Burden of skin disease and associated socioeconomic status in Europe: An ecologic study from the Global Burden of Disease Study 2017

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Introduction: Dermatoses contribute to a large burden of global disease, but the relationship between socioeconomic status and the effect of dermatologic conditions in Europe is not well understood.

Methods: We selected Global Burden of Disease Study data sets to analyze disability-adjusted life-years (DALYs) and the annual rate of change of dermatoses between 1990 and 2017 in 43 European countries. The principal country-level economic factor used was gross domestic product per capita from the World Bank. Statistical analysis was performed with Spearman ρ correlation.

Results: Wealthier European countries had higher DALYs for melanoma, basal cell carcinoma, psoriasis, atopic dermatitis, acne, seborrheic dermatitis, alopecia, asthma, contact dermatitis, and viral skin disease. Poorer countries had higher DALYs of squamous cell carcinoma, urticaria, decubitus ulcers, pruritus, scabies, tuberculosis, and syphilis. Thirteen European countries were in the top 10th percentile globally for annual increase in skin and subcutaneous disease burden.

Conclusion: The majority of European countries have experienced an increase in skin and subcutaneous diseases in recent decades relative to the rest of the world, but the burden of individual dermatoses in Europe varies by country and socioeconomic status. DALYs can potentially serve as a purposeful measure for directing resources to improve the burden of skin disease in Europe. (JAAD Int 2020;1:95-103.)

Key words: age-standardized prevalence rates; atopic dermatitis; basal cell carcinoma; DALYs; disability-adjusted life-years; GBD; GDP; Global Burden of Disease Study database; global medicine; gross domestic product per capita; health care disparities; health equity; melanoma; NMSC; nonmelanoma skin cancer; pruritus; psoriasis; scabies; socioeconomic status; squamous cell carcinoma; syphilis; tuberculosis; urticaria; viral skin diseases.

INTRODUCTION

Skin conditions are one of the leading contributors to the global burden of disease. They affect people of all cultures and ages and are associated with substantial morbidity. Skin and subcutaneous diseases were the fourth leading cause of nonfatal disease burden and disability worldwide in 2010 and 2013, emphasizing dermatology's expanding role

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and importance in global health.[1,2] Skin disease burden can be measured with disability-adjusted life-years (DALYs), calculated as the sum of the years lost because of premature death and years lost because of living with disability.[3] The burden of dermatoses has been steadily increasing; the total DALYs globally caused by skin and subcutaneous diseases increased from 1.21% in 1990 to 1.76% in 2017.[4] Certain cutaneous disorders have been shown to cause a disproportionate number of DALYs in relation to their corresponding prevalence, such as fungal skin diseases, atopic dermatitis, and scabies.[5]

Socioeconomic factors play a major role in skin disease morbidity and quality of life. The Socio-Demographic Index was developed to identify where countries or other geographic areas are in their aspects of development. It is a composite average of income per capita, average educational attainment, and fertility rate and expressed on a scale of 0 to 1.[6] Socioeconomic burden in part depends on health care delivery models, the availability of therapy for skin diseases, and the cost of medications.[7] Across geographic borders, the burden of skin disease varies. For example, Western Europe experiences a greater burden from psoriasis and acne vulgaris,[2] and additionally it shows the highest total rate of DALYs from skin disease compared with Central and Eastern Europe.[2]

Although skin disease is prevalent throughout Europe, the relationship between socioeconomic status and skin burden of disease is not well understood. Understanding the geographic variations in skin disease burden provides information that can help address these inequalities. This observational study compared the relationship between socioeconomic status and burden of skin disease in Europe in 2017 and investigated the annual percentage change of common skin diseases between 1990 and 2017.

CAPSULE SUMMARY

- Understanding the regional effect of dermatologic disease is critical to developing a concerted and sustained global effort toward reducing this burden.
- A relationship exists between socioeconomic status, geographic location, and certain dermatoses. Resources should be directed at countries with high disability-adjusted life-years to create influential interventions in Europe.

METHODS

Data source

The principal country-level economic factor used to measure socioeconomic status was 2017 data for gross domestic product per capita from the World Bank.[8] Information on the DALYs of the most common dermatoses was obtained from the latest publicly available Global Burden of Disease Study 2017 data sets, which provide data to compare the effect of diseases, injuries, and risk factors across age groups, sexes, countries, and regions from 1990 to the present for greater than 350 diseases in 195 countries.[9] The Global Burden of Disease Study project is led by the Institute for Health Metrics and Evaluation at the University of Washington and collaborates with greater than 145 countries and 3600 researchers worldwide.[9] A detailed protocol is available from the institute on how data are obtained, incorporated, calculated, and published in the Global Burden of Disease Study.[10]

Study design

This study was an ecologic observational analysis including the entire European population. Individual European country demographics are provided (Table I). A global map of the percentage change of age-standardized prevalence rates of skin and subcutaneous disease per 100,000 population from 1990 to 2017 of all 195 Global Burden of Disease Study countries is provided (Fig 1). Age-standardized DALYs per 100,000 of skin and subcutaneous diseases, melanoma, and nonmelanoma skin cancers were also compared with the absolute Socio-Demographic Index values of 43 European countries in 2017 (Figs 2 and 3).

Statistical analysis

Three broad categories of dermatoses were analyzed for each European country: neoplastic, inflammatory, and infectious. Statistical analysis of correlations (Spearman ρ) was performed with SPSS Statistics (version 25.0, IBM Corp, Armonk, NY). Statistical significance was set at $P < .05$. European countries were organized in a heat table by gross domestic product per capita by least wealthy (top rows) to most wealthy (bottom rows) and DALYs ranking of each country were numerically ranked from 1 (highest DALYs, red) to 195 (lowest DALYs, blue) for each disease analyzed (Fig 4). A positive correlation between gross domestic product per capita and DALYs ranking showed that as a country's gross domestic product per capita increased, the DALYs ranking approached 195 (lower DALYs), whereas a negative correlation signified that as gross domestic product per capita increased, the DALYs

Abbreviations used:

BCC: basal cell carcinoma
DALY: disability-adjusted life-year
SCC: squamous cell carcinoma

ranking approached 1 (higher DALYs). Additionally, by using the DALYs per 100,000 in European countries and all 195 countries worldwide between 1990 and 2017, we measured the annual percentage change of skin and subcutaneous diseases, melanoma, nonmelanoma skin cancer, basal cell carcinoma (BCC), squamous cell carcinoma (SCC), lip and oral cancer, seborrheic dermatitis, contact dermatitis, pruritus, pyoderma, decubitus ulcer, cellulitis, fungal infection, and tuberculosis (Table II).

RESULTS

European countries were shown to have a cluster of high skin and subcutaneous disease burden when the global map of percentage change in age-standardized prevalence rate from 1990 to 2017 was examined (Fig 1). In comparison of the geographic regions of Europe, Western Europe showed a higher percentage change compared with Eastern European countries.

When age-standardized DALYs rates caused by skin and subcutaneous diseases in 2017 were compared, several European countries, such as Norway, Sweden, France, Greenland, and the United Kingdom, had higher-than-expected age-standardized DALYs rates according only to their Socio-Demographic Index score (Fig 2). Other countries, including Macedonia, Montenegro, Slovak Republic, Lithuania, and Slovenia, had lower-than-expected age-standardized DALYs rates. A similar comparison was performed of age-standardized DALYs rates caused by melanoma and nonmelanoma skin cancer and associated Socio-Demographic Index score in 2017 across the same countries (Fig 3). Norway, Sweden, Denmark, Slovenia, and the Netherlands were among the countries with a higher-than-expected age-standardized DALYs rate caused by melanoma, whereas others such as Montenegro, Cyprus, Spain, and Malta had a much lower-than-expected rate. The difference in age-standardized DALYs rates was not as prevalent when nonmelanoma skin cancer was assessed.

For the neoplastic category, there was a positive correlation between DALYs rankings and gross domestic product per capita for SCC (0.68) (Fig 4). In contrast, there was a negative correlation for BCC (−0.54) and melanoma (−0.31). For the inflammatory category, there was a positive correlation between DALYs rankings and gross domestic product per capita for urticaria (0.73), decubitus ulcer (0.61), and pruritus (0.70) and a negative correlation for acne (−0.88), psoriasis (−0.89), atopic dermatitis (−0.81), seborrheic dermatitis (−0.72), alopecia (−0.66), asthma (−0.68), and contact dermatitis (−0.67). Last, for the infectious category, there was a positive correlation between DALYs rankings and gross domestic product per capita for scabies (0.74), tuberculosis (0.75), and syphilis (0.38) and a negative correlation for viral skin diseases (−0.76).

Between 1990 and 2017, 13 European countries were in the top 10th percentile in the world for annual percentage change in skin and subcutaneous disease, including Malta (first), Portugal (sixth), Germany (seventh), and Cyprus (ninth) (Table II). Lithuania (fifth) and Belarus (ninth) ranked in the top 10 globally for annual percentage change in melanoma DALYs, whereas Bosnia and Herzegovina (eighth) was within the top 10 for nonmelanoma skin cancer. Regarding BCC, Portugal (second), Romania (third), Poland (fourth), and Germany (fifth) were part of the top 10 countries, whereas Bosnia and Herzegovina (eighth) was ranked in the top 10 for SCC. Fungal infections were highly prevalent in Europe, with 13 countries composing the top 20 countries worldwide for annual change: Malta (third), Lithuania (fifth), Greece (sixth), Slovenia (eighth), and Portugal (ninth) were in the top 10. Additionally, 4 European countries made up the top 10th percentile for annual change in tuberculosis, with Ukraine ranked third.

DISCUSSION

Our results showed that wealthier European countries had higher DALYs of BCC, melanoma, acne, psoriasis, atopic dermatitis, seborrheic dermatitis, alopecia, asthma, contact dermatitis, and viral skin diseases. On the other hand, European countries with lower socioeconomic status had higher DALYs of SCC, urticaria, decubitus ulcer, pruritus, scabies, tuberculosis, and syphilis.

European countries with a higher gross domestic product per capita have been strongly associated with increased risk of melanoma and nonmelanoma skin cancer.[12-14] It is suggested this risk is due to increased ultraviolet exposure from more frequent sun-seeking trips in more affluent regions.[12] Although high socioeconomic status is strongly associated with BCC risk, this association is weaker in SCC.[13] BCC arises de novo with no precursor lesions, whereas SCC precursor lesions include actinic keratoses and Bowen disease, suggesting

Table I. European country profiles[11]

Country	Population	Per-capita GDP, $	Fertility rate	Educational attainment, years	Female life expectancy, years	Male life expectancy, years	Mortality <5	Mortality <1
Albania	2.8M	11,466	1.9	10.2	82.1	75.0	12.7	10.7
Andorra	80.0K	69,202	1.2	13.3	85.1	80.6	1.9	1.1
Armenia	3.0M	8505	1.6	12.1	78.7	72.4	9.6	8.1
Austria	8.8M	45,465	1.5	13.0	84.0	79.4	3.4	2.9
Azerbaijan	10.2M	16,349	2.0	11.3	74.7	67.2	35.2	30.9
Belarus	9.5M	18,282	1.6	12.4	78.8	66.1	6.5	5.1
Belgium	11.3M	42,569	1.7	14.1	83.8	78.9	3.6	3.0
Bosnia and Herzegovina	3.4M	10,762	1.3	10.5	79.1	74.3	6.4	5.6
Bulgaria	7.1M	18,957	1.5	13.5	78.6	71.3	7.7	6.5
Croatia	4.3M	22,271	1.4	13.2	81.6	75.4	4.3	3.6
Cyprus	1.3M	31,531	1.0	13.2	85.2	78.5	2.9	2.5
Czech Republic	10.6M	32,611	1.6	13.5	82.0	76.3	2.9	2.3
Denmark	5.7M	45,244	1.7	15.0	82.7	78.8	3.7	3.3
Estonia	1.3M	28,542	1.6	14.2	82.1	73.7	3.0	2.2
Finland	5.5M	40,215	1.6	14.5	84.3	78.6	2.2	1.8
France	65.7M	38,992	1.8	13.7	85.7	79.8	3.9	3.1
Georgia	3.7M	9486	2.0	12.8	77.3	68.4	11.1	9.5
Germany	83.3M	45,446	1.4	13.0	83.0	78.3	3.6	3.0
Greece	10.4M	25,232	1.4	12.4	83.6	78.4	4.5	3.8
Hungary	9.7M	26,491	1.4	12.8	80.2	73.2	4.8	4.1
Iceland	337.5K	47,062	1.8	15.1	85.9	79.8	2.2	1.5
Ireland	4.9M	64,037	1.8	13.1	83.7	80.0	3.4	3.0
Italy	60.6M	35,079	1.3	12.6	85.3	80.8	3.2	2.7
Kazakhstan	17.9M	23,781	2.4	11.4	76.4	67.5	14.1	11.3
Latvia	1.9M	24,227	1.6	13.6	79.9	70.2	4.9	4.0
Lithuania	2.8M	28,645	1.6	13.7	80.2	69.6	4.8	3.9
Luxembourg	590.5K	97,887	1.5	14.0	83.3	80.0	2.1	1.7
Malta	434.5K	36,920	1.5	12.5	83.0	78.9	6.0	5.4
Moldova	3.7M	4915	1.3	11.9	77.4	68.2	14.4	12.7
Montenegro	626.3K	15,716	1.7	13.0	78.9	74.1	4.0	3.3
Netherlands	17.0M	48,405	1.7	14.5	83.1	79.9	3.9	3.3
North Macedonia	2.2M	13,628	1.5	11.9	79.7	73.9	9.6	8.6
Norway	5.3M	63,501	1.7	14.1	84.2	80.5	2.6	2.0
Poland	38.4M	26,735	1.3	13.8	81.8	74.1	4.4	3.8
Portugal	10.7M	28,158	1.3	10.9	84.2	78.5	3.4	2.8
Romania	19.4M	22,535	1.6	12.8	79.0	71.6	8.7	7.3
Russia	146.2M	24,427	1.6	12.5	77.2	66.8	7.4	6.0
Serbia	8.9M	13,959	1.4	11.8	77.9	73.6	5.0	4.4
Slovakia	5.4M	30,067	1,4	13.6	80.6	74.1	5.9	5.0
Slovenia	2.1M	31,251	1.5	13.8	84.2	77.9	2.2	1.7
Spain	46.4M	34,908	1.4	11.9	85.8	80.2	3.2	2.6
Sweden	10.0M	46,388	1.8	13.7	84.2	80.8	2.7	2.3
Switzerland	8.6M	56,296	1.5	12.9	85.7	82.1	3.8	3.3
Turkey	80.5M	22,903	1.8	10.1	83.1	75.2	14.2	11.5
Ukraine	44.7M	8548	1.4	13.1	76.5	64.7	9.5	7.5
United Kingdom	66.6M	39,708	1.7	12.8	82.7	79.2	4.4	3.8

All data are from 2017. Mortality rates less than 1 and less than 5 are measured in deaths per 1,000 live births. Total fertility rate is the average number of children a woman would deliver during her lifetime.
GDP, Gross domestic product; *K*, thousand; *M*, million.

that their etiologies may differ.[15] Additionally, SCC has been shown to be associated with occupational sun exposure (high lifetime cumulative exposure to ultraviolet radiation), whereas melanoma and BCC have been associated with recreational or nonoccupational sun exposure.[16,17] Our results show that

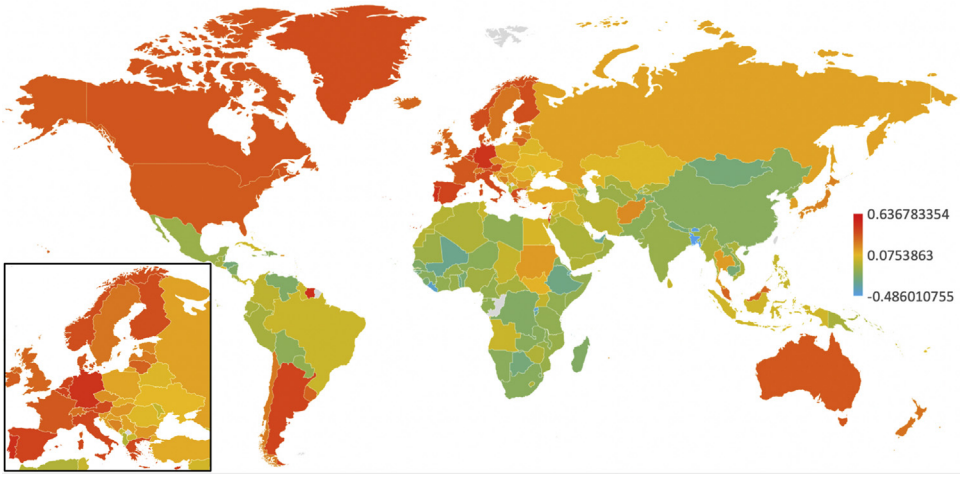


Fig 1. Percentage change in age-standardized prevalence rate of skin and subcutaneous disease per 100,000 population from 1990 to 2017.

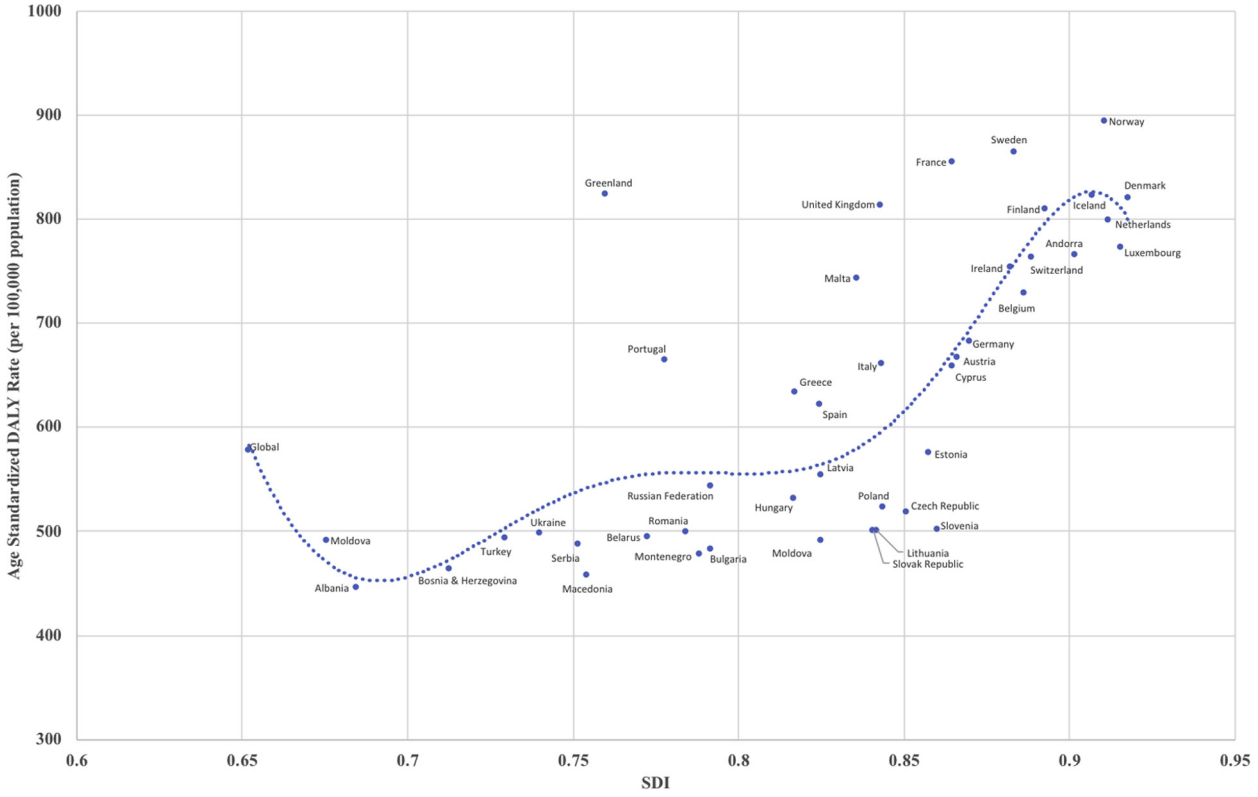


Fig 2. Age-standardized disability-adjusted life-years rates from skin and subcutaneous disease by Socio-Demographic Index score for European countries in 2017. *DALY*, Disability-adjusted life-year; *SDI*, Socio-Demographic Index.

SCC is higher in poorer European countries, which may be explained by an increase of outdoor working environments.

Poverty is a major risk factor for poor health because of the lack of decent living standards, sanitation, and clean water.[18] Resource-poor environments cause high morbidity rates, especially for transmissible skin diseases.[19] Common and treatable transmissible skin diseases are associated with household crowding and lack of hygiene, which are reflections of low socioeconomic status.[20,21] Our results demonstrated that countries with lower gross

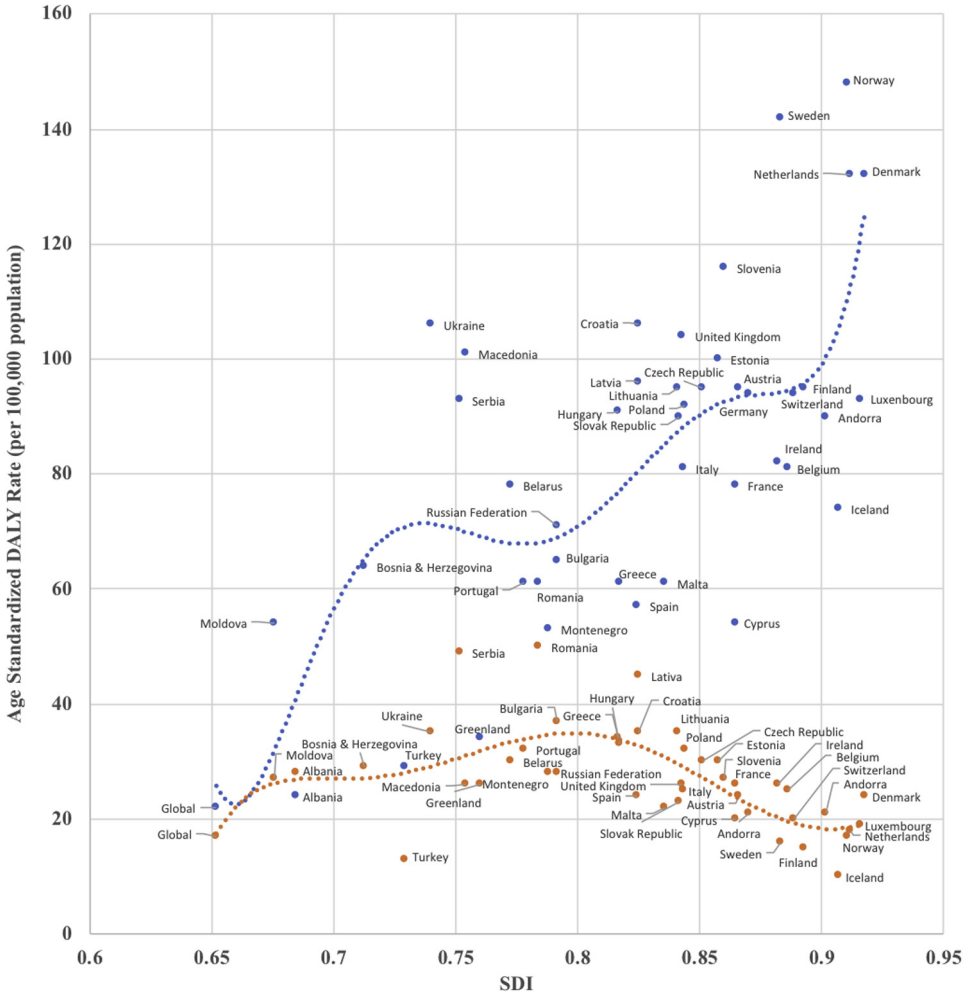
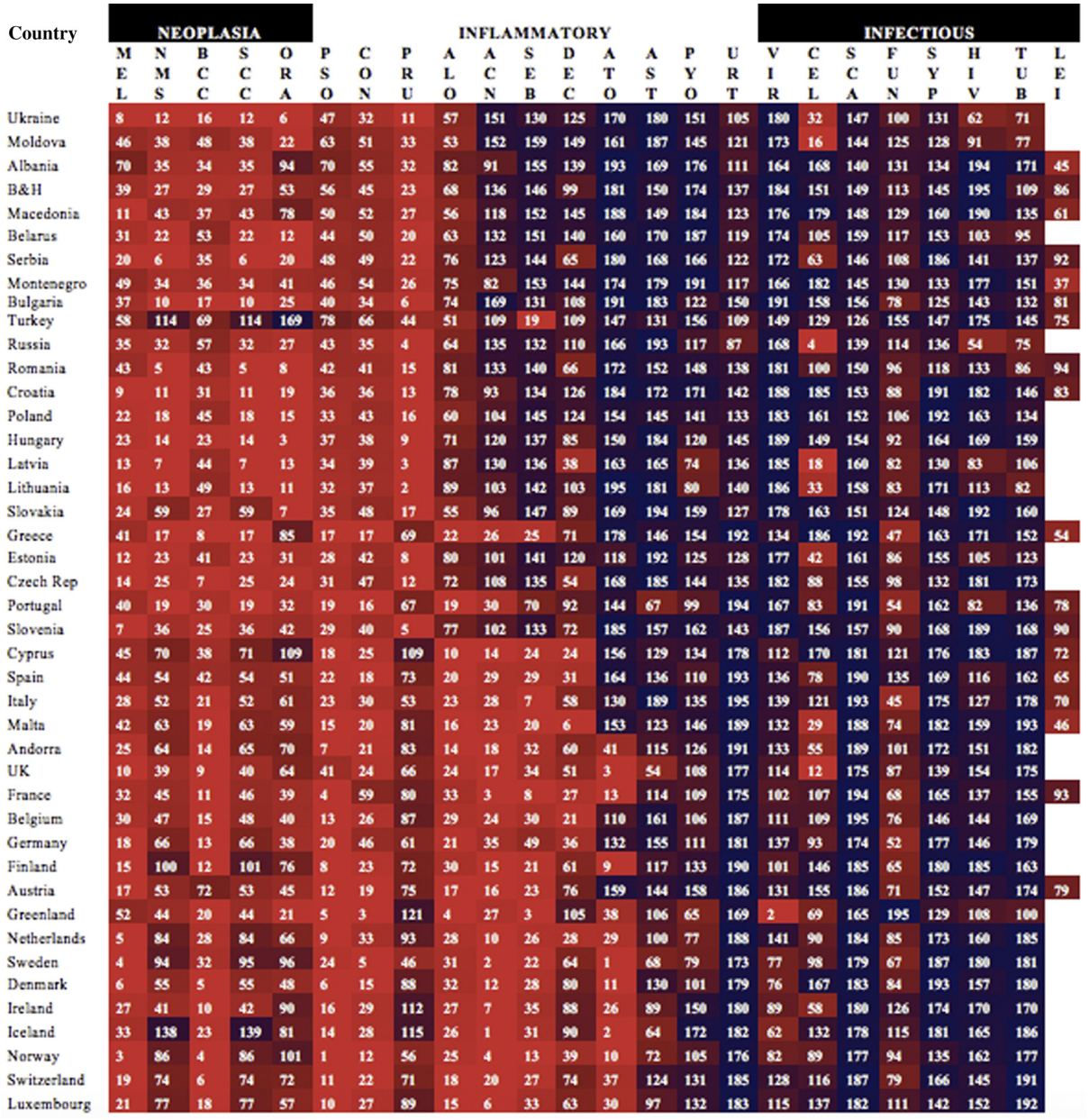


Fig 3. Age-standardized disability-adjusted life-years rates from melanoma (blue) and nonmelanoma skin cancer (orange) by Socio-Demographic Index score for European countries in 2017. *DALY*, Disability-adjusted life-year; *SDI*, Socio-Demographic Index.

domestic product per capita had higher DALYs of many infectious dermatoses, such as scabies, tuberculosis, and syphilis, which could be due to housing and living situation discrepancy.[7]

We found psoriasis burden to be greatest in high-income European countries. Previous studies of patients in the United States and France have shown a significant association between lower educational level and poor control and severity of psoriasis.[22,23] In contrast, a recent study examining psoriasis on a global scale showed a higher burden of psoriasis in high-income countries, with Western Europe ranking second in a regional comparison of psoriasis prevalence.[24]

It has been reported that higher socioeconomic status is associated with a higher prevalence and DALYs of atopic diseases.[25] A link between atopic diseases and particulate air pollution from motor vehicles has been previously shown.[26] Furthermore, individuals living in a metropolitan area and higher educational levels have been associated with a higher prevalence of eczema.[27] The "hygiene hypothesis" proposes that the increased prevalence of allergic diseases in more developed countries is explained by improved living conditions, antibiotic use, and childhood vaccinations, resulting in the reduction of infections. The immunologic mechanism underlying the hygiene hypothesis is not well understood, but one mechanism suggests that the lack of microbial burden in developed countries redirects the typical immunoresponse from a strong T helper cell type 1 immunity toward a T helper cell type 2 phenotype, predisposing the host to allergic disorders.[28] Our results support these findings because wealthier European countries presented with higher DALYs caused by atopic dermatitis, which is possibly explained by the increased prevalence in the region.



Country	NEOPLASIA					INFLAMMATORY											INFECTIOUS							
	MEL	NMS	BCC	SCC	ORA	PSO	CON	PRU	ALO	ACN	SEB	DEC	ATO	AST	PYO	URT	VIR	CEL	SCA	FUN	SYP	HIV	TUB	LEI
Ukraine	8	12	16	12	6	47	32	11	57	151	130	125	170	180	151	105	180	32	147	100	131	62	71	
Moldova	46	38	48	38	22	63	51	33	53	152	159	149	161	187	145	121	173	16	144	125	128	91	77	
Albania	70	35	34	35	94	70	55	32	82	91	155	139	193	169	176	111	164	168	140	131	134	194	171	45
B&H	39	27	29	27	53	56	45	23	68	136	146	99	181	150	174	137	184	151	149	113	145	195	109	86
Macedonia	11	43	37	43	78	50	52	27	56	118	152	145	188	149	184	123	176	179	148	129	160	190	135	61
Belarus	31	22	53	22	12	44	50	20	63	132	151	140	160	170	187	119	174	105	159	117	153	103	95	
Serbia	20	6	35	6	20	48	49	22	76	123	144	65	180	168	166	122	172	63	146	108	186	141	137	92
Montenegro	49	34	36	34	41	46	54	26	75	82	153	144	174	179	191	117	166	182	145	130	133	177	151	37
Bulgaria	37	10	17	10	25	40	34	6	74	169	131	108	191	183	122	150	191	158	156	78	125	143	132	81
Turkey	58	114	69	114	169	78	66	44	51	109	19	109	147	131	156	109	149	129	126	155	147	175	145	75
Russia	35	32	57	32	27	43	35	4	64	135	132	110	166	193	117	87	168	4	139	114	136	54	75	
Romania	43	5	43	5	8	42	41	15	81	133	140	66	172	152	148	138	181	100	150	96	118	133	86	94
Croatia	9	11	31	11	19	36	36	13	78	93	134	126	184	172	171	142	188	185	153	88	191	182	146	83
Poland	22	18	45	18	15	33	43	16	60	104	145	124	154	145	141	133	183	161	152	106	192	163	134	
Hungary	23	14	23	14	3	37	38	9	71	120	137	85	150	184	120	145	189	149	154	92	164	169	159	
Latvia	13	7	44	7	13	34	39	3	87	130	136	38	163	165	74	136	185	18	160	82	130	83	106	
Lithuania	16	13	49	13	11	32	37	2	89	103	142	103	195	181	80	140	186	33	158	83	171	113	82	
Slovakia	24	59	27	59	7	35	48	17	55	96	147	89	169	194	159	127	178	163	151	124	148	192	160	
Greece	41	17	8	17	85	17	17	69	22	26	25	71	178	146	154	192	134	186	192	47	163	171	152	54
Estonia	12	23	41	23	31	28	42	8	80	101	141	120	118	192	125	128	177	42	161	86	155	105	123	
Czech Rep	14	25	7	25	24	31	47	12	72	108	135	54	168	185	144	135	182	88	155	98	132	181	173	
Portugal	40	19	30	19	32	19	16	67	19	30	70	92	144	67	99	194	167	83	191	54	162	82	136	78
Slovenia	7	36	25	36	42	29	40	5	77	102	133	72	185	157	162	143	187	156	157	90	168	189	168	90
Cyprus	45	70	38	71	109	18	25	109	10	14	24	24	156	129	134	178	112	170	181	121	176	183	187	72
Spain	44	54	42	54	51	22	18	73	20	29	29	31	164	136	110	193	136	78	190	135	169	116	162	65
Italy	28	52	21	52	61	23	30	53	23	28	7	58	130	189	135	195	139	121	193	45	175	127	178	70
Malta	42	63	19	63	59	15	20	81	16	23	20	6	153	123	146	189	132	29	188	74	182	159	193	46
Andorra	25	64	14	65	70	7	21	83	14	18	32	60	41	115	126	191	133	55	189	101	172	151	182	
UK	10	39	9	40	64	41	24	66	24	17	34	51	3	54	108	177	114	12	175	87	139	154	175	
France	32	45	11	46	39	4	59	80	33	3	8	27	13	114	109	175	102	107	194	68	165	137	155	93
Belgium	30	47	15	48	40	13	26	87	29	24	30	21	110	161	106	187	111	109	195	76	146	144	169	
Germany	18	66	13	66	38	20	46	61	21	35	49	36	132	155	111	181	137	93	174	52	177	146	179	
Finland	15	100	12	101	76	8	23	72	30	15	21	61	9	117	133	190	101	146	185	65	180	185	163	
Austria	17	53	72	53	45	12	19	75	17	16	23	76	159	144	158	186	131	155	186	71	152	147	174	79
Greenland	52	44	20	44	21	5	3	121	4	27	3	105	38	106	65	169	2	69	165	195	129	108	100	
Netherlands	5	84	28	84	66	9	33	93	28	10	26	28	29	100	77	188	141	90	184	85	173	160	185	
Sweden	4	94	32	95	96	24	5	46	31	2	22	64	1	68	79	173	77	98	179	67	187	180	181	
Denmark	6	55	5	55	48	6	15	88	32	12	28	80	11	130	101	179	76	167	183	84	193	157	180	
Ireland	27	41	10	42	90	16	29	112	27	7	35	88	26	89	150	180	89	58	180	126	174	170	170	
Iceland	33	138	23	139	81	14	28	115	26	1	31	90	2	64	172	182	62	132	178	115	181	165	186	
Norway	3	86	4	86	101	1	12	56	25	4	13	39	10	72	105	176	82	89	177	94	135	162	177	
Switzerland	19	74	6	74	72	11	22	71	18	20	27	74	37	124	131	185	128	116	187	79	166	145	191	
Luxembourg	21	77	18	77	57	10	27	89	15	6	33	63	30	97	132	183	115	137	182	111	142	152	192	

Fig 4. European countries ordered with rows from highest (least wealthy) to lowest (most wealthy) and each country numerically ranked in the world from 1 (highest disability-adjusted life-years, red) to 195 (lowest disability-adjusted life-years, blue) for each disease in 2017. *ACN*, Acne; *ALO*, alopecia areata; *AST*, asthma; *ATO*, atopic dermatitis; *BCC*, basal cell carcinoma; *B&H*, Bosnia and Herzegovina; *CEL*, cellulitis; *CON*, contact dermatitis; *DEC*, decubitus ulcer; *FUN*, fungal skin disease; *LEI*, leishmaniasis; *MEL*, melanoma; *NMS*, nonmelanoma skin cancer; *ORA*, oral/lip cancer; *PRU*, pruritus; *PSO*, psoriasis; *PYO*, pyoderma; *Rep*, Republic; *SCA*, scabies; *SCC*, squamous cell carcinoma; *SEB*, seborrheic dermatitis; *SYP*, syphilis; *TUB*, tuberculosis; *UK*, United Kingdom; *URT*, urticaria; *VIR*, viral skin disease.

Limitations of the Global Burden of Disease Study have been described, including inconsistent reporting of mortality by skin disease in assessing DALYs.[7] Disability reflects only symptoms such as itch and appearance including disfigurement, not capturing other complications such as secondary infection and mental illness. There are also potential limitations inherent in our descriptive study design and population, including the ecologic fallacy. It is possible that there are confounding intrinsic or extrinsic systematic differences between individuals of different countries, such as Fitzpatrick skin types or

Table II. Notable top 10th percentile world rankings of European countries by annual percentage change from 1990 to 2017, measured in disability-adjusted life-years per 100,000

Disease	European country	World ranking
Skin and subcutaneous disease	Malta	1
	Portugal	6
	Germany	7
	Cyprus	9
	Spain	10
	Belgium	11
	Netherlands	13
	Italy	14
	Greece	15
	Austria	16
	Greenland	17
	Norway	18
	Finland	19
Melanoma	Lithuania	5
	Belarus	9
	Greece	12
	Latvia	15
	Portugal	16
	Bulgaria	17
	Ukraine	19
Nonmelanoma skin cancer	Bosnia and Herzegovina	8
	Macedonia	13
	Latvia	14
BCC	Portugal	2
	Romania	3
	Poland	4
	Germany	5
	Netherlands	11
	Serbia	13
	Slovenia	15
	Cyprus	16
	Latvia	17
SCC	Bosnia and Herzegovina	8
	Macedonia	13
	Latvia	14
Lip and oral cancer	Romania	6
	Ukraine	19
Seborrheic dermatitis	Greenland	3
Contact dermatitis	Albania	5
Pruritus	Albania	3
	Bosnia and Herzegovina	7
Pyoderma	Ukraine	11
	Belgium	13
	Netherlands	20
Decubitus ulcer	Bosnia and Herzegovina	20
Cellulitis	Ukraine	10
	United Kingdom	16
Fungal infection	Malta	3
	Lithuania	5
	Greece	6
	Slovenia	8
	Portugal	9
	Croatia	11
	Italy	12
	Spain	13
	Latvia	14
	Bulgaria	16
	Estonia	17
	Finland	18
	Bosnia and Herzegovina	20
Tuberculosis	Ukraine	3
	Russia	10
	Belarus	11
	Lithuania	16

BCC, Basal cell carcinoma; *SCC*, squamous cell carcinoma.

environmental factors such as climate or air pollution. Future studies with an analytic approach on an individual level may be warranted before potential public health solutions are addressed. Despite these limitations, understanding the relationship between socioeconomic status on geographic burden of common skin diseases is a valuable step in developing measurable, influential, and sustainable interventions to reduce disease morbidity in both resource-rich and -poor countries.

Dermatologic diseases pose significant burdens on the health status and quality of life for patients. Europe in particular is heavily affected by skin and subcutaneous diseases; 13 European countries are in the top 10th percentile for annual change in these diseases worldwide. To adequately address these issues, efforts should be focused on dermatoses with the highest DALYs in their respective countries.

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