



Allergic diseases and asthma: a major global health concern

Ruby Pawankar^a, Giorgio W. Canonica^b, Stephen T. Holgate^c, and Richard F. Lockey^d

The prevalence of allergic diseases and asthma is increasing worldwide, particularly in low and middle-income countries. Moreover, the complexity and severity of allergic diseases, including asthma, continue to increase especially in children and young adults, who are bearing the greatest burden of these trends. In order to address this major global challenge that threatens health and economies alike, it is important to have a global action plan that includes partnerships involving different stakeholders from low-income, middle-income, and high-income countries.

Allergic diseases include life-threatening anaphylaxis, food allergies, certain forms of asthma, rhinitis, conjunctivitis, angioedema, urticaria, eczema, eosinophilic disorders, including eosinophilic esophagitis, and drug and insect allergies. Globally, 300 million people suffer from asthma and about 200–250 million people suffer from food allergies [1]. One-tenth of the population suffers from drug allergies and 400 million from rhinitis [1]. Moreover, allergic diseases commonly occur together in the same individual, one disease with the other. This requires an integrated approach to diagnosis and treatment and greater awareness of the underlying causes among family physicians, patients as well as specialists.

A recent report from the World Allergy Organization, the *WAO White Book on Allergy* [1], summarizes the burden of allergic diseases worldwide, the risk factors, impact on quality of life of patients, morbidity, mortality, their socio-economic consequences, recommended treatment strategies, future therapies, and the cost–benefit analyses of care services. For instance, asthma prevalence is rising in several high as well as low-income and middle-income countries, and the prevalence and impact of allergic diseases continue to grow. According to the World Health Organization, the number of patients having asthma is 300 million and with the rising trends it is expected to increase to 400 million by 2025. Patients with asthma and allergic diseases have a reduced quality of life. According to the World Health Organization,

asthma causes 250 000 deaths annually. Moreover, asthma in infancy often goes unrecognized and thus untreated. In the United States, 23 million people including 7 million children suffer from asthma and the prevalence is increasing. The economic costs of asthma are high both in terms of direct and indirect costs [1] (Table 1), especially in severe or uncontrolled asthma. In the United States, pediatric asthma results in 14 million missed days of school each year, which in turn result in lost workdays – and lost wages – for caregivers [2]. As asthma continues to affect more children in lower-income countries, this will lead to long-term consequences for their education and perpetuation of their poverty. We need to find ways to control indoor and outdoor air pollution, to train healthcare professionals to diagnose and treat asthma in children, and to ensure that asthma medications are affordable for all who need them. Educational programs for self-management of asthma and national efforts to tackle asthma as a public health problem have produced remarkable benefits resulting in dramatic reductions in deaths and hospital admissions [1,3].

The upsurge in the prevalence of allergies is observed as societies become more affluent and urbanized. An increase in environmental risk factors like outdoor and indoor pollution like tobacco smoke combined with reduced biodiversity also contributes to this rise in prevalence. In many low-income and middle-income countries, including rural areas in India, people rely on solid fuel (wood, cow dung, or crop residues) that they burn in simple stoves or open fires for domestic energy [1]. Secondhand smoke has become more common as

^aNippon Medical School, Tokyo, Japan, ^bUniversity of Genoa, Genoa, Italy, ^cSouthampton General Hospital, Southampton, UK and ^dUniversity of South Florida College of Medicine, Tampa, Florida, USA

Correspondence to Professor Ruby Pawankar, MD, PhD, Nippon Medical School, 1-1-5, Sendagi, Bunkyo-ku, Tokyo 113-8603, Japan. Tel: +81 3 5802 8177; e-mail: pawankar.ruby@gmail.com

Curr Opin Allergy Clin Immunol 2012, 12:000–000

DOI:10.1097/ACI.0b013e32834ec13b

Table 1. The economic burden of allergy

Country	Year cost calculated	Population (2010)	Disease	Direct costs ^a	Indirect costs ^b	Total costs estimated
Australia	2007	23 million	All allergies	A\$1.1 billion	A\$8.3 billion	A\$9.4 billion
Finland	2005	5.3 million	All allergies	€468 million	€51.7 million	€519.7million
South Korea	2005	50 million	Asthma	–	–	US\$1.78 billion
			Allergic rhinitis			US\$266 million
Israel		7.5 million	Asthma	–	–	US\$250 million
Mexico	2007	103 million	Asthma			US\$35 million
USA	2007	310.2 million	Asthma	US\$14.7 billion	US\$5 billion	US\$19.7 billion
	2005		Allergic rhinitis	US\$11.2 billion	Up to US\$9.7 billion	Up to \$20.9 billion

A few global facts and figures for two common allergic diseases: asthma and rhinitis. Data from Pawankar *et al.* [1].

^aDirect costs: expenditure on medication and healthcare provision.

^bIndirect costs: costs to society from loss of work, social support, loss of taxation income, home modification, lower productivity at work, etc.

parents become affluent enough to buy cigarettes. Together, these factors generate indoor air pollution that is estimated to be as much as five times as severe in poor countries as in rich ones [4]. In rural Bangladesh, the prevalence of wheezing in rural children over a 12-month period was 16% [5]. The *White Book* highlights data from China that reports outdoor pollution as a cause of 300 000 deaths annually [1]. Moreover, climate change, change in ambient temperatures, and changes in weather during pollen seasons can cause both biological and chemical changes to pollens and have direct adverse consequences on human health by inducing disease exacerbations especially in urban and polluted regions. Appropriate environmental control measures of risk factors like indoor tobacco smoke, outdoor pollution, and biomass fuel can have huge health benefits. There are also other complex, but measurable, associations between early life circumstances like maternal and childhood nutrition. Such evidences indicate early life opportunities for interventions targeted towards the prevention of allergies and asthma.

Persons with allergic diseases like asthma also often have other comorbid conditions like diabetes, obesity, cardiovascular disease, and gastro-esophageal diseases leading to more complex situations and worse outcomes associated with these complications. Furthermore, owing to the high healthcare costs, morbidity, impact on quality of life, absenteeism, poorer work performance, and socio-economic costs, allergic diseases result in a socioeconomic burden to the affected families as well as countries. The costs for treating rhinitis in the USA have doubled in 5 years to US\$11 billion. In the developed countries, the financial burden of asthma ranges from US\$300 to 1300 per patient per year annually. In developing countries like

Vietnam, it is estimated to be US\$184 per patient per year, and in India, the monthly cost of medication for an asthmatic child can amount to one-third of an average family's monthly income. In fact, many developing countries are now caught in a stage of transition in which they face a growing burden of allergic diseases among other non-communicable diseases on top of the ongoing health problems of communicable diseases.

Efforts targeting allergic diseases are still very fragmented. The World Allergy Organization also puts forward a set of recommendations the '*Declaration of Recommendations*' in the *White Book* targeted towards governments and healthcare policy makers, namely, need for global epidemiological studies to assess the true burden of allergic diseases; need to implement appropriate environmental control measures and develop adequate preventive measures; need to increase the availability of and affordability of drugs; need to increase capacity building among those treating allergies; need to increase the clinical expertise among general practitioners; and need to increase public awareness and develop innovative preventive strategies.

In light of this ever-increasing threat of allergic diseases, high-income, middle-income, and low-income countries need to come together to develop a common strategy to find solutions at the levels of policy, healthcare delivery, health communication, and education under a platform of global cooperation. Global partnerships of multi-disciplinary teams, involving clinicians, academia, patient representatives, and industry, should work towards a common goal of reducing the burden of allergic diseases, developing cost-effective innovative preventive strategies and a more integrated, holistic approach to treatment, thereby preventing

premature and unwanted deaths and improving the quality of life of patients.

Acknowledgements

None.

Conflicts of interest

There are no conflicts of interest for any of the authors in relation to this publication.

REFERENCES

1. Pawankar R, Canonica GW, Holgate ST, Lockey RF, editors. The WAO white book on allergy. World Allergy Organization. 2011. pp. 1–216. <http://www.worldallergy.org/UserFiles/file/WAO-White-Book-on-Allergy.pdf>.
2. Mellon M, Parasuraman B. Pediatric asthma: improving management to reduce cost of care. *J Manag Care Pharm* 2004; 10:130–141.
3. Haahtela T, Tuomisto LE, Pietinalho A, *et al.* A 10 year asthma programme in Finland: major change for the better. *Thorax* 2006; 61: 663–670.
4. Bousquet J, Khaltaev N, editors. Global surveillance, prevention and control of chronic respiratory diseases: a comprehensive, approach. Geneva: World Health Organization; 2007. pp. 1–112.
5. Zaman K, Takeuchi H, Md Y, *et al.* Asthma in rural Bangladesh children. *Indian J Pediatric* 2007; 74:539–543.