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Sanitation and Hygiene Factors Related to the Incidence of Dermatitis in the Community of Baliara Village, West Kabaena Islands

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ABSTRACT

Introduction: Dermatitis is a common skin health problem in Baliara Village. Data from the West Kabaena Community Health Center shows a fluctuating trend: 12 cases in 2021, 23 in 2022, a decrease to 8 in 2023, and an increase to 25 in 2025. The main risk factors include limited clean water and exposure to the mining environment. This study Sanitation and Hygiene Factors Related to the Incidence of Dermatitis in the Community of Baliara Village, West Kabaena.

Method: This research was quantitative with a cross-sectional design. The study was conducted from June to July 2025, with 317 respondents. The population in this study was 1,532. The research instrument was a closed-ended questionnaire, with data analysis using the chi-square test and logistic regression in SPSS.

Result: The results of the bivariate analysis showed a significant relationship between access to clean water (p = 0.015) and environmental factors (p = 0.000) with the incidence of dermatitis. The logistic regression analysis indicated that environmental factors were the most dominant variable influencing the incidence of dermatitis (OR = 2.86), followed by access to clean water (OR = 1.67).

Conclusion: The conclusion of this study is that environmental factors are the primary determinant of dermatitis incidence among the coastal community in Baliara Village. To reduce the incidence of dermatitis, it is recommended to improve sanitation infrastructure and the provision of clean water in coastal areas, implement continuous health and hygiene education, and strengthen monitoring of the environmental impacts of mining activities.

Introduction

Indonesia, an archipelago of over 17,000 islands, boasts a long and extensive coastline, making it the country with the largest coastal area in the world. More than 60 million people, or approximately 30% of Indonesia's total population, live in coastal areas.[1] These coastal communities largely depend on coastal natural resources such as

fisheries, agriculture, and tourism. However, despite their significant economic potential, coastal areas often face challenges related to poverty, access to basic services, and environmental degradation caused by human activities.[2] Public health is a crucial indicator of a region's development. Among various health issues, skin diseases such as dermatitis are among the most common, particularly in coastal areas with inadequate sanitation.[3]

The skin diseases remain among the top 10 most common diseases in Indonesia, and their prevalence tends to increase year after year, particularly in areas with high population density and poor sanitation. This indicates that skin diseases are a public health problem that requires serious attention.[4] Similar conditions also occur in Southeast Sulawesi, particularly in coastal areas such as Baliara Village, West Kabaena District, Bombana Regency. This region faces not only limited clean water and sanitation, but also the impacts of nickel mining activities, which cause environmental pollution.[5] According to data from the West Kabaena Community Health Center, dermatitis cases in Baliara Village show a fluctuating but still high trend. In 2021, 12 cases were recorded, increasing to 23 in 2022, decreasing to 8 in 2023, and then rising again to 25 in 2025. This fluctuation indicates that underlying factors remain unaddressed.[6]

One of the causes of the high incidence of dermatitis in this region is thought to be a combination of several factors, such as inadequate household sanitation, limited access to clean water for bathing and washing, low levels of personal hygiene in the community, and the proximity of settlements to mining areas that produce dust and heavy metal waste.[7]

Exposure to heavy metals such as nickel, chromium, and lead from mining activities can cause skin reactions such as irritation and allergies. Combined with poor sanitation and poor hygiene, the risk of dermatitis increases. This makes coastal communities near mines particularly vulnerable to skin diseases.[8]

In addition, the low level of public awareness regarding the importance of clean and healthy living behavior also contributes to the worsening situation, particularly due to the limited environmental health education in coastal areas such as Baliara.[6]

Previous research conducted in Baliara Village showed that all environmental and behavioral factors including environmental sanitation, personal hygiene, access to clean water, mining environmental factors, and community awareness had a significant association with the incidence of dermatitis ($p < 0.05$), with environmental factors being the dominant variable (OR = 2.86).

The geographical condition of Baliara as a remote coastal area, with inadequate sanitation infrastructure and direct exposure to nickel mining activities, makes it a highly vulnerable region to skin diseases such as dermatitis.

The main problem in this study is the still high incidence of dermatitis in Baliara Village, which is influenced by environmental factors and community behavior. Limited access to clean water is also a significant problem, considering that clean water is a basic need for maintaining personal and environmental hygiene. On the other hand, exposure to mining environments such as dust and heavy metal waste is a source of pollution that increases the risk of dermatitis. These problems have not been widely studied specifically in this area, so in-depth, data-based scientific studies are needed to produce appropriate intervention recommendations.

The urgency of this research is reinforced by the absence of comprehensive scientific data regarding the relationship between sanitation, hygiene, and exposure to mining environments with the incidence of dermatitis in the coastal area of Baliara Village, highlighting the need for an evidence-based approach as a foundation for public health interventions.

The purpose of this study is to analyze the relationship between exposure factors to mining environments and access to clean water, with the incidence of dermatitis in the community of Baliara Village, Kabaena Islands.

Method

This research is a quantitative analytical study with a cross-sectional approach. It was conducted from June to July 2025 in Baliara Village, Kabaena Islands, Bombana Regency, Southeast Sulawesi Province. The population used in this study was all residents of Baliara Village,

Kabaena Islands, who were exposed to nickel mining pollution and were at risk of developing dermatitis, amounting to 1,532 people, with a sample size of 317 respondents. The sampling technique used was purposive sampling. Data collection was carried out through questionnaires, and data were analyzed using the Chi-square Test and multiple logistic regression.

Result

Table 1 shows that 172 respondents had poor access to clean water, of which 163 (51.4%) had dermatitis and 9 (2.8%) did not. Meanwhile, 145 respondents had good access to clean water, of which 58 (18.3%) had dermatitis and 87 (27.4%) did not. The chi-square test yielded a significance value (sig) of 0.015 (<α 0.05), indicating a significant relationship between clean water access and the incidence of dermatitis in the Baliara Village community.

Table 2 shows that 219 respondents were exposed to negative environmental factors, of which 141 (64.4%) had dermatitis and 78 (35.6%) did not. Meanwhile, 98 respondents were exposed to positive environmental factors, of which 68 (69.4%) had dermatitis and 30 (30.6%) did not. The chi-square test showed a significance value (sig) of 0.000 (<α 0.05), indicating a highly significant relationship between environmental factors and the incidence of dermatitis in the Baliara Village community.

Table 3 shows that all independent variables significantly influenced the incidence of dermatitis. The variable with the highest odds ratio was environmental factors (OR = 2.86), meaning respondents living in unhealthy environments had an almost threefold higher risk of developing dermatitis than those living in healthy environments. Meanwhile, the variable for access to clean water (OR = 1.67) indicated that respondents with access to unhealthy clean water had an almost twofold higher risk of developing dermatitis than those with access to healthy clean water.

Based on these results, it can be concluded that environmental factors such as proximity to waste, the presence of stagnant water, and exposure to mining activities are the most dominant determinants influencing the incidence of dermatitis in the community. An unhealthy environment creates ideal conditions for skin irritation due to chemical and microorganism contamination. Furthermore, poor personal hygiene practices and inadequate household sanitation conditions also significantly contribute to the increased risk of dermatitis. Infrequent bathing, not using soap, and lack of basic sanitation facilities exacerbate the skin's susceptibility to infection. Furthermore, access to clean water and public awareness have been shown to be important modifiable factors. Interventions in the form of education on clean and healthy living behavior and the provision of clean water and environmental sanitation facilities are strategic steps that can reduce the incidence of dermatitis in coastal areas such as Baliara Village.

Table 1.
Distribution of Access to Clean Water with Incidence of Dermatitis Disease

Access to Clean Water	Dermatitis Incident				Total		Statistical Result
	Suffer		Not Suffering				
	n	%	n	%	n	%	
Bad	163	51,4	9	2,8	172	54,3	p-value = 0,015 α = 0,05
Good	58	18,3	87	27,4	145	45,7	
Total	221	69,7	96	30,3	317	100,0	

Table 2.
Distribution of Environmental Factors with the Incidence of Dermatitis Disease

Environmental Factors	Dermatitis Incident				Total		Statistical Result
	Suffer		Not Suffering				
	n	%	n	%	n	%	
Not healthy	141	44,5	78	24,6	219	69,1	p-value = 0,000 α= 0,05
Healthy	68	21,5	30	9,6	98	30,9	
Total	209	65,9	108	34,1	317	100,0	

Table 3.
Results of Logistic Regression Analysis on Dermatitis Incidence

Variables	*p-value*	Exp(B)	Wald
Access to Clean Water	0,041	1,67	0,591
Environmental Factors	0,000	2,86	0,491

Discussion

Access to Clean Water

Access to clean water plays a crucial role in maintaining personal hygiene and preventing skin diseases such as dermatitis, clean water is water that is safe to use for household purposes without posing health risks, free from pathogenic microorganisms, hazardous chemicals, and other pollutants.[9] In Lalonde's theory of health determinants, the availability of clean water as part of the physical environment is one of the important external factors influencing community health status.[10]

Limited access to clean water can lead to a decline in basic hygiene practices such as bathing and washing, which increases the risk of skin disorders, particularly dermatitis. Within the framework of social-ecological systems theory, this problem is also influenced by structural factors such as infrastructure availability, government policies, and local water resource management capacity.[11]

Baliara Village, located on the coast of West Kabaena Island, is a hilly area with limited basic infrastructure, including access to clean water. Most residents still rely on unprotected dug wells, rainwater catchments, or even collect water from rivers and the sea due to the lack of a piped water network from the Regional Water Company. The results of this study indicate that 54.3% of respondents lack access to clean water. Furthermore, based on physical water quality indicators, 168 respondents (53.0%) stated that the water they use for bathing, washing, and cooking has an odor or color, while only 149 respondents (47.0%) use water that is odorless or colorless. This indicates that more than half of the Baliara community still uses water with physical quality that does not meet environmental health standards.

Water with a strong odor or color usually indicates contamination by organic compounds, heavy metals, or pathogenic microorganisms. If used in daily activities, such water can cause skin irritation, infection, and increase the risk of dermatitis. According to Indonesian Minister of Health Regulation No. 32 of 2017, water used for domestic purposes must be odorless, colorless, and free from the risk of chemical and biological contamination. In coastal areas close to mining activities and lacking adequate water filtration systems, physical water pollution is often accompanied by chemical and microbiological contamination.[12] Sari et al. confirmed that using odorous or colored water can increase the risk of dermatitis by up to 1.8 times compared to using clean water.[13]

This situation results in low bathing and washing frequency, as well as overall

environmental and personal hygiene, which ultimately increases vulnerability to exposure to bacteria, fungi, and chemical compounds that cause skin irritation. Bivariate analysis results showed a significant association between access to clean water and the incidence of dermatitis (p = 0.015), and multivariate results showed an Odds Ratio (OR) of 1.67, meaning respondents without access to clean water had a 1.67 times greater risk of developing dermatitis than those with adequate access.

These findings align with research,[14] which revealed that people who use water from unsafe sources such as ponds, rivers, or shallow wells without protection have a twofold higher risk of developing skin infections. [14] A similar finding was reported[15], who showed that limited clean water led to a decrease in bathing and washing frequency in coastal communities, with some even resorting to bathing in the sea or murky rivers, which actually increases the risk of dermatitis.[15]

Therefore, increasing access to clean water needs to be a priority in public health promotion and prevention efforts. This is also in line with the target of Sustainable Development Goals (SDGs) point 6.1, which emphasizes the importance of universal access to safe and affordable drinking water by 2030. This access improvement strategy not only includes infrastructure development, but must also be accompanied by education and community empowerment regarding the importance of clean water in maintaining skin health and preventing environmental-based diseases.

Environmental Factors

Environmental factors are a crucial element in the ecological approach to public health because they significantly influence the health of individuals and communities. In social ecological theory, the physical environment, such as air, soil, and surface water quality, plays a significant role in health risks, including skin diseases. [16] Exposure to environmental pollutants such as heavy metals, domestic waste, and mining dust can enter the human body through inhalation, ingestion, and skin absorption. In coastal and mining areas such as Baliara Village, exposure from mining activities is a major source of various health risks. [17] explain that pollutants from the mining industry can damage the microbiological structure of soil and water, creating environmental conditions that support the growth of pathogenic microorganisms such as bacteria, fungi, and parasites that can attack human skin.[17]

The results of this study indicate that environmental factors are the most dominant variable in the incidence of dermatitis, with an Odds Ratio (OR) of 2.86 and a highly significant chi-square test (p = 0.000). This means that respondents living in unhealthy environments, such as near mines, landfills, or open waste, have almost three times the risk of developing dermatitis compared to respondents in healthy environments. Based on field data, data shows that of 317 respondents, 219 people (69.1%) live in environments with open waste, while only 98 people (30.9%) live in environments without open waste. The presence of open waste is a strong indicator of poor environmental sanitation because it can become a breeding ground for pathogenic microorganisms, produce unpleasant odors, and attract disease vectors such as flies and rats. According, environmental exposure such as this plays a significant role in the increase in skin diseases in low-income areas.[18] A study states that open waste contributes to chronic skin irritation due to the accumulation of chemical and biological substances.[19] Meanwhile, stated that people living near unmanaged waste have a two to three times higher risk of developing dermatitis. [15]

Baliara Village is a coastal area adjacent to several mining activities, so the community is frequently exposed to dust, heavy metal particles, and polluted surface water. Exposure to heavy metals such as nickel, chromium, lead, and arsenic is very harmful to the skin, as it can cause irritant and allergic contact dermatitis. A study supports these findings, stating that communities living near mining sites have a higher prevalence of skin diseases caused by chemical particles and mining residues inhaled or deposited on the skin surface. [8] Furthermore, high humidity on the coast makes the skin more susceptible to absorbing these chemicals, increasing the risk of skin irritation and infection. [8] The presence of open waste worsens the home environment and increases the risk of skin infections.[19] stated that open waste significantly contributes to chronic skin irritation.[19] Various studies confirm that mining

activities have a significant impact on community skin health showed that skin contact with soil or water contaminated with heavy metals can cause contact dermatitis also noted an increase in cases of skin irritation and wounds among metal plating industry workers who did not use protective equipment.[20,21] Meanwhile, found that communities living within a 300-meter radius of heavy metal pollution sites had higher rates of dermatitis.[22]

Politically, this is regulated in Government Regulation No. 22 of 2021 concerning Environmental Protection and Management. However, its implementation in remote areas like Baliara still faces various obstacles, including limited institutional capacity, low access to information, and suboptimal oversight of industrial activities.[23] Therefore, public health interventions in coastal and smining areas must prioritize environmental factors, through strengthening regulations, public education, and establishing safe zones away from pollution sources.

Conclusion

Based on the research results, it can be concluded that there is a significant relationship between access to clean water and the incidence of dermatitis. Respondents who do not have access to clean water are at a 1.67 times higher risk of developing dermatitis than those with adequate access; and there is a significant relationship between environmental factors, especially those related to mining activities, and the incidence of dermatitis. Respondents who live in unhealthy environments such as near mines or open waste have a 2.86 times greater risk of developing dermatitis.

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