growth of disease-spreading vectors such as cockroaches, flies, and rodents. Contaminated soil can, in turn, affect water sources used for daily activities and drinking water supply (Zahtamal dkk., 2022).

This study provides crucial insights for developing public health programs focused on the negative impact of poor wastewater management. The significant relationship between wastewater disposal methods and skin disease complaints highlights the necessity of infrastructure improvements in sanitation systems. Policymakers should establish minimum SPAL standards in both rural and urban areas, allocate funds for effective drainage systems, and implement educational campaigns on hygiene and sanitation. Furthermore, this research paves the way for future studies that explore additional factors influencing skin disease prevalence and extend sample coverage to enhance result validity.

The Relationship Between Household Density and Complaints of Skin Diseases

In environments with high residential density, physical contact between individuals occurs more frequently, increasing the risk of transmitting skin diseases caused by direct contact with individuals suffering from infections such as impetigo, scabies, and dermatophytosis (ringworm), which are caused by pathogens such as bacteria, viruses, or fungi (Fadillah et al. 2023; Hidayati and Abidin 2016). High-density housing can also create humid environments if ventilation and sunlight exposure are inadequate. These conditions are ideal for the growth of pathogenic microorganisms such as fungi and bacteria, which can lead to skin diseases. Therefore, it is essential to consider not only household density but also supporting factors such as ventilation, natural lighting, and good hygiene practices to prevent skin disease risks in densely populated areas.

The findings in Indralaya District indicate that there is no significant relationship between compliant housing density and the occurrence of skin diseases. Although the majority of respondents lived in housing that met the density requirements, many still experienced skin health complaints. Conversely, some individuals residing in non-compliant density conditions did not report such complaints. These findings suggest that other factors, such as personal hygiene practices, ventilation quality, natural lighting, and environmental sanitation conditions, may contribute significantly to the community's skin health. A study by Ridwan, Sahrudin, and Ibrahim (2021) at the Darul Mukhlisin Islamic

Boarding School in Kendari also found no significant relationship between household density and complaints of skin diseases (scabies). Despite the non-compliant housing density in the boarding school, good personal hygiene practices among students reduced the risk of skin infections.

Good personal hygiene plays a crucial role in maintaining individual health, especially in the context of housing density. Research indicates that individuals who maintain proper hygiene, including skin cleanliness, hand hygiene, and genital hygiene, have a lower risk of developing skin diseases, even in high-density housing conditions (Fadillah et al. 2023). Although high housing density can affect environmental quality, such as air circulation and access to adequate sanitation facilities, individuals who practice good hygiene can reduce the potential for infection or irritation. This suggests that the interaction between personal hygiene practices and environmental conditions is highly relevant in understanding individual skin health. Therefore, efforts to improve personal hygiene standards and enhance sanitation infrastructure in densely populated areas are essential to minimize the risk of skin diseases (Tuharea, Wakano, and Rumakey 2021). Government and public health agencies should focus on awareness campaigns and infrastructure development to promote better hygiene and living conditions, ensuring a healthier population overall.

Relationship Between Waste Disposal Habits and Skin Disease Complaints

Observations and interviews revealed that a significant portion of the community in Indralaya Subdistrict remains unaware that waste accumulation can be a source of various diseases, including skin diseases, as accumulated waste serves as a breeding ground for bacteria and germs. Social and cultural factors may also contribute to improper waste disposal habits, as these practices have been passed down through generations, and there is a lack of strict social sanctions or regulations. Contaminated waste in river water is a primary trigger for skin disease complaints among the community, as many still rely on river water for daily needs. This behavior can lead to irregular waste disposal, resulting in waste accumulation and increased exposure to pathogens responsible for skin diseases

This study aligns with the findings of Axmalia and Mulasari (2020), which indicate that communities living near waste piles experience symptoms of skin disease. Complaints of skin diseases have also been reported in other studies when waste is disposed of in inappropriate locations, such as illegal dumpsites with infrequent collection schedules, allowing viruses and bacteria to spread through the air or vectors (Khoiriyah 2021). Waste management is a critical environmental issue in both developed and developing countries, requiring urgent attention due to its impact on public health and the environment. Addressing waste issues should be a priority for both the government and the community, given the continuous increase in population growth.

Improper waste management contributes to environmental contamination and increases the risk of skin infections by promoting bacterial and insect proliferation. Communities with irregular waste disposal face higher exposure to unsanitary conditions, leading to more skin disease complaints. This study emphasizes the need for public education and improved waste infrastructure to mitigate health risks. Awareness campaigns and better waste management facilities, especially in rural areas, can help create cleaner environments and reduce skin disease incidence. Integrating waste management education into community health programs can further support these efforts.

CONCLUSION

This study identifies a significant link between water sources, sanitation facilities, and waste management with skin disease incidence in Indralaya District. Poor sanitation and contaminated water use elevate health risks, as many residents still rely on polluted river water and well water affected by drainage overflow. The use of public toilets and direct sewage disposal into rivers foster bacterial growth, increasing skin disease cases, especially among vulnerable groups. Accumulated waste further contributes to bacterial proliferation. However, factors like latrine distance from water sources and household density showed no significant correlation with skin disease occurrence. Instead, water quality and sanitation played a more decisive role in skin health.

To mitigate risks, this study recommends expanding access to clean water, improving sanitation infrastructure, and promoting hygiene education, including proper waste disposal and handwashing practices.

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