Global Oxygen Alliance (GO_2AL)
Strategy: executive summary 2024–2030

Global Oxygen Alliance

GlobalOxygenAlliance.org

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Introduction

1.1 Oxygen: essential for saving lives and an integral part of health systems and security

Oxygen is vital for life. For the sick and injured, medical oxygen[i] is a lifesaving essential medicine with no substitute[1], and is thus included on the 23rd WHO Model List of Essential Medicines[2] and the 9th WHO Model List of Essential Medicines for Children[3]. It is used to treat both acute and chronic respiratory illnesses, including COVID-19 and pneumonia in people of all ages. Oxygen is essential for surgery, trauma, emergency, critical care, and for treating the elderly, pregnant women with obstetric complications, and newborns and children in respiratory distress[1]. Additionally, medical oxygen can support the management of opportunistic infections due to advanced HIV infection, severe forms of tuberculosis and malaria, as well as noncommunicable diseases such as chronic obstructive pulmonary disease (COPD), cancer and cardiovascular disease (see Fig. 1).

In May 2023, the World Health Assembly (WHA) Resolution WHA76.3 on Increasing access to medical oxygen[4] was adopted by all 194 WHO Member States and called on world leaders and governments to position oxygen systems as a building block for universal health coverage (UHC) and pandemic prevention, preparedness and response (PPPR). The resolution affirms that neither of the UHC and PPPR agendas, nor the health-related Sustainable Development Goals (SDGs), can be fully realized without universal access to high-quality medical oxygen and its related medical technologies for diagnosis and treatment.

1.2 Aligning the GO_2AL Strategy timeline with the 2030 Agenda for Sustainable Development

Nearly 25 million deaths arise each year from conditions that require medical oxygen, including 6 million from pneumonia and COPD alone[5].[ii] Many of these deaths could be prevented with access to medical oxygen, enabling countries to make faster progress in achieving most of the SDGs for health.

Oxygen is essential for seven out of the nine health-related SDG targets (see Fig. 2), including reducing maternal mortality, ending preventable child deaths and epidemics of communicable diseases, reducing mortality from noncommunicable diseases, road injuries and deaths, achieving

i Throughout this document the term “oxygen” refers to medical oxygen.

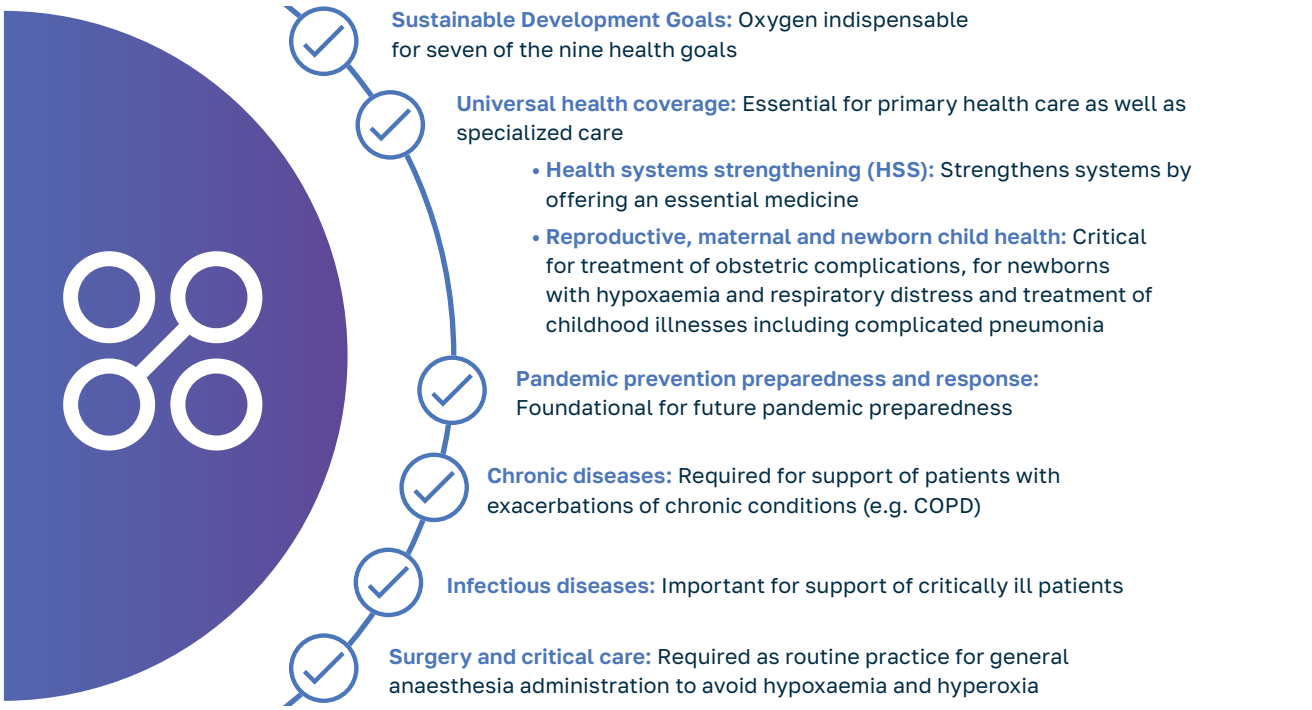
ii Calculation includes counts for 9 million from heart disease, 4 million from injuries, 4 million from lower respiratory infections and tuberculosis, 3 million from COPD, 2 million from lung cancer and 2 million from neonatal disorders.

UHC, and reducing deaths from hazardous chemicals and air pollution.

For children with severe pneumonia and hypoxaemia, studies have shown that: fewer than one in five actually receive oxygen[6]; medical oxygen can reduce all-cause deaths among children with pneumonia by up to 35%[7], and investments in oxygen are as cost-effective as vaccination[8]. Closing the oxygen gap would save hundreds of thousands of newborn and children's lives every year, and accelerate progress towards meeting the SDG 3.2 target. In addition, there are an estimated 17 million deaths each year due to lack of safe surgery[9], with the recent Lancet Commission on Global Surgery reporting that 24% of surgical facilities in low- and middle-income countries (LMICs) lack reliable oxygen access and 70% of operating rooms in parts of sub-Saharan Africa have no pulse oximeters needed to measure blood oxygen saturation[10]. Increasing oxygen availability would have a profound, lifesaving impact on surgical outcomes, and contribute towards meeting SDG 3.1, 3.2, 3.4, 3.6 and 3.8 indicators[11].

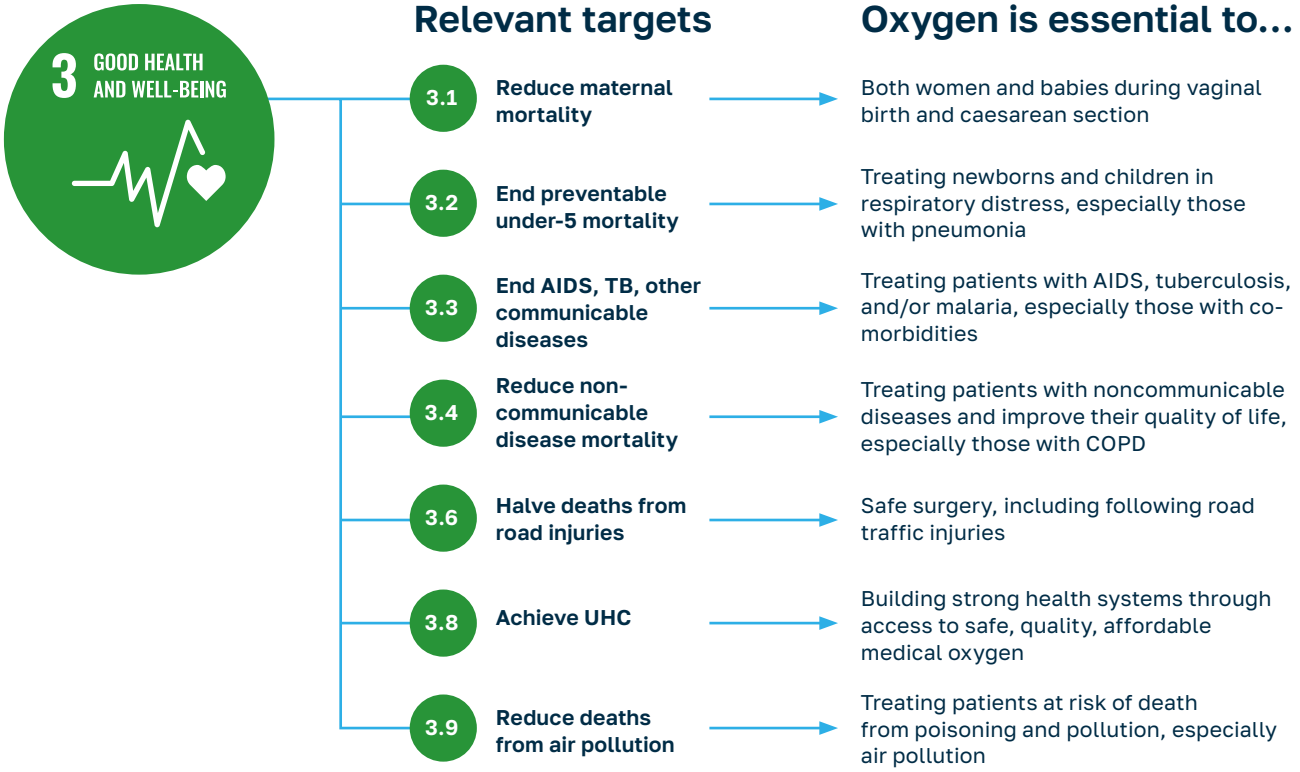
While it is not known exactly how many of the 7 million official global deaths due to COVID-19[12] could have been prevented with access to medical oxygen, one study of 64 intensive care units (ICUs) across Africa found that 50% of COVID-19 patients died without receiving any oxygen support[13]. Given the likelihood of another respiratory pandemic on the scale of COVID-19 in the next decade[14], it is imperative to strengthen oxygen systems now to safeguard health security and protect human life. To this end, the Global Oxygen Alliance (GO_2AL) has developed a 7-year strategy (2024–2030) to align with the SDG 2030 agenda.

Fig 1: Oxygen – an essential molecule for global health



Source: Interviews with GO_2AL members in August 2023.

Fig 2: Oxygen contributes to seven out of nine SDG health goals



Source: United Nations SDGs[15]. Interview with the Every Breath Counts Coalition in August 2023.

Country spotlight: Bangladesh

Oxygen therapy proves critical to saving a life: 4-month-old Ahammad[16]

Four-month-old Ahammad was admitted to the ICU after being diagnosed with severe pneumonia, acute malnutrition, severe sepsis and COVID-19.

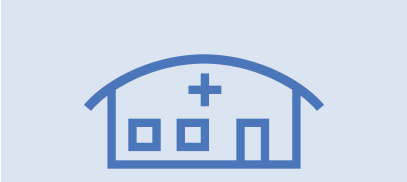
Impact of oxygen: Ahammad was put on bubble continuous positive airway pressure (CPAP) oxygen therapy, and after 2 weeks of care, was well enough to return home. Childhood pneumonia is a leading cause of death for children under 5. Access to oxygen therapy will save many more patients like Ahammad, and support progress towards SDG 3.2.

1.3 Most health facilities in low- and middle-income countries do not have access to medical oxygen

Oxygen is needed to treat patients at all levels of the health system (see Fig. 3). Although there are sparse data on oxygen availability and access around the world across all LMICs, WHO surveys have found that fewer than half of all health facilities have uninterrupted access to oxygen[1]. A 2020 study of health facilities in four sub-Saharan African countries found that only 43% had both continuous power and any form of oxygen available[17]. This is a worrying access gap that became starkly apparent during the COVID-19 crisis.

While nearly US$ 1 billion was committed to oxygen during the COVID-19 pandemic, the majority of this funding was devoted to plants and related equipment. There is an equally urgent need to mobilize the complementary financing for people and systems to install, maintain and operate the equipment purchased with the initial capital investment and maximize lives saved.

Fig 3: Medical units across levels of the health system where oxygen and related medical technologies for diagnostics and treatment are needed

Primary level	Secondary level	Tertiary level
e.g. home, community care, health post, health centre	e.g. district hospital	e.g. regional, specialized hospital, specialized outpatient clinics
		
• General ward • Labour unit • Neonatal resuscitation corner • Emergency triage • Transport to referral	• Emergency triage • Labour and delivery room • Neonatal care • Paediatric and/or adult ward • ICU • Operating theatre	• Emergency triage • Labour and delivery room • ICU (neonatal, paediatric, adult) • Paediatric and adult wards • Surgery and recovery wards • Cardiopulmonary ward • Emergency ward

Note: Archetypal examples only; not necessarily representative of all locations.
Source: WHO[18].

Country spotlight: Peru

Implementing change on the ground: Rosa Sanchez de Santillan Hospital[19]

In northern Peru, Rosa Sanchez de Santillan Hospital lacked a functioning oxygen facility, resulting in virtually no access to medical oxygen for Ascope, a town of 6800.

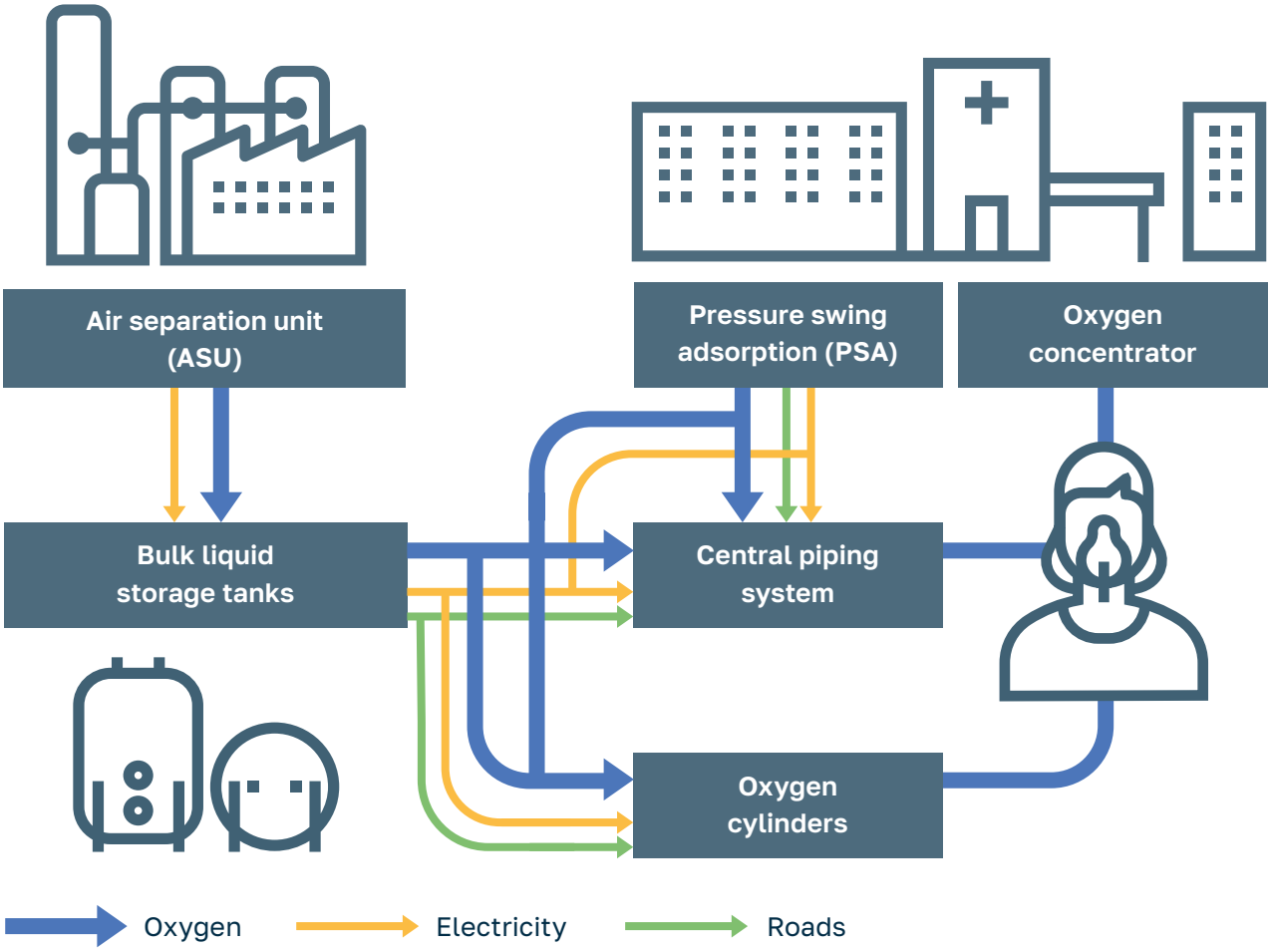
Impact of oxygen: In partnership with Unitaid and Build Health International, the Partners in Health team repaired the oxygen plant and trained staff for its operation and maintenance. Rosa Sanchez now has a fully operational oxygen plant providing for its patients, those at home and 15 nearby health centres. By March 2023, the plant had provided oxygen therapy for more than 200 patients.

1.4 Oxygen is more than gas in a cylinder – it requires an entire ecosystem to function

Oxygen is part of a system of production, distribution, delivery infrastructure (see Fig. 4) and expertise, nested within a broader supportive ecosystem of policy and regulatory frameworks, financing, data management and leadership[20]. A stable, resilient oxygen system requires both access to the product and the enabling environmental components to ensure system reliability and safe and appropriate usage.

Oxygen delivery and health facility production require a trained cadre of oxygen health workers, including doctors, nurses, intensive care medical staff, respiratory therapists, vital signs assistants and community health workers. Medical devices to measure and monitor levels of oxygen, like pulse oximeters and appropriate sensors, are needed to diagnose hypoxaemia[18] so that patients can be prescribed oxygen when needed. Specialized biomedical engineers and technicians are required to maintain and operate oxygen production machinery and, in addition, stable and high-quality electrical grids, water supply, piping within hospitals to bedsides for treatment, along with oxygen administration equipment and accessories, must be available. Oxygen ecosystem elements (production, transport, storage, health facilities) also need to be connected by robust road infrastructure to ensure distribution from production and/or storage facilities to the usage point.

Fig 4: Oxygen as a system



Adapted from PATH[21].

1.5 Key components of the oxygen ecosystem missing in low- and middle-income countries

In LMICs, essential components of the oxygen ecosystem have been non-existent, limited or fragile due to historical neglect of the requisite infrastructure and human resources elements (see Fig. 5).

Shortage of trained workforce: Health workers trained to monitor and treat patients with medical oxygen are in short supply, as are the biomedical and clinical engineers needed to assess, plan, install, maintain and repair oxygen-related medical equipment and the required consumables[23]. Some LMICs report a density of less than 5% of the engineers available in high-income countries[24]. Once oxygen health workers and engineers are trained, there is the additional challenge of retaining them within the public health care system.

Weak maintenance and availability of delivery systems: Infrastructure maintenance is also weak in lower income settings, with low-quality electricity supply damaging delicate oxygen-generating plants at health facilities during power surges. Energy costs are an additional consideration making the running of plants difficult. Delivery of oxygen is further hampered by poor quality roads.

Lack of financing: Historically, resourcing for oxygen was limited prior to the COVID-19 pandemic[25].

Limited policy and planning ability: Countries need costed strategies or roadmaps embedded within health plans and regulatory frameworks to enable an adequate supply of safe, quality, affordable medical oxygen, as well as regular needs assessments and planning for sound programmatic control.

Absence of data: There is a severe shortage of high-quality, routinely collected data on oxygen, in-country and globally, limiting the ability to assess needs, gaps and epidemiological trends, plan for distribution, prepare budgets and continuously strengthen underlying systems.

Fragmented markets: The global oxygen market is currently fragmented across sources (e.g. liquid, pressure swing adsorption [PSA] plants and mobile concentrators) but highly concentrated within specific markets, especially liquid oxygen (LOX), where many players remain minimally engaged. This limits the availability, affordability and quality of products and undermines supply security, competitive pricing and innovation[18]. There is also a limited market for providers able to maintain and repair plant equipment as part of service agreements.

Variable governance and community engagement: Country governance of medical oxygen is variable and often weak, and strong community engagement is lacking, limiting the political and financial advocacy for investing in oxygen that is reflected in more mature, well-resourced health system domains.

Fig 5: Key barriers preventing access to medical oxygen in LMICs

	Delivery and access gaps		Enabling environment gaps				
	Shortage of trained workforce	**Weak maintenance and availability of infrastructure and delivery systems**	**Lack of financing**	**Limited policy and planning ability and regulatory frameworks**	**Absence of data for routine reporting and tracking of key performance indicators (KPIs)**	**Fragmented market**	**Variable governance and community engagement**
Needs	• Trained health workforce, including medical doctors, nurses and respiratory therapists • Biomedical engineers	• Production, storage and distribution • High-quality electrical supply • Water supply • Heating, ventilation and air conditioning • Structural engineering	• Regular, adequate financial budget support • Partnerships • Affordability for patients	• Quality assurance and control • Regular needs assessments, planning	• System monitoring • Accountability	• Availability, affordability, quality, acceptability, secure supply and delivery	• Strong leadership, coordination and political will • Robust advocacy and demand generation

Source: WHO[20].

Country spotlight: Rwanda

Capitalizing on pandemic response momentum: achieving universal access to medical oxygen[22]

In July 2020, Rwanda implemented a national plan to increase access to medical oxygen, tackling barriers in protocols, finance, equipment and human resources. Rwanda is now investing in sustaining the new medical oxygen plants and increased production with a focus on establishing training mechanisms.

Impact of oxygen: Rwanda increased its oxygen production capacity by 600%, producing more than 2500 cylinders a day. The volume of oxygen currently being piped provides every patient access to oxygen in all the hospital units in the country.

2

GO_2AL: a partnership to expand the impact of investments made during the pandemic

In February 2021, during the COVID-19 pandemic and amidst widespread global oxygen shortages, the world's leading health agencies created the Oxygen Emergency Taskforce as part of the Access to COVID-19 Tools Accelerator (ACT-A). This global taskforce responded to the urgent need for oxygen in LMICs, coordinated the response of health and development agencies, and mobilized financing to help LMICs address acute oxygen shortages.

Among its many achievements, the taskforce:

- Secured US$ 1 billion for the oxygen emergency response to expand sustainable oxygen access in LMICs, improve affordability and accelerate oxygen delivery.
- Directly supported nearly 100 countries by carrying out catalytic interventions to upgrade health facilities and human resource capacity; assessing oxygen needs; and providing support to LMICs to access funding available via ACT-A partners.
- Brokered ground-breaking agreements with medical oxygen suppliers, securing price reductions for bulk LOX (15%) and filled cylinders (10–50%) to address hospital surge demand.

As the world transitions from the acute phase of the pandemic and prepares for future threats, the ACT-A Oxygen Emergency Taskforce has evolved into the Global Oxygen Alliance (GO_2AL) – a broader and more inclusive partnership.

The aims of GO_2AL are to continue the critical work of the previous taskforce and maximize the lives saved through informed investments. This will entail securing financing to expand production, seeking to lower the price of oxygen, and providing technical support on oxygen to countries. In addition, GO_2AL will take a more inclusive and planned approach that emphasizes the importance of assessing oxygen and oxygen systems needs at the country, regional and global levels through key partner engagement, working with countries, industry, civil society and communities, to facilitate bottom-up planning, programming and resource mobilization.

2.1 Vision and mission

GO_2AL's vision is to create a world in which safe, affordable, high-quality medical oxygen is available and equitably accessible to all those in need.

GO_2AL's mission is to save lives by promoting collective efforts among health and development agencies, funding mechanisms, countries, industry, civil society, communities and initiatives for UHC and PPPR to achieve the vision of making safe, high-quality medical oxygen available, affordable and accessible across all LMICs.

2.2 A strategic framework to focus resources and drive impact

GO_2AL has developed an initial strategic framework outlining its five priority objectives directed against the major barriers currently limiting oxygen access in LMICs (see Fig. 6).

The framework is anchored by the overall GO_2AL partnership structure, which will enable long-term predictable funding, political commitment and leadership, shared decision-making, and increased knowledge and awareness to make oxygen systems stronger.

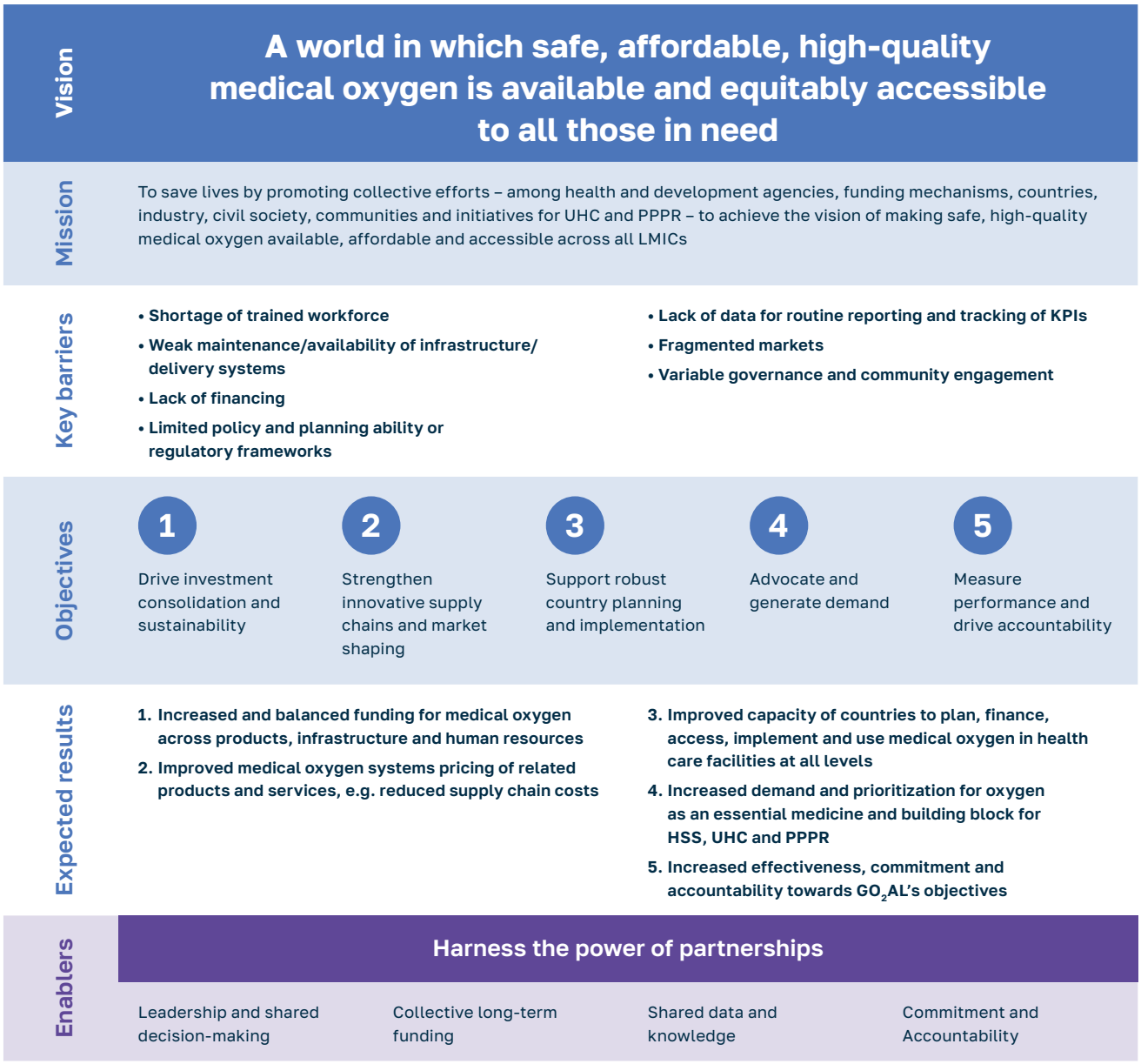
Country spotlight: Democratic Republic of the Congo

A hospital now able to provide oxygen to patients in "3 minutes"[26]

In January 2021, the Ministry of Health of the Democratic Republic of the Congo conducted a rapid assessment and determined that the lack of medical oxygen was contributing to increased deaths in communities and hospitals. With support from the World Bank and other partners, it was able to strengthen its oxygen system with PSA plants, which has made a lifesaving difference for patients.

Impact of oxygen: "Before," said Dr Patrick Mayi, Head of Emergencies at the Provincial Hospital of Kinshasa, even if patients arrived with a critically low oxygen level "it took about an hour to access medical oxygen because families had to go to obtain oxygen and, by the time it arrived, it was too late. Now we have the capacity to provide oxygen to critical patients in 3 minutes on average at their bedside."

Fig 6: GO_2AL strategic framework



Since GO_2AL is still in its pre-operational phase and in the process of establishing its Secretariat and working groups to drive its objectives, this framework and executive summary offer a high-level overview of GO_2AL's future strategic plan and budget. In 2024, when GO_2AL enters its operational phase, the full strategic plan and budget will be developed.

2.3 GO_2AL's five objectives

1. Drive investment consolidation and sustainability

While significant investments in oxygen were approved during the most acute phase of the COVID-19 pandemic, the work is not finished. Through 2024, GO_2AL will support donors and countries to implement existing investments and reprogramme remaining funding to maximize impact through systems and implementation strengthening, while seeking to mobilize an additional US$ 4 billion over the next 7 years to sustain and expand medical oxygen system investments in LMICs.

2. Strengthen innovative supply chains and market shaping

GO_2AL will work to ensure improved pricing and services as well as increased production capacity in LMICs, provide coordinated technical assistance and training to countries, engage with LOX-producing gas companies and establish improved, lower cost supply chains.

3. Support robust country planning and implementation

GO_2AL will support countries in the development and implementation of robust, costed national oxygen roadmaps, provide coordinated technical assistance and training, strengthen regional networks and secure diversified financing options for more sustainable oxygen systems. GO_2AL will also promote joint learning and knowledge sharing between countries to expedite affordable and equitable access to oxygen in LMICs.

4. Advocate and generate demand

GO_2AL will promote its objectives among global health stakeholders and support sustainable approaches for oxygen access in LMICs as part of HSS, UHC and PPPR efforts and, at country-level, for community engagement and domestic resource mobilization. GO_2AL advocacy efforts will be evidence-based, amplifying and accelerating implementation of best practices.

5. Measure performance and drive accountability

The initiative will collect high-quality data on oxygen access, implementation, financing and market health, and measure and report progress towards its objectives. GO_2AL will support countries to strengthen data systems to enable wider regional and global measurement of oxygen access and gaps, and engage with LOX-producing gas companies to encourage and track further positive action. Improved data availability will allow GO_2AL to better plan, programme and track its commitments.

2.4 Agile governance

GO_2AL brings together an unprecedented group of stakeholders from countries, donors, technical and implementing agencies, and advocates together to leverage expertise and facilitate joint effort to close the oxygen gap in LMICs.

GO_2AL's governance structure is streamlined and agile, with a small number of critical working groups that balance inclusivity and efficiency. GO_2AL is composed of co-chairs and vice-chairs, the new Global Oxygen Taskforce and the GO_2AL Secretariat. GO_2AL will form additional working groups and stakeholder engagement groups as needed and collaborate with the Lancet Global Health Commission on Medical Oxygen Security[iii] and its global network of Oxygen Access Collaborators.

GO_2AL is currently hosted by Unitaid, along with WHO and UNICEF, which comprise its Secretariat. For the first 2 years, it will be co-chaired by Unitaid (as a founding Chair of the ACT-A Oxygen Emergency Taskforce) and the Global Fund to Fight AIDS, Tuberculosis and Malaria (the largest financing channel for medical oxygen during the pandemic). The Pan American Health Organization and the Africa Centers for Disease Control and Prevention will serve as vice-chairs.

The new taskforce within GO_2AL is its engine, generating technical, advocacy and resource mobilization outputs. In addition to the leadership, GO_2AL members currently include the Access to Medicine Foundation, Bill & Melinda Gates Foundation, Build Health International, Clinton Health Access Initiative (CHAI), Every Breath Counts Coalition, Partners in Health, PATH, Save the Children, United Nations Office for Project Services, United States Agency for International Development, World Bank and representatives from civil society and affected communities. New members, particularly representatives from LMICs, are being invited as GO_2AL strives to build a stronger, more diverse and inclusive membership.

iii For more information on the Lancet Oxygen Commission, see https://doi.org/10.1016/S2214-109X(22)00407-7.

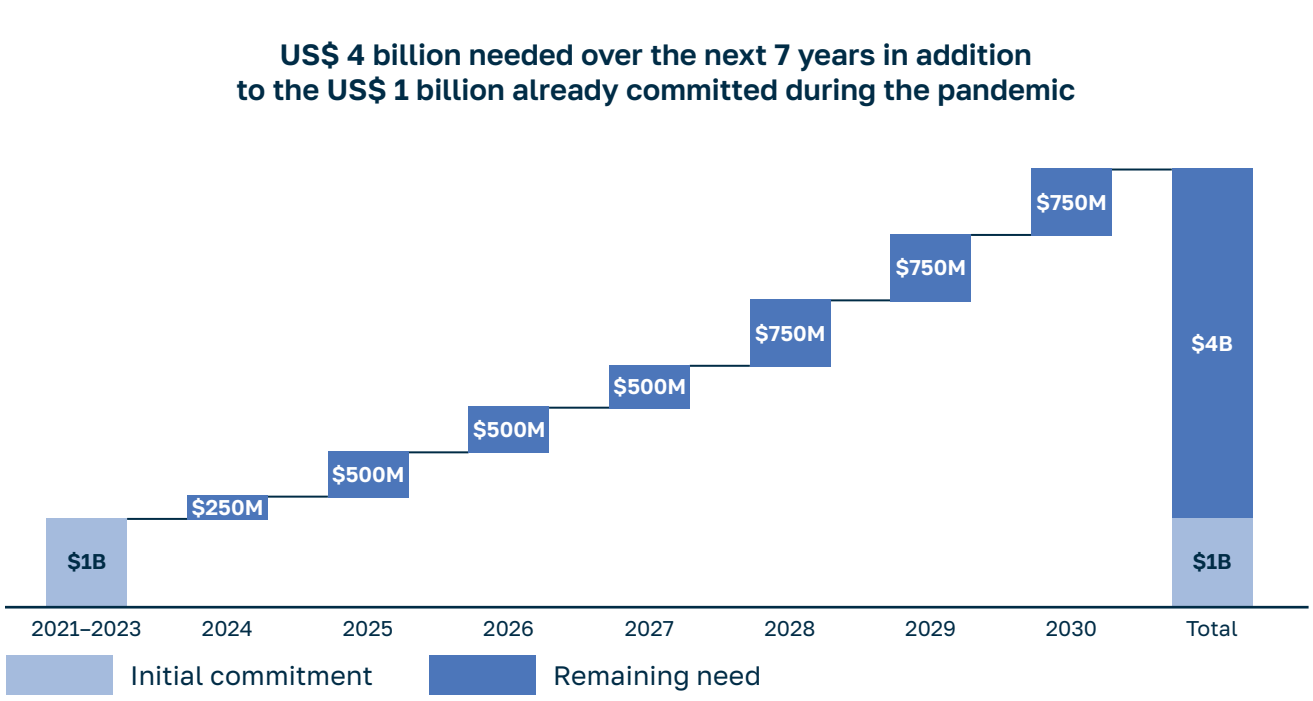
3

Call to action: close the oxygen gap now

3.1 Call to raise US$ 4 billion over 7 years – challenging but achievable

GO_2AL is calling for at least an additional US$ 4 billion between 2024 and 2030 as a significant investment towards ending preventable deaths worldwide due to hypoxaemia (see Fig. 7). US$ 4 billion is an indicative estimate, which will be updated and finalized in 2024 as part of GO_2AL's full strategy development. The investments will be phased to take into account existing committed funding, and in line with country capacity to absorb additional funding as underlying systems are strengthened. The GO_2AL Secretariat will require modest support to enable it to fulfil its mandate for global coordination, strategic direction, advocacy and performance tracking.

Fig 7: Investment needed to strengthen oxygen systems in LMICs[iv]



Note: US$ 1B includes the hundreds of millions of dollars for oxygen investment made through ACT-A.
Source: GO_2AL 2023.

iv The US$ 4 billion is an indicative estimate, which will be updated and finalized in 2024 as part of GO_2AL's full strategy development.

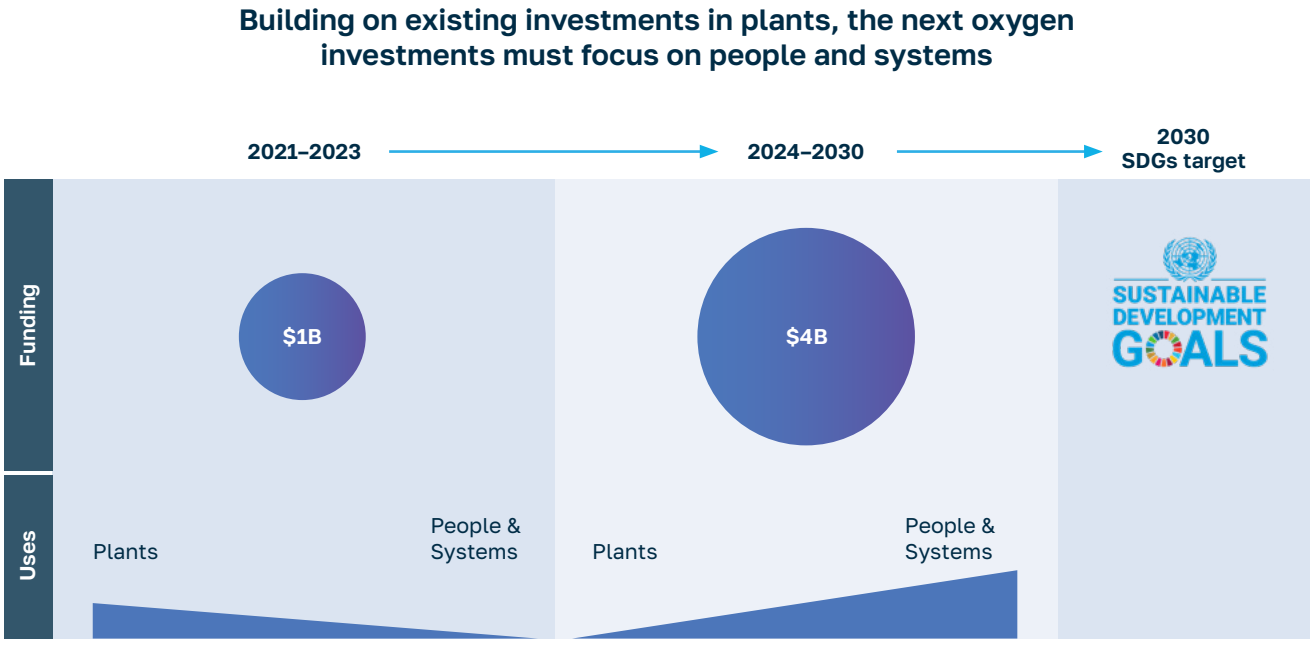
The initial US$ 1 billion invested during the COVID-19 pandemic (2021–2023)[27] was mostly spent on capital expenditures, including production plants, rather than on human resources and underlying oxygen systems. GO_2AL's 7-year strategic plan seeks to optimally rebalance future investments between production, storage, delivery, equipment and people to enable overall oxygen system strength.

To achieve this goal, countries must lead by contributing their fair share of resources to build and maintain oxygen infrastructure and hire and train key workers. Donors must do their part by providing complementary funding and technical assistance.

3.2 Rapid improvement is possible

Past experience shows that rapid improvements in oxygen access can be achieved when political will and resources come together as illustrated by the "country spotlights" across this executive summary. For example, Ethiopia's previous work to strengthen capacity, training, human resources and oxygen production, beginning in 2015, saved lives during the COVID-19 pandemic, creating an oxygen system that was able to respond to surge demand. Nepal is delivering an oxygen training and capacity building programme with the help of Build Health International. Rwanda, meanwhile, has rapidly strengthened its systems and achieved universal access to medical oxygen across all hospitals during the pandemic.

Fig 8: Investments in medical oxygen



Country spotlight: Ethiopia

A head start in oxygen preparedness saved lives during the pandemic[28]

The Federal Ministry of Health in Ethiopia, in partnership with CHAI, began working in 2015 to strengthen its oxygen systems. New policies and guidelines were developed, oxygen equipment was procured and maintained, and health workers and biomedical engineers trained. Within 4 years, an evaluation found that in the 32 public hospitals that were studied, functional availability of oxygen increased 62–100% within paediatric wards, functional availability of pulse oximetry increased 45–96% and clinical practice had changed to include measurement of blood oxygen saturation at diagnosis 21–83%.

Impact of oxygen: As a result of this system strengthening investment, Ethiopia was able to respond to the COVID-19 pandemic surge in oxygen demand. This head start in preparedness saved lives during the early phases of the pandemic[29].

3.3 Oxygen investments benefit other sectors too

Oxygen improvements have multiple ripple effects across other parts of the health system. Expanded numbers of trained biomedical technicians and engineers will increase the lifespan of oxygen plants and of myriad other health-related devices and machinery currently in a poor state of repair – some studies have found that 40–70% of medical devices in LMICs are broken, unused or unfit for purpose[30]. Investments in improving the quality and availability of electricity supply is not only beneficial for the lifespan of delicate oxygen production equipment, but also for boosting productivity and economic activity, improving public safety, and advancing the delivery of other health services and education.

3.4 Need to act swiftly and invest in people and systems

While there remains some unspent funding for oxygen from COVID-19-related grants, this money is expected to be exhausted within the next 2 years. Without additional funding for oxygen, recent gains will not be protected and, as cited above, hundreds of millions of dollars of donated production equipment will be wasted. The window of opportunity is now. It is imperative that extra funding be allocated for implementation, human resources, operations and oxygen systems, as well as for building more production capacity, to maximize return on existing investments and save lives.

4

Conclusion

The vision of a world in which everyone who needs oxygen to survive, is achievable. The cost in dollars and “oxygen workers” (nurses and doctors, biomedical and clinical engineers and repair personnel) is affordable and manageable. Many other ongoing global and national health initiatives, including the UHC and PPPR movement, primary health care revitalization, and global surgery expansion, stand to gain from having a strong functioning oxygen system.

Now is the time to work together in the coming year to launch the GO_2AL partnership, craft a detailed consensus “Oxygen for All” strategy, and rapidly expand by the end of 2024 a multi-year effort to give lifesaving and life-renewing oxygen to the millions who need it around the world.

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Cover photo: Fanta Fomba's 4-month-old son, Abdoul Karim Mariko, receives oxygen therapy to treat severe respiratory distress in the paediatric unit at the Centre de Santé de Référence in Dioila, Mali.

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The Global Oxygen Alliance (GO_2AL) is hosted by Unitaid, the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF)

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