The Global Burden of Skin Disease in 2010: An Analysis of the Prevalence and Impact of Skin Conditions

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The Global Burden of Disease (GBD) Study 2010 estimated the GBD attributable to 15 categories of skin disease from 1990 to 2010 for 187 countries. For each of the following diseases, we performed systematic literature reviews and analyzed resulting data: eczema, psoriasis, acne vulgaris, pruritus, alopecia areata, decubitus ulcer, urticaria, scabies, fungal skin diseases, impetigo, abscess, and other bacterial skin diseases, cellulitis, viral warts, molluscum contagiosum, and non-melanoma skin cancer. We used disability estimates to determine nonfatal burden. Three skin conditions, fungal skin diseases, other skin and subcutaneous diseases, and acne were in the top 10 most prevalent diseases worldwide in 2010, and eight fell into the top 50; these additional five skin problems were pruritus, eczema, impetigo, scabies, and molluscum contagiosum. Collectively, skin conditions ranged from the 2nd to 11th leading cause of years lived with disability at the country level. At the global level, skin conditions were the fourth leading cause of nonfatal disease burden. Using more data than has been used previously, the burden due to these diseases is enormous in both high- and low-income countries. These results argue strongly to include skin disease prevention and treatment in future global health strategies as a matter of urgency.

Journal of Investigative Dermatology (2014) **134,** 1527–1534; doi:10.1038/jid.2013.446; published online 21 November 2013

INTRODUCTION

Skin disease is one of the most common human illnesses. It pervades all cultures, occurs at all ages, and affects between 30% and 70% of individuals, with even higher rates in at-risk subpopulations (NHANES, 1978; Bickers *et al.*, 2006; Scholfield *et al.*, 2009; Hay and Fuller, 2012). Its detrimental effects on health range from physical incapacity to death (Basra and Shahrukh, 2009). Children and their families often bear the brunt of this disease burden (Mahe, 2005). The International Classification of Disease 10 classification of human disease lists more than 1,000 skin or skin-related illnesses, a pattern dominated by a few conditions accounting for most of the skin disease burden. Yet despite this profound impact, skin disease continues to receive relatively little attention in the national or global health debate.

Previous attempts have been made to estimate the prevalence and health impact of skin diseases (Murray and Lopez, 1996; Global Burden of Disease, 2008) but these have relied on epidemiological studies, analytical methods, and disability weighting, which had flaws (Salomon, 2010). The Global Burden of Disease Study 2010 (GBD 2010) attempts to rectify these limitations. It provides consistent estimates of disease prevalence, incidence, mortality, and disability for 261 conditions in 187 countries, by 20-year age groups, by sex, from 1990 to 2010 (Salomon *et al.*, 2012; Vos *et al.*, 2012) using systematic reviews of the published literature but analyzed with the aid of a Bayesian program, which provides for missing data. Disability was assessed by weighting the comparative severity of the sequelae of diseases and estimating their contribution to total health loss over time. These estimates provide key information to global bodies such as the World Bank (Murray *et al.*, 2013) and national and regional institutions by identifying need, informing policy, and contributing to evidence-based resource allocation. This paper describes the methods adopted to assess the global burden of skin disease as part of GBD 2010. Fifteen common subcategories of skin conditions were selected for analysis: eczema, psoriasis, acne vulgaris, pruritus (itching without attributable cause), alopecia areata, decubitus ulcer,

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Abbreviations: BCC, basal cell carcinoma; DALY, disability adjusted life year; GBD, global burden of disease; NMSC, non-melanoma skin cancer; SCC, squamous cell carcinoma

Received 5 July 2013; revised 1 September 2013; accepted 9 September 2013; accepted article preview online 28 October 2013; published online 21 November 2013

urticaria, scabies, fungal skin diseases, impetigo, abscess, and other bacterial skin diseases, cellulitis, viral warts, molluscum contagiosum/warts, and non-melanoma skin cancer (NMSC). The remainder of skin diseases was assigned as other skin and subcutaneous disease. Other key diseases that form a major part of the work of dermatologists, such as melanoma, were not included in this analysis.

RESULTS

Skin disease causes a huge burden in the global context of health. Collectively, skin conditions were the 4th leading cause of nonfatal burden expressed as years lost due to disability in 2010; taking into account health loss due to premature death expressed as disability-adjusted life years (DALYs), skin remains the 18th leading cause of health burden worldwide (Tables 1 and 2).

Key prevalence findings

Three skin conditions were in the top 10 most prevalent diseases globally in 2010—fungal skin diseases (4th global prevalence = 984,290,432), other skin and subcutaneous diseases (5th), and acne vulgaris (8th global prevalence = 645,499,136; Vos *et al.*, 2012). There are further five skin diseases in the top 50 most common causes of disease—pruritus (global prevalence = 279,889,120), eczema (global prevalence = 229,761,000), impetigo (global prevalence = 140,495,000), molluscum contagiosum/warts (global prevalence = 122,601,000), and scabies (global prevalence = 100,625,000).

Previously reported GBD estimated annual deaths for skin disease included 66.5×10^3 from bacterial skin infections such as cellulitis and 30.6×10^3 from NMSC (Lozano *et al.*, 2012).

Table 1. DALY ranks when considering skin conditions collectively

Cause	Global DALYs	DALY rank
Ischemic heart disease	129,800,000	1
Lower respiratory infections	115,200,000	2
Cerebrovascular disease	102,200,000	3
Diarrheal diseases	89,523,909	4
Malaria	82,688,806	5
HIV/AIDS	81,549,177	6
Low back pain	80,666,896	7
Preterm birth complications	76,979,669	8
Chronic obstructive pulmonary disease	76,778,819	9
Road injury	75,487,102	10
Major depressive disorder	63,239,334	11
Neonatal encephalopathy (birth asphyxia and birth trauma)	50,162,510	12
Tuberculosis	49,399,351	13
Diabetes mellitus	46,857,136	14
Iron-deficiency anemia	45,349,897	15
Sepsis and other infectious disorders of the newborn baby	44,236,488	16
Congenital anomalies	38,890,019	17
Skin conditions	**36,921,995**	**18**
Self-harm	36,654,590	19
Falls	35,405,935	20

Abbreviation: DALY, disability-adjusted life year.
Bold values indicate the skin data.

Disability due to skin disease

Collectively, skin conditions ranged from being the 2nd to 11th leading cause of years lived with disability at the country level for 2010; they range from 3rd to 28th, taking into account premature deaths.

Supplementary Table S1 online provides the overall skin condition nonfatal burden per 100,000 population, for 1990 and 2010, by sex. Singapore, Brunei, Hungary, and Sudan experienced the most nonfatal skin disease burden per capita in both 1990 and 2010, and Albania, Lithuania, Romania, and Indonesia the least. Across specific causes, ages, and regions, burden is higher among females.

In Supplementary Table S2 online, the prevalence of each cause is provided by region and sex for 2010. Rates differ substantially by cause across regions: western Europe has the highest prevalence rate for pruritus but the lowest for scabies and eastern sub-Saharan Africa has the highest rates of cellulitis, fungal skin disease, and viral warts but the lowest rates of urticaria. Figure 1a and b further demonstrate these regional differences.

The burden of skin conditions, notably acne vulgaris and decubitus ulcer, show marked age patterns (Figure 2a and b).

The DALY is a measure of health loss taking into account both nonfatal and fatal health burden (Salomon *et al.*, 2012). The leading cause of skin condition DALYs is eczema, when looking across countries, ages, sex, and time because of the combined high prevalence across geographies and population and relatively high average disability weight. Supplementary Tables S3 and S4 online present DALY rates per 100,000 individuals in 2010.

Figure 3 presents the DALY rate per 100,000 individuals in 2010 for all skin conditions combined. Supplementary Figure S1 online presents the annualized percent change in DALY rates over the 20-year period from 1990 to 2010.

DISCUSSION

In delivering data on skin disease, the team encountered a number of methodological problems. The classification of skin disease was derived from International Classification of Disease 10, which led to the inclusion of most diseases seen in dermatology clinics under skin, but other skin problems under other medical specialities. The best examples of this are melanoma, which presents in skin clinics but is reported under cancer, and certain infections such as cutaneous leishmaniasis, which is reported under infectious disease. The study group also found, as anticipated, that there were substantial areas of missing and variable quality data at the regional level. In terms of age ranges, design of surveys, and even case definitions, data sources did not follow a uniform approach. Because of the sheer number and complexity of skin diseases, the analysis

focused on the most common of these conditions, but future work must include important disorders such as bullous diseases and melanoma.

Ideally, an estimate of global burden takes into account the multiplicity and complexity of the involvement of the skin as a clinical presentation of disease while recognizing that the skin involvement is secondary to a generalized process such as septicaemia. Unfortunately, in GBD 2010, each disease state was mutually exclusive and collectively exhaustive. This means, e.g., that lupus erythematosus burden forms part of ''other musculoskeletal disease,'' with the related dermatological manifestations taken into account in the disability weight. The estimates shown here, therefore, may underestimate the total burden of skin diseases. This underestimate needs to be recognized in any exercise that attributes resources to the management, including prevention, of disease on the basis of disability or mortality.

As expected there is variation in the main contributors to the burden of skin disease between the tropical resource-poor versus temperate regions. In Oceania, sub-Saharan Africa, southeast Asia, and the tropical Americas, skin infections assume a higher proportion of the disease burden (Leekassa *et al.,* 2005; Steer *et al.,* 2009). The lower burden due to skin infection in the high-income Asian region highlights the impact of poverty in addition to climate in defining risk. However, the high burden of disability related to eczema remains consistent globally. Although this, in part, reflects the rising prevalence of atopic dermatitis even in areas where previously it was uncommon (Haileamlak *et al.,* 2005; Williams *et al.,* 2008), eczema in adults remains an important source of disease load. By age 1 year, skin problems already assume importance as a reason for disability with high levels seen in teenage years. There is also a high burden of skin disease in the elderly above the age of 70 years, where eczema, ulceration, other skin conditions, NMSC, infections, and pruritus are key problems. Future revisions of GBD will concentrate on these issues as well as providing data on new areas of concern such as the growing evidence of a pathogenetic association between psoriasis and cardiovascular disease (Ghazizadeh *et al.,* 2010). Beyond this data, which reflects disease in large populations, very high prevalence rates of certain skin diseases, particularly infections, can occur in community or institutional settings; for instance, scabies is one of the commonest conditions in a global setting, which can affect more than 60% of the people living in certain communities (Nair *et al.,* 1977). Therefore, the impact of skin diseases must be viewed in terms of local health needs, as regional variations in disability may reflect differences in both prevalence and availability of health care.

To those in the field of dermatology, it will come as no surprise that conditions affecting our skin comprise one of the largest burdens of disease worldwide. However, this can now be contextualized with all other disease to show that skin conditions are both widespread and among the most prevalent and disabling diseases, and a source of considerable loss of healthy life. Patients attend for treatment at front-line health facilities, because patients identify an illness that requires attention. These results confirm why, in all health settings, skin disease constitutes a major proportion of all diagnoses in primary care (NHANES, 1978; Scholfield *et al.,* 2009). It also affirms an urgent need for the inclusion of skin disease prevention and treatment in national and global health policies. For dermatologists, there are also two clear challenges. The first is to prioritize the collection and analysis of epidemiological and disability data that allow comparison to be made with other diseases. The second challenge is to make known and disseminate widely the obvious conclusion of this study that strategies to manage and control skin disease are an effective and necessary use of health resources. Although this is recognized in some skin diseases (Staples *et al.,* 1998), the results of this study show that we are merely tackling the tip of the iceberg. There is huge scope for significant therapeutic advances as well as preventive strategies operating at international and regional levels; support by decision-makers is critical in converting need into practical health policies.

Table 2. YLD ranks when considering skin conditions collectively

Cause	Global YLDs	YLD rank
Low back pain	80,666,896	1
Major depressive disorder	63,239,334	2
Iron-deficiency anemia	42,505,250	3
Skin conditions	**33,717,725**	**4**
Neck pain	32,650,797	5
Chronic obstructive pulmonary disease	29,420,262	6
Other musculoskeletal disorders	28,247,230	7
Anxiety disorders	26,847,326	8
Migraine	22,362,507	9
Diabetes mellitus	20,791,397	10
Falls	19,479,581	11
Osteoarthritis	17,148,545	12
Drug use disorders	16,434,052	13
Other hearing loss	15,824,531	14
Asthma	13,843,163	15
Alcohol use disorders	13,838,157	16
Road injury	13,489,949	17
Schizophrenia	12,975,089	18
Bipolar affective disorder	12,878,832	19
Dysthymia	11,091,105	20

Abbreviation: YLD, years lost due to disability.
Bold values indicate the skin data.

MATERIALS AND METHODS

The overall aim of this study was to estimate the GBD attributable to skin disease from 1990 to 2010 for 187 countries, by age and sex. The first step in this estimation was a systematic review to collect data. Data were analyzed using a Baysian meta-regression tool, described below, to harmonize discordant data where multiple estimates were available as well as fill in gaps in geography, time, or age-sex groups, where data were lacking. The prevalence and incidence estimates from this process were applied to severity distributions and their

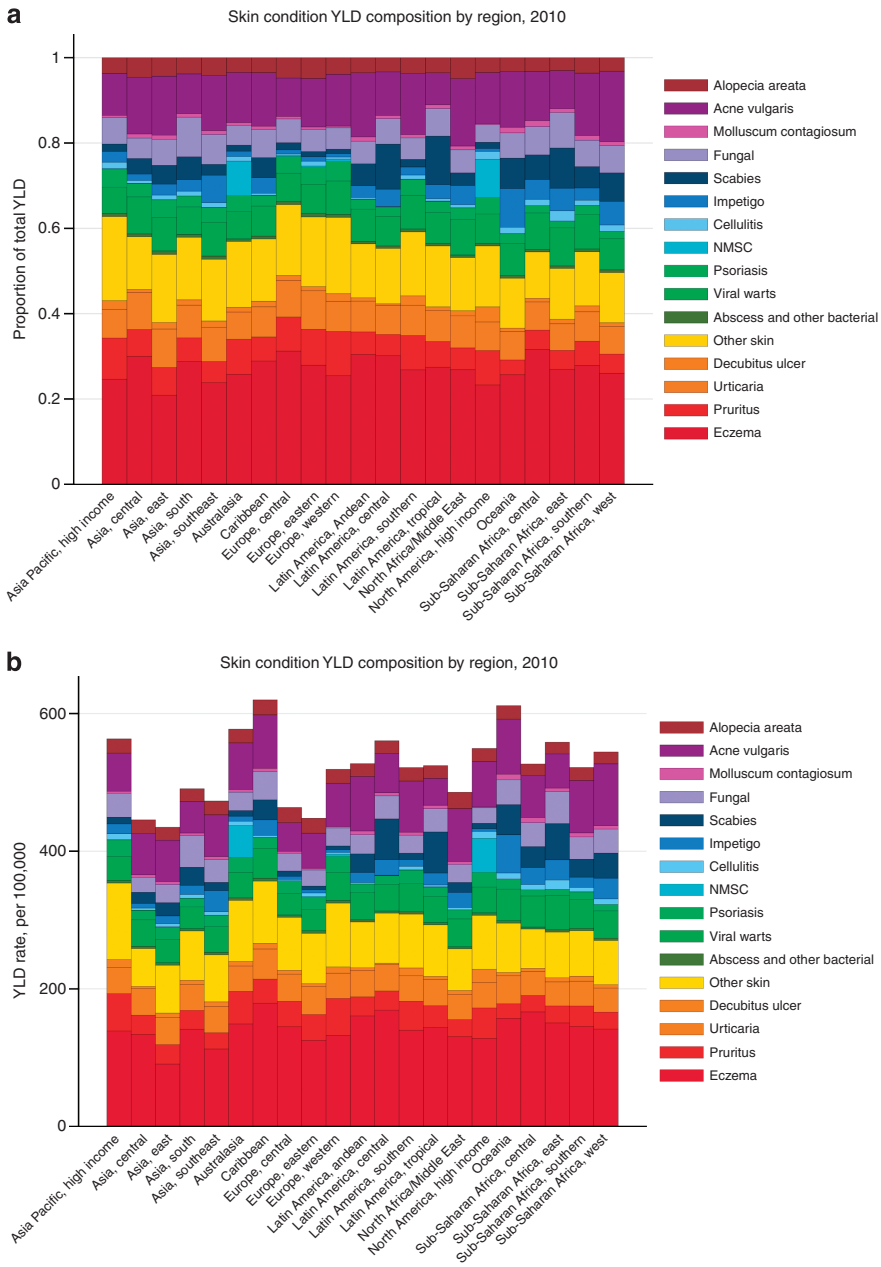

Figure 1. Skin condition years lost due to disability (YLD) composition by region, 2010. (**a**) Proportion of total YLD, (**b**) YLD rate per 100,000. NMSC, non-melanoma skin cancer.

related sequelae as well as estimates of magnitude of health loss to produce burden of non-fatal health loss estimates. A separate strategy was undertaken to estimate the relatively small burden of mortality, outlined elsewhere (Lozano *et al.*, 2012).

The GBD 2010 Skin Conditions Expert Group provided the lead in data collection and disease consultation for all analyses. The group was recruited from volunteers who responded to an international web-based invitation for assistance. To ensure uniformity of investigational approach, training was provided by the Institute of Health Metrics, and participants used a common procedure manual. The team reviewed world literature and databases for incidence, prevalence, and remission rates, using acceptable case definitions and stringent criteria for validity of data collection. It divided skin diseases into manageable subcategories from more than 1,000 different disease entities, and selected the following conditions for analysis on the basis of prevalence, common case definitions, and data availability: eczema, psoriasis, acne vulgaris, pruritus, alopecia areata, decubitus ulcer, urticaria, scabies, fungal skin diseases, impetigo, abscess, and other bacterial skin diseases, cellulitis, viral warts, molluscum contagiosum, and NMSC.

The categories of disease analyzed were those defined in International Classification of Disease 10 and noted in Supplementary Table S5 online.

Disease sequelae, the direct disabling consequences of the illness on the skin, were defined and graded by severity. To maintain consistency with broader GBD 2010 Study's definitions, the group had to limit the definition of disability to that pertaining to the skin in

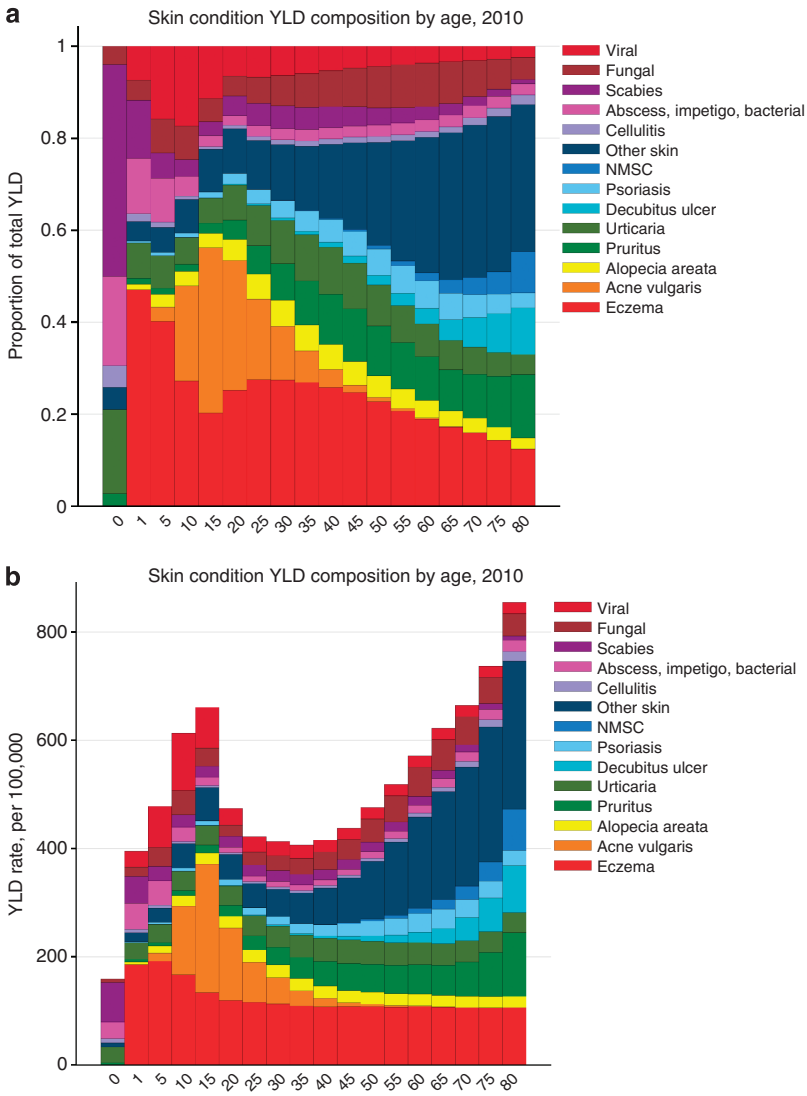

Figure 2. Skin condition years lost due to disability (YLD) composition by age, 2010. (**a**) Proportion of total YLD. (**b**) YLD rate per 100,000. NMSC, non-melanoma skin cancer.

terms of symptoms such as itching as well as disfigurement, rather than expanding disability to include non-health-based quality-of-life reductions or sequelae captured elsewhere in GBD 2010 (e.g., pain from psoriatic arthritis, reported under the arthritis burden assessment; Vos *et al.*, 2012).

Standardized disease definitions were established in several ways. For instance, with atopic dermatitis, within the broader heading of eczema, definitions such as the UK working party definition of AD were used (Williams *et al.*, 1994). Likewise in NMSC histopathological confirmation was required. Elsewhere, the diagnosis of a trained health worker was the standard case definition. The Expert Group defined sequelae to encompass the symptoms of itch and discomfort as well as disfigurement and provided lay descriptors for disability to be used in the GBD 2010 Disability Weights survey in the establishment of disability weights (Salomon *et al.*, 2012).

Search strategy for identification of studies

Data were collected in a two stage literature review. The expert group conducted an initial literature review comprised primarily of three data sources: published articles found in medical literature databases such as Medline (US National Library of Medicine) and Embase (Elsevier); national and regional health surveys; and personal communications of unpublished data. The Medline database was searched using queries composed of MeSH (Medical Subject Headings) terms by which articles were indexed. Queries generally consisted of the Mesh terms ''Skin disease'', ''Dermatosis,'' or ''cutaneous disease''. For specific disease states, the name of the condition, plus any variants, was used. For instance for scabies, the words used were scabies, *Sarcoptes*, itch mite, Norwegian scabies, crusted scabies. Data identified under the general MeSH terms but not included under specific disease headings were recorded under other skin and subcutaneous diseases.

A secondary literature review was conducted following finalization of the specific cause categories using PubMed and Google Scholar for each cause. The details of data retrieval are provided in Supplementary Table S6 online. The inclusion criteria were studies that were published between 1980 and 2010 that provided data on relevant disease incidence or prevalence.

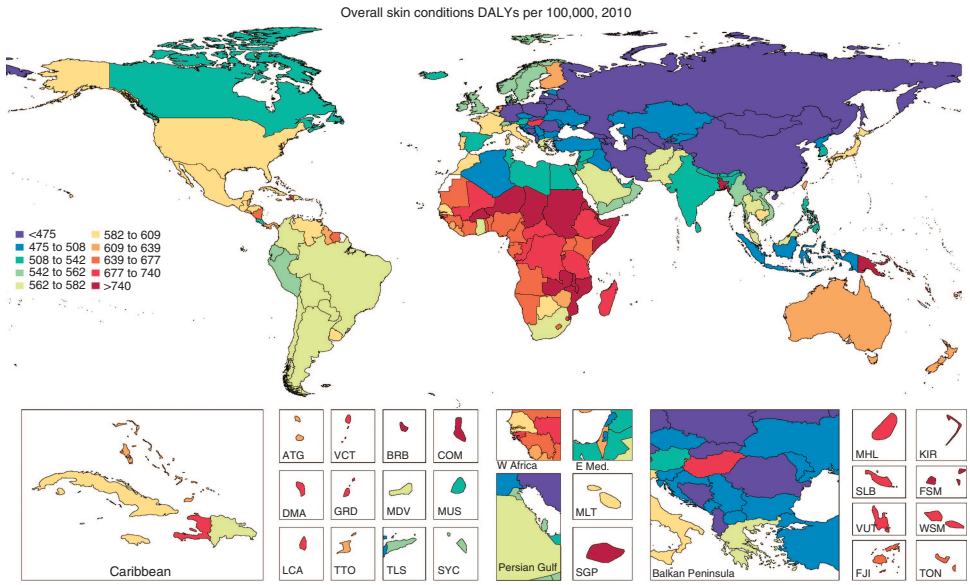

Figure 3. Disability-adjusted life year (DALY) rate per 100,000 individuals in 2010 (all skin conditions combined). ATG, Antigua; BAR, Barbados; COM, Comoros; DMA, Dominica; FJI, Fiji; FSM, Federated States of Micronesia; GRD, Grenada; KIR, Christmas Island; LCA, St Lucia; MDV, Maldives; MHL, Marshall Islands; MLT, Malta; MUS, Mauritius; SGP, Singapore; SLB, Solomon Islands; SYC, Seychelles; TLS, Timor-Leste; TON, Tonga; TTO, Trinidad and Tobago; VCT, St Vincents; VUT, Vanuatu; WSM, Western Samoa.

Studies were excluded for the following reasons:

- Data in study were self-reported unless it had been validated by the diagnosis of a trained physician
- The study sampled specific groupings
- Occupational groups
- Studies that use data generated by first hospital or clinic presentation: unless the incidence of those diseases were, in the opinion of the specialist team, likely to be an accurate reflection of true incidence
- Non-random samples (i.e., employees, health center patients)
- Studies on specific ethnic or social groups
- Outside the 1980–2010 year range
- Sample size smaller than 100
- Experimental arm of a clinical trial
- Papers that provided estimates rather than data

The reviews were carried out in three stages:

Round (1): Title/abstract review of hits from searches of medical literature databases.

Round (2): Whole article review of hits remaining after Round 1.

Round (3): Evaluation of articles remaining after Round 2 using agreed quality criteria.

Most incidence data used for certain skin diseases were obtained from two medical record sources: (1) inpatient data from Europe, Latin America, and United States of America, and (2) outpatient data from Great Britain and United States of America (Royal College of General Practitioners Research Unit (UK), 2010; Medical Expenditure Panel Survey, 2010), and (3) in the case of NMSC, registry data where it included NMSC, e.g., Northern Ireland Cancer Registry (2010).

The extracted data included as much of the following information as was available: incidence, prevalence, remission, mortality risk, severity distribution, ages studied, sexes studied, time period, uncertainty in point estimates, sample size, and any relevant covariates such as case definition. Ultimately, 895 country-years of data were used, covering 82 countries. Individual cause models used from 16 to 155 country-years worth of data.

Analysis of data

Skin and subcutaneous disease morbidity was modeled using the program, DisMod-MR, a negative binomial Bayesian meta-regression tool, with data gathered (see above). DisMod-MR combines a compartmental model of disease progression with an age-integrating mixed-effects negative-binomial model of relevant epidemiological data. DisMod was used to synthesize all available data and predict epidemiological parameters of each of the specific causes. Because of differences in disease etiologies, NMSC was modeled in DisMod-MR separately as squamous cell carcinoma (SCC) and basal cell carcinoma (BCC).

There are many parameters that determine the distribution of skin diseases, from genetic susceptibility to environmental factors. Social factors such as poverty, affluence, inequality, education, and access to health care all have an important role in the epidemiology of skin disease (NHANES, 1978; Williams *et al.*, 1994; Gibbs, 1996; Figueroa *et al.*, 1998; Scholfield *et al.*, 2009). Movements of individuals through travel, migration, or war increase the chance of spread of infectious skin diseases. Non-infectious skin diseases are also affected by global social and economic changes including climate change and natural disasters. The current rise in the burden of NMSC, e.g., is the result of a complex interaction between societal customs and medical interventions leading to varied population awareness of risk across the world.

Where data are lacking, either across geographies or across time, DisMod utilizes covariates at the study and country level to generate

Table 3. Disability weights for skin and subcutaneous diseases

Cause	Average disability weight
Non-melanoma skin cancer	0.060
Eczema cases	0.038
Psoriasis cases	0.054
Cellulitis cases	0.035
Impetigo cases	0.008
Abscess and other bacterial skin diseases cases	0.003
Scabies cases	0.016
Fungal skin diseases	0.002
Molluscum contagiosum cases	0.002
Viral warts cases	0.029
Acne vulgaris cases	0.006
Alopecia areata cases	0.035
Pruritus cases	0.008
Urticaria cases	0.031
Decubitus ulcer cases	0.108
Other skin and subcutaneous diseases	0.006

predictions. Study-level covariates included such elements as case definitions and indicators of inpatient or outpatient data; country-level covariates included average temperature (impetigo and fungal skin disease; Singh, 1973; Taplin *et al.,* 1973), proportion of the population with access to sanitation (molluscum contagiosum and scabies; La Vicente *et al.,* 2009), incidence of melanoma (Gandini *et al.,* 2005; NMSC) or average sugar consumption per capita (acne vulgaris; Melnik, 2012).

Additional analytic steps were taken to estimate NMSC prevalence. Data on BCC duration are highly variable because of differences in screening, access to health care, diagnosis, workup, and management protocols. In an attempt to capture this access-related duration, we created two models of BCC: the first based on an 'ideal' average duration of 1 year, as might be the case in Australia, where full skin exams are conducted annually, and the second based on a 'worst-case' average duration of 5 years, the time it would take progression to reach a stage where someone with limited health-care access would seek care. The prevalence of BCC for a country was a weighted average of the results of these two models, based on a measure of health system access. SCC prevalence was estimated in the standard way described above, but required allocation to stages of cancer development for disability calculation. Once again, high- and low-survival curves (based on Surveillance, Epidemiology and End Results data) were weighted by access to health care. The proportion alive after 5 years was assigned the disability of diagnosis and treatment stage of cancer; the proportion dying within 5 years were assigned the disability of diagnosis and treatment, remission, metastasis, and terminal phases based on SEER data, literature data, and Skin Expert Group-provided information.

Disability

The GBD 2010 study uses the prevalence estimates produced by this analytical strategy to estimate years lost due to disability and DALYs. Both measures are applied to whole populations without differentiating for potential variables such as social class or environment.

Disability was derived from an analysis of the comparative impact of the direct disabling consequences of skin disease such as itch and disfigurement against other conditions through a disability weights survey, which involved the use of international panels of volunteers, a telephone-based survey, and a web-based tool. Consistency was demonstrated among all six sources (Salomon *et al.,* 2012). Estimates of disease duration and severity distribution were provided by the dermatology team; the latter was also informed, in part, by data from the Medical Expenditure Panel Survey, 2000–2009 USA (Medical Expenditure Panel Survey, 2010). The assigned health states are shown in Supplementary Table S7 online. For instance, psoriasis and scabies cases were assigned the sequelae of itch and disfigurement, level 1. Impetigo, abscess, and other bacterial skin diseases, fungal skin disease, molluscum contagiosum, and viral warts cases were assigned to the percent asymptomatic from the MEPS analysis, above, with symptomatic cases assigned the disability weight of a mild acute infectious disease case. In these diseases, the lay description of itch and disfigurement ultimately used the GBD Disability Weight Survey, suggested disability beyond that conferred by an average case of these conditions. NMSC disability combined BCC and SCC disabilities. BCC was considered to have negligible fatality and disfigurement was the associated disability; SCC produced fatalities and was associated with disability due to cancer treatment, remission, and metastases. Table 3 shows average weight for each cause.

Skin diseases of similar severities and extents will affect different subject's lives in strikingly different ways, but for consistency and because of data limitations, the disability weights were defined as such. The GBD 2010 Study aimed to capture exclusively health loss, rather than encompassing reductions in the quality of life.

CONFLICT OF INTEREST

The authors state no conflict of interest.

ACKNOWLEDGMENTS

The study was funded by a grant from the Bill and Melinda Gates Foundation. We acknowledge the help and advice of the following in analyzing the data: Andrew Finlay, Suephy Chen, Henry Lim, Roberto Estrada, Antoine Mahe, Henning Grossman, and John Masenga.

SUPPLEMENTARY MATERIAL

Supplementary material is linked to the online version of the paper at http://www.nature.com/jid

REFERENCES

Basra MKA, Shahrukh M (2009) Burden of Skin Diseases. *Expert Rev Pharmacoeconomics Outcomes Res* 9:271–83

Bickers DR, Lim HW, Margolis D *et al.* (2006) The burden of skin diseases: 2004 a joint project of the American Academy of Dermatology Association and the Society for Investigative Dermatology. *J Am Acad Dermatol* 55:490–500

Figueroa JI, Fuller LC, Abraha A *et al.* (1998) Skin disease in southwestern Ethiopia: rationale for a community approach. *Inter J Dermatol* 37:752–8

Gandini S, Sera F, Cattaruzza MS *et al.* (2005) Meta-analysis of risk factors for cutaneous melanoma: II. Sun exposure. *Eur J Cancer* 41:45–60

Ghazizadeh R, Shimizu H, Tosa M *et al.* (2010) Pathogenic Mechanisms Shared between Psoriasis and Cardiovascular Disease. *Int J Med Sci* 7:284–9

Gibbs S (1996) Skin disease and socioeconomic conditions in rural Africa (1996) Tanzania. *Int J Dermatol* 35:633

Global Burden of Disease: 2004 Update (2008) WHO Press: Geneva

Haileamlak A, Lewis SA, Britton J *et al.* (2005) Validation of the International Study of Asthma and Allergies in Children (ISAAC) and U.K. Criteria for atopic eczema in Ethiopian children. *Br J Dermatol* 152:735–41

Hay RJ, Fuller LC (2012) The assessment of dermatological needs in resource-poor Regions. *Int J Dermatol* 50:552–7

La Vicente S, Kearns T, Connors C *et al.* (2009) Community management of endemic scabies in remote aboriginal communities of Northern Australia: low treatment uptake and high ongoing acquisition. *PLOS Neg Trop Dis* 3:e444

Leekassa R, Bizuneh E, Alem A *et al.* (2005) Community diagnosis of common skin diseases in the Zay community of the Zeway Islands, Ethiopia. *Ethiop Med J* 43:189–95

Lozano R, Naghavi M, Foreman K *et al.* (2012) Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 380:2095–128

Mahe A (2005) Epidemiology and Management of Common Skin Diseases in Children in Developing Countries. WHO, http://whqlibdoc.who.int/hq/2005/WHO_FCH_CAH_05.12_eng.pdf

Medical Expenditure Panel Survey (2010) http://meps.ahrq.gov/mepsweb/

Melnik BC (2012) Diet in acne: further evidence for the role of nutrient signalling in acne pathogenesis. *Acta Derm Venereol* 92:228–31

Murray CJL, Richards MA, Newton JN *et al.* (2013) UK health performance: findings of the Global Burden of Disease Study 2010. *Lancet* 381: 997–1020

Murray CJL, Lopez A (eds) (1996) *Global Burden of Disease: A Comprehensive Assessment of Mortality and Disability From Diseases, Injuries, and Risk Factors in 1990 and Projected to 2020.* Harvard Univ Press

Nair BK, Joseph A, Kandamuthan M (1977) Epidemic scabies. *Indian J Med Res* 65:513–8

NHANES (1978) Skin conditions and related need for medical care among persons *1–74 years* . NHANES:. *United States, 1971–1974 DHEW Publication 1978 No. (PHS),* pp 79–1660

Northern Ireland Cancer Registry (2010).) http://www.qub.ac.uk/research-centres/nicr/CancerData/OnlineStatistics/

Royal College of General Practitioners Research Unit (UK) (2010)) Annual Reports http://www.rcgp.org.uk/clinical-and-research/research-and-surveillance-centre.aspx

Salomon JA (2010) New disability weights for the global burden of disease. *Bull World Health Org* 88:879

Salomon JA, Vos T, Hogan DR *et al.* (2012) Common values in assessing health outcomes from disease and injury: disability weights measurement study for the Global Burden of Disease Study 2010. *Lancet* 380:2129–43

Scholfield JK, Grindlay D, Williams HC (2009) *Skin Conditions in the UK: A Health Needs Assessment* : University of Nottingham, Centre of Evidence Based Dermatology UK; Nottingham, UK

Singh G (1973) Heat, humidity and pyodermas. *Dermatologica* 147: 342–7

Staples M, Marks R, Giles G (1998) Trends in the incidence of non-melanocytic skin cancer (NMSC) treated in Australia 1985–1995: are primary prevention programs starting to have an effect? *Int J Cancer* 78:144–9

Steer AC, Jenney AW, Kado J *et al.* (2009) High burden of impetigo and scabies in a tropical country. *PLoS Negl Trop Dis* 3:e467

Taplin D, Lansdell L, Allen AM *et al.* (1973) Prevalence of streptococcal pyoderma in relation to climate and hygiene. *Lancet* 1:501–3

Vos T, Flaxman AD, Naghavi M *et al.* (2012) Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 380:2163–96

Williams H, Stewart A, von Mutius E *et al.* (2008) Is eczema really on the increase worldwide? *J Allergy Clin Immunol* 121:947–54

Williams HE, Strachan P, Hay RJ (1994) Atopic eczema—disease of the advantaged. *Br Med J* 308:1132

Williams HE, Burney PGJ, Hay RJ *et al.* (1994) The UK Working Party's diagnostic criteria for atopic dermatitis. 1: derivation of a minimum set of discriminators for atopic dermatitis. *Br J Dermatol* 131:383–96