

# The changing global prevalence of asthma and atopic dermatitis

Allergic diseases encompass a large number of conditions, including asthma, allergic rhinitis, food allergy, atopic dermatitis, and drug and venom allergy—some of which cluster together in atopic individuals. The aetiology of allergic diseases reflects a complex and poorly understood interplay between genetic susceptibility and environmental factors. Allergic diseases are common and serious. In 2019, the World Health Organisation estimated that asthma alone affected 262 million people and caused 455,000 deaths worldwide.<sup>1</sup> Allergic diseases tend to chronicity, leading to high disease and treatment burden. Unlike many other chronic diseases, however, allergic disease is prevalent amongst children and young adults, affecting school and work attendance and productivity, and leading to personal, social and economic impacts.

For many decades, there has been deep concern regarding the rising incidence and prevalence of allergic diseases occurring in both developed and developing countries.<sup>2</sup> Reasons for this are complex, but probably include; increasing exposure to indoor and outdoor air pollution (with allergic disease increasing in tandem with affluence and urbanisation); decreasing exposure to infections, with associated changes to the gut microbiome; and altered prenatal, perinatal and childhood nutrition.<sup>3–6</sup> These risk factors vary significantly across regions, and often even within countries, complicating attempts to describe the epidemiology of allergic disease, which are so necessary to inform and develop coordinated strategies to address allergic disease.

In this issue of *Allergy*, Shin et al.<sup>7</sup> provide an important piece of this epidemiological puzzle. Based on data from the latest Global Burden of Disease Study, they report the incidence and prevalence of asthma and atopic dermatitis over the three decades between 1990 and 2019. Over time, they found an increase in incident and prevalent cases for both asthma and atopic dermatitis, but a reduction in age-standardised incidence and prevalence rates over time. The global age-standardised prevalence of asthma dropped substantially by 24.1%, while that of atopic dermatitis fell more modestly by 4.3%. These findings suggest that the observed increase in cases was due to population growth, not rising rates of disease. Reassuringly, overall mortality rates and disability-adjusted life years attributable to asthma decreased over the study period. A high body-mass index contributed to more asthma morbidity and mortality than did smoking and occupational asthmagens.

For both asthma and atopic dermatitis, prevalence across age-groups showed an initial peak in childhood between the age of 5–9 years, and a later rise throughout adulthood. Asthma prevalence

was similar in men and women, while atopic dermatitis was much more prevalent among women.

Asthma prevalence varied widely between regions. The highest prevalence was observed in the United States and Australasia. However, while age-standardised rates of asthma have fallen in Australasia (reflecting the predominant trend in high-income regions), concerningly they have increased in the United States.

As a group, high-income regions had a higher prevalence of asthma but lower mortality and morbidity, when compared to low-income regions. The latter finding probably reflects greater access to medications and health care in high-income countries. For atopic dermatitis, different trends were observed—high-income regions had both the highest prevalence and highest burden of disease, in contrast to low-income regions. However, this finding may be confounded by under-diagnosis and/or under-reporting in low-income countries.

The Global Burden of Disease study was launched in 1991 as a collaboration between the World Health Organisation and the World Bank as a collation of standardised and comprehensive prevalence, mortality and disability information for a range of diseases across more than 200 countries.<sup>8</sup> It has provided invaluable epidemiological information on a range of conditions, but some methodological considerations are pertinent to interpreting the current study results. First, overall trends from the combined data of 204 countries may obscure important local trends, given regional variation in disease and risk factor prevalence. However, the authors of this paper have provided extensive country-specific data in the on-line supplement, which are highly valuable for national researchers and public health practitioners. Second, achieving consistency in data collection across so many countries and health systems is a challenge, and represents a major limitation to efforts such as these, although considerable efforts have been made to improve data consistency over time. Third, the Global Burden of Disease study in some instances uses extrapolated population estimates based on low levels of actual data, a methodology at high risk of bias.

At a disease-specific level, asthma is highly heterogeneous; for example, there are different risk factors for allergic and non-allergic phenotypes. A high-level analysis, as reported in this study, is unable to elucidate the complexities of asthma aetiology. Furthermore, asthma misdiagnosis is common,<sup>9</sup> and misclassification may have occurred in this study with the requirement for 'wheezing in the past year'. This could have incorrectly excluded people with well-controlled asthma and minimal symptoms, and incorrectly included

people with wheezing from other causes. Improvements in asthma treatments over time, including combination inhaled corticosteroid/long-acting beta-agonists (and monoclonal biologics in affluent countries), may conceivably have led to some people with better-controlled asthma being excluded from disease estimates, and contributed to the reported fall in asthma incidence and prevalence.

In summary, this study supports a substantial and reassuring fall in global age-adjusted rates of asthma prevalence over three decades, accompanied by a similar but more modest fall for atopic dermatitis. It also reports striking variation in disease rates between regions and highlights uncomfortable disparities in asthma outcomes based on socioeconomic demographic index. These data are invaluable to inform the development of public health policy and clinical strategies to address allergic disease at local, regional and global levels.

### CONFLICT OF INTEREST STATEMENT

The authors report no conflicts of interest.

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