

# Asthma, atopy, and COPD in sub-Saharan countries: the challenges

S Musafiri, G Joos, and J P van Meerbeeck

## Introduction

Chronic obstructive pulmonary disease (COPD) is a major cause of chronic morbidity and mortality worldwide and represents a substantial economic and social burden throughout the world.<sup>1</sup> COPD is often diagnosed after a long period of physician's hesitation and patient concern and this leads to a suboptimal treatment. This may be an important factor in the increase in mortality and morbidity as a result of asthma or COPD.<sup>2</sup> Westernisation of lifestyle, particularly in urban Africa, leads to an increased burden of allergic diseases, possibly even more dramatic than has been observed in Europe, Australia, or the USA, because parasitic infections have primed the immune system for IgE (immunoglobulin E) responses.<sup>3</sup> Recent research of helminth infections in relation to asthma and atopy has shed new light on the possible mechanism in the development of atopic (th2) as well as autoimmune (th1) diseases.<sup>4</sup>

The rate of tobacco consumption is increasing throughout the developing world. Africa is likely to be particularly hard hit because of an ageing population and because tobacco use is rising faster there than in any other continent.<sup>5</sup> If nothing is done to stop this rate of growth, Africa will have one of the world's highest childhood levels of tobacco consumption.<sup>6</sup>

The International Study of Asthma and Allergies (ISAAC) has reported that asthma prevalence is increasing in the world, including Africa.<sup>7</sup> Considering only the statistics, asthma and allergy do not rank high among causes of deaths and disabilities; however, their cost and the way they affect the lives of millions of people show how the two diseases deserve detailed attention. Allergic diseases in the setting of urban poverty may be more severe and result in greater morbidity and mortality, owing to poor access to care, unavailability of medication, and problems with adherence and risk avoidance.<sup>8</sup> Although deaths from asthma have declined in many countries over the past two decades, asthma still accounts for an estimated 180 000 deaths each year, most of which could be prevented with appropriate controller treatment. Globally, about 300 million people

have asthma, of which 50 million are in Africa.<sup>9</sup> Data on asthma and COPD are lacking here and it is becoming a chronic situation.

## Asthma, atopy and COPD in sub-Saharan Africa: what do we know?

The definition of asthma includes bronchial hyper-responsiveness, airway inflammation, and the presence of airflow obstruction, which may be relieved spontaneously or with medication. COPD, however, is defined as a chronic and usually progressive disease characterised by airflow limitation that is not fully reversible.<sup>10</sup>

Compared with industrialised countries, COPD, although associated with poverty, is less frequent in developing countries because of a younger population and lower tobacco consumption.<sup>5</sup> It has to be expected that tobacco consumption will increase in the near future, since a study on trends and affordability of cigarette prices showed that cigarettes are becoming more expensive in more developed countries while remaining more affordable in many developing countries. Moreover, developing countries have been subjected to intensive tobacco marketing.<sup>11</sup>

The word 'asthma' is well known in sub-Saharan countries and many theories have been developed by local inhabitants to explain its aetiology. In Dar-es-Salaam, Tanzania, a study showed that traditional healers are convinced that asthma is caused by 'ingestion of amniotic fluid during birth' (83%), by 'God' (75%), or inherited from parents (73%).<sup>12</sup> Conversely, a large proportion of medical staff are not well informed on COPD and ignore it completely. What is not 'asthma' is generally called 'chronic bronchitis'. In the general population COPD is totally unknown. Moreover, a diagnosis of COPD on purely clinical grounds is problematic in developing countries characterised by a high prevalence of lung infections (including tuberculosis) and the subsequent development of chronic irreversible airflow obstruction which may mimic COPD is common.<sup>13</sup> As in many Asian countries, asthma is the general term used to describe all types of chronic airway disease;<sup>13</sup> in Rwanda and some African countries, the presence of wheezes serves as the main diagnostic proof.

For atopy, people in sub-Saharan countries mainly understand food allergy and always make a link with intestinal parasitosis. Few know the correlations between asthma and atopy. Nothing is known about local aero-

S Musafiri, Department of Internal Medicine, Butare Teaching Hospital, Rwanda; G Joos and J P van Meerbeeck, Department of Respiratory Medicine, University Hospital of Ghent, Belgium. Correspondence to Dr Musafiri Sanctus. Email: musanct@yahoo.fr

allergens and air pollution in many African countries where an increase of allergic conditions depending on urbanisation in Africa has been demonstrated.<sup>14</sup>

## Research on asthma and COPD in sub-Saharan Africa

Few studies have been conducted in sub-Saharan countries on chronic respiratory diseases such as asthma and COPD. The International Study of Asthma and Allergies in Childhood (ISAAC) is one of the main sources of information on prevalence rates in Africa. The additional new centres in ISAAC phase three showed that the prevalence of asthma symptoms in Africa, especially those with severe disease, was one of the highest in the world.<sup>15</sup>

Looking at about 120 papers from MedLine on asthma in Africa, we found that asthma research is currently dominated by authors from South Africa, followed by authors from Nigeria, Tanzania, Kenya, Ethiopia, and the Gambia. Most of these are case studies, closely followed by cross-sectional studies and then case-control studies; there have been very few cohort studies.<sup>16</sup>

Research on COPD, asthma, and atopy is lacking in sub-Saharan Africa. There are several possible reasons for research in low-income countries being focussed on issues that are less important to these sub-Saharan countries.<sup>17</sup>

First, the type of research is often influenced by the agency paying for it.<sup>18</sup> This issue holds true both for developed and developing countries; as an example, 70% of the money for clinical trials drugs in the USA comes from industry rather than from the National Institutes of Health.<sup>18</sup> Likewise, research topics in Africa are often proposed by funders from the Western world.

Second, the tobacco industry is involved in some governmental activities and also sponsors some research. It is, therefore, obvious that research on tobacco consumption will be lacking. Public authorities are thus intimidated by the threats of economic loss or attracted by immediate economic gains.<sup>19</sup>

Finally, HIV/AIDS, tuberculosis, malaria, and other infectious diseases are priorities for researchers in Africa and they are supported by local governments and international funders. This can be partly understood considering the fact there is no budget allocated to research in many sub-Saharan countries and nearly three-quarters of mortality is from infectious diseases. It has been also noted that the World Health Organization (WHO) budget allocation is heavily biased towards infectious diseases.<sup>20</sup> As a consequence there are evident obstacles to conducting investigator-initiated research on asthma and COPD in general, and organising community-based surveys in sub-Saharan countries. With pulmonary obstructive diseases in particular the cost is always high, and illiteracy makes it difficult to use questionnaires, which sometimes have to be translated into the many local dialects. Moreover, the lack of specialists is another great barrier for research in Africa since they often need to be involved. The small number of specialists available work in teaching hospitals and are overwhelmed by clinical responsibilities.

## COPD and asthma: a diagnostic challenge

Lung function assessment is a very important tool to diagnose and quantify airflow obstruction and to differentiate asthma from COPD. Unfortunately very few clinics in sub-Saharan countries can perform those tests due to lack of resources and trained staff. Skin and serological tests for atopy are also unavailable and only a few privileged clinics can perform those tests. It has been recognised that features of COPD – and occasionally asthma – overlap, often rendering a unequivocal diagnosis difficult for the clinical practitioner.<sup>21</sup> This situation becomes dramatic when basic tools for diagnosis and monitoring are lacking.

A study carried out in Muhimbili Hospital, Tanzania, showed that almost half of doctors and nurses were not satisfied with their job, not only because of their low salary but even more because of the frequent unavailability of necessary equipment and consumables to ensure proper patient care.<sup>22</sup>

In 1998, WHO initiated the Practical Approach to Lung Health (PAL) which is a patient-centred approach to improve the quality of diagnosis and treatment of common respiratory illnesses in primary healthcare settings. It seeks to standardise service delivery through the development and implementation of clinical guidelines and managerial support within the district health system.<sup>23</sup> Many African countries have generated efficient tuberculosis programmes, but only 31 countries were at different stages of PAL in 2008. Obstacles to PAL development should be studied to allow implementation of that strategy which can improve diagnosis and management of chronic respiratory conditions in developing countries

## Risk factors

Data on chronic respiratory diseases and related risk factors are scarce or unavailable in most developing countries, particularly in sub-Saharan countries.<sup>24</sup>

For asthma and atopy, recent studies in sub-Saharan Africa described house dust mite, pollen, and cockroach, cat, and dog dander as the main allergens found in the region.<sup>25–27</sup> A study conducted in East Africa in 2000, concluded that in tropical regions there is an interaction between asthma and allergy, and specific IgE reactivity to environmental allergens may not be related to asthma.<sup>28</sup> Associations between helminth infections and allergy seem contradictory which may be attributed to differences in the length of infection and species studied.<sup>29</sup>

Data on COPD prevalence and risk factors are quite absent in sub-Saharan Africa; a few studies in the region have been focused on occupational exposure and a link between exposure to chemicals and dusts with COPD has been established.<sup>30–32</sup>

The relationship between tobacco smoking and COPD is universally known. In sub-Saharan countries not only are data on smoking patchy but the place of cigarette smoking as a cause of COPD is relatively unknown.

## Treatment challenges in sub-Saharan countries

Asthma and COPD guidelines are rarely and sometimes not at all implemented in sub-Saharan countries,<sup>33</sup> except in South-Africa, one of the wealthiest sub-Saharan countries. Most developing countries have no standard protocols for assessing and managing non-communicable respiratory diseases, the services that exist do not reach most of the population afflicted by human poverty.<sup>5</sup>

Inaccessibility to health centres due to poverty, traditional beliefs, and illiteracy gives traditional healers in many sub-Saharan countries an important place in the management of many diseases, including chronic respiratory diseases. Teklu in Ethiopia described many traditional asthma treatments, such as the ingestion of raw beaten eggs or smoking dry excreta of elephants.<sup>34</sup> This could explain why patients with chronic respiratory disease consult health centres not only for respiratory symptoms but also because of complications of an inappropriate treatment.

Tuberculosis and HIV treatments are free of charge in many African countries and programmes for both diseases are sometimes combined. That is not the case for many COPD and asthma drugs, such as inhaled corticosteroids that are essential for treatment of persistent asthma. They are either not available or not affordable in many settings, especially in low-income countries.<sup>35</sup> Decision-makers in some African countries say that it is not realistic to assume that the essential drugs for management of asthma and COPD can be supplied free of charge to all patients everywhere. The rationale for this policy has to be critically evaluated in the light of the successful programmes for the management of tuberculosis and HIV/AIDS.

The fact that many African countries have well-organised tuberculosis programmes should be a strength to implement the Global Alliance against Chronic Respiratory Diseases (GARD) where all the chronic respiratory diseases could be integrated. The non-availability of drugs most needed for healthcare and disease control in sub-Saharan Africa is not only due to insufficient funding, but also to the use of limited funds for expensive drugs that have little bearing on the disease.<sup>36</sup>

## Conclusion

Asthma, atopy, and COPD are significant health problems in Africa and if nothing is done the situation will worsen in the near future. Africa has many health problems but it is urgent to set up priorities and prevent chronic diseases such as COPD and asthma. Many African societies are in a transition period compared with Westernised societies and this leaves enough time for African planners to set up strategies for reducing tobacco consumption and environmental pollutants. Tomorrow will probably be too late.

## References

1. Romain AP, Klaus F. Burden and clinical features of chronic obstructive pulmonary disease. *Lancet* 2004; 364: 613-20.

2. Van Schayck CP, Chavannes NH. Detection of asthma and COPD in primary care. *Eur Respir J* 2003; 39: 16S-22S.
3. Van Ree R, Yazdanbakhsh M. Allergic disorders in African countries: linking immunology to accurate phenotype. *Allergy* 2007; 62: 237-46.
4. Von Hertzen LC, Haahtela T. Asthma and atopy - the price of affluence? *Allergy* 2004; 59: 124-37.
5. Ait Khaled N, Enarson D, Bousquet J. Chronic respiratory diseases in developing countries, the burden and strategies for prevention and management. *Bull World Health Org* 2001; 79: 971-9.
6. Yach D. Tobacco in Africa. *World Health Forum* 1996; 17(1): 29-36.
7. ISAAC steering committee. Worldwide variation in prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and atopic eczema. *Lancet* 1998; 351: 1225-32.
8. Bateman ED, Jithoo A. Asthma and allergy, a global perspective. *Allergy* 2007; 62: 213-15.
9. English RG, Fairall LR, Bateman ED. Keeping allergy on the agenda, integrated guidelines for respiratory diseases in developing countries. *Allergy* 2007; 62: 224-9.
10. Graciela E, Duane L, Stefano G, Robert A. Asthma as a risk factor for COPD in a longitudinal study. *Chest* 2004; 126: 59-65.
11. Guindon GE, Tobin S, Yach D. Trends and affordability of cigarettes price: ample room for taxes increases and health gains. *Tob Control* 2002; 11: 35-43.
12. Semali IAJ, Masawe AE. Bronchial asthma as known by traditional healers. *East Afr Med J* 1985; 62: 533-9.
13. Chan-Yeung M, Ait-Khaled N, White N, Ip MS, Tan WC. The burden and impact of COPD in Asia and Africa. *Int J Tub Lung Dis* 2004; 8: 2-14.
14. Yamaneberhan H, Bekele Z, Verun A, et al. Prevalence of wheeze and asthma and relation to atopy in urban and rural Ethiopia. *Lancet* 1997; 350(9071): 85-90.
15. Lai CKW, Beasley R, Crane J, et al. Global variations in the prevalence and severity of asthma symptoms: phase three of the International Study of Asthma and Allergies in Childhood (ISAAC). *Thorax* 2009; 64: 476-83.
16. Wjst M, Boakye D. Asthma in Africa. *PLoS Med* 4(2): 72e.
17. Singh RB. Asthma in India: applying science to reality. *Clin Exp Allergy* 2004; 34(5): 686-8.
18. Ross LF, Norton JW, Young SA, et al. Is academic medicine for sale? *N Engl J Med* 2000; 343(7): 508-10.
19. Ratté S, Slama K. État des données et de la recherche en Afrique francophone. *Promot Educ* 2005; 4: 17-22.
20. Stuckler D, King L, Robinson H, McKee M. WHO's budgetary allocations and burden of disease: a comparative analysis. *Lancet* 2008; 372(9649): 1563-9.
21. Chang J, Mosenifar Z. Differentiating COPD and asthma in clinical practice. *J Intensive Care Med* 2007; 22(5): 300-9.
22. Leshabari MT, Muhondwa EP, Mwangi MA, Mbembati NA. Motivation of health care workers in Tanzania: a case study of Muhimbili National Hospital. *East Afr J Public Health* 2008; 5(1): 32-7.
23. Ottmani S, Scherprier R, Pio A, et al. *Practical Approach to Lung Health, WHO/HTM/TB/2005.351*. Geneva: World Health Organization 2005.
24. Martins P, Josado-Pinto J, Do Céu Teixeira M, et al. Under-report and undiagnosing of chronic respiratory diseases in an African country. *Allergy* 2009; 64: 1061-7.
25. Mpairwe H, Muhangi L, Ndibazza J, et al. Skin prick test reactivity to common allergens in women, Entebbe, Uganda. *Trans R Soc Trop Hyg Med* 2008; 102(4): 367-73.
26. Westritschnig K, Sibanda E, Thomas W, et al. Analysis of the sensitization towards allergens in central Africa. *Clin Exp Allergy* 2003; 33: 22-7.
27. Ado-Yobo EOD, Woodcock A, Allotey A, et al. Exercise-induced bronchospasm and atopy in Ghana: two surveys ten years apart. *Plos Med*; 4(2): e70.
28. Sunyer J, Torregrosa J, Anto JM. The association between atopy and asthma in a semirural area of Tanzania (East-Africa). *Allergy* 2000; 55: 762-6.
29. Obeng BB, Hartgers F, Boakye D, Yazdanbakhsh M. Out of Africa: what can be learned from the studies of allergic disorders in Africa and Africans? *Curr Opin Allergy Clin Immunol* 2008; 8(5): 391-7.
30. Ballal SG. Respiratory symptoms and occupational bronchitis in chromite ore miners - Sudan. *J Trop Med Hyg* 1986; 89: 223-8.
31. Mustapha KY, Lakha AS, Milla MH, et al. Respiratory symptoms and spirometric lung function tests in Tanzania sisal workers. *Br J Ind Med* 1978; 35: 123-8.
32. Yach D, Myers J, Bradshaw D, Benatar SR. A respiratory epidemiological survey of grain mill workers in Cape Town, South Africa. *Am Rev Respir Dis* 1985; 131: 505-10.
33. Bousquet J, Ndiaye M, Ait Khaled, Annesi-Maessano AM. Management of chronic respiratory and allergic diseases in developing countries. Focus on Sub-Saharan Africa. *Allergy* 2003; 58(44): 265-83.
34. Teklu B. Bronchial asthma at high altitude, a clinical and laboratory study in Addis-Ababa. *Thorax* 1989; 44(7): 586-7.
35. Bodenheimer T. Uneasy alliance. Clinical investigators and the pharmaceutical industry. *N Engl J Med*; 342(20): 1539-44.
36. WHO. Evaluation of the PAL, Report of meeting. Geneva: WHO/HTM/TB/2008.396, June 2007.