

16 Chronic respiratory diseases

Burden, epidemiology and priority interventions

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Chronic respiratory diseases (CRDs) are diseases of the airways and other structures of the lung. CRDs include chronic obstructive pulmonary disease (COPD), asthma, bronchiectasis, pneumoconiosis (lung diseases related to occupational exposures, e.g. silicosis and asbestosis), and other rarer lung diseases (e.g. interstitial lung disease and pulmonary sarcoidosis) as well as other chronic respiratory diseases such as pulmonary hypertension and allergic rhinitis.^{1,2} More than 500 million people are affected by these conditions globally.

Definitions

COPD is a chronic inflammatory lung disease that causes obstructed airflow to the lungs.³ Symptoms include breathing difficulty, cough, production of mucus (sputum) and wheezing (stridor). COPD is mainly caused by long-term exposure to particulate matter and irritating chemicals, including tobacco smoke and air pollution (ambient or indoor solid fuel smoke) and dust.⁴ People with COPD have an increased risk of developing cardiovascular disease, including pulmonary hypertension, lung cancer and other conditions (including sleep apnoea). Emphysema (characterized by air-filled cavities/spaces in the lung, which results in fewer alveoli [air sacs] needed for oxygen/carbon dioxide exchange) and chronic bronchitis (characterized by an inflammation of the linings of the bronchial tubes that causes sputum production and coughing) are the most common underlying conditions of COPD, and often occur together. COPD is a progressive disease that can lead to fatal respiratory failure. With proper management (removing exposure to tobacco smoke and particulate matter in addition to medical treatment, for example antibiotics to treat pneumonia and oxygen therapy, in severe cases), the symptoms of COPD can be controlled for many years in the majority of people, enabling a reasonable quality of life, and a reduced risk of complications.

Asthma is a chronic inflammatory disease of the lung airways, which affects people of all ages, with a prevalence of around 10% in children (more in high-income countries [HICs], less in low- and middle-income countries).⁵ Asthma is characterized by recurring airflow obstruction episodes with bronchospasms, airway thickening and increased mucus production. Symptoms

Risk factors

In 2019, 40% of all COPD deaths were attributable to smoking, 18% to ambient particulate matter, 13% to occupational particulates, 10% to household air pollution, 9% to low temperature, 9% to ozone and 7% to second-hand smoke (IHME). These high attributable fractions related to a few modifiable risk factors emphasize the high potential impact of prevention measures to reduce the occurrence of CRDs, and mainly COPD. For asthma, high BMI contributed to 16% of global asthma deaths, smoking 12% and occupational asthmagens 7% (IHME). In view of their risk factors (including tobacco use, indoor and ambient air pollution), CRDs are often associated with poverty. CRDs, as a result of occupational exposure, is also an important public health issue in certain groups (e.g. coal mines, construction workers, etc.) and although they have decreased over the years they still occur, particularly in marginalized and vulnerable communities.

Interventions at the population level

WHO best buys and other recommended interventions to address tobacco use, are described in Chapters 18 and 33. The following WHO recommendations interventions are specific to CRDs:

- Access to improved stoves and cleaner fuels to reduce indoor air pollution.
- Interventions to prevent occupational lung diseases, e.g. exposure to silica and asbestos.
- Influenza vaccination for patients with COPD is also considered a recommended intervention.

Interventions for reducing air pollution beyond those above are not currently included in the WHO best buys and other recommendations interventions but will be reviewed when the best buys are next updated. A WHO Clean Household Energy Solutions Toolkit (CHEST) was published in 2018⁷ and provides tools that countries can use to implement recommendations on household fuel combustion.⁸ Further details on air pollution are provided in Chapter 27.

Interventions at the individuals level

The burden of CRDs on the health system is very significant given that up to a third of all patients who attend primary health care present with a cough as a primary symptom and many will have a CRD. Long-term sequelae following COVID-19 infection may add to this burden. Access to appropriate investigations is important in order to diagnose COPD, asthma or another CRD, as well as other causes of cough such as heart disease and cancer, and in order to ensure appropriate treatment. This is important because of the

seriousness of these conditions (including the risk of sudden death) and given that treatment is often long term. Despite this, health systems are often poorly resourced when it comes to the effective management of CRD, e.g. standardization of services with adequate diagnostic equipment, medicines, protocols and trained staff, especially in low- and middle-income countries. For example, salbutamol and corticoid inhalers are generally available in primary care public health facilities in only around half of the low-income countries.⁹

The diagnosis of COPD and asthma is usually based on symptoms, lung function tests such as spirometry and peak flow meter (tests used to help diagnose and monitor certain lung conditions by measuring how much air can be exhaled in one forced breath), and response to treatment over time. Basing the diagnosis on clinical symptoms alone may lead to over- or underdiagnosis of these conditions. Spirometry is often not available in low-resource settings (although simple peak flow meters are more likely to be available) and so the diagnosis may be missed or, at least, not documented appropriately. Pneumoconiosis is mainly diagnosed on the basis of the history of exposure, radiological imaging, lung function tests and biopsy.

There is no cure for COPD but early diagnosis and treatment are important to slow the progression of symptoms and reduce the risk of flare-ups.

Treating asthma and symptomatic relief for both asthma and COPD are included in WHO's best buys and other recommended interventions, i.e.:

- Symptom relief for patients with asthma with inhaled salbutamol (which rapidly relaxes muscles of the airways).
- Symptom relief for patients with COPD with inhaled salbutamol.
- Treatment of asthma using low-dose inhaled beclomethasone (a steroid) and a short-acting beta-agonist (e.g. salbutamol).

In addition, patients with asthma or COPD should be advised to:

- Quit smoking (where they smoke).
- Reduce their exposure to particulate matter, including improved stoves and cleaner fuels.
- Be vaccinated against pneumonia, influenza and coronavirus (in addition to vaccination for diseases that can result in pulmonary complications and are part of immunization schedules).

Additional interventions for the management of COPD include pulmonary rehabilitation and treatment of comorbidities such as cardiovascular disease, lung cancer, osteoporosis, muscle weakness and depression. Those with asthma and COPD need support to understand triggers to avoid, how to manage their symptoms and signs, and when and how to get emergency support, as an untreated asthma attack can be rapidly fatal.

It is important that CRDs are managed in a way that is integrated across public health programmes and primary and secondary care. Access to

affordable good quality essential medicines for the treatment of asthma and COPD is critical. Progress to achieve this important goal within WHO's universal health coverage policy has been very limited in many low-income countries. Healthcare systems and their healthcare personnel, national professional societies and patient advocacy organizations need to increase their efforts to ensure improved access to medicines and that patients use their medicines and inhalers correctly and as prescribed. Relevant issues around universal health coverage and strengthening health systems are provided in Chapters 38 and 42.

Further guidance on CRDs is available from a number of authoritative publications including:

- The WHO package of essential NCD interventions for primary health-care, which provides guidance on the diagnosis and treatment of asthma and COPD.¹⁰
- WHO's practical approach to lung health (PAL), which provides a syndromic approach to the management of patients who attend primary health care services for respiratory symptoms.¹¹ It largely emphasizes tuberculosis but also addresses other respiratory diseases. It is a multi-step process built on the development and implementation of guidelines for clinical respiratory disease practice with clearly defined coordination between different levels of the health system.
- The Global Initiative For Asthma (GINA), a collaboration launched by WHO and the US National Heart, Lung, and Blood Institute that aims to increase awareness of asthma among health professionals, health authorities and the general public; improve diagnosis, management and prevention; and stimulate research. It publishes annually updated evidence-based strategies for asthma management and prevention, which can be adapted for local use.¹²
- The Global Initiative for Chronic Obstructive Lung Disease (GOLD), which provides guidance for the management of COPD.¹³
- The WHO Model Essential Medicines List, which includes treatment options for asthma and COPD.¹⁴

Monitoring

Several indicators are useful to assess the capacity to investigate and treat CRDs, including the availability of diagnostic devices (spirometry, peak flow meter) and medicines including salbutamol and corticosteroid inhalers; the proportion of patients with COPD/asthma on treatment, proportion 'under control'; and proportions with exacerbations, lost to follow-up, treated by emergency departments, hospitalized for CRDs and who died.¹⁵ Vital statistics, where available, can provide information on CRD mortality. Surveys are useful for assessing services provision and understanding trends (e.g. SARA,

Table 16.2 Examples of WHO global targets and indicators relevant for CRDs

Domain	Element	Target 2025 (baseline 2010)	Indicator
National systems' response.	Essential NCD medicines and basic technologies to treat major NCDs.	An 80% availability of the affordable basic technologies and essential medicines, including generics required to treat major NCDs in both public and private facilities.	Availability and affordability of quality, safe and efficacious essential NCDs medicines, including generics, and basic technologies in both public and private facilities.
Behavioural risk factors.	Tobacco control.	A 30% relative reduction in prevalence of current tobacco use in persons aged 15+ years.	Prevalence of current tobacco use among adolescents. Age-standardized prevalence of current tobacco use among persons aged 18+ years.

Chapter 5 on surveillance); such surveys should include public as well as private providers.

The WHO Global NCD Action Plan includes targets and indicators that are relevant to all main NCDs, including CRDs (Table 16.2). These and other indicators, for example, air pollution are described in more detail in other chapters.

Notes

- 1 GBD 2019 Diseases and Injuries Collaborators, Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet* 2020;396:1204–22.
- 2 Global surveillance, prevention and control of chronic respiratory diseases: a comprehensive approach. WHO, 2007.
- 3 Christenson SA et al. Chronic obstructive pulmonary disease. *Lancet* 2022;399:2227–42.
- 4 Global initiative for chronic obstructive lung disease, 2021.
- 5 García-Marcos L et al. The burden of asthma, hay fever and eczema in children in 25 countries: GAN phase I study. *Eur Respir J* 2022;60:2102866.
- 6 Global strategy for asthma management and prevention. Global Initiative for Asthma, 2021.
- 7 Clean household energy solutions toolkit (CHEST). WHO, 2018.
- 8 WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. WHO, 2021.
- 9 Bissell K et al. Access to essential medicines to treat chronic respiratory disease in low-income countries. *Int J Tuberc Lung Dis* 2016;20:717–28.
- 10 Package of essential noncommunicable (PEN) disease interventions for primary health care. WHO, 2020.

- 11 Practical approach to lung health – Manual on initiating PAL implementation. WHO, 2008.
- 12 Reddel HK et al. Global initiative for asthma (GINA) strategy 2021 - Executive summary and rationale for key changes. *Am J Respir Crit Care Med* 2022;1:17–35.
- 13 Global initiative for chronic obstructive lung disease. <https://goldcopd.org/>.
- 14 Halpin DMG et al. Global initiative for the diagnosis, management, and prevention of chronic obstructive lung disease. The 2020 GOLD science committee report on COVID-19 and chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 2021;203:24–36.
- 15 Billo NE. Role of the global alliance against respiratory diseases in scaling up management of chronic respiratory diseases-summary meeting report. *J Thorac Dis* 2017;9:2337–38.