Original Research

Contact Dermatitis among Healthcare Workers: A Cross-Sectional Study in Two Regional Referral Hospitals in Dar es Salaam, Tanzania

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Abstract

Background: Contact dermatitis is a common occupational skin disease among healthcare workers (HCWs), often linked to wet work, disinfectants, and glove use. It negatively affects work productivity and quality of life, yet data from Tanzania remain scarce.

Methods: A cross-sectional study was conducted in June 2024 at two regional referral hospitals in Dar es Salaam. Stratified random sampling was used across professional cadres. Data were collected using a Standardised Nordic Occupational Skin Questionnaire. Contact dermatitis was defined as two or more skin symptoms within the past 12 months. Modified Poisson regression was applied to identify associated factors, adjusting for age, sex, and education.

Results: A total of 369 HCWs participated, of whom 200 (54.2%) were women. Most were aged 31–40 years (41.5%). The prevalence of contact dermatitis was 30.0%. The most commonly reported symptoms were dry skin (31.7%), itching (27.9%), and redness (16.3%). Hands were the most frequently affected (86.3%). Independent predictors included female sex (adjusted prevalence ratio–APR=1.11; 95% CI: 1.03–1.19), personal history of hay fever (APR =1.08; 95%

CI:1.00–1.16), allergy (APR=1.14;95% CI:1.05–1.24), working in the medical department (APR=1.11; 95% CI:1.01–1.22), working >8 hours/day (APR=1.17; 95% CI:1.09–1.25), and using >10 pairs of gloves/day (APR=1.20; 95% CI:1.06–1.35).

Conclusion: Contact dermatitis is common among HCWs and is associated with both personal and work-related factors. Preventive measures should include optimizing glove use, promoting skin-friendly hand hygiene practices, regulating workloads, and strengthening occupational health services.

Keywords: *Contact Dermatitis; Healthcare Workers; Occupational Skin Diseases*

Introduction

Occupational skin diseases are among the most common work-related health problems (1). Contact dermatitis is the predominant form and its prevalence varies across regions (2,3). High rates have been reported among healthcare workers (HCWs) in high-income countries, such as Ireland (82.6%) and the United States (60%) (4,5). In Africa, studies from South Africa, Tunisia and Ethiopia reported prevalence of 14.5%, 22% and 31.5%, respectively (6–8). In Tanzania, however, only limited data exist, with a previous study documenting a prevalence of 10.2% among HCWs (6). However, methodological differences and underreporting may underestimate the true burden.

Multiple personal and work-related factors have been implicated in the occurrence of contact dermatitis among HCWs. Personal risk factors include female sex, younger age, and a personal or family history of allergic diseases such as asthma, hay fever, or atopic dermatitis (9–11). Work-related factors such as frequent handwashing, prolonged glove use, exposure to disinfectants, and extended working hours significantly increase the risk of developing skin symptoms (2,3,6,7). These risks were further amplified during the Coronavirus Disease 2019 (COVID-19) pandemic, when intensified infection-prevention practices increased HCWs' exposure to wet work and chemical irritants, leading to widespread reports of occupational skin problems (12).

Contact dermatitis among HCWs is not only a clinical issue but also a major occupational health concern. It negatively impacts quality of life, contributes to absenteeism, reduces work productivity, and can lead to long-term skin sensitization (1,13). Despite its importance, studies on the prevalence and determinants of contact dermatitis among HCWs in Tanzania remain scarce and under-documented (6).

Against this backdrop, the present study was conducted among HCWs at two regional referral hospitals in Dar es Salaam, Tanzania, to determine the prevalence of contact dermatitis and identify associated personal and work-related risk factors. The findings aim to inform evidence-based preventive strategies that can be integrated into occupational health programs in Tanzania and other comparable low- and middle-income healthcare settings.

Methods

Study design, population and sampling

A cross-sectional study was conducted in June 2024 among HCWs at two regional referral hospitals in Dar es Salaam, Tanzania. These hospitals serve as key healthcare facilities in the region, each receiving referrals from lower-level facilities and attending to approximately 1,000 patients daily. They were purposively selected because they are the largest regional referral hospitals in the city, offer a wide range of clinical services, and employ diverse cadres of HCWs. Stratified random sampling was applied based on professional categories, including medical specialists, medical officers, nurses, health attendants, pharmacists, and laboratory technicians. Administrative and support staff not directly involved in patient care were excluded.

Questionnaire

Data were collected using the Standardized Nordic Occupational Questionnaire (SNOQ) for the assessment of skin disease, which was adapted and modified for the Tanzanian setting. The SNOQ has been applied in several countries, including Tanzania and Ethiopia, and has demonstrated high validity and reliability when administered face-to-face (7,14). Prior to data collection, the tool was translated into Kiswahili, back-translated to ensure validity and consistency and pretested among 20 HCWs at a different hospital to assess its suitability. Necessary adjustments were made based on feedback to improve clarity and cultural appropriateness. The questionnaire was administered in Kiswahili by trained research assistants The questionnaire collected information on sociodemographic characteristics, occupational history, history of atopy, affected skin areas, exacerbating factors, and the consequences and life impacts of skin symptoms.

Operational definitions

Contact dermatitis was defined as the presence of two or more skin symptoms (redness, burning, blisters, itching, dry skin, fissures, pain, or crusting) within the past 12 months affecting any part

of the body (6). Hay fever was defined as a 'yes' response to the question: *'Have you ever had hay fever or symptoms of nasal or eye allergy triggered by pollen, animals, or other environmental agents?'*. Cutoff points for work-related exposure variables were selected based on data distribution and thresholds reported in a previous study (7).

Data management and analysis

Data were analysed using STATA version 17 (StataCorp, College Station, TX, USA). Preliminary checks for missing values and outliers were performed, and identified errors were corrected. Frequencies of categorical variables such as sex, age, and education were compared between HCWs with and without contact dermatitis using the Chi-squared test. Univariate and multivariable modified Poisson regression models were applied to assess associations between contact dermatitis and predictor variables, adjusting for age, sex, and education level. A p-value of <0.05 was considered statistically significant.

Ethical considerations

Ethical approval for this study was obtained from the Muhimbili University of Health and Allied Sciences (MUHAS) Institutional Review Board (Ref. No: MUHAS-REC-05-2024-2276). Permission to conduct the study was also granted by the respective Medical Officers in charge of the hospitals. Written informed consent was obtained from all participants prior to data collection. Confidentiality was assured through anonymized data collection and secure data storage.

Results

Study population

A total of 369 participants were included in the study, of whom 200 (54.2%) were women (Table 1). Most participants were aged 31–40 years (41.5%) or 21–30 years (34.4%). The majority (95.1%) had attained college or university education, while only one participant had primary education. With respect to marital status, more than half were married (55.3%). Overall, 110 participants (30%) reported skin symptoms suggestive of contact dermatitis. Women were significantly more affected than men (36.0% vs. 22.5%, $p = 0.005$). No significant differences in the prevalence of contact dermatitis were observed across age groups, education levels, or marital status, although the prevalence was relatively higher among widowed participants (45.0%).

Table1: Characteristics of study participants and prevalence of contact dermatitis (n = 369)

Variables	Total n (%)	Contact Dermatitis Yes n (%)	Contact Dermatitis No n (%)	p-value (Chi-squared test)
		110 (30.0)	259 (70.0)	
Sex				
Male	169 (45.8)	38 (22.5)	131 (77.5)	0.005
Female	200 (54.2)	72 (36.0)	128 (64.0)	
Age (years)				
21-30	127 (34.4)	31 (24.4)	96 (75.6)	
31-40	153 (41.5)	50 (32.7)	103 (67.3)	
41-50	69 (18.7)	23 (33.3)	46 (66.7)	
>50	20 (5.4)	6 (30.0)	14 (70.0)	0.426
Education level				
Primary	1 (0.3)	1 (100)	0 (0.0)	
Secondary	17 (4.6)	5 (29.4)	12 (70.6)	
College/University	351 (95.1)	104 (29.6)	247 (70.4)	0.418*
Marital status				
Single	141 (38.2)	39 (27.7)	102 (72.3)	
Married	204 (55.3)	62 (30.4)	142 (69.6)	
Divorce/Separated	4 (1.1)	0 (0.0)	4 (100.0)	
Widow/Widower	20 (5.4)	9 (45.0)	11 (55.0)	0.274*

*Fisher's exact test

Skin symptoms

The most commonly reported skin symptoms among HCWs were dry skin (31.7%), itching (27.9%), redness (16.3%), and soreness (10.0%), as illustrated in Figure 1. Among the 227 HCWs who reported skin symptoms, the hands were the most frequently affected body part (n = 196; 86.3%).

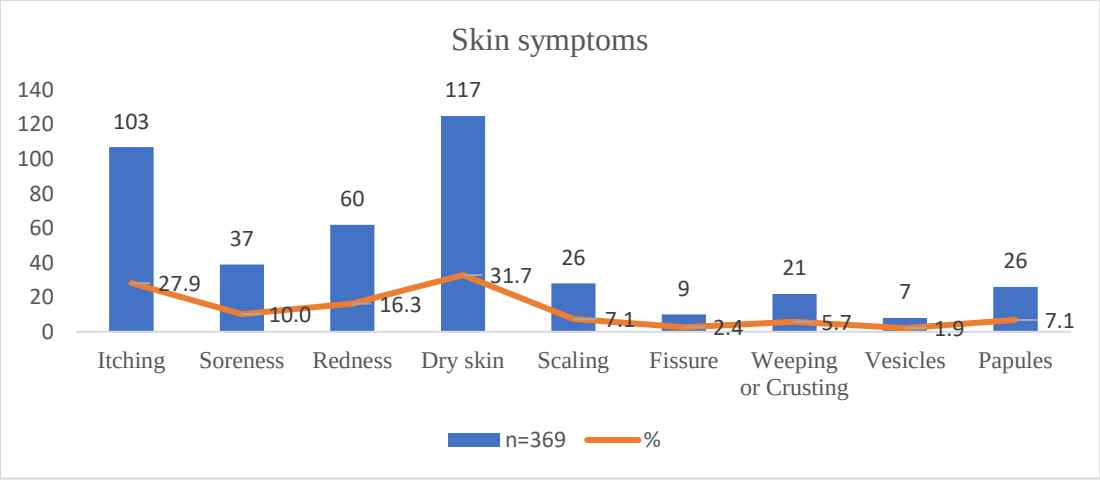

Figure 1: Skin symptoms reported by healthcare workers (n = 369)

Personal factors associated with contact dermatitis

Results of the univariate and multivariable modified Poisson regression analyses examining the association between contact dermatitis and personal factors are presented in Table 2. Higher odds of contact dermatitis were observed among female participants (adjusted prevalence ratio–APR = 1.11; 95% CI: 1.03 – 1.19). Similarly, contact dermatitis was positively associated with a personal history of hay fever (APR = 1.08; 95% CI: 1.00 – 1.16) and with having ever been diagnosed with an allergy (APR = 1.14; 95% CI: 1.05 – 1.24). In contrast, family history of asthma or hay fever suggested a positive association with contact dermatitis; however, the estimates were imprecise.

Table 2: Personal factors associated with contact dermatitis

Personal factors		Univariate		Multivariable	
	n (%)	PR (95% CI)	p-value	APR (95% CI)	p-value
Sex*					
Male	169 (45.8)	Ref			
Female	200 (54.2)	1.11 (1.03-1.19)	**0.004**	1.11 (1.03-1.19)	**0.005**
Personal history of hay fever					
No	235 (63.7)	Ref			
Yes	134 (36.3)	1.09 (1.02-1.18)	**0.018**	1.08 (1.00-1.16)	**0.045**
Ever diagnosed with any allergy					
No	283 (76.7)	Ref			
Yes	86 (23.3)	1.15 (1.06-1.25)	**0.001**	1.14 (1.05-1.24)	**0.002**
Family history of asthma					
No	298 (80.8)	Ref			
Yes	71 (19.2)	1.09 (1.00-1.20)	0.054	1.06 (0.97-1.17)	0.199
Family history of hay fever					
No	284 (77.0)	Ref			
Yes	85 (23.0)	1.03 (0.95-1.12)	0.477	1.02 (0.93-1.11)	0.658

Each prevalence ratio is derived from a separate regression model, presented both unadjusted and adjusted for age, sex, and level of education, unless otherwise specified.

*: Adjusted for age and level of education.

PR: Prevalence Ratio; APR: Adjusted Prevalence; Ratio CI: Confidence Interval.

Work-related factors associated with contact dermatitis

Results of the univariate and multivariable modified Poisson regression analyses examining the association between contact dermatitis and work-related factors are summarised in Table 3. Higher odds of contact dermatitis were observed among

HCWs working in the medical department (APR=1.11;95% CI:1.01–1.22). Participants with contact dermatitis were also more likely to report working more than 8 hours per day (APR=1.17;95% CI:1.09–1.25) and using more than 10 pairs of gloves per day (APR=1.20;95% CI:1.06–1.35). Spending more than 3 hours per day wearing gloves was associated with an 8% increased rate of contact dermatitis, although this estimate was of borderline precision (APR=1.08;95% CI:1.00–1.18). However, total duration of employment in the healthcare industry was not significantly associated with contact dermatitis.

Table 3: Work-related factors associated with contact dermatitis

Work-related factors	n (%)	Univariate		Multivariable	
		PR (95% CI)	p-value	APR (95% CI)	p-value
Working department					
Others*	75 (20.3)	Ref			
Emergency	63 (17.1)	1.09 (0.97-1.20)	0.165	1.11 (0.99-1.25)	0.079
Surgical	74 (20.1)	1.07 (0.96-1.20)	0.237	1.07 (0.95-1.20)	0.253
Medical	157 (42.6)	1.10 (1.00-1.21)	0.054	1.11 (1.01-1.22)	**0.037**
Total years in healthcare industry					
<5	197 (53.4)	Ref			
6 – 10	90 (24.4)	1.05 (0.96-1.14)	0.308	1.01 (0.90-1.12)	0.888
11 – 15	51 (13.8)	0.95 (0.85-1.05)	0.306	0.88 (0.76-1.02)	0.092
>15	31 (8.4)	1.08 (0.95-1.23)	0.257	1.09 (0.88-1.35)	0.450
Working hours per day					
≤8 hours	203 (55.0)	Ref			
>8 hours	166 (45.0)	1.16 (1.08-1.24)	**<0.001**	1.17 (1.09-1.25)	**<0.001**
Pair of gloves used per day (n=363)					
<5	25 (6.9)	Ref			
5-10	65 (17.9)	1.10 (0.95-1.27)	0.190	1.12 (0.98-1.30)	0.109
>10	273 (75.2)	1.19 (1.05-1.34)	**0.005**	1.20 (1.06-1.35)	**0.004**
Number of hours spent wearing gloves per day					
≤3 hours	266 (72.1)	Ref			
>3 hours	103 (27.9)	1.08 (0.99-1.17)	0.068	1.08 (1.00-1.18)	0.056

Each prevalence ratio is derived from a separate regression model, presented both unadjusted and adjusted for age, sex, and level of education.

PR: Prevalence Ratio; APR: Adjusted Prevalence; Ratio CI: Confidence Interval.

Others*= Radiology, Laboratory, Pharmacy or Sterilization.

Discussion

In this cross-sectional study of 369 HCWs in two referral hospitals in Dar es Salaam, 30% reported skin symptoms suggestive of contact dermatitis, with dry skin, itching, redness, and soreness being the most common complaints. Hands were the predominantly affected body part. Female participants were significantly more affected than males. A personal history of hay fever or prior allergy diagnosis was positively associated with contact dermatitis. Furthermore, employment in the medical department, working more than 8 hours per day, and using more than 10 pairs of gloves per day were also associated with a higher prevalence of contact dermatitis.

The 30% prevalence of contact dermatitis reported among HCWs in our study is similar to findings from a study conducted in Ethiopia, which reported a 31.5% prevalence of self-reported occupational contact dermatitis among HCWs (7). The comparable prevalence in these studies may reflect similarities in study design, sample size, and healthcare settings. Our findings, however, indicate a higher prevalence than a previous study conducted in Tanzania and South Africa before the COVID-19 pandemic (data collected between 2014 and 2018), which reported an overall prevalence of 12.3% among HCWs (6). The higher prevalence observed in our current study may be partly explained by the intensified infection-prevention demands during and after the COVID-19 pandemic (2020–2024), when HCWs faced increased workloads, more frequent patient contact, and higher use of personal protective equipment, including gloves, along with repeated handwashing to prevent infection. These conditions likely contribute to greater skin irritation, underscoring contact dermatitis as a significant occupational health concern in Tanzania that warrants ongoing attention and targeted interventions.

Consistent with previous research, the hands were the most affected body part, with dry skin, itching, and soreness being the most commonly reported symptoms (7,12,15). This finding aligns with the nature of healthcare work, which often requires frequent handwashing, prolonged glove use, and exposure to disinfectants and cleaning chemicals. Preventive measures should therefore focus on selecting appropriate, less irritating gloves, minimizing exposure to harsh chemicals where possible, and implementing hand care strategies to protect HCWs' skin while maintaining infection control standards.

In our study, female HCWs reported a higher prevalence of contact dermatitis than males, a finding consistent with evidence from Saudi Arabia where 66% of affected HCWs were women compared to 34% men (10). This disparity has been widely observed across various settings, including Tanzania, with registry data and hospital-based studies showing that women are disproportionately represented in high-exposure groups characterized by frequent handwashing, prolonged glove use, and disinfectant handling (2,16–18). This gender distribution within the Tanzanian healthcare workforce likely contributes to the higher prevalence of contact dermatitis observed among women (18). Behavioural factors, such as greater symptom reporting among women, may also play a role (19). Recent findings further suggest that women with occupational skin disease experience higher absenteeism and greater work impairment compared to men, underscoring their disproportionate burden (20). These observations highlight the need for gender-sensitive preventive strategies, including safer hand hygiene protocols, provision of alternative glove materials, and targeted educational interventions.

In this study, contact dermatitis was significantly associated with a personal history of hay fever and other allergic conditions, consistent with previous studies linking atopy and allergic predisposition to increased risk of occupational skin disease (3,7). Similarly, the suggested association with a family history of hay fever or asthma corroborates earlier findings identifying familial allergy as a predictor of contact dermatitis (3). Individuals with personal or familial allergic conditions often have increased skin sensitivity and impaired barrier function, predisposing them to irritant and allergic reactions (21). These results underscore the importance of recognizing underlying allergic conditions in HCWs, both in clinical assessment and in designing preventive strategies, such as targeted education, regular dermatologic screening, and early interventions to minimize occupational exposures.

The higher prevalence of contact dermatitis observed among HCWs in the medical department is likely attributable to the greater patient volumes and the resulting increase in “wet work,” including frequent handwashing, prolonged glove use, and regular handling of disinfectants and antiseptics (22–24). The intensity of exposure in these clinical areas highlights how workload and infection-prevention practices can increase the risk of

occupational skin disease. In contrast, other investigations have identified laboratory personnel and technicians as a particularly high-risk group, primarily due to their routine exposure to chemical reagents and solvents (6,25). Surgical and intensive care unit staff have also been reported to experience elevated risks due to extended glove wear and increased exposure to disinfectants and sterilizing agents (22,26,27). These variations highlight how the type of clinical activity, rather than the department alone, is a critical determinant of contact dermatitis risk. Recognition of these department-specific patterns is important for tailoring preventive strategies, including provision of less irritant hand hygiene formulations, substitution of glove materials, and department-focused education on skin protection.

Wearing more than ten pairs of gloves per day was identified as a predictor of contact dermatitis, consistent with previous findings linking frequent glove use to occupational skin disease (10,24,27). The use of rubber gloves among HCWs is a well-documented risk factor for both irritant and allergic contact dermatitis due to sensitizing chemicals such as thiurams, carbamates, and benzothiazoles used in glove manufacturing (24,28,29). Prolonged occlusive glove wear has also been shown to alter skin physiology by increasing temperature, sweat accumulation, and pH, thereby impairing the epidermal barrier and enhancing penetration of irritants and allergens (30,31). These findings underscore the need to balance infection-prevention requirements with skin-protection strategies by promoting the use of alternative glove materials, implementing rotation protocols for gloves, and encouraging the regular application of moisturisers.

In the present study, working more than eight hours per day was significantly associated with contact dermatitis among HCWs. Extended working hours likely increase cumulative exposure to wet work, disinfectants, and prolonged use of personal protective equipment, thereby amplifying the risk of irritant and allergic skin reactions (23). Longer shifts may be associated with reduced compliance with recommended skin care practices, such as regular application of emollients, due to time constraints and fatigue (12). Moreover, continuous glove use during extended duty hours further compromises skin barrier integrity by promoting occlusion, moisture imbalance, and irritant penetration (31). These findings underscore the importance of workload management, structured shift scheduling, and provision of adequate rest

periods as preventive strategies to reduce occupational skin diseases in healthcare settings. Integration of skin-protection programs within occupational health policies is particularly crucial in high-demand departments where extended shifts are common.

This study is among the few to investigate contact dermatitis among HCWs in Tanzania (6). One of the study limitations, however, is that case identification relied on self-reported questionnaires without clinical examinations or confirmatory investigations such as patch testing. This approach may have led to misclassification, potentially overestimating prevalence by capturing non-specific symptoms, but also underestimating it if HCWs underreport or fail to recall past symptoms. To minimize these risks, respondents were given clear instructions, assured of privacy and confidentiality, and guided on the importance of providing reliable information, which likely improved the validity of responses. Although some effect sizes were modest, these associations are consistent with findings from previous studies and represent well-established risk factors for contact dermatitis. Moreover, even small relative increases in risk can lead to a substantial cumulative burden when applied across a large healthcare workforce, particularly in settings with high exposure frequency.

The two hospitals were purposively selected based on their size and service diversity; therefore, the findings may not be fully representative of all regional referral hospitals in Tanzania, introducing a potential for selection bias. Social desirability bias may also have influenced responses, as participants might have underreported behaviours perceived as inappropriate. Finally, the cross-sectional design limits the ability to establish temporal relationships between exposures and outcomes. Furthermore, the study did not assess other workplace factors such as soap type or the availability of moisturisers, which may also contribute to contact dermatitis. Future studies should incorporate these elements to provide a more complete understanding of exposure risks.

Conclusions

This study revealed that contact dermatitis is common among HCWs in the two referral hospitals. Factors positively associated with contact dermatitis included female sex, personal history of allergy, working in the medical department, frequent glove use, and long working hours. These findings highlight the multifactorial nature of skin diseases in the

workplace and underscore the need for comprehensive preventive strategies in healthcare settings. Priority measures include optimizing glove use, promoting skin-friendly hand hygiene practices, providing hypoallergenic protective equipment, ensuring regular workplace safety training, and implementing surveillance systems for early detection and management of skin conditions.

Hospital administrators should facilitate supportive working conditions through adequate staffing, shift regulation, and access to occupational health services. Meanwhile, healthcare workers are encouraged to practice proper hand hygiene, promptly report any skin symptoms, and participate in training and awareness programs. Future studies should incorporate objective clinical assessments, including dermatological evaluation and patch testing, to improve diagnostic accuracy. Collectively, these interventions are essential for reducing the burden of contact dermatitis and protecting the well-being of healthcare workers.

Acknowledgements: We acknowledge the contributions of healthcare workers from the two hospitals and research assistants for their excellent cooperation throughout the study.

Funding: This research received no external funding; all expenses were covered by the authors.

Authors' contributions: TBK, HHM, and LPM conceptualised the study. TBK, HHM, LPM developed the methodology. TBK collected and managed the data under the mentorship of HHM and LPM. TBK and HHM performed the data analysis and prepared the first draft of the manuscript. KAS provided dermatological expertise. TBK, LPM, KAS, ZIK, EJM and HHM interpreted the data, critically reviewed and edited the manuscript. All authors read and approved the final version of the manuscript.

Availability of data and materials: The data supporting the findings of this study are available upon request from the corresponding author.

Consent for publication: Not applicable

Competing interests: The authors declare that they have no competing interests.

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