ASSESSING THE CORRELATION BETWEEN SOCIOECONOMIC FACTORS AND DERMATOLOGICAL DISEASES: A STUDY IN THE EASTERN COASTAL AREA OF CA MAU PROVINCE, MEKONG DELTA, VIETNAM

Huynh Van Tung[1], Huynh Van Ba[5*], Nguyen Van Nguyen[2],
Huynh Thi Nga[2], Tran To Loan[3], Huynh Bach Cuc[4], Nguyen Huynh Ngan[5], Huynh Anh Dao[5]

[1]*Can Tho University of Technology - 256 Nguyen Van Cu, Ninh Kieu Dist, Can Tho City, Vietnam*
[2]*FOB Vocational Education Center of Beauty*
[3]*FOB International Cosmetic Dermatological Institute*
[4]*Nguyen Tri Phuong Hospital - 468 Nguyen Trai, An Dong Ward, Ho Chi Minh City, Vietnam*
[5]*Can Tho University of Medicine and Pharmacy Hospital -*
179 Nguyen Van Cu, Ward An Khanh, Dist Ninh Kieu, Can Tho City, Vietnam

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ABSTRACT

Background: Although skin diseases have a low mortality rate, they cause significant discomfort and profoundly affect the quality of life and economic status of patients and society. The eastern coastal area of Ca Mau province, Mekong Delta, Vietnam - characterized by a tropical climate, diverse livelihoods, and socioeconomic disparities - creates complex interactions that impact dermatological health and healthcare costs.

Objectives: To evaluate the correlation between socioeconomic factors and skin diseases in the eastern coastal area of Hiep Thanh ward, Ca Mau province.

Subjects and methods: A descriptive cross-sectional study was conducted on 176 patients with community skin disease.

Results: The mean age of patients was 48.5 years (SD 20.4 years). The majority were female (71.1%) and of Khmer ethnicity (51.1%). A total of 18 dermatological conditions were diagnosed, with atopic dermatitis (AD) being the most prevalent (40.7%). AD showed a strong negative correlation ($r = -0.199$) with household economic autonomy and the strongest positive correlation ($r = 0.271$) with financial barriers to healthcare access (accounting for 45.5% of obstacles). The rates of self-medication for AD (22.8%, $r = 0.161$) and non-treatment for scabies (49.1%, $r = 0.153$) were high, indicating efforts to avoid formal healthcare costs, which inadvertently increase the risk of chronicity and disease transmission. 100% of patients experienced an impact on their quality of life, with a mean DLQI score of 10.7 ± 3.9 (indicating a substantial effect). Psychological burden (low self-esteem, social avoidance) correlated strongly with eczema, scabies, and prurigo ($r > 0.154$). Ethnic, occupational, and hygiene factors showed strong correlations: the Khmer population had a higher prevalence of scabies ($r = 0.203$) and prurigo ($r = 0.179$); occupations such as marine fishing, agriculture, and chemical exposure correlated with seborrheic dermatitis, eczema, and psoriasis, respectively ($0.185 < r < 0.325$). The use of river/healthy water correlated with scabies and prurigo, while the use of bar soap correlated with folliculitis, and disease duration correlated with asteatotic eczema ($r > 0.252$). All correlations were statistically significant ($p < 0.05$ and $p < 0.01$). Conclusion: The quantitative findings clearly demonstrate the correlation between socioeconomic factors and skin diseases, highlighting root-cause factors (occupation, hygiene, ethnicity) that require intervention in this coastal community.

Keywords: Skin disease, atopic dermatitis, dermatology life quality index (DLQI), Ca Mau, Mekong Delta.

1. INTRODUCTION

While skin diseases have a low mortality rate, they represent a significant burden on the global health system and economy, primarily by impairing health-related quality of life, increasing direct treatment costs, and reducing labor productivity. Understanding the socioeconomic and environmental factors influencing skin diseases is crucial for developing cost-effective public health interventions.

*Corresponding author
Email: bs.ba_fob@yahoo.com.vn **Phone:** (+84) 908831414 **Https:**//doi.org/10.52163/yhc.v67iE1.5096

The eastern coastal region of Hiep Thanh Ward, Ca Mau Province, located in the Mekong Delta of Vietnam, features a tropical climate. It is one of the areas with the highest temperatures and thermal radiation in the region, with an average air temperature of 27 °C and significant solar irradiance (photovoltaic power output, PVOUT, reaching 1,480.9 kWh/kWp[6]). The local community primarily subsists on aquaculture and marine fishing, necessitating prolonged occupational exposure to sunlight, seawater, and other environmental agents. Furthermore, the diverse economic context (significant renewable energy developments, such as offshore wind power) and social setting (cohabitation of the Kinh, Hoa, and Khmer ethnic groups) create substantial disparities in livelihoods, barriers to healthcare access, and the ability to pay. This complexity is predicted to generate an unequal burden of dermatological diseases.

Studies have demonstrated that natural factors (climate, radiation), economic-occupational factors, and social factors are closely linked to the pathogenesis and exacerbation of tropical skin diseases. To provide a health economics database for proposing solutions to enhance adaptive capacity and skin protection for residents, we conducted this case study to assess the correlation between socioeconomic factors and skin diseases in this coastal community.

2. STUDY SUBJECTS AND METHODS

2.1. Study design, subjects, and sample size

A descriptive cross-sectional study was performed. Data was collected in July 2024. The sampling method was non-probability, convenience, and stratified random sampling. Inclusion criteria comprised patients diagnosed with skin diseases who consented to participate, with no history of psychiatric disorders and not currently using antipsychotic medication.

Sample size was estimated using the formula

$$n = N/(1 + N.e^2)$$

+ N was the population size of Vinh Trach Dong commune (now part of Hiep Thanh ward, Ca Mau province, per Resolution No. 1655/NQ-UBTVQH15 dated June 16, 2025) with approximately 15,907 people [19];

+ e was the permissible error (± 0,05);

+ n was the required sample size to determine the prevalence of skin disease in 390 people.

We assumed a high prevalence of skin disease at 40% (higher than the 8.3% prevalence in the elderly [9] and the 95% rate of untreated skin diseases in coastal areas [8]). The calculated sample size for the study was 156 patients. The actual number of patients recruited was 167.

2.2 Data collection

Data collection was conducted through a combination of clinical dermatological examinations and direct patient interviews. The study utilized structured and semi-structured questionnaires to gather comprehensive data. The information collected encompassed patient demographics, dermatological history, occupational information, and habits related to environmental and occupational exposure, diet, facilitators and barriers to healthcare access, and the impact of skin diseases on patients' quality of life.

2.3. Data analysis

Data were cleaned using Excel and SPSS before analysis. Descriptive statistics, including frequency analysis, percentage calculations, mean values, and standard deviations, were employed to summarize the study variables. Pearson correlation analysis (r) was performed to examine the linear relationships between environmental, economic, and social factors and skin diseases, with statistical significance established at $p < 0.05$. Additionally, the Dermatology Life Quality Index (DLQI) was calculated for patients aged 16 years and older.

3. RESULTS

3.1. Correlation between economic factors and skin diseases

Demographics:

The mean age of participants was 48,5 ± 20,4 years. The majority were female (71.1%). Regarding ethnicity, Khmer was the most prevalent (51.1%), followed by Kinh (38.3%) and Hoa (10.2%). Educational attainment was predominantly at the primary school or lower level (65.2%). Participants engaged in diverse occupations and had varying living standards.

Dermatological disease structure:

Clinical examination diagnosed 18 skin diseases. Atopic dermatitis (AD) was the most common (40.7%), followed by contact dermatitis (13.2%), dermatophytosis (10.2%), urticaria (7.5%), seborrheic dermatitis (6.6%), prurigo (5.4%), eczema (4.2%), scabies (4.2%), and other conditions (10.5%).

Table 1. Frequency and proportion of dermatological diseases

Dermatological diseases	n	%
Atopic dermatitis	68	40.7
Contact dermatitis	22	13.2
Dermatophytosis	17	10.2
Urticaria	12	7.5
Seborrheic dermatitis	11	6.6
Prurigo	9	5.4
Eczema	7	4.2
Scabies	7	4.2
Acne vulgaris	3	1.8
Scalp folliculitis	3	1.8
Folliculitis	3	1.8
Hyperpigmentation	2	1.2
Skin aging	2	1.2

Dermatological diseases	n	%
Parakeratosis	1	0.6
Furuncle	1	0.6
Miliaria	1	0.6
Alopecia	1	0.6
Psoriasis	1	0.6
Total dermatological diseases	171	100
Total patients	167	

Economic Barriers and Healthcare Access:

Analysis of the correlation between economic factors, treatment history, access difficulties, and skin diseases revealed key findings:

+ Atopic dermatitis showed a strong negative correlation (r = -0.199, p = 0.010) with household economic autonomy (47.3% autonomy and 52.7% non-autonomy). Patients with AD tended to come from families with lower economic independence, suggesting that AD was not only prevalent but also associated with financial burden for less affluent households.

+ AD showed a positive correlation (r = 0.161, p = 0.038) with a history of self-medication (22.8%). This may be due to avoidance of formal medical costs or the chronic nature of the disease. Furthermore, a very high rate of non-treatment (49.1%) correlated with scabies (r = 0.153, p = 0.048). This contributes to ineffective disease control, disease recurrence and exacerbation, increased risk of community transmission, and psychosocial/economic difficulties.

+ Financial difficulty was the most significant barrier to accessing healthcare services (45.5%) and showed a strong positive correlation with AD (r = 0.271, p = 0.000). This was the strongest relationship observed, confirming that AD poses the most significant financial challenge to accessing care and directly reflects the disease's economic burden. Additionally, transportation difficulties (26.4%) correlated with AD (r = 0.196, p = 0.011). Difficulties due to the disease itself (low self-esteem, social avoidance) (25.2%) correlated strongly with eczema (r = 0.223, p = 0.004), scabies (r = 0.154, p = 0.047), and prurigo (r = 0.228, p = 0.003). These conditions create not only direct economic burdens but also potentially indirect burdens by hindering social interaction and employment.

Table 2. Correlation between economic barriers/healthcare access and skin diseases

Economic barriers, treatment history, and healthcare access difficulties		Skin diseases	Correlation	
Variable	Description		Correlation coefficient (r)	P-value (p)
Household economic autonomy	Yes: 47.3% No: 52.7%	Atopic dermatitis	-0.199	0.010
Treatment history	Non-treatment: 49.1%	Scabies	0.153	0.048
	Self-treatment: 22.8%	Atopic dermatitis	0.161	0.038
Healthcare access difficulties	Financial: 45,5%	Atopic dermatitis	0.271	0.000
	Transportation: 26,4%	Atopic dermatitis	0.196	0.011
	Disease (low self-esteem, social avoidance): 25,2%	Eczema	0.223	0.004
		Scabies	0.154	0.047
		Prurigo	0.228	0.003

3.2. Impact of skin disease on quality of life

All patients reported an impact on their quality of life (DLQI 2), with 61.3% experiencing a large-to-severe effect. Psychological impact was the most evident; low self-esteem and social avoidance were significant challenges, particularly for chronic, difficult-to-treat, infectious, or visibly disfiguring diseases like eczema, scabies, prurigo, and AD ($p < 0.05$). The mean DLQI score was 10.7 ± 3.9, falling within the “large effect” range (11-20 points), reflecting a significant burden on mental health and participation in socioeconomic activities.

Table 3. Impact of skin disease on quality of life (n = 150, age ≥ 16)

DLQI	n	%
No impact (0-1 points)	0	0.0
Impact (2-30 points)	150	100.0
+ Little impact (2-5 points)	19	12.7
+ Medium impact (6-10 points)	38	25.3
+ High impact (11-20 points)	92	61.3

DLQI	n	%
+ Very high impact (21-30 points)	1	0.7
Mean DLQI ± standard deviation	10.7 ± 3.9	

3.3. Correlation between social factors, exposure, environmental hygiene, and skin diseases

The analysis highlights the role of social, environmental, and hygiene factors in the burden of skin disease in coastal areas.

+ Sociocultural burden: Ethnicity is a key factor. Significant correlations were found between the Khmer ethnic group and scabies (r = 0.203, p = 0.009) and prurigo (r = 0.179, p = 0.021). The Hoa ethnic group showed a correlation with scalp folliculitis (r = 0.253, p = 0.001). This suggests customs, hygiene practices, or specific living conditions of each community play a role.

+ Occupational and exposure burden: The specific working environment of the coastal region (marine fishing 7.2%, agriculture 6.6%) is directly linked to seborrheic dermatitis (r = 0.300, p = 0.000) and eczema (r = 0.185, p = 0.016), confirming occupational exposure as a primary cause.

+ Hygiene and environmental burden: The use of unsafe water sources, specifically river water (1.2%) and well water (1.8%), was significantly correlated with scabies (r = 0.252, p = 0.001) and prurigo (r = 0.167, p = 0.031). The habit of using bar soap for bathing (14.9%) was strongly correlated with scalp folliculitis (r = 0.322, p < 0.001).

+ Furthermore, the study results suggest that a high salt diet (11.4%) may be indirectly related (potentially via cutaneous water and electrolyte imbalance) to miliaria in children (r = 0.217, p = 0.005) and parakeratosis, which demonstrated a tendency toward chronicity and prolonged duration (r = 0.296, p < 0.001) in this study cohort.

Table 4. Correlation between demographic/environmental factors and skin diseases (n = 167)

Sociocultural, exposure, and hygiene factors		Skin diseases	Correlation	
Variable	Description		Correlation coefficient (r)	P-value (p)
Ethnicity	Kinh: 38.3%	Scabies	-0,165	0,033
	Hoa: 10.2%	Scalp folliculitis	0,253	0,001
	Khmer: 51.1%	Scabies	0,203	0,009
		Prurigo	0,179	0,021
Occupational and exposure factors				
Occupation	Student: 6.6%	Alopecia	0,292	0,000
	Retired/Elderly: 12.6%	Xerosis	0,205	0,008
	Seasonal worker: 8.9%	Furuncle	0,247	0,001
	Agriculture: 6.6%	Eczema	0,185	0,016
	Marine fishing: 7.2%	Seborrheic dermatitis	0,300	0,000
	Children: 3.6%	Miliaria	0,402	0,000
Hygiene and environmental factors				
Environment	High sun exposure: 37.12%	Scalp folliculitis	0,174	0,025
	Chemical exposure: 5.4%	Psoriasis	0,325	0,000
Hygiene	Bar soap: 14,9%	Scalp folliculitis	0,322	0,000
Water source	Well water: 1,8%	Prurigo	0,167	0,031
	River water: 1,2%	Scabies	0,252	0,001
Disease duration	Minimum: 0.5 months Maximum: 360 months Mean: 29.63 ± 55.4 months	Parakeratosis	0,296	0,000
Diet	High salt diet: 11,38%	Miliaria	0,217	0,005

4. DISCUSSION

4.1. Correlation of economic, skin disease, and dermatological quality of life

Atopic dermatitis was the most common disease (40.7%). This rate is significantly higher than general epidemiological reports for AD in Vietnam and globally, 7-20% in children (Nutten, S., 2015) [13], approximately 20% in dermatology clinics (Nguyen Trong Hao et. al., 2018) [12]. This prevalence likely results from the specific socioeconomic conditions and exposures of the coastal community (low income, low education), promoting disease onset, recurrence, and chronicity. The recurrent nature of AD increases the risk of superinfection and prolonged illness (Silverberg, J. I., 2019) [16], confirming it as a significant economic burden, especially for households with low economic autonomy (Wollenberg, A. et al., 2018) [21].

This research showed a strong correlation between AD and economic factors, aligning with the definition of AD as a burden on families and society (Ehlers, A. et al., 2018) [4]. The negative correlation with economic autonomy and positive correlation with financial barriers ($r = 0.271$) confirms that AD imposes substantial treatment costs (medication, moisturizers, consultation fees) on vulnerable households.

Regarding the self-medication in AD patients (22.8%) and non-treatment in scabies patients (49.1%), they may avoid immediate direct costs but increase opportunity costs and indirect economic burden due to lost productivity and prolonged disease duration, as noted in the study of Tran, B. X., et al. (2014) [18]. Ineffective self-treatment or scratching can disrupt the skin barrier, leading to an "itch-scratch" cycle and superinfection (Silverberg, J. I., 2019) [15], ultimately increasing long-term treatment costs and indirect economic burden (loss of workdays and reduced productivity). Additionally, scabies is an infectious disease; delays in treatment increase the risk of transmission within the community and households, exerting significant pressure on public health and psychological well-being (low self-esteem, social avoidance) (Engelman, D. et al., 2020) [5]. Difficulties arising from low self-esteem ($r = 0.154$, $p = 0.047$) associated with scabies and other chronic conditions (eczema, prurigo) serve as evidence of this psychosocial burden.

Our study results reveal a substantial psychosocial burden, with 100% of patients affected and a mean DLQI score of 10.7 ± 3.9 (falling within the "large effect" range). This DLQI score is significantly higher than those reported for other dermatological conditions in Vietnam. For instance, a study on plaque psoriasis in Can Tho reported a mean DLQI of 6.5 ± 3.29 (within the "moderate effect" range) (Le Minh Ngoc et al., 2018) [10]. This discrepancy reinforces the conclusion regarding the dermatological disease profile in our study, which is characterized by a predominance of atopic dermatitis. Atopic dermatitis and other pruritic, visible dermatoses (such as eczema and scabies) impose a heavier psychosocial burden (manifesting as low self-esteem and feelings of inferiority) compared to certain other chronic skin diseases (e.g., psoriasis typically has a DLQI score < 10). This necessitates integrating mental health intervention programs into primary dermatological care. According to Wollenberg et al. (2018) [21], psychological counseling is recommended for patients with chronic atopic dermatitis, and patient education measures are advised for both children and adults to alleviate psychological burden.

4.2 Correlation of sociocultural, exposure, hygiene factors, and skin disease

Our study results reveal that ethnicity is correlated with scabies ($r = 0.203$) and prurigo ($r = 0.179$). This finding is consistent with studies regarding barriers to healthcare access among ethnic minorities in Vietnam. An overview of barriers to healthcare access among ethnic minorities in Vietnam includes geographical location, economic conditions, and limited information (Pham Thi Thu Huong et al., 2019)[14]. Further analysis of socio-cultural barriers and customs that hinder ethnic minorities from seeking and adhering to treatment aligns with arguments regarding hygiene practices (Duong Thi Thanh Huyen, 2021)[3]. Meanwhile, scabies is a critical public health issue, easily transmissible and persistent in communities with poor hygiene conditions and limited access to treatment (Engelman, D. et al., 2020)[5].

Regarding occupational burden and exposure, the study's correlations strongly indicate the necessity for occupational health interventions. Typically, marine fishing correlates strongly with seborrheic dermatitis ($r = 0.300$, $p = 0.000$), and agriculture correlates with eczema ($r = 0.158$, $p = 0.016$). Specific occupational characteristics in coastal regions (frequent exposure to saltwater, mud, and agrochemicals, and poor hygiene) weaken the skin barrier, leading to contact dermatitis (a form of eczema) and seborrheic dermatitis. This confirms that occupational exposure is a direct cause contributing to the increased burden of skin disease. Exposure to saltwater, high humidity, and heat rises sebum secretion, creating a favorable environment for Malassezia to cause seborrheic dermatitis (Gupta, A. K., et al., 2014) [7]. Agriculture is one of the sectors with a high rate of occupational contact dermatitis (OCD) due to exposure to irritants and allergens (pesticides, fertilizers, plants), which compromise the skin barrier (Thyssen, J. P., et al., 2009) [17].

Furthermore, chemical exposure correlates strongly with psoriasis ($r = 0.325$, $p = 0.000$). Although psoriasis is an immune-mediated disease, chemical exposure may play a role as a trigger or exacerbating factor, necessitating occupational safety interventions. Occupational exposure to chemicals, solvents, and other irritants can act as a trigger factor or worsen psoriasis in individuals with a genetic predisposition (Naldi, L. et al., 2014) [11].

Lifestyle habits and unsafe water sources are major risk factors. In our study, river/well water strongly correlated with scabies/prurigo ($r = 0.252$). The use of untreated water sources and poor hygiene are the most significant risks for infectious and parasitic skin diseases. Scabies is recognized by the World Health Organization (WHO, 2020) as an essential public health problem due to its high transmissibility and persistence in impoverished communities [22].

The habit of using bar soap strongly correlates with scalp

folliculitis (r = 0.322). Traditional bar soaps typically have a high alkaline pH, which disrupts the skin barrier (increasing surface pH), causing irritation and increasing the risk of bacterial infection/scalp folliculitis (Ananthapadmanabhan, K. P., et al., 2004) [1]. Disease duration correlates with parakeratosis (r = 0.296). Parakeratosis is a chronic condition tending to be persistent and recurrent, representing a long-term economic burden (Diepgen, T. L., 2012) [2].

5. CONCLUSION

The study results not only quantified the correlation between socioeconomic factors and skin diseases but also identified the root-cause factors (ethnicity, occupation, hygiene) driving the burden of skin disease in the eastern coastal community of Ca Mau Province, Mekong Delta, Vietnam.

Accordingly, the recommendations include:

(1) developing occupational health programs and providing protective equipment for workers in the fishery and agricultural sectors;

(2) implementing hygiene-focused public health campaigns, explicitly addressing the issue of unsafe water sources and community hygiene practices to control scabies and prurigo; and (3) proposing formal healthcare cost support mechanisms for atopic dermatitis patients with low economic autonomy to mitigate self-medication behaviors.

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