

Diverging Global Patterns and Temporal Trends in Inflammatory and Infectious Skin Diseases

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Purpose: Skin and subcutaneous diseases were the third most common global condition and the eighth leading cause of non-fatal health burden in 2021. Despite their high prevalence and substantial impact on quality of life, they remain relatively underprioritized in public health policy. This study aimed to examine long-term global trends and regional disparities in the burden of inflammatory and infectious skin diseases from 1990 to 2021.

Patients and Methods: We conducted a cross-sectional analysis using data from the Global Burden of Disease (GBD) Study 2021. Age-standardized incidence rates, years lived with disability (YLDs), and average annual percentage change (AAPC) were assessed across 204 countries and territories, 21 global regions, and all age groups.

Results: In 2021, skin and subcutaneous diseases ranked as the eighth leading cause of YLDs worldwide. Between 1990 and 2021, inflammatory skin diseases demonstrated a modest increase in incidence (AAPC 0.08%) and YLDs (0.04%). Infectious skin diseases showed a slightly greater rise in incidence (0.19%), whereas YLDs declined marginally (−0.01%). The burden varied markedly by sociodemographic index (SDI) level and age, with the greatest impact observed among individuals younger than 20 years.

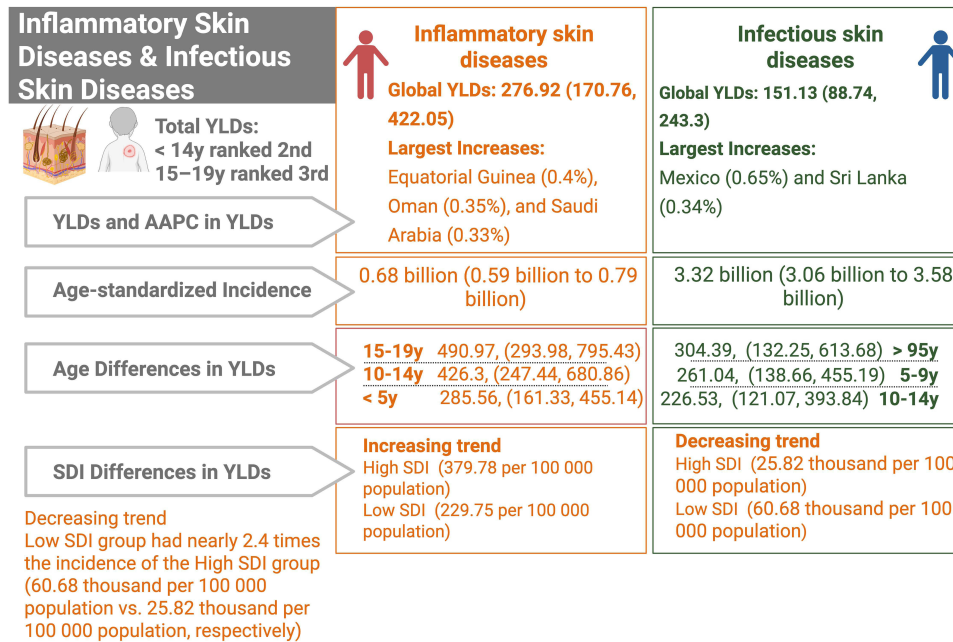
Conclusion: Inflammatory and infectious skin diseases exhibit distinct global trajectories and disproportionate burdens across regions and age groups. These findings highlight the importance of context-specific prevention strategies, improved equity in health service delivery, and greater policy prioritization of skin disease management in global and national health agendas.

Keywords: dermatology, global disease burden, inflammatory skin diseases, infectious skin diseases

Introduction

Among all human diseases, skin and subcutaneous diseases rank as the fourth most common category, with incidence placing third, affecting approximately 4.7 billion people. According to the Global Burden of Disease (GBD) study, non-fatal disease burden data from 2021 highlight skin diseases as the eighth¹ leading cause globally, significantly impacting patients' quality of life.^{2–5} Within this broad disease group, inflammatory and infectious skin diseases represent two dominant and clinically distinct categories with substantial public health implications. There is a lack of a global overview of the burden of different types of dermatologic disorders due to their variety, complexity, and diverse etiology, as well as the involvement of multiple skin structures such as the epidermis, dermis, and dermal appendages in different pathologic manifestations.^{6–8} Importantly, distinguishing inflammatory from infectious skin diseases is highly relevant for health policy and clinical planning, as these conditions differ fundamentally in pathogenesis, prevention strategies, treatment approaches, and health system requirements. Inflammatory skin diseases, a major class of skin and subcutaneous diseases, are often chronic and primarily mediated by immune mechanisms.^{9,10} These diseases are clinically diverse and exhibit relapsing patterns of severity. Common examples include psoriasis, atopic dermatitis, and alopecia areata etc. Within the GBD classification framework, non-communicable infectious skin diseases refer to a group of skin

Graphical Abstract



conditions caused by pathogenic organisms, including bacterial, fungal, and viral infections, as well as parasitic diseases such as scabies.⁶

Comprehensive estimations of global disease burden play a crucial role in advancing our understanding of the health impact of diseases and injuries on population health and in assessing progress toward achieving international health goals.¹ Several studies have reported the burden and trends of acne vulgaris,^{11,12} psoriasis^{13,14} and atopic dermatitis¹⁵ worldwide according to Global Burden of Diseases (GBD) database and other reports. However, despite these efforts, systematic comparisons between inflammatory and infectious skin diseases—particularly with respect to global trends, regional disparities, and sociodemographic patterns—remain limited. This gap in knowledge hinders the development of targeted disease-related policy decisions essential for effective healthcare strategies.

Notably, recent GBD 2021–based analyses have provided valuable descriptive overviews of skin and subcutaneous diseases as a whole;¹⁶ however, a focused comparative evaluation of inflammatory versus infectious skin diseases remains insufficiently explored. Moreover, the GBD 2021 study incorporates updated post-pandemic data and refined modeling approaches, providing an opportunity to reassess the global and regional burden of skin diseases in a changing health landscape. Thus, utilizing the GBD 2021 study, we described the burden of inflammatory and infectious skin diseases at the global, regional, and national levels, stratified by sex, age, and sociodemographic index (SDI). This study was designed to provide an updated overview of disease burden, identify high-risk populations and priority regions, and support more informed public health and policy decision-making.

Materials and Methods

Study Population and Data Collection

In our analysis of the GBD 2021 study, we utilized repeated cross-sectional data from the Global Health Data Exchange, which includes the global burden of 371 diseases and injuries across 21 regions and 204 countries and territories, encompassing skin and subcutaneous diseases from 1990 to 2021.¹ According to the Global Burden of Disease (GBD) hierarchical cause classification, diseases at Levels 3–4, which represent specific disease entities within broader cause groups, were included in this study. At these levels, atopic dermatitis, contact dermatitis, seborrhoeic dermatitis, psoriasis,

acne vulgaris, alopecia areata, and urticaria were categorized as inflammatory skin diseases, while bacterial skin diseases, scabies, fungal skin diseases, and viral skin diseases were classified as infectious skin diseases.⁶ We extracted sex-, age-, and region-specific data on incidence, lived with disability (YLDs), disability-adjusted life years (DALYs) for both inflammatory and infectious skin diseases, including corresponding 95% uncertainty intervals (UI), from the Global Health Data Exchange (<https://vizhub.healthdata.org/gbd-results>). DALYs were defined as the sum of YLDs and years of life lost (YLLs). Prevalence estimates from DisMod-MR 2.1 served as the finalized outputs for comorbidity adjustment, enabling further processing into skin and subcutaneous disease-related YLDs. YLLs were calculated using the Cause of Death Ensemble model (CODEm) model, followed by adjustments through CoDCorrect.¹ The [Supplementary Method](#) gave details of the estimation methods. This study was reviewed and approved by the Ethics Committee of the Air Force Medical Center, Fourth Military Medical University (Approval No. 2024–121-PJ01).

Statistical Analysis

Data from systematic reviews, surveys, and longitudinal studies were processed using DisMod MR 2.1, a Bayesian meta-regression model, to estimate the non-fatal burden of these conditions. Additionally, this model was integrated with the CODEm to estimate mortality related to skin and subcutaneous diseases.¹ We calculated age-standardized rates and corresponding 95% UI based on the world standard population as defined in GBD 2021 study.¹ All estimates were expressed per 100,000 population. To evaluate the magnitude and direction of temporal trends in the incidence, YLDs, DALYs, and mortality of inflammatory and infectious skin diseases, we computed the average annual percent change (AAPC) and corresponding 95% confidence intervals (CI) using joinpoint regression.¹⁷ AAPC represents the average rate of change for a specific variable over a given period, derived as the weighted average of the slope coefficients from the joinpoint regression model covering the years 1990 to 2021. An AAPC value indicates the percentage change per year (increase, decrease, or stability). If the annual percent change (APC) estimate and its 95% CI are both greater than 0 (or both less than 0), the corresponding rate is interpreted as increasing (or decreasing). All statistical analyses were conducted using R (version 4.4.1) and the Joinpoint Regression Program (version 5.2.0).

Results

Study Population and Data Collection

According to official GBD data, in 2021, the DALYs rate of skin and subcutaneous diseases ranked 21st globally (compared to 20th in 1990). In contrast, the YLDs burden ranked eighth in 2021, maintaining the same position as in 1990 (see [Supplementary Figure 1](#)). The absence of mortality data for inflammatory skin diseases largely accounts for this ranking. Thus, subsequent analyses of the overall burden focus primarily on the YLDs (see [Supplementary Figure 2](#)). When stratified by age group, age-standardized YLDs reveals a higher burden among individuals under 20 years. Specifically, the age group under 5 years ranked second in YLD (see [Supplementary Figures 1 and 3](#)).

Global and National Trends of Inflammatory and Infectious Skin Diseases

We next analyzed the global burden of inflammatory skin diseases—including urticaria, acne, alopecia, psoriasis, and dermatitis—and non-communicable infectious skin diseases (hereafter referred to as infectious skin diseases), comprising viral, fungal, and bacterial skin infections as well as scabies, based on Level 3 cause categories within the GBD framework. From 1990 to 2021, inflammatory and infectious skin diseases exhibited consistent upward trends in incidence rates. Specifically, the age-standardized incidence of inflammatory skin diseases increased from 0.44 billion in 1990 to 0.68 billion (from 0.59 billion to 0.79 billion) in 2021. Similarly, the age-standardized incidence of infectious skin diseases rose from 2.05 billion (from 1.88 billion to 2.23 billion) in 1990 to 3.32 billion (from 3.06 billion to 3.58 billion) in 2021 ([Table 1](#) and [Figure 1A](#)). Moreover, the AAPC in age-standardized incidence rates from 1990 to 2021 was higher for infectious skin diseases (AAPC = 0.19%) compared to inflammatory skin diseases (AAPC = 0.08%, [Figure 1B](#)).

However, the trends in age-standardized YLDs for inflammatory and infectious skin diseases diverged significantly over the same period. The age-standardized YLDs for inflammatory skin diseases showed a steady increase from

Table 1 Age-Standardized Incidence and YLDs of Inflammatory and Infectious Skin Diseases in Individuals, Along with Their AAPCs, from 1990 to 2021 at the Global Level

	1990 (95% UI)				2021 (95% UI)				1990-2021 AAPC (%; 95% CI)	
	Incidence		YLDs		Incidence		YLDs		Incidence	YLDs
	No of People (000 000s)	Age Standardised Rate (per 100 000)	No of People (000 000s)	Age Standardised Rate (per 100 000)	No of People (000 000s)	Age Standardised Rate (per 100 000)	No of People (000 000s)	Age Standardised Rate (Per 100 000)		
Inflammatory Skin Diseases										
Global	441.79 (384.43 to 508.59)	8355.27 (7286.32 to 9627.57)	15.04 (9.17 to 23.08)	273.35 (167.52 to 417.04)	682.30 (594.77 to 788.74)	8565.44 (7468.57 to 9872.13)	21.55 (13.35 to 32.74)	276.92 (170.76 to 422.05)	0.08 (0.08 to 0.08)	0.04 (0.04 to 0.04)
Sex:										
Females	245.96 (214.25 to 284099148)	9348.1 (8164.16 to 10786.27)	8.39 (5.11 to 12.85)	307.25 (187.9 to 469.31)	376.79 (328.75 to 436.33)	9500.68 (8290.57 to 10955.05)	11.82 (7.31 to 17.94)	307.19 (189.21 to 468.36)	0.05 (0.05 to 0.06)	0 (0 to 0)
Males	195.84 (170.01 to 225.67)	7376.45 (6416.58 to 8512.09)	6.65 (4.06 to 10.24)	240.19 (147.49 to 366.74)	305.51 (266.24 to 352.75)	7645.58 (6658.52 to 8813.84)	9.73 (6.03 to 14.79)	247.66 (153 to 377.27)	0.11 (0.11 to 0.12)	0.1 (0.09 to 0.1)
Age group (< 20 years):										
0 to 4	30.36 (25.56 to 36.19)	4897.05 (4122.58 to 5838.02)	1.81 (1.02 to 2.87)	291.62 (164.96 to 463.7)	32.33 (27.13 to 38.60)	4911.87 (4122.12 to 5865.49)	1.88 (1.06 to 3.00)	285.56 (161.33 to 455.14)	0.01 (0 to 0.02)	-0.07 (-0.09 to -0.06)
5 to 9	30.10 (22.53 to 39.77)	5158.39 (3860.17 to 6815.72)	1.88 (1.03 to 3.09)	322.21 (175.89 to 529.97)	36.76 (27.55 to 48.47)	5349.99 (4009.17 to 7055.36)	2.15 (1.17 to 3.50)	312.41 (171.01 to 508.88)	0.1 (0.09 to 0.11)	-0.1 (-0.11 to -0.08)
10 to 14	62.16 (46.18 to 81.79)	11,603.84 (8621.41 to 15268.18)	2.16 (1.24 to 3.46)	402.78 (231.32 to 646.25)	88.19 (65.87 to 115.49)	13,229 (9880.75 to 17324.4)	2.84 (1.65 to 4.54)	426.3 (247.44 to 680.86)	0.43 (0.42 to 0.44)	0.18 (0.17 to 0.19)
15 to 19	52.25 (38.51 to 68.33)	10,059.96 (7414.25 to 13154.5)	2.37 (1.40 to 3.84)	456.14 (270.22 to 739.63)	65.45 (48.52 to 85.48)	10,489.39 (7775.59 to 13699.33)	3.06 (1.83 to 4.96)	490.97 (293.98 to 795.43)	0.14 (0.11 to 0.17)	0.24 (0.23 to 0.26)
Infectious Skin Diseases										
Global	2050.4 (1875.6 to 2233.28)	39,610.67 (36,401.89 to 42932.73)	9.30 (5.13 to 15.77)	170.65 (93.78 to 289.76)	3317.26 (3056.97 to 3582.9)	42,140.08 (38,839.96 to 45538.33)	13.28 (7.24 to 22.62)	151.13 (88.74 to 243.3)	0.19 (0.15 to 0.24)	-0.1 (-0.14 to -0.06)
Sex:										
Females	999.07 (915 to 1086.62)	38,527.57 (35,403.88 to 41746.65)	4.45 (2.45 to 7.54)	164.7 (90.5 to 279.08)	1632.41 (1503.62 to 1762.89)	41,171.31 (37,968.97 to 44483.19)	6.36 (3.48 to 10.82)	164.66 (90.1 to 279.72)	0.2 (0.15 to 0.26)	0 (0 to 0)
Males	1051.33 (959.05 to 1145.94)	40,662.47 (37,365.74 to 44065.66)	4.85 (2.67 to 8.23)	176.56 (96.99 to 300.31)	1684.85 (1551.69 to 1820.5)	43,076.42 (39,670.82 to 46519.2)	6.92 (3.76 to 11.80)	177.41 (96.5 to 302.71)	0.18 (0.15 to 0.22)	0.1 (0.09 to 0.1)
Age group (< 20 years):										
0 to 4	265.08 (223.39 to 320.15)	42,758.47 (36,034.34 to 51642.77)	1.18 (0.64 to 2.00)	190.45 (102.73 to 323.18)	309.27 (261.59 to 373.65)	46,988.9 (39,744.52 to 56771.05)	1.29 (0.69 to 2.21)	196.26 (105.37 to 335.18)	0.27 (0.24 to 0.3)	0.06 (-0.03 to 0.14)
5 to 9	241.21 (189.64 to 301.69)	41,335.84 (32,498.95 to 51700.75)	1.46 (0.78 to 2.54)	250.5 (133.48 to 436.1)	311.79 (247.04 to 388.26)	45,381.44 (35,956.37 to 56510.32)	1.79 (0.95 to 3.13)	261.04 (138.66 to 455.19)	0.32 (0.28 to 0.36)	0.12 (0.07 to 0.18)
10 to 14	194.79 (152.49 to 244.09)	36,362.42 (28,466.7 to 45565.7)	1.19 (0.64 to 2.06)	222.71 (119.35 to 385.04)	269.1 (212.26 to 335.72)	40,366.44 (31,840.67 to 50360.71)	1.51 (0.81 to 2.63)	226.53 (121.07 to 393.84)	0.36 (0.25 to 0.46)	0.05 (0 to 0.09)
15 to 19	185.17 (143.07 to 232.85)	35,648.54 (27,544.28 to 44828.98)	1.03 (0.54 to 1.77)	198.46 (103.01 to 341.19)	246.15 (193.29 to 307.17)	39,447.83 (30,976.71 to 49227.45)	1.20 (0.62 to 2.08)	192.32 (98.93 to 334.07)	0.35 (0.25 to 0.45)	-0.05 (-0.2 to 0.1)

Abbreviations: AAPC, Average Annual Percent Changes; CI, Confidence Interval; UI, Uncertainty Interval; YLD, Years Lived with Disability.

273.35 per100000population in 1990 to 276.92 (per100000population) in 2021, with an AAPC of 0.04% from 1990 to 2021. In contrast, the age-standardized YLDs for infectious skin diseases decreased from 170.65 (per100000population) in 1990 to 151.13 (per100000population) in 2021, with an AAPC of -0.1% . Additionally, the age-standardized DALYs for infectious skin diseases showed no significant change over this period (Table 1, Figure 1 and Supplementary Figure 4).

At the national level, the countries with the highest increase in age-standardized incidence rates of inflammatory skin diseases from 1990 to 2021 were Kuwait, Libya, the Syrian Arab Republic, Saudi Arabia, and Oman, with an average annual AAPC of 0.15% . The countries with the largest increases in age-standardized YLDs for inflammatory skin diseases were Equatorial Guinea (AAPC = 0.4%). United States was the only country where both the age-standardized incidence (AAPC = -0.39%) and YLDs (AAPC = -0.08%) of inflammatory skin diseases decreased (Figure 2 and Supplementary Table 1). For infectious skin diseases, the countries with the highest increases in age-standardized incidence rates were Mexico (AAPC = 0.37%). Egypt experienced the most significant decline in age-standardized incidence rates (AAPC = -0.15%). Mexico also had the largest increase in age-standardized YLDs for infectious skin diseases (AAPC = 0.65% , see in the Supplementary Figure 5, Table 1 and Supplementary Table 2).

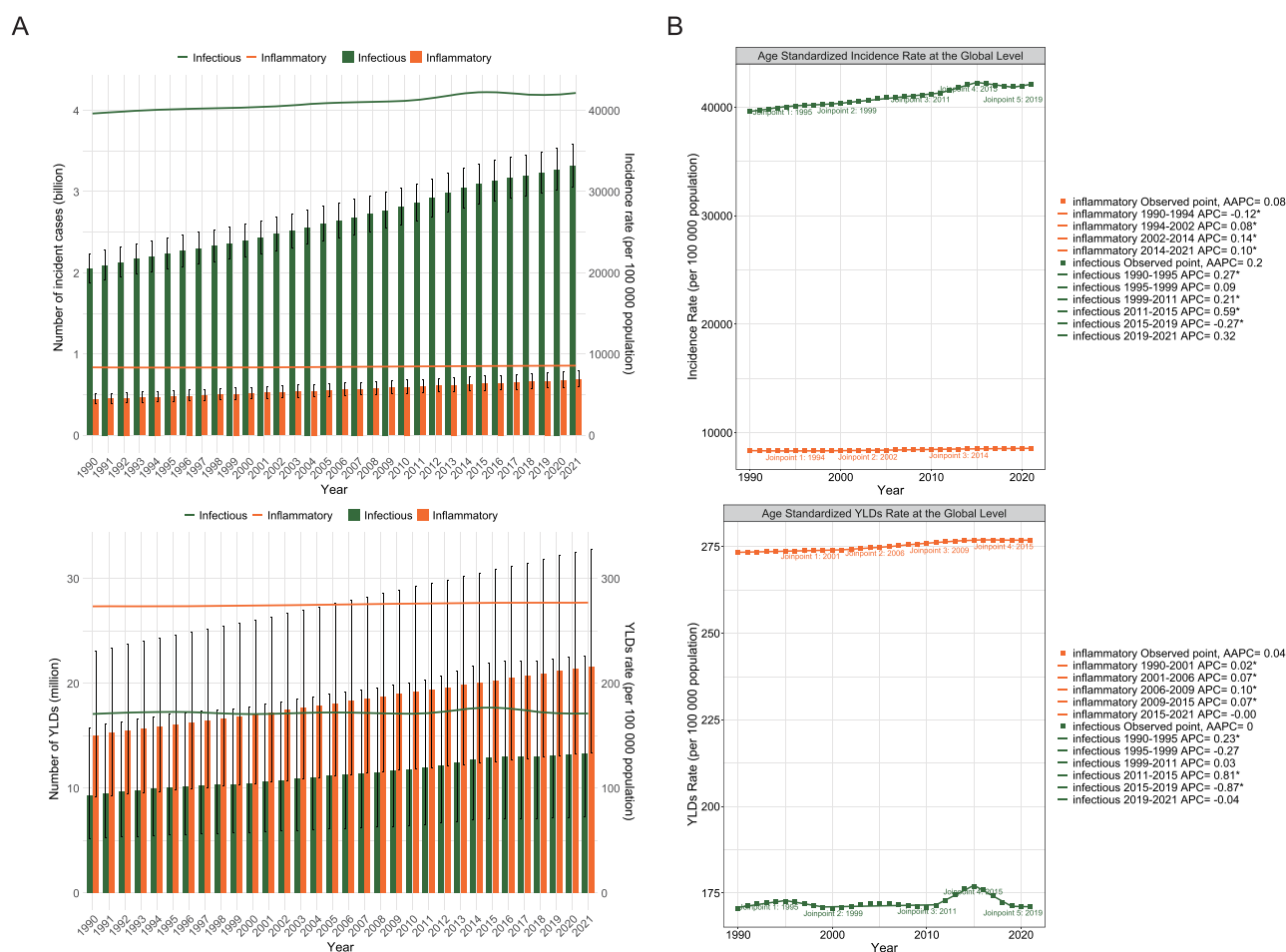


Figure 1 Global numbers and age-standardized rates of incidence and YLDs for inflammatory and infectious skin diseases (A), along with the corresponding jointpoint regression analysis (B), from 1990 to 2021. *Indicates a statistically significant APC ($P < 0.05$).

Abbreviations: AAPC, Average Annual Percent Change; APC, Annual Percent Change; YLD, Years Lived with Disability.

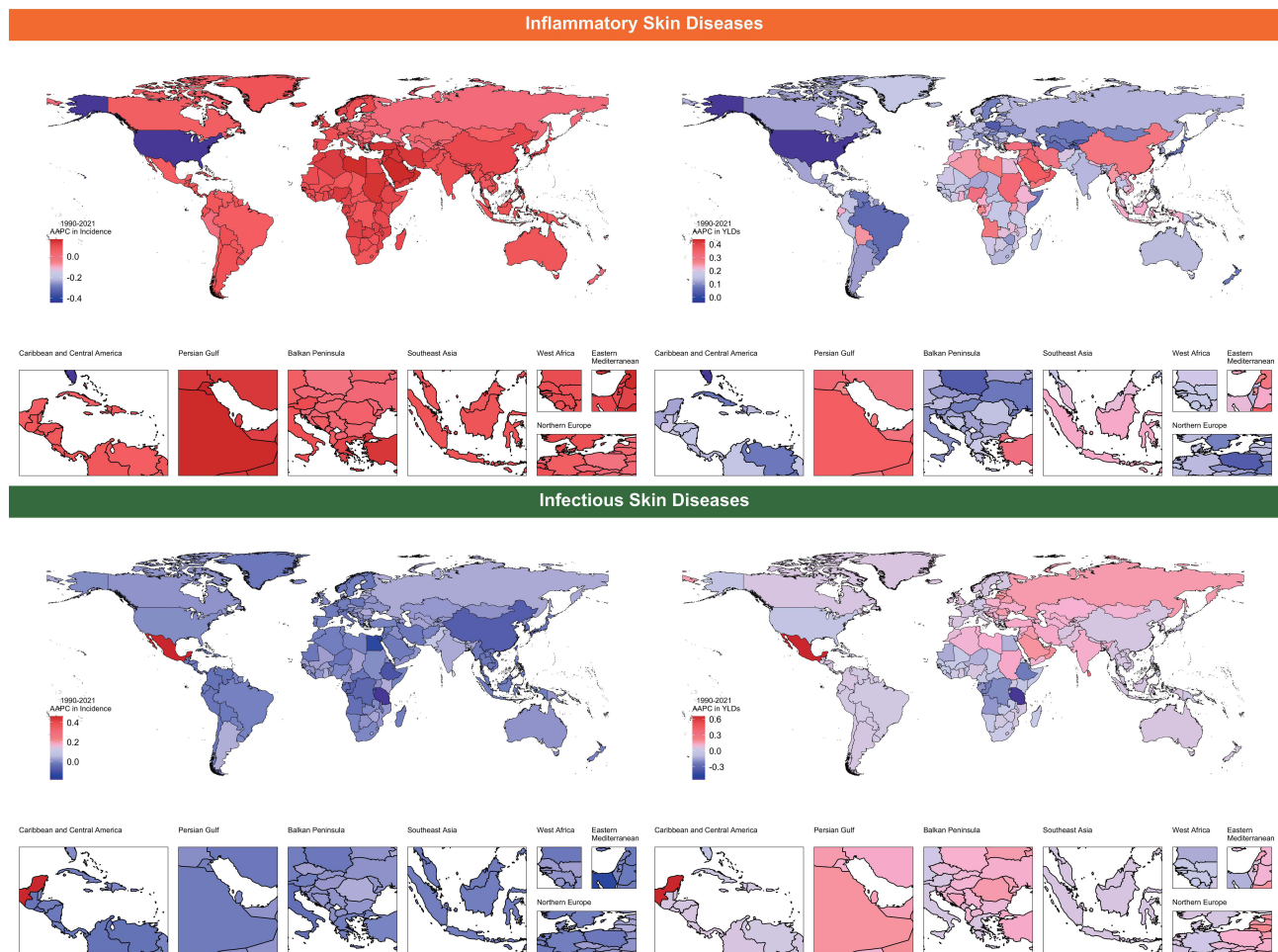


Figure 2 Map illustrating the AAPC in global incidence and YLDs for inflammatory and infectious skin diseases from 1990 to 2021. **Abbreviations:** AAPC, Average Annual Percent Change; YLD, Years Lived with Disability.

Global Trends by Sex, Age, and Sociodemographic Index Subgroup of Inflammatory and Infectious Skin Diseases

From 1990 to 2021, both inflammatory and infectious skin diseases exhibited increases in age-standardized incidence rates for both males and females (Table 1). Global trends reveal distinct age patterns for inflammatory and infectious skin diseases in 2021. The lowest age-standardized incidence rate for inflammatory skin diseases was found in the under 5 years (4,911.87 per100000-population). The highest incidence rate was observed in the 10–14 years. The age distribution pattern of YLDs in inflammatory skin diseases is like the incidence (Table 1, Figure 3A, B, Supplementary Tables 3 and 4). For infectious skin diseases, the highest age-standardized incidence rate in 2021 was observed in the 95-plus age group. Notably, the 5–9 years had the third-highest age-standardized YLDs (261.04 per100000population, see in Table 1, Figure 3A, B, Supplementary Figure 6, Supplementary Tables 5 and 6).

In 2021, the age-standardized incidence rate of inflammatory skin diseases followed a “W” shaped trend across SDI categories. Conversely, the age-standardized incidence rate of infectious skin diseases showed a clear decreasing trend with increasing SDI. When comparing the trends in age-standardized YLDs for both disease types, distinct patterns emerged. The age-standardized YLDs showed a marked upward trend for inflammatory skin diseases with increasing SDI. This result indicates an unequal distribution of the disease burden across different SDI categories (Figure 3A, C, Supplementary Tables 3 and 4).

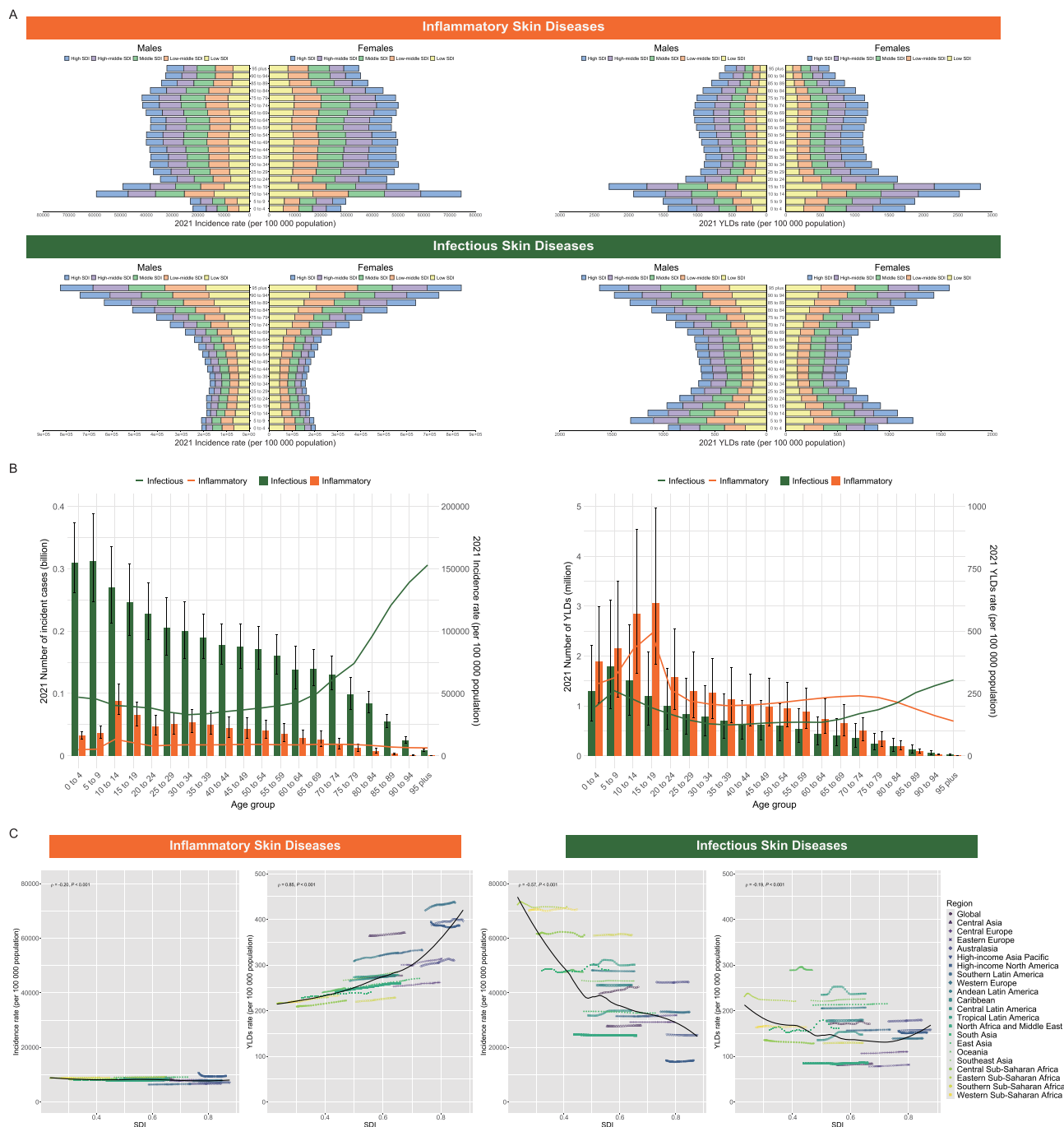


Figure 3 Age-standardized rates of incidence and YLDs for inflammatory and infectious skin diseases stratified by sex, age, and SDI in 2021 (A), global numbers and age-standardized rates by age and sex in 2021 (B), and age-standardized rates across GBD regions stratified by SDI from 1990 to 2021 (C).

Abbreviations: GBD, Global Burden of Disease; SDI, Sociodemographic Index; YLD, Years Lived with Disability.

Contributions of Specific Diseases to the Burden of Inflammatory and Infectious Skin Diseases

We further analyzed the contributions of specific diseases to the incidence and YLDs of inflammatory and infectious skin diseases. For inflammatory skin diseases, dermatitis was subdivided into seborrhoeic dermatitis, contact dermatitis, and atopic dermatitis according to GBD Level 4. Globally, a notable trend emerged: the rankings of incidence and non-fatal disease burden for specific diseases were often inconsistent. Among inflammatory skin diseases, contact dermatitis had

the highest age-standardized incidence rate (3020.33 per100000population). In terms of non-fatal disease burden, atopic dermatitis ranked highest (37.23 per100000population, despite being sixth in incidence). For infectious skin diseases, fungal skin diseases had the highest age-standardized incidence rate but ranked third in YLDs. Scabies, despite its relatively low incidence, contributed the most to the global non-fatal burden (68.72 per100000population, Figure 4, Supplementary Tables 7 and 8).

Similar patterns were observed across the seven GBD super-regions, although significant differences existed in the contributions of individual diseases to inflammatory and infectious skin disease burdens. For inflammatory skin diseases, acne vulgaris had the highest age-standardized incidence rate (2084.61 per100000population) in the high-income region, whereas atopic dermatitis accounted for the highest YLDs. Finally, we examined the global age distribution of the four most prevalent diseases within inflammatory and infectious skin diseases. Each disease exhibited distinct age-related patterns. Detailed distributions are presented in Supplementary Figure 7. These findings underscore the importance of implementing age-specific prevention and management strategies for skin diseases globally.

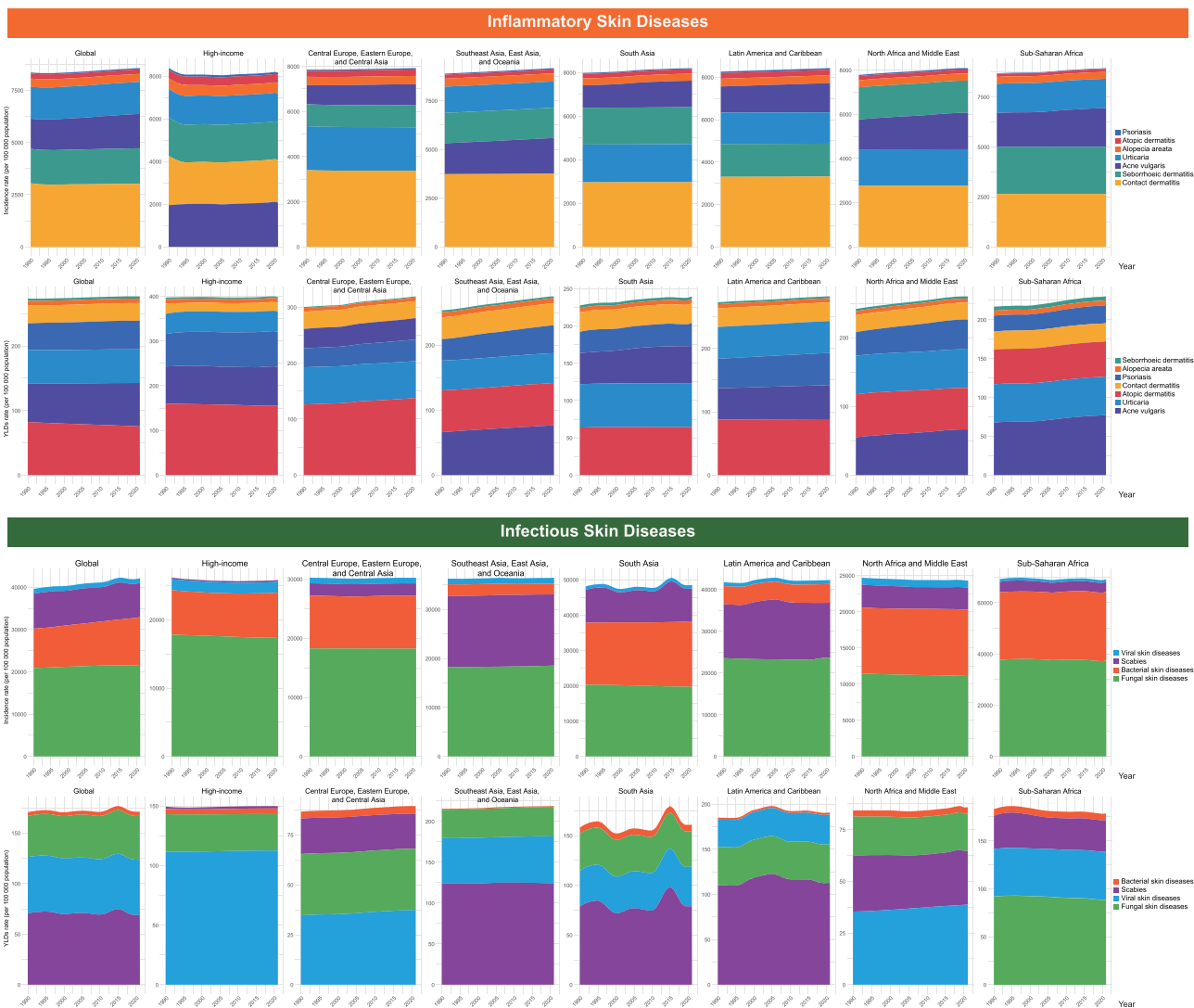


Figure 4 Global and super-regional age-standardized rates of incidence and YLDs for inflammatory and infectious skin diseases, categorized by Level 3–4 causes, from 1990 to 2021. **Abbreviation:** YLD, Years Lived with Disability.

Discussion

Global Trends in the Burden of Inflammatory and Infectious Skin Diseases

Skin diseases pose a significant threat to patients' economic stability, mental health, functionality, and social participation.^{2–5} Vulnerable groups, such as older people and children, are particularly at risk due to their more fragile skin, making them more susceptible to skin diseases. Despite considerable improvements in healthcare over the past three decades, skin and subcutaneous diseases ranked third globally in terms of incidence in 2021, following respiratory infections and tuberculosis, and other non-communicable diseases.¹ This substantial and persistent burden has also been formally recognized at the policy level, with the World Health Assembly adopting Resolution WHA 78.15 in May 2025, acknowledging skin diseases as a global public health priority.¹⁸ Based on our comparative analysis, public education, early detection, and prevention of non-communicable infectious skin diseases should be prioritized within health policies and resource allocation frameworks, particularly in settings with limited access to dermatologic care. Interestingly, although the age-standardized non-fatal burden of inflammatory skin diseases has increased steadily over the past three decades, the apparent plateau observed between 2015 and 2021 should be interpreted with caution. This pattern may partly reflect changes in burden estimation methods and data availability—particularly the growing reliance on health insurance claims data, which are predominantly derived from high-income countries and may inadequately represent low- and middle-income countries. Given the limited global accessibility of advanced therapies such as monoclonal antibodies, it is unlikely that treatment uptake alone accounts for this trend at the global level.⁹ Rather, these findings highlight potential methodological limitations in current burden estimation approaches rather than a true reduction in disease burden.

Age Differences in the Burden of Inflammatory and Infectious Skin Diseases

For inflammatory skin diseases, the substantial non-fatal burden observed among children and adolescents aged under 20 highlights the need for age-targeted prevention and management strategies, including school-based skin health education, routine dermatological screening in primary care, and timely referral for early diagnosis and treatment, which may help reduce long-term disease chronicity and associated disability.¹⁹ In contrast, for infectious skin diseases, public health efforts should prioritize older adults aged ≥ 65 years, who experience a disproportionately high incidence and YLD burden, by strengthening infection prevention, improving skin integrity care, and enhancing early detection and treatment in geriatric and long-term care settings.²⁰ Simultaneously, preventive interventions in children and adolescents, such as hygiene promotion, vaccination where applicable, and early management of minor skin infections, remain essential to reduce transmission and downstream complications across the life course.

Sociodemographic Differences

The SDI is a measure used to assess the relationship between socioeconomic development and disease burden. Our findings show significant inequities in the distribution of the incidence rates and non-fatal disease burdens of both inflammatory and infectious skin diseases in 2021, particularly in low-SDI regions. This pattern is likely linked to different regions' public health policies, socioeconomic conditions, and living standards. Previous studies have shown that in resource-limited settings, common skin and soft tissue infections arise from multiple, interrelated risk factors. Conditions such as cellulitis and tinea pedis are often associated with improper footwear and prolonged moisture exposure,^{21,22} while skin infections may also be facilitated by skin barrier disruption, including burns, physical trauma, chronic wounds, insect bites, and underlying dermatoses.²³ In addition, scabies remains highly prevalent among populations living in overcrowded environments with limited access to hygiene and sanitation facilities.²⁴ Additionally, drug costs remain a significant barrier to the accessibility of treatment for skin diseases. Notably, in tropical regions such as sub-Saharan Africa and Southeast Asia, the incidence and non-fatal burden of infectious skin diseases have not shown a clear increase over the past three decades; however, this finding should be interpreted with caution. Rather than indicating a true stabilization of disease burden, this pattern may partly reflect changes in data sources and estimation methods, particularly the limited availability and representativeness of underlying data in these regions. The World Health Organization's initiatives targeting neglected tropical diseases have raised global awareness

and redirected policies, providing substantial support for managing skin diseases in these regions.²⁵ In contrast to infectious skin diseases, the sociodemographic distribution pattern for inflammatory skin diseases differs considerably. The incidence of inflammatory skin diseases shows an uneven distribution across SDI levels, with a “W”-shaped pattern from low to high SDI regions. This result could reflect differences in disease detection rates among these regions. Notably, the non-fatal burden of inflammatory skin diseases increases with higher SDI, possibly due to greater disease detection, public awareness, educational levels, and healthcare accessibility within these populations.

Limitation

However, several important limitations should be acknowledged. First, our findings are inherently influenced by the methodological constraints of the GBD study. In particular, UIs rather than CIs were estimated for age-standardized incidence rates, and these should be interpreted with appropriate caution. More importantly, reliance on model-based estimates—especially those informed by heterogeneous and unevenly distributed data sources—may generate results that do not fully reflect real-world epidemiological patterns, particularly in low- and middle-income countries (LMICs) where national reporting quality and diagnostic consistency may be limited, potentially leading to misleading interpretations when used to inform health service planning and resource allocation. Second, estimates of incidence and non-fatal burden are highly dependent on disease detection methods, screening coverage, and the completeness and quality of data registration, all of which vary substantially by socioeconomic status. Given the marked disparities in healthcare access and surveillance capacity across countries, especially in low-SDI settings, the burden of skin diseases may be underestimated. Moreover, heterogeneity in data sources, time windows, estimation frameworks, and modeling approaches may further contribute to discrepancies between GBD estimates and real-world epidemiological patterns, warranting cautious interpretation. Consistent with this, regional studies have reported high prevalences of fungal skin diseases and acne in Sub-Saharan Africa, although absolute prevalence estimates differ across studies, supporting the use of GBD-based estimates as a useful—albeit imperfect—reference framework.^{26,27} Third, skin and subcutaneous diseases comprise a broad and heterogeneous group of conditions.^{6–8} In this study, disease classification primarily followed Level 3 categories within the GBD hierarchy, focusing on inflammatory and non-communicable infectious skin diseases. Consequently, several conditions—such as non-melanoma skin cancer, vitiligo, and certain common infectious skin diseases (eg, herpes zoster and molluscum contagiosum)—were not included in the analysis. This categorical approach, while facilitating global comparisons, may mask disease-specific heterogeneity and emerging sub-patterns, and the cross-sectional nature of the analysis further limits causal interpretation of observed temporal trends. While this approach enabled focused trend analyses, future studies should aim to refine disease classification and expand epidemiological contributions from dermatology clinicians and researchers. Finally, the current GBD framework does not comprehensively incorporate risk factor analyses for skin and subcutaneous diseases, limiting the ability to identify modifiable drivers of disease burden. As a result, policy recommendations derived from burden estimates alone may lack regional specificity and operational detail. Future research should prioritize integrating risk factor data—such as urbanization, hygiene practices, occupational exposures, and environmental factors—to better elucidate their roles in disease incidence, progression, and overall burden, thereby strengthening the evidence base for targeted prevention and intervention strategies.

Conclusion

According to estimates from the Global Burden of Disease (GBD) study, from 1990 to 2021, inflammatory and non-communicable infectious skin diseases exhibited distinct global burden trends. Inflammatory skin diseases showed concurrent increases in incidence and YLDs, whereas non-communicable infectious skin diseases demonstrated rising incidence but declining YLDs, a pattern that may reflect improved diagnostic capacity, earlier detection, and more effective and diversified treatment options. Disease burden remains disproportionately high among individuals under 20 years of age and in low-SDI regions, with the persistent non-fatal burden of inflammatory skin diseases posing ongoing challenges for disease management. These findings highlight the need for more equitable and targeted clinical guidelines and public health policies, including age- and region-specific prevention strategies, strengthened primary dermatologic care in resource-limited settings, and enhanced disease surveillance. Future research should prioritize more granular

disease-level analyses and the integration of modifiable risk factor data to improve the policy relevance and practical applicability of global skin disease burden estimates.

Data Sharing Statement

The datasets used and/or analyzed during the current study are available from Qingrong Ni upon reasonable request.

Ethics Approval and Consent to Participate

This study was reviewed and approved by the Ethics Committee of the Air Force Medical Center, Fourth Military Medical University (Approval No. 2024-121-PJ01). The requirement for informed consent was waived by the Ethics Committee because the study was based on anonymized data with no identifiable personal information.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest in this work.

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