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ORIGINAL RESEARCH

Global and Regional Burden of Seborrheic Dermatitis: Trends in Incidence and DALYs, 1990–2021

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Background: Seborrheic dermatitis (SD) is a prevalent chronic skin condition affecting areas rich in sebaceous glands, causing significant discomfort and psychological burden. Despite its impact, detailed global burden trends remain underexplored.

Methods: Data from the Global Burden of Disease (GBD) study for SD from 1990 to 2021 were analyzed, examining incidence and Disability-Adjusted Life Years (DALYs). Trends were assessed using the estimated annual percentage change (EAPC), and correlations between disease burden and socio-economic development indices (SDI) were evaluated.

Results: In 2021, SD affected 135,710,441 individuals globally—an increase of 53% since 1990. Despite this growth, the global age-standardized incidence rate (ASIR) remained relatively stable at 1,704.04 per 100,000 (EAPC: 0.11183). Females showed a higher ASIR than males, while males had slightly higher age-standardized DALYs rates. The 75+ age group experienced the highest DALYs burden despite the lowest ASIR, highlighting a disproportionate impact on the elderly. Regions with higher SDI levels generally had lower incidence and DALYs rates, whereas Western Sub-Saharan Africa bore the highest burden. Nationally, Nigeria, Ghana, and Cameroon had the highest ASIRs. These findings underscore significant regional and national disparities in SD burden, even amid overall rate stability.

Conclusion: Despite stable age-standardized rates, the increasing absolute burden of seborrheic dermatitis and pronounced regional disparities underscore the need for targeted public health interventions, particularly in resource-limited settings. Strengthening disease management strategies and expanding research efforts in these areas will be crucial to reducing the global impact of SD.

Keywords: global burden of disease, seborrheic dermatitis, incidence, DALYs

Introduction

Seborrheic dermatitis (SD) is a widespread chronic skin condition that manifests through red, scaly patches and itching, predominantly affecting areas with a high concentration of sebaceous glands, such as the scalp, face, chest, and back.[1,2] Although SD is not considered life-threatening, its impact on quality of life can be significant, leading to considerable social and psychological challenges for those affected.[1] SD's persistence and visibility often cause discomfort and embarrassment, intensifying the psychological burden.[3] Recent advancements in dermatological research and the increased availability of comprehensive global health data have facilitated a more detailed and nuanced understanding of the burden imposed by SD.[4]

The Global Burden of Disease (GBD) study is a vital resource for understanding the epidemiology of SD, providing essential data on the incidence rates and Disability-Adjusted Life Years (DALYs) associated with the condition.[5] The GBD data reveal a complex and multifaceted picture of the global burden of SD, influenced by a variety of factors including demographic shifts such as aging populations, environmental changes, evolving lifestyle patterns, and ongoing medical advancements.[5,6] Despite the richness of this data, detailed exploration of burden trends across different regions

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and countries remains limited.[7] Many existing studies focus on specific populations or geographic areas, leaving a gap in our understanding of how the burden of SD varies on a broader, global scale.[8]

This study aims to bridge this gap by conducting a comprehensive analysis of global incidence and DALYs data for SD from 1990 to 2021. By quantifying long-term trends and regional disparities, the study directly addresses the need for a broader, more systematic understanding of SD burden, which has been largely overlooked in previous research. By systematically evaluating and comparing data across diverse regions and countries, this research intends to provide valuable insights into how the burden of SD has evolved over time and how it varies between different geographical areas.[7,9] Such insights are crucial for informing future research directions and developing effective public health strategies.[10] Understanding the regional and global variations in burden will aid in the creation of targeted interventions and efficient resource allocation, ultimately contributing to improved patient outcomes and a reduction in the overall impact of the disease.

Materials and Methods

Data Source

The GBD 2021 study provides comprehensive estimates on the incidence, mortality, and DALYs for over 370 diseases in 204 countries and regions.[6,7] This extensive evaluation provided detailed data on incidence rates, mortality rates, DALYs, and age-standardized rates (ASRs).[7] Data were meticulously collected from reliable and reputable public databases and underwent a series of rigorous quality control procedures to ensure accuracy.[11] The GBD team performs annual updates to maintain the precision and relevance of the data. Furthermore, the data collected by the GBD network were subjected to thorough cleaning, transformation, and sophisticated modeling processes conducted by research organizations worldwide.[12] Similar to the GBD study 2019, the data collection, processing, and overall analysis methods of the GBD study (2021) have been reported in detail previously.[7,13] We extracted the annual incidence and DALYs data for SD across all genders and age groups from 1990 to 2021 using the Global Health Data Exchange query tool.[7]

Socio-Demographic Index (SDI)

The Socio-demographic Index (SDI), a composite indicator based on income per capita, education level, and fertility rate, was used to assess development status. It helps interpret variations in SD burden across countries and regions by grouping them into five SDI categories (low to high).[14] In brief, it is the geometric mean of the total fertility rate (for those under 25 years), mean education level (for those aged 15 and older), and lag-distributed income per capita, scaled between 0 and 1.[6] In GBD 2021, the SDI values are multiplied by 100 to produce a scale from 0 to 100, where 0 represents the lowest income and education levels and the highest fertility rate, while 100 represents the highest income and education levels and the lowest fertility rate.[15] Based on their SDI values, the 204 countries and regions were classified into five groups: high-SDI, middle-high-SDI, middle-SDI, middle-low-SDI, and low-SDI regions.[8] In our study, patients with SD were categorized into the following age groups: 0–14 years, 15–49 years, 50–74 years, and 75 years and older.

Statistical Analysis

The data were reported as absolute numbers with corresponding 95% uncertainty intervals (UIs), categorized by age, sex, year, region, and country.[16] The prevalence, incidence, mortality, and DALYs were projected per 100,000 individuals in the population, including their 95% UIs.[17] The GBD estimates were generated using the DisMod-MR 2.1, a Bayesian meta-regression model that integrates multiple data sources and adjusts for data quality and bias.

To evaluate temporal trends, we calculated the Estimated Annual Percentage Change (EAPC) using the following log-linear regression model:

$$\ln(\mathrm{ASR}) = \alpha + \beta \times (\text{calendar year}) + \epsilon,$$

where α represents the intercept, β denotes the slope, and ϵ indicates the error term.

The EAPC and its 95% confidence interval (CI) were computed as:

$$\mathrm{EAPC} = 100 \times (\exp(\beta) - 1).$$[18]

Trends were classified based on the 95% CI for the EAPC: if the upper bound of the CI was below 0, the trend was considered decreasing; if the lower bound of the CI was above 0, the trend was deemed increasing; and if the CI included 0, the trend was regarded as stable.[18] We used Pearson correlation tests for normally distributed variables and Spearman rank correlation tests for non-normally distributed variables. Statistical analyses and visualizations were performed in R (Version 4.2.3; https://www.R-project.org/), using packages including ggplot2, dplyr, and readr. A two-tailed P-value of less than 0.05 was considered statistically significant. The procedures for analysis and graphical representation utilized the World Health Organization's Health Equity Assessment Toolkit along with R software.[19]

Results

Global Overall Burden of Seborrheic Dermatitis

In 2021, the number of new cases of SD was 135,710,441 (95% UI: 125,371,044 to 145,731,936), representing a significant increase of 53% compared to 88,538,512 new cases in 1990 (95% UI: 81,730,960 to 95,375,764) (Table 1 and Figure 1A). The ASIR of SD in 2021 was 1,704.04 per 100,000 (95% UI: 1,574.1 to 1,831.85 per 100,000), compared to 1,652.54 per 100,000 in 1990 (95% UI: 1,527.09 to 1,777.46 per 100,000). Additionally, the EAPC shows a slight but relatively stable increase in the global ASIR of SD from 1990 to 2021 [0.11183 (95% CI: 0.10546 to 0.11821)] (Table 1 and Figure 1C).

Moreover, regarding the disease burden of SD, we measured the DALYs. The global number of DALYs increased from 172,397 in 1990 (95% UI: 100,450 to 275,782) to 282,828 in 2021 (95% UI: 165,091 to 451,331), reflecting a 64% increase (Table 2). However, the age-standardized DALYs rates were stable, with 3.4 in 1990 (95% UI: 1.98 to 5.39) and 3.51 in 2021 (95% UI: 2.05 to 5.61), showing a stable trend with an EAPC of 0.13538 (95% CI: 0.12454 to 0.14622) (Table 2 and Figure 1E). In summary, the global burden of SD, both in terms of incidence and DALYs, has remained stable over the decades, reflecting the effectiveness of global healthcare policies related to this condition. However, there may be variations in burden based on factors such as gender, age, region, and different countries.

Global Level of Seborrheic Dermatitis by Sex and Age

In 2021, the number of new cases of SD in females was 68,715,687 (95% UI: 63,539,088 to 73,865,815), which is 2.57% higher than the 66,994,754 cases in males (95% UI: 61,871,072 to 72,104,145). However, the increase in cases relative to 1990 was consistent across both genders, with a 53% rise in both (Table 1 and Figure 1A). When analyzing by age groups (0–14 years, 15–49 years, 50–74 years, and 75+ years), we found that the 15–49 years group consistently had the highest number of new cases, reaching 88,291,603 in 2021 (95% UI: 79,676,854 to 96,899,539) (Table 1 and Figure 1B). Although the 75+ years group had the fewest new cases, with 2,213,619 in 2021 (95% UI: 1,920,329 to 2,477,770), it experienced the largest increase since 1990, rising from 899,212 (95% UI: 775,296 to 1,009,384), an increase of 146% (Table 1).

Despite the similar overall number of new cases of SD, incidence rates differ by gender and age group due to variations in population structure. In 2021, the ASIR for females was 1,740 per 100,000 (95% UI: 1,607.99 to 1,868.85 per 100,000), significantly higher than the 1,668.7 per 100,000 (95% UI: 1,542.35 to 1,797.5 per 100,000) for males (Table 1 and Figure 1C). The 15–49 years age group also had a high incidence rate of 2,236.03 per 100,000 (95% UI: 2,017.86 to 2,454.03 per 100,000). However, the age group 0–14 years saw the most significant increase in ASIR from 1990 to 2021, with an EAPC of 0.25575 (95% CI: 0.23272 to 0.27879) (Table 1 and Figure 1D). Conversely, while the 75+ years group showed the highest increase in case numbers, this may be attributed to population aging and a growing elderly population. The EAPC for the 75+ years group was the only negative value, at −0.00477 (95% CI: −0.00766 to −0.00188) (Table 1).

Interestingly, although females have a higher ASIR of SD than males, males exhibit slightly higher age-standardized DALYs rates—3.56 per 100,000 (95% UI: 2.07–5.68) versus 3.47 per 100,000 (95% UI: 2.03–5.55) for females (Table 1 and Figure 1E). Similarly, the 75+ age group shows the highest age-standardized DALYs rate at 7.52 per 100,000 (95% UI: 4.23–11.92), despite having the lowest ASIR. Notably, the most substantial increase in DALYs rates from 1990 to

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Table 1 Global Incidence Cases and Age-Standardized Incidence Rates of Seborrheic Dermatitis From 1990 to 2021 with Their Trends

Characteristics	1990		2021		Num_change	EAPC_CI
	Cases, n	ASIR, per 100,000	Cases, n	ASIR, per 100,000		
Global	88538512(81730960 to 95375764)	1652.54(1527.09 to 1777.46)	135,710,441(125371044 to 145731936)	1704.04(1574.1 to 1831.85)	0.53(0.51 to 0.56)	0.11183(0.10546 to 0.11821)
Sex						
Male	43758940(40330231 to 47245548)	1614.68(1490.87 to 1738.47)	66,994,754(61871072 to 72104145)	1668.7(1542.35 to 1797.5)	0.53(0.51 to 0.55)	0.1148(0.11042 to 0.11918)
Female	44779572(41356488 to 48265750)	1691.41(1563.65 to 1818.67)	68,715,687(63539088 to 73865815)	1740(1607.99 to 1868.85)	0.53(0.51 to 0.56)	0.10808(0.09947 to 0.11668)
Ages						
0–14 years	20075871(17088209 to 23303780)	1154.35(982.56 to 1339.95)	25,549,407(21619751 to 29707629)	1269.94(1074.61 to 1476.62)	0.27(0.26 to 0.29)	0.25575(0.23272 to 0.27879)
15–49 years	58415437(52592256 to 64273451)	2155.17(1940.33 to 2371.3)	88,291,603(79676854 to 96899539)	2236.03(2017.86 to 2454.03)	0.51(0.49 to 0.53)	0.11761(0.10829 to 0.12693)
50–74 years	9147992(7979553 to 10332760)	1193.24(1040.83 to 1347.78)	19,655,811(17155586 to 22171174)	1196.79(1044.56 to 1349.94)	1.15(1.14 to 1.16)	0.0673(0.03662 to 0.098)
75+ years	899212(775296 to 1009384)	766.29(660.69 to 860.18)	2,213,619(1920329 to 2477770)	767.21(665.56 to 858.76)	1.46(1.43 to 1.51)	−0.00477(−0.00766 to −0.00188)
SDI regions						
High SDI	15773569(14559679 to 16963054)	1747.87(1614.06 to 1874.03)	18,204,452(16872394 to 19474424)	1700.3(1571.6 to 1822.86)	0.15(0.14 to 0.17)	−0.04(−0.05895 to −0.02105)
High-middle SDI	15454662(14303157 to 16656985)	1416.48(1306.04 to 1523.29)	19,247,347(17838891 to 20640637)	1454.46(1341.8 to 1563.86)	0.25(0.22 to 0.28)	0.09648(0.08803 to 0.10492)
Middle SDI	27763820(25549344 to 29960209)	1588.51(1469.42 to 1707.89)	40,325,943(37273288 to 43415081)	1600.07(1479.49 to 1721.11)	0.45(0.42 to 0.49)	0.02324(0.0226 to 0.02389)
Low-middle SDI	19497249(17882758 to 21083932)	1697.68(1569.43 to 1825.22)	34,348,216(31689974 to 37036833)	1734.95(1604.64 to 1866.53)	0.76(0.73 to 0.79)	0.0673(0.06436 to 0.07024)
Low SDI	9982758(9134052 to 10779405)	2086.09(1923.15 to 2239.53)	23,493,803(21536669 to 25376983)	2101.81(1936.78 to 2256.85)	1.35(1.34 to 1.37)	0.02212(0.02102 to 0.02321)
Location						
Andean Latin America	567267(522140 to 613468)	1532.8(1417.31 to 1649.52)	1,040,869(962177 to 1123908)	1532.77(1417.42 to 1649.58)	0.83(0.8 to 0.88)	−6e-05(−7e-05 to −6e-05)
Australasia	348655(321759 to 375803)	1669.89(1538.64 to 1796.58)	511,600(473335 to 549479)	1670.65(1539.27 to 1797.61)	0.47(0.45 to 0.49)	0.00123(−0.00013 to 0.00259)
Caribbean	539815(497984 to 583758)	1532.8(1417.41 to 1649.58)	739,407(683316 to 796761)	1532.79(1417.51 to 1649.62)	0.37(0.34 to 0.4)	−3e-05(−4e-05 to −2e-05)
Central Asia	644259(592557 to 695947)	954.93(886.35 to 1025.59)	923,955(855793 to 994762)	954.73(886.1 to 1025.4)	0.43(0.41 to 0.46)	−0.00076(−8e-04 to −0.00073)
Central Europe	1258302(1168083 to 1346054)	990.74(917.68 to 1061.71)	1,139,675(1060744 to 1212138)	989.75(916.51 to 1058.66)	−0.09(−0.11 to −0.08)	0.00017(−7e-04 to 0.00104)
Central Latin America	2488758(2289014 to 2683727)	1548.08(1431.48 to 1668.85)	4,043,905(3736018 to 4363836)	1547.94(1431.52 to 1668.23)	0.62(0.59 to 0.67)	−0.00057(−0.00077 to −0.00037)
Central Sub-Saharan Africa	1172830(1068351 to 1273565)	2265.8(2074.42 to 2439.81)	3,064,692(2791027 to 3330926)	2265.46(2073.99 to 2441.05)	1.61(1.6 to 1.63)	−0.00054(−0.00061 to −0.00048)
East Asia	19816834(18253731 to 21415891)	1561.42(1445.11 to 1684.53)	23,464,069(21758324 to 25244274)	1561.33(1445.16 to 1684.24)	0.18(0.14 to 0.23)	−0.00022(−0.00027 to −0.00018)
Eastern Europe	2239218(2079897 to 2391179)	970.97(900.52 to 1037.61)	2,049,113(1909980 to 2183450)	971.07(900.41 to 1037.73)	−0.08(−0.1 to −0.07)	0.00036(3e-04 to 0.00042)
Eastern Sub-Saharan Africa	4093093(3739827 to 4443830)	2285.19(2098.74 to 2460.32)	9,712,211(8882356 to 10536328)	2285.19(2098.88 to 2461.04)	1.37(1.35 to 1.39)	−0.00086(−0.00122 to −0.00049)
High-income Asia Pacific	3061246(2817733 to 3295819)	1685.5(1549.22 to 1812.14)	2,977,461(2761306 to 3195381)	1682.02(1545.67 to 1809.03)	−0.03(−0.05 to −0.01)	−0.007(−0.00762 to −0.00637)
High-income North America	5910008(5465782 to 6358410)	2042.64(1892.04 to 2194.8)	6,858,596(6370702 to 7302571)	1900.23(1761.04 to 2034.37)	0.16(0.14 to 0.18)	−0.08801(−0.14199 to −0.034)
North Africa and Middle East	5049901(4591722 to 5522065)	1453.27(1341.44 to 1567.08)	9,385,205(8628375 to 10150555)	1456.78(1344.7 to 1571.7)	0.86(0.81 to 0.9)	0.01023(0.00906 to 0.0114)
Oceania	97207(89276 to 105289)	1532.78(1416.78 to 1649.56)	212,458(195617 to 229404)	1532.77(1417.03 to 1649.5)	1.19(1.16 to 1.21)	0(−1e-05 to 1e-05)
South Asia	18487023(16945220 to 20032480)	1690.44(1565.79 to 1818.03)	32,496,611(30026282 to 35020288)	1693.81(1568.86 to 1820.47)	0.76(0.72 to 0.79)	0.00604(0.00589 to 0.0062)
Southeast Asia	7178899(6609063 to 7732353)	1548.56(1432.45 to 1669.2)	11,269,943(10404131 to 12161533)	1549.78(1433.1 to 1670.86)	0.57(0.53 to 0.61)	0.00278(0.00248 to 0.00308)
Southern Latin America	822687(758018 to 884668)	1668.18(1539.47 to 1794.08)	1,157,136(1071061 to 1247029)	1666.55(1537.9 to 1792.21)	0.41(0.39 to 0.42)	−0.00219(−0.00255 to −0.00182)
Southern Sub-Saharan Africa	1200042(1102407 to 1300490)	2303.25(2120.23 to 2480.63)	1,932,903(1774651 to 2087531)	2301.85(2119.13 to 2480)	0.61(0.58 to 0.64)	−0.00177(−0.00236 to −0.00119)
Tropical Latin America	2400208(2203644 to 2582320)	1561.62(1444.48 to 1684.54)	3,682,881(3404136 to 3974087)	1561.38(1444.36 to 1684.44)	0.53(0.49 to 0.58)	−5e-04(−0.00052 to −0.00049)
Western Europe	6636027(6097141 to 7149889)	1716.69(1578.56 to 1852.06)	7,145,852(6597496 to 7665595)	1715.85(1577.69 to 1851.03)	0.08(0.06 to 0.09)	−0.00067(−0.00116 to −0.00018)
Western Sub-Saharan Africa	4526233(4141696 to 4926670)	2465.86(2265.53 to 2661.8)	11,901,899(10892046 to 12981357)	2466.15(2265.7 to 2661.61)	1.63(1.62 to 1.64)	5e-04(9e-05 to 0.00091)

Notes: Data in parentheses are 95% uncertainty intervals for cases and rates, and 95% confidence intervals for EAPC.

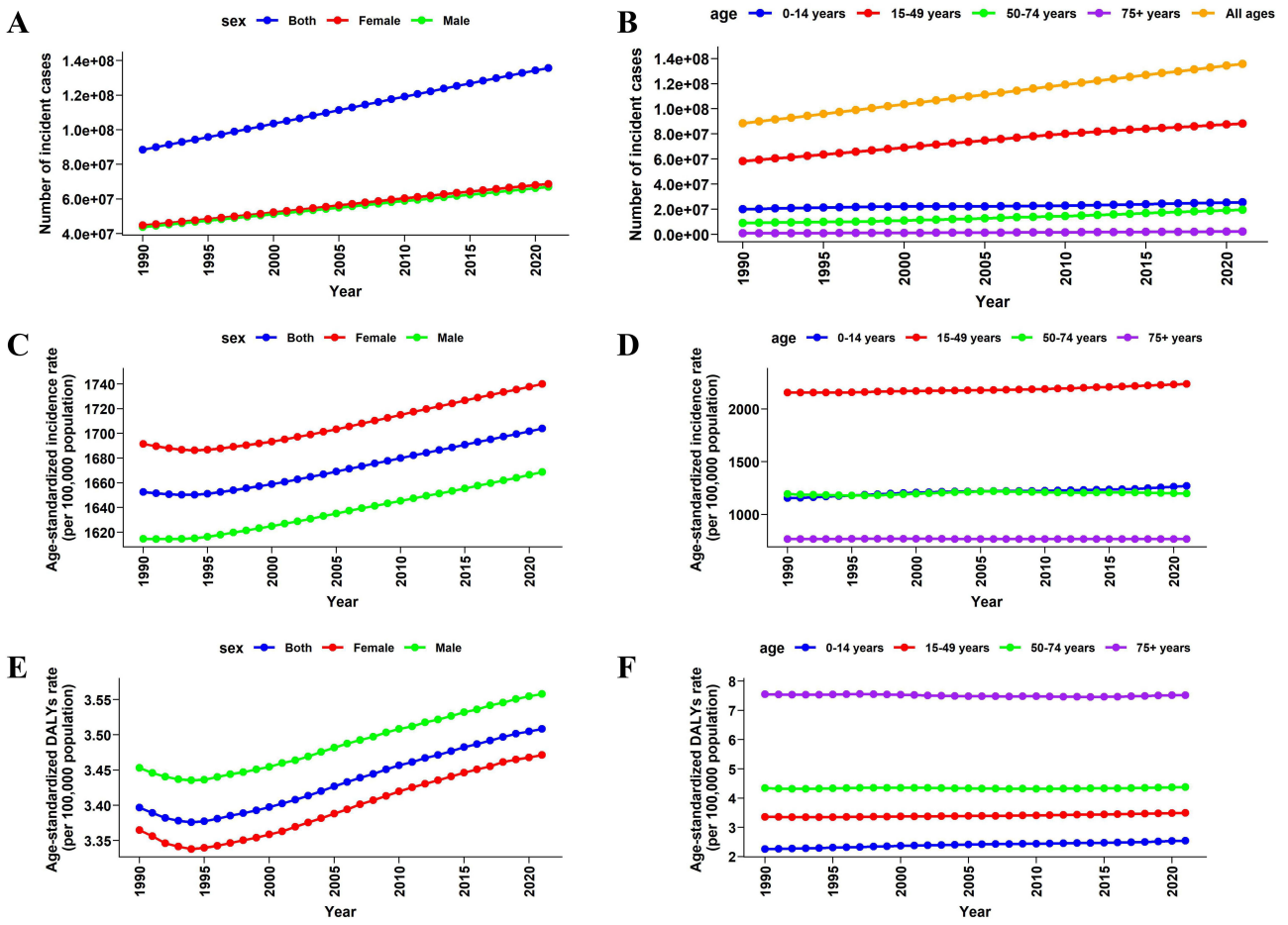

Figure 1 Trends in Seborrheic Dermatitis Incidence and disability-adjusted life years (DALYs) from 1990 to 2021. (**A**) Incidence trends of seborrheic dermatitis by sex. (**B**) Incidence trends of seborrheic dermatitis by age group. (**C**) Age-standardized incidence rates (ASIR) of seborrheic dermatitis by sex. (**D**) Age-standardized incidence rates (ASIR) of seborrheic dermatitis by age group. (**E**) Age-standardized DALYs rates of seborrheic dermatitis by sex. (**F**) Age-standardized DALYs rates of seborrheic dermatitis by age group.

2021 was observed in the 0–14 age group, with an EAPC of 0.36553 (95% CI: 0.34879–0.38227) (Table 1 and Figure 1F).

Regional Burden of Seborrheic Dermatitis

Based on the SDI values, the world is categorized into five regions: high-SDI, middle-high-SDI, middle-SDI, middle-low-SDI, and low-SDI regions. In 2021, the ASIR for these regions were 1,700.3 per 100,000 (95% UI: 1,571.6 to 1,822.86 per 100,000) for high-SDI, 1,454.46 per 100,000 (95% UI: 1,341.8 to 1,563.86 per 100,000) for middle-high-SDI, 1,600.07 per 100,000 (95% UI: 1,479.49 to 1,721.11 per 100,000) for middle-SDI, 1,734.95 per 100,000 (95% UI: 1,604.64 to 1,866.53 per 100,000) for middle-low-SDI, and 2,101.81 per 100,000 (95% UI: 1,936.78 to 2,256.85 per 100,000) for low-SDI regions (Table 1). Among these, the highest cumulative number of new cases was found in the Middle-SDI region, with 40,325,943 cases (95% UI: 37,273,288 to 43,415,081). From 1990 to 2021, the increase in new cases remained relatively stable, with the EAPC fluctuating around 0 (Table 1 and Figure 2A).

Compared to 2019, the number of SD cases in Central Sub-Saharan Africa, Eastern Sub-Saharan Africa, North Africa and the Middle East, Oceania, and Western Sub-Saharan Africa nearly doubled, with changes of 161%, 137%, 86%, 119%, and 163%, respectively (Table 1). In 2021, the top five regions with the highest ASIR for SD were Central Sub-Saharan Africa, Eastern Sub-Saharan Africa, High-income North America, Southern Sub-Saharan Africa, and Western Sub-Saharan Africa (Table 1 and Figure 2B). Among these, Western Sub-Saharan Africa had the highest ASIR at 2,466.15 per 100,000 (95% UI: 2,265.7 to 2,661.61 per 100,000) (Figure 2B). Additionally, Central Asia, Central Europe,

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Table 2 Global DALYs Cases and Age-Standardized DALYs Rates of Seborrheic Dermatitis From 1990 to 2021 with Their Trends

Characteristics	1990		2021		Num_change	EAPC_CI
	Cases, n	DALYs rates, per 100,000	Cases, n	DALYs rates, per 100,000		
Global	172397(100450 to 275782)	3.4(1.98 to 5.39)	282,828(165091 to 451331)	3.51(2.05 to 5.61)	0.64(0.61 to 0.67)	0.13538(0.12454 to 0.14622)
Sex						
Male	86338(50392 to 137810)	3.45(2.02 to 5.48)	141,965(82754 to 226554)	3.56(2.07 to 5.68)	0.64(0.61 to 0.67)	0.12237(0.11291 to 0.13184)
Female	86059(50300 to 137870)	3.36(1.96 to 5.35)	140,863(82079 to 224383)	3.47(2.03 to 5.55)	0.64(0.61 to 0.67)	0.13694(0.12421 to 0.14966)
Ages						
0–14 years	39252(22427 to 65332)	2.26(1.29 to 3.76)	51,239(29351 to 84501)	2.55(1.46 to 4.2)	0.31(0.27 to 0.34)	0.36553(0.34879 to 0.38227)
15–49 years	91015(52301 to 151217)	3.36(1.93 to 5.58)	138,037(79250 to 227241)	3.5(2.01 to 5.75)	0.52(0.49 to 0.54)	0.13897(0.12618 to 0.15176)
50–74 years	33263(19075 to 51691)	4.34(2.49 to 6.74)	71,857(41158 to 110824)	4.38(2.51 to 6.75)	1.16(1.13 to 1.19)	0.01279(−0.00087 to 0.02645)
75+ years	8867(4964 to 13998)	7.56(4.23 to 11.93)	21,695(12198 to 34384)	7.52(4.23 to 11.92)	1.45(1.4 to 1.5)	−0.03413(−0.04552 to −0.02273)
SDI regions						
High SDI	35815(20814 to 57018)	3.76(2.18 to 5.99)	47,264(27146 to 74879)	3.6(2.09 to 5.73)	0.32(0.29 to 0.35)	−0.04244(−0.08026 to −0.00462)
High-middle SDI	29174(16965 to 46790)	2.73(1.59 to 4.37)	41,039(23836 to 65316)	2.86(1.66 to 4.58)	0.41(0.36 to 0.46)	0.16137(0.14944 to 0.17329)
Middle SDI	50287(29327 to 80483)	3.14(1.82 to 4.98)	80,270(46834 to 127351)	3.18(1.85 to 5.05)	0.6(0.55 to 0.64)	0.04321(0.04017 to 0.04625)
Low-middle SDI	37245(21644 to 59799)	3.54(2.07 to 5.65)	67,744(39361 to 108829)	3.65(2.12 to 5.83)	0.82(0.77 to 0.86)	0.09711(0.09206 to 0.10215)
Low SDI	19753(11497 to 31478)	4.49(2.62 to 7.14)	46,329(26884 to 74563)	4.56(2.66 to 7.26)	1.35(1.29 to 1.4)	0.05494(0.05236 to 0.05752)
Location						
Andean Latin America	1002(570 to 1616)	2.99(1.7 to 4.79)	1964(1140 to 3196)	2.99(1.73 to 4.83)	0.96(0.82 to 1.12)	0.00034(−0.00407 to 0.00474)
Australasia	734(421 to 1166)	3.4(1.96 to 5.44)	1244(721 to 1980)	3.43(1.99 to 5.44)	0.7(0.57 to 0.83)	0.01858(0.01397 to 0.02319)
Caribbean	993(573 to 1598)	2.98(1.72 to 4.76)	1465(839 to 2334)	2.97(1.7 to 4.74)	0.48(0.4 to 0.56)	−0.00673(−0.00918 to −0.00427)
Central Asia	1068(618 to 1699)	1.67(0.97 to 2.62)	1550(904 to 2510)	1.66(0.97 to 2.67)	0.45(0.37 to 0.56)	0.00243(−0.00125 to 0.0061)
Central Europe	2249(1310 to 3551)	1.73(1.01 to 2.74)	2272(1321 to 3541)	1.73(1.02 to 2.74)	0.01(−0.03 to 0.06)	0.0084(0.0039 to 0.0129)
Central Latin America	4315(2502 to 6937)	2.98(1.72 to 4.77)	7668(4442 to 12344)	2.98(1.72 to 4.8)	0.78(0.71 to 0.85)	0.00222(0.00048 to 0.00396)
Central Sub-Saharan Africa	2277(1308 to 3656)	4.86(2.81 to 7.79)	5919(3388 to 9536)	4.89(2.82 to 7.69)	1.6(1.42 to 1.79)	0.02609(0.01992 to 0.03227)
East Asia	35368(20307 to 56572)	3(1.74 to 4.77)	49,444(28619 to 78194)	3.01(1.74 to 4.82)	0.4(0.34 to 0.46)	0.00407(0.00236 to 0.00578)
Eastern Europe	3954(2317 to 6275)	1.67(0.98 to 2.66)	3886(2243 to 6199)	1.67(0.97 to 2.68)	−0.02(−0.06 to 0.02)	0.00883(0.00581 to 0.01185)
Eastern Sub-Saharan Africa	7906(4606 to 12640)	4.88(2.84 to 7.76)	18,599(10739 to 30329)	4.89(2.82 to 7.89)	1.35(1.29 to 1.41)	0.02096(0.01791 to 0.02401)
High-income Asia Pacific	6359(3706 to 10245)	3.43(2 to 5.53)	8392(4800 to 13317)	3.44(1.98 to 5.53)	0.32(0.27 to 0.38)	0.01656(0.01477 to 0.01835)
High-income North America	14709(8478 to 23256)	4.8(2.77 to 7.6)	18,718(10800 to 29364)	4.2(2.43 to 6.63)	0.27(0.24 to 0.3)	−0.16219(−0.25954 to −0.06473)
North Africa and Middle East	11413(6554 to 18334)	3.26(1.89 to 5.22)	20,264(11687 to 32557)	3.28(1.9 to 5.26)	0.78(0.71 to 0.85)	0.02974(0.02638 to 0.0331)
Oceania	167(96 to 271)	2.97(1.71 to 4.78)	369(209 to 603)	2.97(1.69 to 4.79)	1.22(1.02 to 1.4)	0.00677(0.00331 to 0.01023)
South Asia	34667(20107 to 55254)	3.54(2.07 to 5.6)	63,486(36900 to 100929)	3.55(2.06 to 5.6)	0.83(0.77 to 0.88)	0.01401(0.01191 to 0.01611)
Southeast Asia	12491(7232 to 20264)	2.99(1.74 to 4.81)	21,088(12203 to 33764)	2.99(1.74 to 4.79)	0.69(0.63 to 0.75)	0.01064(0.00863 to 0.01264)
Southern Latin America	1668(966 to 2658)	3.43(1.99 to 5.44)	2522(1430 to 3970)	3.42(1.93 to 5.4)	0.51(0.41 to 0.63)	−0.00462(−0.00803 to −0.00121)
Southern Sub-Saharan Africa	2333(1327 to 3760)	4.88(2.82 to 7.78)	3815(2192 to 6164)	4.86(2.79 to 7.79)	0.63(0.58 to 0.7)	−0.01511(−0.01766 to −0.01256)
Tropical Latin America	4171(2424 to 6644)	2.97(1.74 to 4.69)	7084(4116 to 11275)	2.97(1.72 to 4.71)	0.7(0.63 to 0.77)	0.00562(0.00235 to 0.00889)
Western Europe	15195(8834 to 24301)	3.53(2.04 to 5.71)	18,769(10893 to 29638)	3.54(2.06 to 5.66)	0.24(0.2 to 0.27)	0.01361(0.01126 to 0.01595)
Western Sub-Saharan Africa	9360(5461 to 15066)	5.47(3.2 to 8.74)	24,311(14059 to 39147)	5.49(3.2 to 8.74)	1.6(1.55 to 1.64)	0.01872(0.01607 to 0.02137)

Notes: Data in parentheses are 95% uncertainty intervals for cases and rates, and 95% confidence intervals for EAPC.

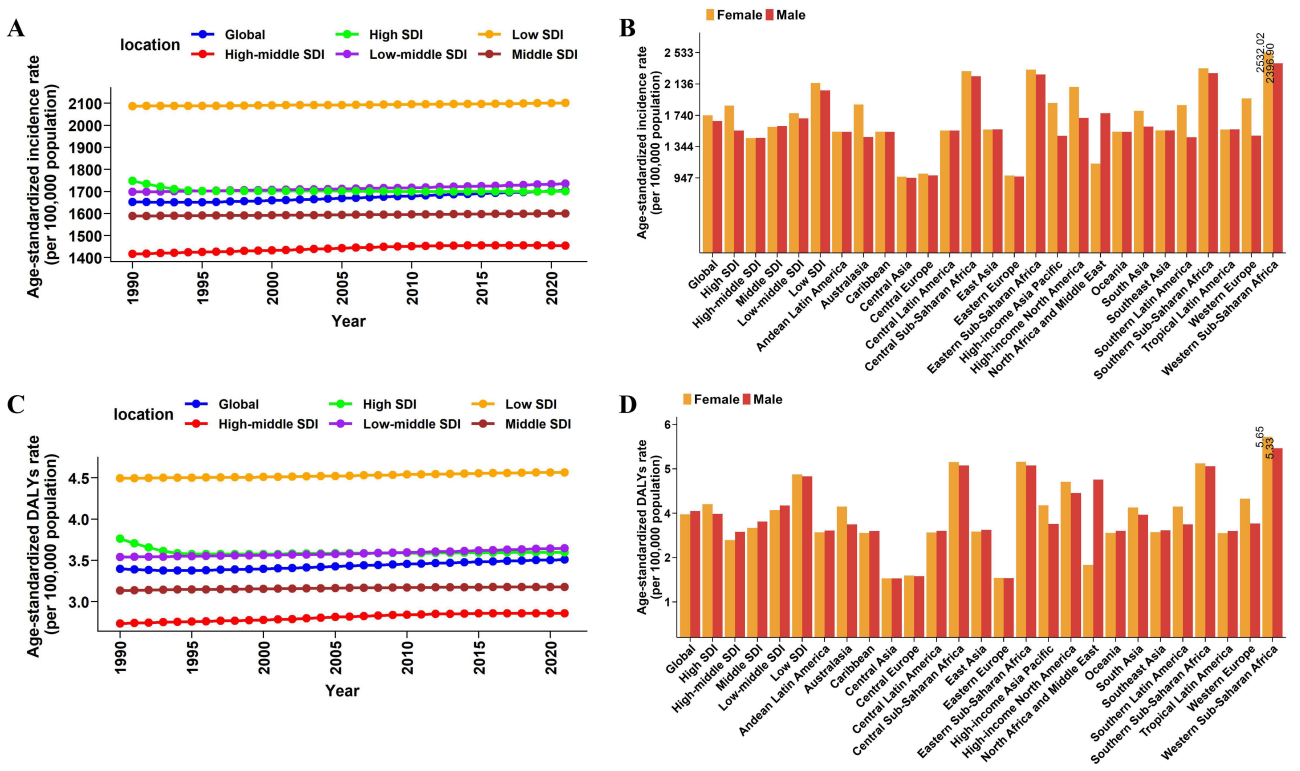

Figure 2 Regional Differences in the Incidence and Disability-Adjusted Life Years (DALYs) of Seborrheic Dermatitis. (**A**) Trends in the age-standardized incidence rates (ASIR) of seborrheic dermatitis across five different SDI regions from 1990 to 2021. (**B**) ASIR of seborrheic dermatitis in 2021 across regions with high to low SDI and 21 different GBD geographical regions. (**C**) Trends in age-standardized DALYs for seborrheic dermatitis across five different SDI regions from 1990 to 2021. (**D**) Age-standardized DALYs rates for seborrheic dermatitis in 2021 across regions with high to low SDI and 21 different GBD geographical regions.

and Eastern Europe had ASIRs below 1,000 per 100,000 (Figure 2B). Notably, from 1990 to 2021, the EAPC remained around 0, indicating a relatively stable trend in overall ASIR (Table 1).

Regarding DALYs, the age-standardized DALYs rates for SD by SDI region from high to low were 3.6 per 100,000 (95% UI: 2.09 to 5.73 per 100,000) for high-SDI, 2.86 per 100,000 (95% UI: 1.66 to 4.58 per 100,000) for middle-high-SDI, 3.18 per 100,000 (95% UI: 1.85 to 5.05 per 100,000) for middle-SDI, 3.65 per 100,000 (95% UI: 2.12 to 5.83 per 100,000) for middle-low-SDI, and 4.56 per 100,000 (95% UI: 2.66 to 7.26 per 100,000) for low-SDI regions (Table 2 and Figure 2C). In 2021, the top five regions with the highest age-standardized DALYs rates for SD were Central Sub-Saharan Africa, Eastern Sub-Saharan Africa, High-income North America, Southern Sub-Saharan Africa, and Western Sub-Saharan Africa, with rates of 4.89 per 100,000 (95% UI: 2.82 to 7.69 per 100,000), 4.89 per 100,000 (95% UI: 2.82 to 7.89 per 100,000), 4.2 per 100,000 (95% UI: 2.43 to 6.63 per 100,000), 4.86 per 100,000 (95% UI: 2.79 to 7.79 per 100,000), and 5.49 per 100,000 (95% UI: 3.2 to 8.74 per 100,000), respectively (Table 2 and Figure 2D).

National Burden of Seborrheic Dermatitis

Diving into individual nations, in 2021, the top five countries with the highest number of new cases of SD were India, China, the United States of America, Nigeria, and Indonesia, with respective figures of 24,250,615 cases, 22,668,834 cases, 6,208,936 cases, 5,689,372 cases, and 4,609,519 cases. The countries with the highest ASIR were Burkina Faso (2,431.49 per 100,000), Cameroon (2,466.80 per 100,000), Ghana (2,484.20 per 100,000), Guinea (2,431.52 per 100,000), and Nigeria (2,493.75 per 100,000) (Figure 3A and Supplementary Table S1). Additionally, only a few countries had ASIRs below 1,000 per 100,000, as detailed in Supplementary Table S1. Notably, the United States of America, the Syrian Arab Republic, and Yemen exhibited a slight decline in ASIR, with EAPC of −0.09722, −0.02277, and −0.01888, respectively (Figure 3B and Supplementary Table S1).

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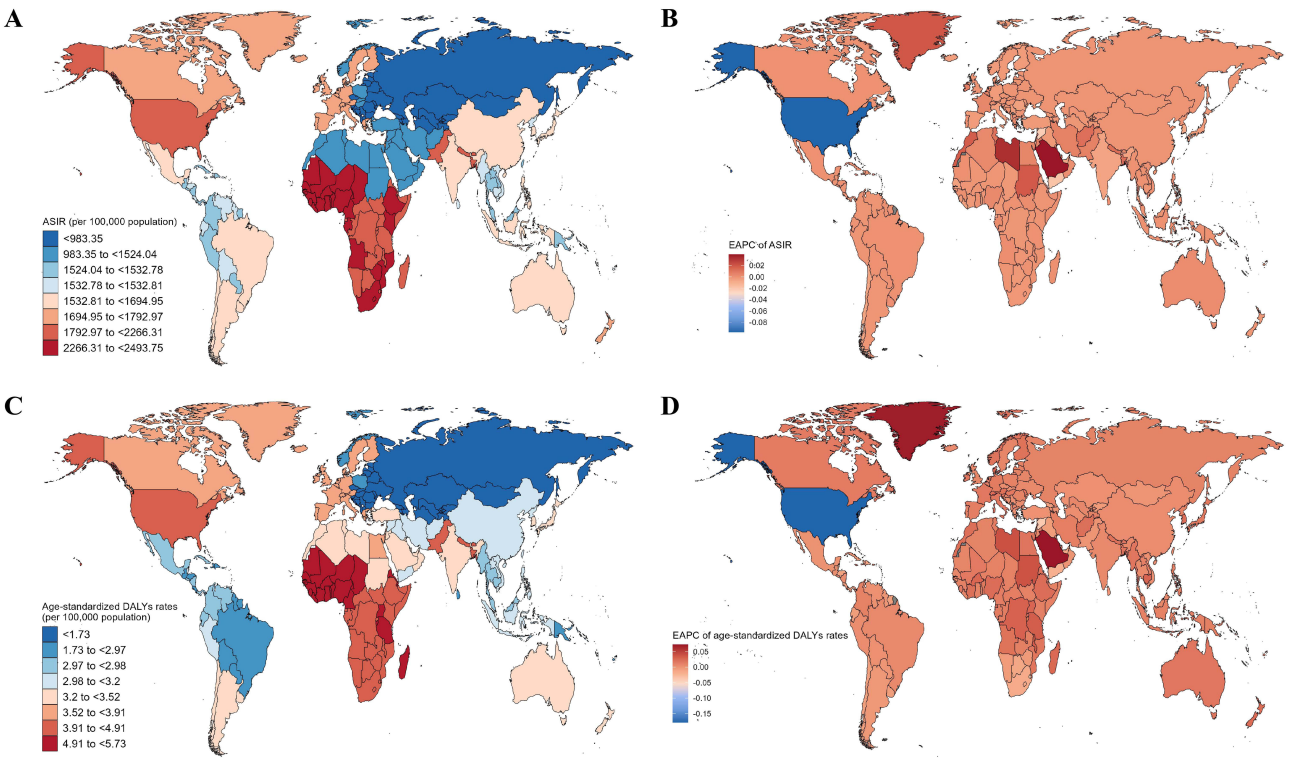

Figure 3 Distribution of Seborrheic Dermatitis Incidence and Disability-Adjusted Life Years (DALYs) Across 204 Countries and Territories. (**A**) Age-standardized incidence rates (ASIR) of seborrheic dermatitis in different countries for the year 2021. (**B**) Estimated Annual Percentage Change (EAPC) illustrating the trends in ASIR of seborrheic dermatitis across various countries from 1990 to 2021. (**C**) Age-standardized disability-adjusted life years (DALYs) of seborrheic dermatitis in different countries for the year 2021. (**D**) EAPC showing the trends in age-standardized DALYs of seborrheic dermatitis across different countries from 1990 to 2021.

Similarly, the number of DALYs varies across different countries and regions. In 2021, the top five countries with the highest number of SD DALYs were China, India, the United States of America, Nigeria, and Pakistan, with DALY counts of 47,749, 46,813, 16,916, 11,419, and 8,614, respectively. The countries with the highest age-standardized DALYs rates were Ghana (5.73 per 100,000), Cameroon (5.58 per 100,000), Mauritania (5.50 per 100,000), Guinea (5.49 per 100,000), and Togo (5.49 per 100,000) (Figure 3C and Supplementary Table S2). Although the age-standardized DALYs rates remained relatively stable across most countries from 1990 to 2021, Saudi Arabia, Greenland, Bahrain, Libya, and Sudan showed a slight upward trend, with EAPCs of 0.07258, 0.06939, 0.05296, 0.03959, and 0.03837, respectively (Figure 3D and Supplementary Table S2).

Correlation of Seborrheic Dermatitis Cases, Age-Standardized Rates, and EAPC

Analyzing the relationship between SD case numbers, ASIR, age-standardized DALYs rates, and EAPC across multiple countries and regions reveals interesting insights. Overall, the global trend for SD remains relatively stable, and we did not observe significant correlations between EAPC and ASIR, age-standardized DALYs rates, or the SDI ($p > 0.05$) (Figure 4A,B and Supplementary Figure S1A and B). To highlight regional and national differences, we found that at the regional level, there is a negative correlation between ASIR and SDI ($\rho = -0.435$, $p < 0.001$). This relationship is even more pronounced at the national level ($\rho = -0.586$, $p < 0.001$). Similarly, the relationship between age-standardized DALYs rates and SDI shows a negative correlation at both the regional ($\rho = -0.422$, $p < 0.001$) and national levels ($\rho = -0.584$, $p < 0.001$) (Figure 4C,D and Supplementary Figure S1C and D). These findings indicate that the burden of SD is associated with the economic level of different regions; specifically, regions with higher SDI levels tend to have a lower SD disease burden. This suggests that higher socio-economic status is linked to better management and lower incidence of SD, reflecting the impact of economic factors on health outcomes.

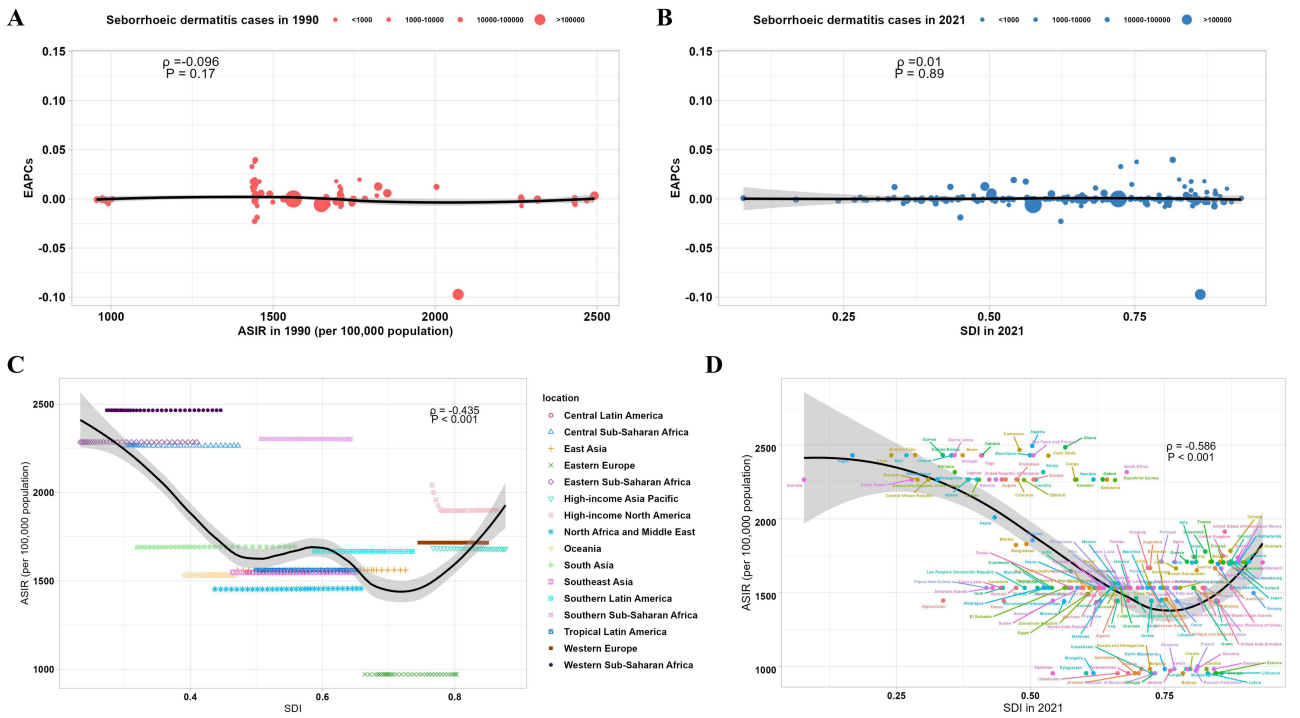

Figure 4 Correlation of EAPC, Incidence, and SDI of Seborrheic Dermatitis. (**A**) The correlation between Estimated Annual Percentage Change (EAPC) and age-standardized incidence rates (ASIR) of seborrheic dermatitis in 1990. (**B**) The correlation between EAPC and Socio-demographic Index (SDI) in 2021. (**C**) The relationship between ASIR of seborrheic dermatitis and SDI at the regional level. (**D**) The correlation between ASIR of seborrheic dermatitis and SDI at the national level.

Discussion

This study provides a comprehensive analysis of the global burden of SD from 1990 to 2021, revealing trends in disease burden across different periods and regions. Our findings indicate that while the global incidence and DALYs of SD have significantly increased, the ASIR and age-standardized DALYs rates have remained relatively stable This stability suggests that despite the overall increase in disease burden, the incidence and burden relative to the population have not changed significantly, potentially reflecting advances in global awareness and treatment of SD.

Recent research has made significant progress in understanding SD.[1,20–22] For instance, numerous factors associated with SD, including excessive sebaceous gland secretion, fungal infections (such as Malassezia), immune dysregulation, and genetic factors, have been identified.[23,24] Studies have highlighted the crucial role of Malassezia in the pathogenesis of SD, particularly in triggering inflammation and exacerbating the disease.[24] Recent findings also suggest that imbalances in the skin microbiome may contribute to SD development, prompting further exploration of the relationship between microbiomes and skin diseases.[24,25] Additionally, systemic conditions such as metabolic syndrome and mental health issues have been linked to SD, offering new perspectives on the disease's complex etiology.[26] Notably, some research points to metabolic abnormalities and insulin resistance as contributing factors to the inflammatory response in SD, suggesting the need for a comprehensive approach to patient management.[27]

Our findings on gender and age effects indicate that new SD cases are slightly more common in females than in males, with the highest incidence observed in the 15–49 age group and the most pronounced increase in ASIR occurring in the 0–14 age group. These results are consistent with previous studies suggesting that gender and age exert complex influences on SD.[28] For example, recent research suggests that SD manifests differently in children and elderly patients, with children often experiencing more severe skin inflammation and elderly patients facing additional comorbidities and quality-of-life issues.[29,30] These findings underscore the role of age and gender in SD pathogenesis and emphasize the need for personalized treatment strategies for different populations.

At the regional and national levels, we observed that lower economic status regions face a higher burden of SD. This phenomenon may be related to inadequate medical resources and public health infrastructure in these regions.[9] Studies

have shown that low-income countries and regions often face shortages in healthcare resources and public health infrastructure, resulting in underdiagnosis and insufficient treatment of SD, which in turn exacerbates the disease burden. This finding aligns with current understandings of global health disparities and underscores the urgent need to strengthen SD management in resource-limited settings.[31,32] Addressing the inequality in healthcare services for SD has become an important research focus.[32] Improving medical resources and technological capabilities in low-income countries and regions will be crucial in alleviating the burden of SD. For instance, countries with high SDI typically have better healthcare facilities and public health systems, which help reduce the burden of SD. This finding is consistent with the current understanding of healthcare management for SD, suggesting that high-income countries can provide more effective treatment and interventions, thereby reducing the disease burden. Recent research is also exploring new treatment methods, such as targeted immune modulation and microbiome interventions, which hold promise for further improving SD management.[33,34] Specifically, the use of topical immunosuppressants and biologics has shown potential in improving disease conditions, while interventions targeting the skin microbiome may alleviate symptoms by balancing skin microecology.[35,36] Additionally, the introduction of new drugs and therapies will help provide more effective treatment options for patients.[1,35]

Although our study provides important data on SD burden, further research is needed to uncover other factors influencing disease burden, such as environmental factors, genetic susceptibility, and treatment efficacy.[7,13] As our understanding of SD pathogenesis deepens, future research could focus on identifying new therapeutic targets and optimizing existing treatment strategies to further improve patient quality of life.[35] Improving interventions in resource-limited areas is essential for mitigating the global burden of SD.[34] Furthermore, fostering interdisciplinary research and international collaboration is vital for gaining a thorough understanding of the complex etiology of SD. This approach will facilitate the development of comprehensive and integrated treatment strategies, leading to more effective global management and control of the disease.[5,37]

Overall, this study highlights that while the global incidence and total DALYs of seborrheic dermatitis have increased, the age-standardized rates have remained stable Economic factors significantly influence the disease burden, with higher-SDI regions experiencing lower impacts. Addressing seborrheic dermatitis in resource-limited areas and promoting international research and collaboration are essential for effective management and reducing its global impact.

Data Sharing Statement

The data are available from the Global Burden of Disease Results Tool of the Global Health Data Exchange (http://ghdx.healthdata.org/).

Ethics Approval and Consent to Participate

This study was approved by the Ethics Committee of Tianjin Academy of Traditional Chinese Medicine Affiliated Hospital in line with the Declaration of Helsinki. As a result of the secondary data analysis in this study, the review board waived informed consent. Additionally, this article does not contain any personal information about patients. All authors are in agreement with the manuscript.

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.

Disclosure

The authors declare no conflicts of interest in this work.

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