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CLINICAL REVIEW

The impact of asthma and COPD in sub-Saharan Africa

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Abstract

Background: Many countries in sub-Saharan Africa have the highest risk of developing chronic diseases and are the least able to cope with them.

Aims: To assess the current knowledge of the prevalence and impact of asthma and chronic obstructive pulmonary disease (COPD) in sub-Saharan Africa.

Methods: A literature search was conducted using Medline (1995–2010) and Google Scholar.

Results: Eleven studies of the prevalence of asthma in sub-Saharan Africa were identified, all of which showed a consistent increase, particularly in urban regions. The data on asthma show a wide variation (5.7–20.3%), with the highest prevalence in 'westernised' urban areas. Only two studies of the prevalence of COPD in sub-Saharan Africa have been performed. Nevertheless, COPD has become an increasing health problem in sub-Saharan Africa due to tobacco smoking and exposure to biomass fuels. In most countries of sub-Saharan Africa, 90% of the rural households depend on biomass fuel for cooking and heating, affecting young children (acute lower respiratory infections) and women (COPD). This is the cause of significant mortality and morbidity in the region.

Conclusions: Asthma and COPD in sub-Saharan Africa are under-recognised, under-diagnosed, under-treated, and insufficiently prevented. A major priority is to increase the awareness of asthma and COPD and their risk factors, particularly the damage caused by biomass fuel. Surveys are needed to provide local healthcare workers with the possibility of controlling asthma and COPD.

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Introduction

Throughout the world, hundreds of millions of people of all ages are affected by chronic respiratory diseases (CRD). The majority live in low- or middle-income countries or deprived populations.[1] The prevalence of CRD is increasing in all parts of the globe, especially in children and older people. Three hundred million people have asthma, 210 million people have chronic obstructive pulmonary disease (COPD), and 600 million have allergic rhinitis; millions of others have other CRD.[2] In 2005 there were 250,000 deaths from asthma and more than three million from COPD. Ninety percent of all COPD deaths were in low- and middle-income countries.[3] Globally, COPD is now the fourth leading cause of death, and by 2025 it is predicted to become the third and will surpass AIDS/HIV in Africa.[4]

In developing countries, CRD and their risk factors – such as smoking, air pollution, allergen exposure, occupational exposure, severe childhood respiratory infections, and tuberculosis – receive insufficient attention from the healthcare community, government officials, patients and their families, as well as the media.[1,5,6] The standards of healthcare for chronic disease management are inadequate in many countries in the developing world where such diseases are prevalent. Health systems are hampered by their inability to differentiate infectious from chronic diseases.[7,8] Diagnostic tests such as hand-held spirometry or even peak flow measurements are only rarely available. Inhaled medication is included in the World Health Organization's Model List of Essential Medicines but is often limited and/or not affordable, particularly in rural areas.[9,10]

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Treatment for conditions such as asthma and COPD is focused on *ad hoc* treatment of acute exacerbations instead of disease management, including lifestyle factors and prevention of exacerbations.[11] Data on CRD and related risk factors are scarce or not available for most developing countries, and only few data on morbidity and economic burden exist, particularly in sub-Saharan Africa.[12] Information on causes of death among adults in sub-Saharan Africa is essentially non-existent because death certificates are often not issued.[8]

The depths of Africa

The continent of Africa has a huge range of climates, flora and fauna, and represents the greatest diversity among its people with more than 2,000 languages and cultures. However, the health problems in developing countries in sub-Saharan Africa sadly seem all too similar. The prevalence of tuberculosis, malaria, HIV/AIDS, and severe infections in young children is very high.[13] These diseases interact to cause an epidemic of CRD.[14] Not only does this region have the highest burden of disease, it also has the weakest health systems and workforces as well as the lowest per capita income. The poorest people have the highest risk of developing chronic diseases, and they are the least able to cope with them.[15] Furthermore, many communities in sub-Saharan Africa have to address other urgent priorities solely to survive, including poor nutrition and housing, often provoked by natural disasters or ethnic conflicts.[16]

The aim of this paper was to assess the prevalence, impact and risk factors of two specific CRD – asthma and COPD – in sub-Saharan Africa.

Methods

Using Medline (1995–2010) and Google Scholar, we conducted a literature search using the following terms: Africa, and each country of sub-Saharan Africa specifically, asthma, COPD, biomass fuel, indoor air pollution, risk factors, epidemiology and prevalence, using 'AND' and 'OR' as combining terms for exposure and outcome. The retrieved abstracts were manually sorted, removing irrelevant and duplicated papers. References in each of the identified papers were screened for any article not identified in the original search.

Results

A total of 445 articles was obtained from the searches and 119 papers (research papers, editorials, reviews, original articles, seminars and reports) relating to asthma and COPD in sub-Saharan Africa were eventually identified: 32 on asthma, 18 on COPD, 59 on indoor air pollution and 10 on primary healthcare, with some overlap.

Prevalence of asthma

The few time trend studies of the prevalence of asthma and other allergic disorders (e.g. International Study of Asthma and Allergies in Childhood (ISAAC) study) showed a consistent increase, particularly in urban areas of middle income countries in sub-Saharan Africa.[8,17-20] Figure 1 shows a world map of the prevalence of clinician-diagnosed asthma based on the European Community Respiratory Health Survey (ECRHS) and ISAAC study.[21]

In the poorer countries asthma appeared to be less common in rural areas than in urban areas.[17] Eleven surveys of the prevalence of asthma in sub-Saharan Africa were identified and are listed in Table 1.[17,20,22-30]

People living in rural grasslands rarely if ever suffer from allergic diseases and most of the local languages do not even have words to describe these conditions.[17,31] The prevalence of asthma varies widely between countries: Ethiopia 9.1%, Kenya 15.8%, Nigeria 13.0%, Mozambique 13.3%, and South Africa 20.3%.[24,32] Asthma appears to be more severe in sub-Saharan Africa than in affluent countries, although the latter have the highest symptom prevalence.[32,33] In countries where several centres are involved in surveys, the prevalence of asthma is generally highest in urban areas. In urban areas which have become increasingly 'westernised', the prevalence is higher and is similar to European countries.[24] Owing to the projected increase in the urban population in sub-Saharan Africa, it is estimated that there may be an increase of at least 35% in the number of people with asthma by 2025.[21] In developed countries children under the age of 15 years represent approximately 20% of the population, whereas in sub-Saharan Africa these children form approximately half of the population.[19] It must be emphasised that most surveys on the prevalence of asthma in sub-Saharan Africa were conducted among school children aged 6–7 years and 13–14 years; only three surveys were conducted among adults (Table 1).

The wide variation in the prevalence of asthma is partly explained by poverty, climate, exposure to tobacco smoke, viral infection, air pollution, chemical irritants, helminth infections, diet, and well-known allergens such as house dust mite, cockroach, dog and cat dander, and even washing soap.[22,31,34] Sensitisation to pet allergy, which was uncommon a decade ago, is becoming consistently more frequent in urban areas.[17] A high prevalence of asthma is also seen in countries with a very high prevalence of HIV/AIDS and tuberculosis.[24,35]

Relevance of helminth infections and gross national income

Helminth infections, which are pandemic in sub-Saharan Africa, are associated with an increased risk of bronchial hyperresponsiveness and a decreased risk of a positive skin prick test response.[22] Skin prick testing is a useful way of establishing the allergens to which a person is sensitive, but is complicated by the high prevalence of helminth infections which not only share the common trait of elevated IgE with allergic disease but also a general Th2 immune response. The relationship between skin

Figure 1. World map of the prevalence of clinician-diagnosed asthma, based on the ECRHS and ISAAC study, reproduced with kind permission from Masoli *et al.*[21]

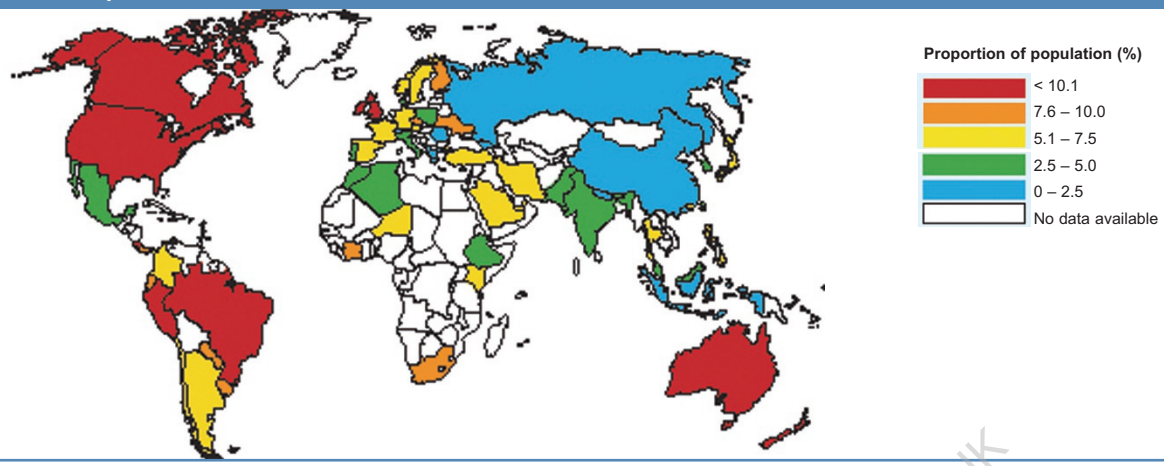
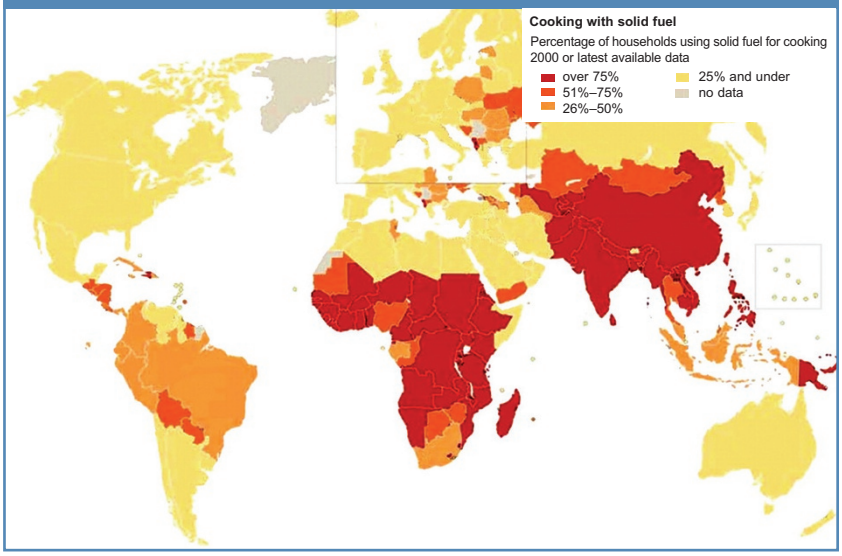


Table 1. Surveys of the prevalence of asthma in sub-Saharan Africa

Study and country	Measurement	Magnitude
Calvert *et al.*[22] 2010, South Africa	Cross-sectional survey comparing 1651 urban and 1671 rural children 8-12 years on EIB	*Ascaris* infection associated with increased EIB OR 1.62 (95% CI 1.23 to 2.11) and decreasedpositive SPT, OR 0.63 (95% CI 0.42 to 0.94)
Desalu *et al.*[23] 2009, Nigeria	Asthma among adults (n=810) using ECRHS questionnaire in city of Ilorin	Prevalence of asthma 15.2%, male:female ratio 2:1, current asthma 12.7% and physician-diagnosed asthma 2.0%
Addo-Yobo *et al.*[17] 2007, Ghana	Comparing atopy and EIB with urban rich (UR), urban poor (UP), rural (R) in 9-16 yr children in 1993 (n=1095) and in 2003 (n=1848)	EIB doubled among UR, UP and R from 4.2%,1.4% and 2.2% to 8.3%, 3.0% and 3.9%;sensitisation doubled from 10.6%, 4.7% and 4.4%to 20.2%, 10.3% and 9.9%
Zar *et al.*[20] 2007, South Africa ISAAC I and ISAAC III	Video and written questionnaire comparing 5178 children in 1995 and 5037 in 2002 aged 13-14 yrs	WQ wheeze 16-20.3%, EIB 21.5-32.5%, noct.cough 23.6-36.6%; VQ wheeze 6.5-11.2%, EIB 11.5-13.9%, noct.cough 11.6-19.2%
Aït-Khaled *et al.*[24] 2007, ISAAC III	Video and written questionnaires in 16 countries in Africa (and 22 centres) on prevalence symptoms asthma 13-14 yr children	High asthma symptoms prevalence: Cape Town 20.3%, Reunion Island 21.5%, Brazzaville 19.9%, Nairobi 18.0%, urban Ivory Coast 19.3%; low prevalence asthma symptoms: Yaounde 5.7%, Kinshasa 7.5%, Addis Ababa 9.1%
Mavale-Manuel[25] 2007, Mozambique ISAAC	Video and written questionnaires prevalence asthma from 6-7 yr children and 13-14 yr students	Prevalence asthma 13.3% in both groups; in 6-7 yr EIB, noct. cough and ever asthma: 11.4, 27.5 and 25.6%, most in suburban areas; in 13-14 yr 28.3, 43.5 and 26.4%, most in suburban areas
Mavale-Manuel[26] 2006, Mozambique ISAAC	Video and written questionnaire (VQ and WQ) comparing 13-14 y children (n=1614) in urban, sub-urban and rural areas	Prevalence current asthma VQ 11.9% and WQ13.3%; EIB 21.0% (all areas); urban-suburban-rural: noct.cough 22.7, 27.1, 14.1%; severe asthma 9.1, 12.3, 11.4%
Erhabor *et al.*[27] 2006, Nigeria	Written questionnaire among 903 students (15-35 y) on prevalence symptoms of asthma	Prevalence wheeze 9.0%, noct.cough 9.4%,chest tightness morning 8.0%; probable asthma 14.1%, suspected asthma 4.1%, previously diagnosed 32.5%
Erlich *et al.*[28] 2005, South Africa	Questionnaire about wheeze and asthma diagnosis among adults (5671 men and 8155 women)	Wheeze reported 14.4% men and 17.6% women; asthma diagnosis 3.7% men and 3.8% women; history TB independent factor of wheeze (OR 3.4) and asthma (OR 1.9)
Dayoye *et al.*[29] 2004, Ethiopia	Cross-sectional survey (n=7155) among children 1-5 y; 60% live in urban areas	Prevalence wheeze 3.4%, lower in rural area with OR 0.47; risk factor urban area: kerosene, tobacco, long time breastfeeding; protective in urban area: living with animals; risk factors rural area: positive SPT and living with animals
Hailu *et al.*[30] 2003, Ethiopia	Written questionnaire about prevalence asthma in 3365 children 13-14 yr	Atopic disorder 36%, wheeze 16.2% rhino-conjunctivitis 14.5%, eczema 10.9%; prevalence diagnosed atopic disease 8.6%

EIB=exercised-induced bronchospasm; SPT=skin prick test; noct.cough=nocturnal cough; ISAAC=International Study of Asthma and Allergies in Childhood; ECRHS=European Community Respiratory Health Survey; VQ=video questionnaire; WQ=written questionnaire.

Figure 2. Worldwide biomass fuel use for cooking, reproduced with kind permission from the World Health Organization[52]



prick test positivity and allergic symptoms is therefore weak, particularly in countries with a low gross national income.[22,24,36] Thus, the epidemiological data show the relevance of the risk factors in different areas and the role of protective factors.

Prevalence of COPD

Until recently, most of the information available on the prevalence of COPD came from high-income countries. Two prevalence studies have been carried out in Africa – both in South Africa[37,38] – and only the BOLD study used post-bronchodilator spirometry values: COPD defined by airflow limitation alone (GOLD stage 2 or higher) was reported in 22.2% of men and 16.7% of women aged ≥40 years. These prevalence data were by far the highest country rates reported within the global BOLD study, and were thought to be due to high levels of prior tuberculosis and occupational exposures and smoking habits.[37,39] In other surveys, no bronchodilator was administered or spirometry was not available so the diagnosis was made using symptoms such as shortness of breath, cough, and sputum production for more than three months over the previous two years.[12]

Only 10 of the 53 countries in Africa have published data on the prevalence of COPD (e.g. selected populations such as factory workers and miners).[40-42] COPD is not often recognised as respiratory symptoms are frequently attributed to smoking, to respiratory infections such as tuberculosis, or to ageing. Furthermore, the term COPD is unfamiliar to the public and even to physicians in many parts of sub-Saharan Africa.[43] In addition, national guidelines for the diagnosis, management, and prevention of COPD are rare in sub-Saharan Africa.[10,11,13]

Contributory factors in the development of COPD

Tobacco smoking has traditionally been the main factor responsible for the development of COPD, particularly in high- and middle-income countries. In low- and middle-income countries the smoking rate is increasing as economies develop, but is still linked to poverty and poor education.[1,43] Exposure to indoor air pollution – caused by the use of biomass fuel for cooking and heating – substantially increases the burden of COPD in addition to tobacco smoking, particularly in rural areas in sub-Saharan Africa.[10,39,44,45] Biomass smoke has been shown to be an independent risk factor for obstructive airways disease, and earlier and longer time of exposure has been shown to increase the risk for the development of COPD.[43,46-50] The risk of developing COPD attributable to biomass smoke exposure is similar to the risk due to tobacco smoking.[51] Figure 2 shows the worldwide use of biomass fuel for cooking produced by the World Health Organization.[52] Occupational exposure and tuberculosis are also emerging as important risk factors in countries with a high COPD burden.[39,53] Other contributory risk factors include outdoor pollution, allergy and bronchial hyperresponsiveness, prematurity, low birth weight, and certain childhood respiratory infections.[43] Lower socioeconomic status increases the risk of developing COPD, although which component factors (e.g. poor housing, poor nutrition, low income, poor education) are the most important in influencing the development of COPD – and to what extent – is unclear.[47] International health authorities have only recognised the rising morbidity and mortality of COPD in the last decade.[10,43,54] The mortality due to COPD is projected to increase by more than 30% in the next 10 years, particularly in these developing countries.[43] Exposure to biomass smoke is the biggest risk factor for COPD globally in sub-Saharan Africa, and possibly globally.[51] Surveys on indoor air pollution in sub-Saharan Africa are shown in Table 2.[55-62]

Consequences of indoor air pollution

Approximately three billion people and up to 90% of rural households in developing countries, such as many regions in sub-Saharan Africa, still rely on unprocessed biomass fuels for cooking and heating.[63] Biomass fuel consists of any material derived from plants or animals which is deliberately burnt by humans. Wood is the most common example, but animal dung, crop residues, and grass are also used. Typically burnt indoors in open fires or poorly functioning stoves with inefficient combustion, these fuels cause extremely high levels of air pollution in the presence of poor ventilation. Women and their young children suffer most.[3,43,64,65] Exposure to particulate matter, especially to particles with a diameter of ≤2.5μm, carries high risks.[66,67] The damaging effect is determined by the concentration

Table 2. Surveys of indoor air pollution in sub-Saharan Africa

Study and country	Measurement	Magnitude
Fullerton *et al*.[55] 2009, Malawi	PM level in 31 rural homes (mostly wood) and 31 urban homes (mostly charcoal)	PM mean level 226µg/m³; $PM_{2.5}$ level >250 µg/m³ >1 hr per day in 52% of rural homes and 17% of homes
Kumie *et al*.[56] 2009, Ethiopia	NO_2 level in 3300 homes using biomass fuel (wood, dung)	Mean NO_2 level 97 µg/m³, and tends to be higher during wet season, wet biomass fuel, and poor ventilation
Dionisio *et al*.[57] 2008, the Gambia	PM and CO level in 13 households using biomass fuel (wood, dung)	$PM_{2.5}$ mean level 361µg/m³ with peal levels in cooking periods ($PM_{2.5}$ >6,000); mean CO level 3.8
Kilabuko *et al*.[58] 2007, Tanzania	PM_{10}, NO_2 and CO levels in kitchen, living room and outdoors in 100 homes using wood as fuel	PM_{10} mean 656µg/m³ with max. 2,565µg/m³; ¾ of homes had intense PM_{10} peak during cooking in kitchen which varied from 3,200 to 10,000µg/m³
Rumchev *et al*.[59] 2007, Zimbabwe	Respiratory symptoms among women and children in 48 house-holds using wood for cooking	Prevalence respiratory symptoms 94% for women and 77% for children; most common for women: cough 79%, chest cold 70% and phlegm 51%; most common among children: chest congestion 52%, dry cough 47%, running nose 40%
Mishra *et al*.[60] 2003, Zimbabwe	Association of biomass fuel use and acute respiratory infection (ARI) prevalence in 3359 children <5 years	Children living in homes using wood, dung or straw had more than twice the chance of ARI compared with homes using LPG or electricity (OR 2.20, 95% CI 1.16 to 4.19)
Ezzati *et al*.[61] 2001, Kenya	Risk of acute respiratory infection (ARI) in relation to PM_{10} in 55 households using biomass fuel	Risk of ARI increases with PM_{10} exposure, but rate of increase falls at exposure > 2000 µg/m³; rate of increase of exposure-response is highest for exposure below 1000-2000 µg/m³
Ezzati *et al*.[62] 2000, Kenya	Comparison emission and exposure from traditional and improved cook stoves in 38 homes in rural areas	Improved wood-burning stoves reduced PM by 48% during cooking and 77% during smouldering phase; greatest reduction achieved by transition from wood to charcoal

WHO guidelines: PM_{10} <50µg/m³ (24-hr mean) and <20µg/m³ (annual mean); $PM_{2.5}$ <25µg/m³ (24-hr mean) and 10µg/m³ (annual mean); CO mean <10mg/m³ or <9ppm; NO_2 mean <40µg/m³.

of pollutants in the indoor environment and by the duration of exposure, commonly 3–7hrs daily over many years and often lifelong.[48,68] Other toxic pollutants due to biomass fuel are carbon monoxide, nitrogen oxide, and a variety of carcinogens, polycyclic aromatic hydrocarbons and other toxins which closely follow tobacco smoke toxins, except for nicotine.[46] Biomass fuel is often the main source of outdoor pollution in rural areas and in some urban areas.[69] Recent time series studies have shown an increase in mortality related to short-term air pollution, and limited prospective cohort studies have also found increased mortality due to long-term exposure to low-level air pollution.[70,71] The strongest associations of respiratory diseases with use of biomass fuel in sub-Saharan Africa are acute respiratory infections in young children (<5 years of age) and COPD, particularly in women.[49,69,72-77] Exposure to biomass smoke may act as an asthma trigger but, in addition, exposure has been associated with an increased prevalence of asthma.[46,60] The greatest burden of ill health related to the use of biomass fuel is found in the poorest and most vulnerable population and is causing a public health tragedy.[67,71,78]

Discussion

In sub-Saharan Africa, data on the impact and prevalence of asthma and COPD are limited. These diseases and their risk factors have not been seen as major health problems. Asthma and COPD are under-recognised, under-diagnosed, under-treated, and insufficiently prevented.[8,11] Unfortunately, the knowledge of asthma and COPD among many physicians is rather poor.[79,80]

Asthma and its risk factors

Urbanisation and asthma

The available data suggest that the prevalence of asthma in sub-Saharan Africa, certainly among children, is continuing to increase.[81] Studies of the prevalence of asthma have consistently shown lower levels in villages and increasing prevalence with urbanisation. The question therefore is: what other changes associated with urbanisation could contribute to the increase in asthma? The degree of urbanisation is one factor that increases with higher gross national income.[82] Urbanisation leads to differences in nutrition and lifestyle, including physical activity and housing, as well as changes in infections.[34,83] The spectrum of pathogens may also be different, with conflicting evidence on helminth, IgE and atopy.[31]

Limitation of diagnostic tests

There is no definitive diagnostic test and, because of cultural and linguistic differences, it is often difficult to adopt a universally accepted definition of asthma and to compare the findings accurately between regions.[21,81] In epidemiological studies, asthma has commonly been defined by (a) the self-reporting of

asthma or asthma-like symptoms (written and video questionnaires) and (b) existence of bronchial hyperresponsiveness, mainly assessed in sub-Saharan Africa by exercise-induced bronchospasm (EIB).[26] Although EIB is suggestive of asthma, these conditions are not equivalent and asthma can be present in the absence of EIB and vice versa.[17,22,83,84] Furthermore, the values of EIB may be limited by environmental factors such as temperature, humidity, or air pollution.[17,22,85]

COPD and its risk factors

COPD is one of the chronic diseases that will continue to become more frequent with the ageing of the population.[1,53] The high prevalence of COPD, particularly among non-smoking women, indicates that the COPD burden in sub-Saharan Africa may be largely due to indoor air pollution.[45,86] Tobacco smoking is an important risk factor worldwide, but exposure to indoor biomass fuel may be even greater and the effects are additive.[51]

Proposals

Many people are still unaware of the damage to respiratory health caused by indoor pollutants which disproportionally affect women and children and are the cause of significant morbidity and mortality in sub-Saharan Africa.[72] The major priorities are to (1) increase awareness in physicians and healthcare workers; (2) increase research efforts into practical ways to reduce the damage caused by indoor air pollution; (3) assess the methods of diagnosing and differentiating CRD appropriate to the resources available; and (4) assess the most cost-effective treatments for asthma and COPD.

Intervention programmes to reduce the impact of indoor air pollution

Four intervention categories have been identified for their potential to reduce the impact of indoor air pollution: cleaner burning fuels, improved cooking stoves, housing design, and behavioural change.[87,88] An improved biomass stove is the most cost-effective intervention for sub-Saharan Africa, particularly in regions where the majority of the population continues to cook with biomass fuels.[55,72,89] Poverty will continue to force most households in rural areas to rely on biomass fuels, at least in the next 2–3 decades.[76] An improved biomass stove – when adequately designed, installed, maintained, and used – can potentially reduce indoor air pollution.[90] Lower emissions may be more effectively achieved by modifying energy use behaviours such as fuel drying, use of pot lids to conserve heat, good maintenance of stoves and chimneys, keeping children away from smoke, and simple changes to ventilation of living and cooking areas.[72,87] Unfortunately, the adherence to intervention programmes is very low. There are a range of general, country-specific, region-specific, and personal reasons why individuals may not adhere to a stove intervention programme.[69] This emphasises the importance of analysing each social system in terms of decision-making process, an in-depth knowledge of cooking habits, and the traditions of the community in which the intervention is to be used. Education and cultural modification by a trusted person is therefore a necessary component of any intervention. Large-scale dissemination of improved cooking stoves has great potential to improve the quality of life and reverse the trends of mortality and morbidity caused by indoor air pollution.[44,50,90,91] A shift from firewood to charcoal can further reduce indoor pollution and allows safe and cost-effective use of biomass fuel.[72,92]

Education in primary care

Programmes for educating healthcare professionals in the care and management of patients with CRD require strengthening in Africa, and public awareness should be increased.[11,93] The diversity of healthcare systems and large variations in access to care indicate that nurses rather than doctors are the key to implementing the several approaches to managing the epidemic of chronic diseases to local needs.[15,91,94] Traditionally, nurses play an essential role in ensuring primary care coverage, especially in rural areas where there are few primary care doctors. In addition, local nurses understand the potential of traditional medicine, which has been underestimated to date. In many countries of sub-Saharan Africa, alternative and complementary medicines are commonly used.[1]

Management of respiratory diseases

Improved access and standardised management of CRD should be advocated by all those interested in public health with as much force, enthusiasm, and perseverance as is dedicated to AIDS/HIV, malaria, and tuberculosis.[13] This can be facilitated by the World Health Organization Global Alliance Against Respiratory Diseases, a voluntary alliance of organisations, institutes, and agencies working towards a common vision to improve global lung health according to local needs. The Practical Approach to Lung Health, also initiated by the World Health Organization, is one of the strategies aimed at managing patients with respiratory conditions in primary healthcare settings and focuses on the most prevalent respiratory diseases at first-level health facilities.[3,15,95,96]

Conclusions

From limited but improving data it is clear that the burden of CRD – particularly asthma and COPD – in sub-Saharan Africa is rising. The greatest prevalence is in the most deprived areas which have the least resources to address the problems. The inverse care law applies dramatically to CRD globally, and its rising impact cannot be addressed without redistribution of resources to places where they are most needed. Accurate data on the prevalence of asthma and COPD and their risk factors are needed, including the impact of asthma and COPD. The risk of CRD associated with exposure to biomass fuel use and the dose-response relationship needs further evaluation to inform effective interventions. Qualitative and quantitative research will be essential to provide key policymakers with convincing evidence for the impact of CRD on local communities and the

implementation of culturally appropriate interventions to control CRD and its risk factors.

Conflicts of interest
None.

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None.

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COMMENTARY

Non-communicable diseases and their importance in low and middle income countries

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Non-communicable diseases (NCDs) have become an important health burden not only in high income countries – where population ageing is a major contributory factor – but also in low and middle income countries (LMICs). Yet they receive insufficient attention from the healthcare community and governments. 80% of all NCDs occur in LMICs, causing 8 million premature deaths annually from the major NCD risk factors. They are also a major cause of poverty and an urgent development issue, with LMICs carrying the biggest burden. However, less than 3% of the global development assistance for health goes to prevention and control of NCDs.[1] The International Primary Care Respiratory Group (IPCRG) has joined the NCD Alliance as part of our campaign for chronic respiratory diseases (CRDs), smoking cessation, and the role of primary care, to be prioritised by national governments and funding agencies so that additional resources are allocated given their economic and health impact (http://www.theipcrg.org/resources/resources_cdmNCDalliance.php). The NCD Alliance's call for action is for the United Nations at its Summit in September 2011 to commit to global action on NCDs.

Tobacco dependence and CRDs such as asthma and chronic obstructive pulmonary disease (COPD) affect hundreds of millions of people all over the world, the majority living in LMICs or deprived populations.[2] Current data on the impact and prevalence of asthma and COPD in these populations are limited; they are under-diagnosed and under-treated, and have therefore not been seen as major health problems. Many sub-Saharan African countries are good examples of how multiple urgent priorities such as the Millennium Development Goals (http://www.un.org/millenniumgoals/poverty.shtml), natural disasters or ethnic conflicts lead to lack of funding, research and knowledge about the prevalence and burden of CRDs and consequent inadequate application of the evidence of effective interventions. Primary prevention activity is also insufficient.

Here, van Gemert *et al*.[3] present an excellent review of the published data to assess the prevalence of asthma, COPD and

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