

# The global burden of scabies: a cross-sectional analysis from the Global Burden of Disease Study 2015



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## Summary

**Background** Numerous population-based studies have documented high prevalence of scabies in overcrowded settings, particularly among children and in tropical regions. We provide an estimate of the global burden of scabies using data from the Global Burden of Disease (GBD) Study 2015.

**Methods** We identified scabies epidemiological data sources from an extensive literature search and hospital insurance data and analysed data sources with a Bayesian meta-regression modelling tool, DisMod-MR 2.1, to yield prevalence estimates. We combined prevalence estimates with a disability weight, measuring disfigurement, itch, and pain caused by scabies, to produce years lived with disability (YLDs). With an assumed zero mortality from scabies, YLDs were equivalent to disability-adjusted life-years (DALYs). We estimated DALYs for 195 countries divided into 21 world regions, in both sexes and 20 age groups, between 1990 and 2015.

**Findings** Scabies was responsible for 0.21% of DALYs from all conditions studied by GBD 2015 worldwide. The world regions of east Asia (age-standardised DALYs 136.32), southeast Asia (134.57), Oceania (120.34), tropical Latin America (99.94), and south Asia (69.41) had the greatest burden of DALYs from scabies. Mean percent change of DALY rate from 1990 to 2015 was less than 8% in all world regions, except North America, which had a 23.9% increase. The five individual countries with greatest scabies burden were Indonesia (age-standardised DALYs 153.86), China (138.25), Timor-Leste (136.67), Vanuatu (131.59), and Fiji (130.91). The largest standard deviations of age-standardised DALYs between the 20 age groups were observed in southeast Asia (60.1), Oceania (58.3), and east Asia (56.5), with the greatest DALY burdens in children, adolescents, and the elderly.

**Interpretation** The burden of scabies is greater in tropical regions, especially in children, adolescents, and elderly people. As a worldwide epidemiological assessment, GBD 2015 provides broad and frequently updated measures of scabies burden in terms of skin effects. These global data might help guide research protocols and prioritisation efforts and focus scabies treatment and control measures.

**Funding** Bill & Melinda Gates Foundation.

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## Introduction

Scabies is a skin infestation caused by the mite *Sarcoptes scabiei* that causes a pruritic skin eruption.<sup>1</sup> Given that scabies transmission occurs with person-to-person contact, scabies is particularly prevalent in resource-poor conditions and among children, and is associated with insufficient access to health-care subsidies. Scabies can occur in any setting but over the past century has become less prevalent in temperate regions and is more common in tropical, humid regions. The predominant symptom of scabies infestation is pruritus, which can be debilitating. Disruption of the skin's protective barrier function promotes secondary bacterial infections, which can lead to additional, potentially life-threatening, complications.<sup>2</sup>

Scabies has high prevalence in the tropics and large cumulative morbidity. Recognition of scabies on the global health agenda would increase awareness, education, and research into diagnosis, treatment, and

prevention.<sup>3</sup> In recognition, WHO recently formally designated scabies as a neglected tropical disease.<sup>4</sup> Previous investigations have reported on scabies prevalence in specific, often low-resource, communities.<sup>5-8</sup> A systematic review of 48 population-based studies found the highest prevalence of scabies in Papua New Guinea, Panama, and Fiji.<sup>9</sup> However, beyond prevalence, the extent to which scabies affects these communities is unknown. In this paper, we provide estimates for the global burden of scabies skin disease using data from the Global Burden of Disease (GBD) study.

GBD provides a way to measure and compare health loss from disease and injury across age, sex, location, and time.<sup>10</sup> GBD is based on formal, systematic, and statistically rigorous analyses of effects of disease and injuries on the health of populations. As an international collaboration of more than 500 experts representing 30 countries, GBD 2015, the third iteration of the GBD process, quantified the effects of 315 diseases and

*Lancet Infect Dis* 2017

Published Online  
September 20, 2017  
[http://dx.doi.org/10.1016/S1473-3099\(17\)30483-8](http://dx.doi.org/10.1016/S1473-3099(17)30483-8)

See Online/Comment  
[http://dx.doi.org/10.1016/S1473-3099\(17\)30469-3](http://dx.doi.org/10.1016/S1473-3099(17)30469-3)

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### Research in context

#### Evidence before this study

We searched PubMed and Google Scholar databases on July 15, 2017, for articles in English, Spanish, and French published before June 30, 2017, using the key word “scabies” in the title or abstract. Studies reported high-risk population-based national and subnational estimates of scabies prevalence as well as associated comorbidities such as psychological disorders.

However, previous attempts to estimate the global burden of scabies skin infection were not available. The Global Burden of Disease (GBD) Study 2015 assesses scabies epidemiological data sources from a PubMed and Google Scholar literature search in English and Spanish between 1980 and 2014. Prevalence and incidence metrics were extracted from included sources and analysed with a Bayesian meta-regression modelling tool. Burden of disease is estimated as disability-adjusted life-years (DALYs).

#### Added value of this study

This study is the first global effort to measure the burden of scabies. The greatest DALYs from scabies are in tropical regions in east Asia, southeast Asia, Oceania, tropical Latin America, and south Asia, especially in children, adolescents, and the elderly.

#### Implications of all the available evidence

Increased global awareness of the burden from scabies will promote international efforts for control of this preventable disease. GBD provides high-quality estimates, which can be used to set research priorities, promote discussion, and ultimately, enact change, at local, national, and global stages.

injuries, including scabies, in 195 countries from 1990 to 2015.<sup>11</sup> Disease burden is measured using the disability-adjusted life-years (DALYs) metric, which uniquely combines mortality (estimated using years of life lost [YLL]) and morbidity (estimated using years lived with disability [YLD]) components. By assessing disease epidemiology on a global scale, GBD has the potential to inform health policy and identify previously undervalued or neglected conditions, such as scabies. The DALY metric has broad clinical and research priority-setting implications because it assesses both the prevalence and impact of a disease and allows for comparison of various diseases. This report presents GBD 2015 results on the global burden of scabies.

## Methods

### Data collection

Although details of GBD methods are extensively published elsewhere,<sup>11–13</sup> a brief overview specific to scabies is presented here. The GBD category of scabies is defined by the International Classification of Diseases (ICD)-9 code 133 and ICD-10 code B86. A systematic literature search was done and results were screened by title and abstract to identify relevant studies, which then underwent full-text screening and data extraction. Studies published between 1980–2014 that provided data on scabies incidence or prevalence, used samples representative of the general population that were larger than 100, and provided sufficient information on methods to assess study quality as well as rules for extracting uncertainty (standard error and 95% CI) were included. Additionally, US health insurance claims data from 2000, 2010, and 2012 were included (appendix). 38 studies on scabies prevalence in 84 countries and three studies on scabies incidence in five countries were included. All extracted scabies incidence and prevalence datapoints were age-sex split and adjusted from primary code to all code based on the claims data. These

datapoints were then input into DisMod-MR 2.1, a Bayesian meta-regression tool, which estimates scabies prevalence by location, year, age, and sex. For the DisMod-MR 2.1 analysis, scabies was modelled with remission set between 1 and 9, corresponding to durations of 6 weeks to 1 year, and mortality was assumed to be zero, on the basis of available epidemiological data, expert opinion, and previous GBD studies. As a proxy for low levels of development, improved water source (proportion of population with access to sufficient quantities of water) was used as a country-level covariate. For countries or regions with missing data, DisMod-MR 2.1 uses data in nearby countries, regions, and predictive covariates to estimate data.

GBD divides disease prevalence into varying severity levels. Scabies prevalence was categorised as one severity level: disfigurement level 1 with itch or pain. This severity level corresponded to the lay description: “The individual has a slight visible physical deformity that is sometimes sore or itchy. Observers notice the deformity, which causes some worry and discomfort to the patient”. The severity level was assigned on the basis of recommendations from the GBD 2010 Skin Conditions Expert Group.<sup>14</sup> The severity prevalence estimates were multiplied with a disability weight to generate YLDs for each age-sex-country-year group. Disability weights, which range from 0 (least disabling) to 1 (most disabling), assessed the degree of disfigurement with itch or pain from scabies in four population-based European surveys and an open-access web-based survey of more than 60 890 respondents.<sup>15</sup> The disability weight assigned to scabies was 0.027 (95% CI 0.015–0.042). Notably, this weighting only takes into account the effect of scabies on the skin.

With scabies, YLL is assumed to be zero; YLDs were equivalent to DALYs. DALY metrics are computed as age-standardised and age-specific DALY rate per 100 000 persons and mean percent change in

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