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Journal of the Pan African Thoracic Society

*Commentary*

# Chronic respiratory disease in low-income and middle-income countries: From challenges to solutions

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Received: 19 February 2022
Accepted: 20 March 2022
EPub Ahead of Print: 19 April 2022
Published: 02 May 2022

**DOI**
10.25259/JPATS_10_2022

**Quick Response Code:**

## ABSTRACT

In 2019, the British Thoracic Society (BTS) launched a Global Health Group in partnership with the Pan African Thoracic Society (PATS). Each year, this group proposes a symposium at the BTS Winter meeting exploring issues of respiratory disease and care which are most relevant to respiratory health across the life course in low- and middle-income countries (LMICs). The first symposium, offered in February 2021, described the burden of five key respiratory exposures/diseases of interest in LMICs, including childhood pneumonia, air pollution, post-TB lung diseases, asthma, and chronic obstructive pulmonary disease, and a summary of the discussion has previously been published in the PATS journal. The second symposium, conducted in November 2021, discussed barriers to the management of chronic respiratory diseases (CRDs) in LMICs, with perspectives presented from Malaysia, The Gambia, Kenya, and sub-Saharan Africa more broadly. These presentations highlighted the challenges of chronic respiratory care in LMICs, while a presentation from the World Health Organization (WHO) officer for CRDs described the role and remit of the WHO in providing leadership and guidance in this area. A summary of this second symposium is presented here, and we discuss the pathways from challenges to solutions for CRD care in low- and middle-income countries.

**Keywords:** Chronic respiratory diseases, Low- and middle-income countries, Tuberculosis, Asthma, COPD, Health systems

## INTRODUCTION

Chronic respiratory diseases (CRDs) are a major contributor to the burden of non-communicable diseases (NCDs) in low- and middle-income countries (LMICs).[1,2] Work describing the burden and distribution of CRDs in LMICs is ongoing: A recent scoping review identified 281 studies describing the burden of asthma ($n$ = 122), chronic obstructive pulmonary disease (COPD) ($n$ = 90), or both conditions together ($n$ = 22),[3] with variable tools used for case definitions.[4] Our understanding of the epidemiology of CRDs in LMICs – and particularly asthma and COPD – has grown in recent years.[5] However, while our knowledge of the burden of disease has grown, work exploring how these conditions might be addressed on the ground, within stretched health systems in low-resource high-burden settings, remains more limited.

In this paper, we summarize the discussions held at the recent seminar entitled "Chronic Respiratory Disease in LMICS: From Challenges to Solutions," which was presented at the Winter Meeting of the British Thoracic Society (BTS) in 2021. In this seminar, which was a joint

initiative between the BTS Global Health Group (GHG) and the Pan African Thoracic Society (PATS), three perspectives were presented on the challenges and opportunities for the diagnosis and care of people with CRDs in LMICs, from Malaysia, The Gambia, and Kenya. A further presentation by the World Health Organization (WHO) medical officer for CRDs highlighted the role of the WHO in addressing CRD prevention, diagnosis, and management, through global leadership, and development of normative guidance and country support.

In this paper, we summarize these presentations and consider the approaches needed for us to prevent, diagnose, and appropriately manage CRDs in LMICs in the decades ahead. This paper builds on the joint BTS-PATS seminar on Africa's respiratory "Big Five" presented at the Winter Meeting of the BTS February 2021 and the joint BTS-PATS initiative of the BTS GHG.[4,6]

## CHALLENGES TO THE DELIVERY OF CARE FOR PEOPLE WITH CRD IN LMICS: A PERSPECTIVE FROM MALAYSIA

Malaysia is an upper-middle-income country with 32.6 million population[7] and three main ethnicities (Malay, Chinese, and Indian). The health system includes both public and a private systems, and Malaysia spent 4.1% of GDP on health in 2019.[8] There are 144 government and 208 privately funded hospitals; 1114 public health centers; and about 6000 private general practices.[8] Public funded health centers provide universal health care at a cost of approximately $0.25 USD per consultation, inclusive of investigations, and treatments, while private general practices operate on a fee for service basis. Diseases of the respiratory system are among the top three causes of mortality and hospitalization in the country.

Malaysia faces challenges in the delivery of care to people with CRD in the following aspects: A high burden of damaging respiratory exposures including air pollution and smoking; limited health information systems; limited access to vaccines, medicines, and devices; health system and workforce constraints; and challenges around the financing, leadership, and governance of services.[9]

Harmful respiratory exposures remain widespread. There have been several severe transboundary haze episodes since 1996 and widespread forest fires with open burning of agricultural land, which have been associated with an increase in morbidity, especially for asthma, and increased mortality rates.[10] Smoking is a risk factor for CRD and worsens control of asthma, but the Malaysian National Health and Morbidity Survey 2019 showed that 21% of people smoke in Malaysia, and one in two were exposed to secondhand smoke.[11]

In Malaysia, the prevalence of asthma is estimated at 8.9–13% in children (6–14 years) and 6.3% in adults; for COPD in a sub-urban population, prevalence was estimated at 3.4–5.1%.[12-15] However, many existing health-care providers have limited awareness of CRDs and lack confidence to diagnose and manage these conditions. Time constraints and heavy workloads seen in the public health sector further contribute to challenges around health-care delivery. Previous work has demonstrated poor asthma control with only 1/3 of asthmatics receiving regular follow-up. Controller medications were underutilized, and oral short-acting ß$_2$ agonist (SABA) use was common.[12,16] For COPD, there is mislabeling of the disease as asthma by both patients and doctors.[17] There is a lack of pulmonary rehabilitation services, and palliative care for severe COPD is scarce.

In addition to the lack of awareness of CRDs among health-care providers, there is also limited understanding of CRDs among patients. One in three adults in Malaysia has low health literacy,[11] and the diagnosis of asthma and COPD, and use of inhalers are stigmatized.

Although inhalers (short- and long-acting ß$_2$ agonists [SABA and LABA], long-acting antimuscarinic agents [LAMAs], and inhaled corticosteroids [ICSs]) are licensed for use on the national formulary, there is medicine limitation, especially in public primary care settings with a quota system due to cost constraints. Spacers are not listed on the national formulary, and vaccines such as influenza and pneumococcal vaccines are payable and optional. Dispensing from private pharmacists is not well regulated. In addition, although tobacco dependence treatment is available, it is not well received. There is a lack of spirometers in primary care settings and limited access to spirometry. This, coupled with a lack of local reference values for the lower limit of normal for spirometry in Malaysia, poses great diagnostic challenge for CRD diagnosis and care.[18]

In terms of governance, finance, and research, inadequate priority has been given to CRD compared to cardiovascular disease, with a lack of investment in primary care infrastructure and workforce.[8] Record keeping is generally poor and electronic records are not universal.

Asthma, COPD, and broader chronic respiratory conditions are neglected non-communicable diseases in Malaysia. There is an unmet need to address the gaps in delivery of care for people with CRD.

## WHAT DO WE DO WHEN IT'S NOT TB: FINDINGS IN THE GAMBIA AND SSA

Most low- and middle-income countries have limited access to accurate diagnostics for non-communicable CRDs.[1] The early recognition of non-communicable CRDs such as bronchiectasis, chronic obstructive airways

disease, and asthma is important to facilitate lifestyle change and preserve lung function. Several strategies addressing lung health through service integration and guidance have been developed including the Practical Approach to Lung Health (PAL) WHO strategy[19] and the Practical Approach to Care Kit.[20] The former advocates for the integration of alternative diagnostics for other respiratory conditions within national tuberculosis programs and the latter focuses on strengthening primary care provision in LMICs. The roll-out of these strategies in LMICs, where health systems remain fragmented and often dependent on externally funded vertical (communicable) disease control programs such as TB programs, has been slow. Despite the longstanding existence of PAL, in practice when patients with chronic respiratory symptoms present to health services in sSA they are faced with limited-service provision that often offers little in the way of alternative diagnostics and follow-on care, aside from an assessment for tuberculosis.

Observational data from The Gambia showed that nearly half of all patients presenting with respiratory symptoms investigated for TB disease did not receive a final diagnosis of tuberculosis.[21] A range of alternative diagnoses – predominantly respiratory – was described, but, importantly, many non-respiratory diagnoses such as heart failure, malignancy, and renal failure were also noted. In 36% of patients not diagnosed with tuberculosis, no alternative diagnosis was made. Minimal health care was afforded to these patients beyond screening for TB and human immunodeficiency virus.

The burden of ill-health in patients with presumed TB who are subsequently found not to have TB, and their on-going engagement with health systems has been largely overlooked. A systematic review of TB diagnostic studies in sub-Saharan Africa highlights our lack of knowledge of the needs of this patient group.[22] The proportion of patients with presumed TB subsequently not diagnosed with TB was 48.5% (95% CI 39.0–58.0) in passive and 92.8% (95% CI 85.0–96.7) in active case finding studies. This proportion increased with declining numbers of clinically diagnosed tuberculosis cases. Patients with a previous history of tuberculosis, estimated at 155 million people globally in 2020,[23] who re-present with respiratory symptoms form part of this neglected group. A history of tuberculosis was documented in 55% of studies identified in this review, with just five out of 18 studies reporting any alternative diagnoses in those subsequently not found to have recurrent TB disease.

A large number of children and adults with chronic respiratory symptoms present to, or are identified, by TB services. Those who are not diagnosed with TB disease are likely to have a high burden of CRDs, and developing systems to support their primary health-care needs is likely to both improve patient outcomes, as well as having efficiencies for both communicable and non-communicable health services.

## PUBLIC HEALTH SYSTEM READINESS FOR ASTHMA CARE: A CASE STUDY FROM KENYA

The true burden of asthma in Kenya is unknown due to the lack of up-to-date population-based research data across age groups. Official government reports cite 10% asthma prevalence, based on studies done over 20 years ago.[24] The Kenyan public health system is devolved with 47 subnational county governments responsible for providing the bulk of healthcare services, ranging from the community health system to secondary referral hospitals. A network of community health volunteers drawn from local communities supports referrals of community members to local health facilities.

We report the findings of a study conducted in Meru County in Central Kenya (August 2019–November 2020) which explored the barriers to the diagnosis and management of asthma using in-depth interviews with health care workers ($n = 57$), in-depth interviews ($n = 8$) and focus group discussions ($n = 11$) with community health volunteers, and key informant interviews with county officials with decision-making roles around health workforce, budget, and service delivery ($n = 13$). Work was based across primary care facilities ($n = 2$), hospitals ($n = 3$), and local community sites ($n = 6$).

Our findings show that clinical consultation for symptomatic patients prioritized ruling out TB using sputum tests, before exploring other diagnosis. Sputum testing was often delayed due to low GeneXpert capacity and electricity power supply disruptions. Consequently, patients were required to submit repeat samples, exposing them to inconvenience and financial strain. Sub-county hospitals did not offer chest X-ray services, and none of the public hospitals offered spirometry services.

Asthma-related stigma undermined appropriate health-care responses. The main drivers of stigma included low awareness about risk factors for asthma, and perceptions of asthma as infectious (like TB) and therefore fear of being in contact with people with asthma. In some communities, people with asthma suffered discrimination and were exposed to adverse social and gender norms, for example, difficulties in marriage prospects. Stigma was associated with patients' refusal to disclose important symptoms such as cough, denial of asthma diagnosis, refusal to use or be seen with inhalers or spacers, and poor adherence to ongoing medical review.

Interview accounts emphasized that drug supplies to health-care facilities have improved. Asthma medications were supplied at subsidized rates – inhalers that would cost US$15–25 at market rates cost US$2 in hospitals (1 $US = 100 Kenyan shillings). Drugs were supplied free-

of-charge at the primary care level, in line with government policy. Challenges in drug supplies included frequent stockouts, and some patients preferred to buy drugs from the private retailers. This led to lost opportunities for clinical review before prescription, and abuse of prescription-only drugs such as oral prednisolone. Although drugs were supplied at subsidized rates, some patients could not afford inhaled therapies.

Inadequate numbers and specialization of health care workers affected the quality of health care, with limited time provided for counseling and health education on risk factors for asthma, or inhaler use. There were no standard treatment plans for asthma and health care workers commonly prescribed oral rather than inhaled steroids to patients whose diagnoses were inconclusive. Frequent strikes by health care workers, as a result of delayed salaries and promotions, disrupted delivery of care.

Weaknesses in communication hampered referrals by community health volunteers. Some health care workers did not acknowledge the Ministry of Health referral forms completed by community health volunteers. This reduced patient follow-up and care, and undermined trust between community health workers and community members. Poor coordination of services at the health facility level (e.g., delays of sputum tests results and drug stockouts) affected uptake of referrals by community members. Community health volunteers had not received training on asthma management.

Household socioeconomic conditions limited access to health care. For example, poor community members could not take up referrals for care because travel costs were unaffordable. In some instances, community health volunteers paid for community members' travel to facilities, yet were themselves not provided any stipend. Our data suggest that patients found it difficult to limit harmful respiratory exposures, such as dust in occupational environments, or smoke from the use of biomass fuels within households.

We conclude that the Kenyan public health system has limited capacity to respond to asthma. Opportunities for involving community health volunteers are not maximized, myths and misconceptions about asthma remain unchallenged, and the referral system is weak. Structural and economic barriers at the household and environmental level pose difficulties in mitigating exposures to risk factors, and organization of services at the facility level leads to bottlenecks and additional costs.

## CRDS WITHIN THE NCD AGENDA: PERSPECTIVES FROM THE WHO

The WHO has a strong mandate to address the burden of NCDs and CRDs in LMICs. The Global Action Plan for the Prevention and Control of NCDs (2013–2020) called for a 25% relative reduction in risk of premature mortality from NCDs, 80% availability of the affordable basic technologies and essential medicines required to treat major NCDs in both public and private facilities, and a 30% relative reduction in prevalence of current tobacco use by 2025.[25] Targets 3.4 and 3.8 of the Agenda for Sustainable Development specify that premature mortality from NCDs must be reduced by one-third, and argue for universal health coverage including financial risk protection, access to quality essential health-care services, and access to safe, effective, quality, and affordable essential medicines and vaccines for all. The 13th General Programme of Work of the WHO serves to re-emphasize these targets, with clear frameworks laid out for patient-centered health services to deliver care across disease types and settings.[26] The provision of integrated care for CRDs is central to meeting these objectives. Historically, the WHO has developed several strategies to address lung health in LMICs such as PAL. Most recently, the package of essential non-communicable (PEN) disease interventions provide protocols for the diagnosis and treatment, both acute and long term, of asthma and COPD in resource-constrained settings.[27]

Efforts to promote the uptake of these strategies – in particular PEN – as well as efforts to ensure that essential respiratory medications including inhaled therapies are readily available to CRD patients in LMICs will require collaborative action between local communities, people with CRDs, health professionals, and governments. Further work is needed to explore and address barriers to implementation. However, it is clear that ongoing advocacy for CRD will be needed at both national and international levels to move this agenda forward: Governments must prioritize CRDs within their national agendas and must call for support from the WHO. The voices of people living with asthma and COPD, their families and their communities, are needed to understand the challenges faced and to cocreate solutions to improve care.

## CONCLUSION

Three perspectives on CRD care in LMICs are presented here – from Malaysia, The Gambia, and Kenya. While the historical, cultural, economic, political, social, and health contexts in each setting vary widely, the similarity in the challenges identified around CRD care between settings is striking.

Together these presentations highlight the importance of multisectorial approaches to address the burden of CRDs in LMICs. Public health measures will be needed to mitigate harmful respiratory exposures including air pollution, biomass fuels, and occupational respiratory exposures. Health system strengthening including clear patient referral pathways, access to diagnostic equipment, and access to medication must

be prioritized. There is a broad need for capacity building among health-care providers, with the provision of training and clinical guidelines for care. Integration of TB and NCD services will be needed for the delivery of care, to ensure that broader differentials beyond TB are considered for adults presenting with respiratory symptoms, and this may be particularly relevant in the context of the ongoing SARS-CoV-2 pandemic. Provision of community services, primary care, and hospital services is needed if we are to deliver holistic care, and relationships between health practitioners at all levels must be strengthened. In addition, at the community level, there is a clear need for health education to address ongoing stigma around respiratory symptoms, disease, and treatment, to improve uptake of services.

This work will require ongoing advocacy – at both the national and international levels. A World Health Assembly Resolution on access to affordable care for all children, adolescents, and adults with CRDs in LMICs would likely help focus attention on these challenges and help direct much needed resources in the direction of the solutions that need to be implemented.

**Acknowledgments**

We thank the BTS for supporting the joint BTS-GHG/PATS initiative that made this symposium and this paper possible. We thank Dr. Sarah Rylance for her contribution to the symposium described here and for her comments on the manuscript.

**Declaration of patient consent**

Patient's consent not required as there are no patients in this study.

**Financial support and sponsorship**

JM is supported by an MRC Skills Development Fellowship (MR/S02042X/1). SJ is funded by an NIHR Clinical Lectureship. SM was funded by the National Institute for Health Research (NIHR) (project reference 16/136/35) using the UK aid from the UK Government to support global health research. The views expressed in this publication are those of the author(s) and not necessarily those of the NIHR or the UK Department of Health and Social Care.

**Conflicts of interest**

There are no conflicts of interest.

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**How to cite this article:** Meghji J, Jayasooriya S, Khoo EM, Mulupi S, Mortimer K. Chronic respiratory disease in low-income and middle-income countries: From challenges to solutions. J Pan Afr Thorac Soc 2022;3:92-7.