

COMMISSION ON MEDICAL OXYGEN SECURITY

POLICY BRIEF

Reducing global inequities in medical oxygen access: *The Lancet Global Health Commission on medical oxygen security*

Introduction

Medical oxygen is an essential medicine that has been in clinical use for over 150 years. It is an essential service, required at every level of the healthcare system. Oxygen is life-saving for children and adults with acute illness, life-sustaining for those undergoing anaesthesia and surgical care, and life-enhancing for those with chronic respiratory failure. The COVID-19 pandemic shone a spotlight onto the longstanding inequities in access to medical oxygen, and the importance of this lifesaving therapy for people of all ages and in every part of the world. It was against this backdrop that **The Lancet Global Health Commission on Medical Oxygen Security** was launched in 2022 – to strengthen evidence and recommend concrete actions for governments, industry, global health agencies, donors, healthcare workforce, and researchers.

The global medical oxygen need is large with the widest coverage gaps in Asia and Africa

- Five billion people, 60% of the world's population, do not currently have access to safe, quality, affordable medical oxygen, with the greatest inequities in low- and middle-income countries (LMICs). Each year, 374 million newborns, children, and adults need medical oxygen, including 364 million patients with acute medical and surgical conditions and nine million patients with long-term oxygen needs due to chronic obstructive pulmonary disease (COPD). Eighty-two percent of these patients live in LMICs, with 70% concentrated in South Asia, East Asia and the Pacific, and Sub-Saharan Africa.
- Less than one in three (30%) people living in LMICs who need oxygen for acute medical or surgical conditions receive it, with even higher coverage gaps in Sub-Saharan Africa, South Asia, and East Asia and the Pacific. This 70% oxygen coverage gap far exceeds gaps for HIV/AIDS (23%) and tuberculosis (25%) treatment.
- Across LMICs, medical oxygen is available in just 12%, 58%, and 86% of primary healthcare facilities, general hospitals, and tertiary hospitals respectively, with frequent shortages and equipment breakdown. Pulse oximetry, the key to cost-effective oxygen services because it measures an essential vital sign (oxygen saturation), is available in only 10%, 54%, and 83% of primary healthcare facilities, general hospitals, and tertiary hospitals respectively. The greatest medical oxygen inequities are in small, rural, government health facilities.

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Pulse oximetry is the key to cost-effective oxygen services

- Pulse oximetry should be routinely assessed in all patients at all levels of healthcare to ensure high-quality oxygen use (i.e., the right patient, at the right time, in the right dose, for the right duration). Yet pulse oximetry is available in only 10%, 54%, and 83% of primary healthcare facilities, general hospitals, and tertiary hospitals in LMICs respectively.
- Healthcare workers are poorly equipped or supported to use pulse oximeters effectively and pulse oximetry is not included in many clinical guidelines and health curricula. We recognise an urgent need to make high-quality, robust pulse oximeters more affordable and the need to improve the accuracy of pulse oximeters in all populations, including people with darker skin and infants and young children.

Closing oxygen coverage gaps is a good investment

- Patients with acute medical and surgical needs require a minimum 1.2 billion cubic metres (Nm³) of medical oxygen annually. An additional, annual US\$6.8 billion is needed to close oxygen coverage gaps in LMICs, equating to US\$34 billion between 2025 and 2030. This does not include the costs for long-term oxygen therapy services or the substantial costs during emergencies (e.g., in 2021, an additional 52 million patients needed 1.9 billion cubic metres of oxygen to treat COVID-19 at a cost of US\$6.8 billion).
- The need for oxygen is rising, driven by population growth, unmet surgery needs, and demand for long-term oxygen therapy. Aging populations, smoking and poor diet, and air pollution are major factors driving rising demand. The case for investing in medical oxygen is strong – it is as cost-effective as routine childhood immunization – and will accelerate progress on eight of the nine health-related SDGs, and pandemic preparedness and response. Efforts to reduce oxygen demand are also critical, through improvements in immunisation, nutrition, smoking cessation, air quality, road safety, and climate change mitigation.

Building resilient national medical oxygen systems is central to closing coverage gaps

- There is no “one-size-fits-all” oxygen solution that will work in every health system. Rather, mixed sources of oxygen should be embraced (liquid, PSA/VSA plant, and mobile concentrators). Back-up oxygen sources are critical, especially during surges in need. Governments and global health donors must use “total cost of ownership” when procuring oxygen equipment to ensure budgets cover operational costs, which are often 50–80% of total costs.
- Increased investments in climate-sensitive, energy-efficient solutions to offset the high costs and environmental impact of oxygen systems, and greater numbers of engineers to maintain the systems are an urgent priority. The Commission proposes every country achieves a minimum threshold of ≥ 0.4 biomedical engineers or equivalent per 10,000 population by 2030 (approximately 1 per 100 hospital beds).
- Special efforts are needed to accelerate the pace of innovation in medical oxygen systems. The Commission highlights *20 Priority Areas for Oxygen Innovation* and calls for greater investment in innovations that emerge from LMICs.

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Governments, industry, and global health agencies must prioritize access to medical oxygen

- Governments should fulfill their commitments under the **WHO Access to Medical Oxygen Resolution** and develop costed, national plans to guarantee access to medical oxygen in their health systems. Currently less than 30 countries have plans and the inclusion of medical oxygen remains largely absent from global and national emergency and pandemic preparedness architecture.
- Oxygen companies should adopt specific access to medical oxygen targets and document company progress in annual reports, and work with governments and regulators to ensure a competitive market with low barriers to entry, open tenders, price transparency, regulatory harmonization, and reduce other market barriers to access. Increases in both domestic and international funding to strengthen national medical oxygen systems are critical and donors should contribute to the US\$4 billion resource mobilization target of the **Global Oxygen Alliance** (GO₂AL) between 2025 and 2030, and ensure that oxygen is included in the 8th Replenishment of The Global Fund.

Wide adoption of new monitoring tools can drive medical oxygen progress

- The Commission has developed new tools to measure and evaluate performance, including *10 Oxygen Coverage Indicators* for monitoring universal access to safe, affordable, quality pulse oximetry and medical oxygen services, and an *Access to Medical Oxygen Scorecard* (ATMO₂S) that governments should use to report their progress implementing the WHO Access to Medical Oxygen Resolution. Current indicators for measuring medical oxygen service coverage are inadequate, relying too heavily on equipment availability and inadequately assessing patient-level access or the adequacy, appropriateness, affordability, or quality of service provision.

Conclusion

As we enter the final five years of the SDG era, multiple forces are rapidly reshaping population health. Poor diet, smoking, and aging are increasing the burden of non-communicable diseases, while rising temperatures and air pollution, exacerbated by climate change, are slowing progress in reducing infectious disease and respiratory-related deaths. At the same time, slow economic recovery from COVID-19 and rising debt levels are putting pressure on LMIC budgets, and competing domestic priorities are reducing donor financing for health. An **independent SDG progress report** concluded that, at current rates of progress, not one of the health SDGs will be achieved by 2030.

In response, the Commission adds its voice to the many calling for a total transformation of the field of “global health,” including **The Lusaka Agenda** and **Global Health 2050**, and argues that medical oxygen can be a pathfinder investment for a new era. With national medical oxygen plans at the heart of the effort, governments firmly in the driver’s seat, and donor investments well-aligned with national plans, health systems can be strengthened in ways that benefit many health priorities simultaneously – communicable, non-communicable, maternal, newborn, and child, and injuries. Further, by investing in climate-sensitive, energy-efficient solutions, national medical oxygen systems can be at the forefront of the future we want – the long-term health and sustainability of our most precious resources – people and planet.

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KEY FINDINGS

- *Global access to medical oxygen is highly inequitable. Five billion people, 60% of the world's population, do not currently have access to safe, quality, affordable medical oxygen, with most living in low- and middle-income countries (LMICs).*
- *Global need for medical oxygen is high and concentrated in LMICs. Each year, 374 million newborns, children, and adults need medical oxygen, including 364 million patients with acute medical and surgical conditions, and nine million patients with long-term oxygen needs due to chronic obstructive pulmonary disease (COPD). Eighty-two percent (306 million) of these patients live in LMICs, with 68% (253 million) concentrated in South Asia, East Asia and the Pacific, and Sub-Saharan Africa.*
- *Oxygen coverage rates are unacceptably low in LMICs. Less than one in three (30%) people who need oxygen for acute medical or surgical conditions receive it due to gaps in service contact, readiness, provision, and quality. Coverage gaps are even higher in Sub-Saharan Africa (91%), South Asia (78%), and East Asia and Pacific (74%). Oxygen coverage gaps far exceed gaps for HIV/AIDS (23%) and tuberculosis (25%) treatment.*
- *Pulse oximeters and oxygen are available in just 54% and 58% of general hospitals, and 83% and 86% of tertiary hospitals respectively, with frequent shortages and equipment breakdown, and practically non-existent in primary healthcare facilities. The greatest inequities are in small, rural, government health facilities.*
- *Even when available, pulse oximetry is provided infrequently for unwell patients attending general hospitals (19%) or tertiary hospitals (54%), and only 45% of patients with hypoxaemia in general hospitals and 79% in tertiary hospitals receive oxygen therapy. On any given day, 93% of primary healthcare facilities, 45% of general hospitals, and 25% of tertiary hospitals in LMICs experience oxygen stockouts.*
- *Pulse oximetry is the gateway to safe, quality, affordable oxygen care and needs to be integrated in clinical guidelines and education, and routinely used to assess patients at all levels of healthcare.*
- *Global quantities of oxygen needed are large and rising. Patients with acute medical and surgical needs require a minimum 1.2 billion cubic metres (Nm³) of medical oxygen annually, while the needs for long-term oxygen therapy (COPD) are 3.2 billion cubic metres. This need is rising, driven by population growth, unmet surgery needs, and demand for long-term oxygen therapy. Aging populations, smoking and poor diet, and air pollution are major factors driving rising demand.*

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Key findings cont.

- *Oxygen needs can rise exponentially during emergencies. In 2021, an additional 52 million patients needed 1.9 billion cubic meters of oxygen to treat COVID-19 globally, putting enormous pressure on health systems. Excess COVID-19 mortality in 2020 and 2021 is estimated at 15.9 million globally, with most deaths in South Asia (4.4 million), Sub-Saharan Africa (2.4 million), and Latin American and the Caribbean (2.3 million) regions.*
- *Global costs to fill oxygen coverage gaps are large. An additional US\$6.8 billion is needed annually to close oxygen coverage gaps in LMICs, equating to US\$34 billion between 2025 and 2030. This does not include the substantial cost to meet the additional oxygen needed for pandemics (e.g., US\$6.8 billion for COVID-19 in 2021) or costs for long-term oxygen therapy services.*
- *Oxygen represents a highly cost-effective investment. The case for investing in medical oxygen is strong – it is as cost-effective as routine childhood immunization (i.e., US\$59 per DALY averted), and will accelerate progress on eight of the nine health-related Sustainable Development Goals (SDGs), and pandemic preparedness and response.*
- *Governments should collaborate with the Global Oxygen Alliance (GO₂AL) to develop national plans to close medical oxygen coverage gaps and increase domestic and international funding. Donors should contribute to GO₂AL's US\$4 billion resource mobilization target (2025–2030) and ensure that oxygen is included in the 8th Replenishment of The Global Fund. As operational costs account for 50–80% of oxygen system costs but have received little global health funding to date, new investments should focus here.*
- *Pulse oximetry and medical oxygen coverage should be routine indicators in UN databases (e.g., WHO Global Health Observatory, UNICEF child health coverage), and hypoxemia-related mortality a risk factor for death and disability in the next iteration of the Global Burden of Disease.*
- *Oxygen companies should adopt specific access to medical oxygen targets, increase collaboration with governments and global health agencies (e.g., GO₂AL), and publish company progress in annual reports.*
- *Governments, industry, and donors should collaborate to increase investment in 20 priority areas for oxygen innovation, many of which originated in LMICs.*
- *New tools to measure and evaluate performance are available, including 10 Oxygen Coverage Indicators for monitoring access to pulse oximetry and medical oxygen services, and an Access to Medical Oxygen Scorecard (ATMO₂S) that governments should use to report their progress implementing the World Health Organization (WHO) Increasing Access to Medical Oxygen Resolution.*

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ABOUT THE COMMISSION

Announced in September 2022, *The Lancet Global Health* Commission on Medical Oxygen Security provides a thorough exploration of medical oxygen coverage gaps, with recommendations to ensure that no patient dies for lack of access to this essential medicine, including during public health emergencies like COVID-19.

The Commission was led by 18 Commissioners – multi-disciplinary academics with clinical, economic, engineering, epidemiological, and public policy expertise – representing all regions of the world. Forty Advisors representing United Nations and global health agencies, donors, academic institutions, and non-governmental organizations provided guidance. A large global network of Oxygen Access Collaborators provided constant input to the Commission and included representatives from industry and Ministries of Health. Special consultations were conducted with patients, caregivers, and clinicians to ensure that their voices and experiences shaped the Commission's recommendations.

An Executive Committee coordinated the work of the Commission and included representatives from **Makerere University**, Uganda; **International Centre for Diarrheal Disease Research (icddr,b)**, Bangladesh; **Murdoch Children's Research Institute (MCRI)**, Australia; **Karolinska Institutet**, Sweden; and **Every Breath Counts Coalition**, USA.

You can find the Commission report [here](#), including 52 recommendations targeted to major stakeholders which are measurable and time bound (usually 2030), and the advocacy package [here](#), including:

- **Report with Comments**
- **Policy Brief (English, French, Spanish, Arabic, Chinese, and Russian)**
- **Spotlight Brief: Access to Medical Oxygen Scorecard (ATMO₂S)**
- **Spotlight Brief: Patient and Caregiver Testimonials**
- **Spotlight Brief: 10 Oxygen Coverage Indicators**
- **Spotlight Brief: 20 Priority Areas for Oxygen Innovation**
- **Country Case Studies**



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