

Sustaining Access to Liquid Medical Oxygen

Virtual roundtable
Thursday 13 October 2022



MEETING SUMMARY

Closed Virtual Roundtable Event

13 October 2022

[Chatham House Rule](#)

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INTRODUCTION

Medical oxygen is essential for every health system. Not only is it a life-saving treatment for those suffering from COVID-19, but for a range of other patients of all ages. The pandemic revealed and further exacerbated major pre-existing shortages and inequity in access to medical oxygen in low-and middle-income countries (LMICs). The response to this crisis, in terms of funding and supply by medical gas companies, has led to significant progress over the last few years.

However, this progress has been concentrated on emergency management and driven by donor funding. Access to medical oxygen needs to remain a priority, with a shift in focus to long-term solutions. This is critical to reduce the number of preventable deaths in LMICs and, consequently, enable the attainment of the United Nations 2030 Sustainable Development Goals and Universal Health Coverage.

On 13 October 2022, **Chatham House** and the **Access to Medicine Foundation** convened in partnership a roundtable of medical oxygen stakeholders. At this event they were able to discuss innovative approaches to access, share best practices, define actions that need to be taken by liquid medical oxygen (LOX) manufacturers and other partners, and to identify how best to track progress. The discussion was held under the Chatham House Rule.¹

¹ When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed.

THE ROUNDTABLE DISCUSSED:

- The role of medical gas companies, global health agencies and funders in expanding access to LOX in LMICs.
- Concrete actions that medical gas companies and global health partners can take to ensure sustainable access to LOX in LMICs.
- Models that pharmaceutical companies apply to increase access that might be useful for medical oxygen companies to emulate.

This report reflects the key themes and general findings from the discussion.

CONTEXT OF LIQUID MEDICAL OXYGEN IN LMICs

The COVID-19 pandemic exposed the critical need for medical oxygen and the significant existing gaps in its provision, particularly in LMICs. Countries reported unreliable access to medical oxygen before the pandemic. In sub-Saharan Africa, 31% of facilities had interrupted oxygen availability and 25% had no availability at all.² While progress has been made in recent years, including in response to the pandemic, there is still a significant unmet need for medical oxygen in LMICs. The World Health Organization identifies barriers to access as high costs, lack of long-term funding, lack of trained human resources, weak supply chains and unreliable power supply access.²

The different oxygen production methods were relevant to the roundtable discussion. Medical oxygen is generated through bedside concentrators and Pressure Swing Adsorption (PSA) plants, which produce gaseous oxygen via PSA technology; Air Separation Units (ASUs) cryogenically produce liquid medical oxygen (LOX). PSA plants are typically smaller and situated onsite, with little or no transport costs, while LOX is produced centrally and transported, resulting in higher transport costs but greater reliability and flexibility.

The majority of funding through the COVID-19 response has been directed toward PSA plants. Participants noted that there was a missed opportunity to explore opportunities for LOX, which is considered a 'gold standard' medical oxygen solution. It was argued that while it was not the right solution for every facility across the world, it is a solution for more facilities than it is currently outfitted for. In illustration, one participant noted that with the exclusion of North Africa, there are only approximately 50 LOX plants on the continent – the majority of which are dedicated to industrial application.

There was a brief discussion on the comparative advantages of LOX versus PSA sources in LMICs, though participants argued that this debate has hindered progress to date. There was consensus that the focus should be the most suitable oxygen source for the specific context, based on an assessment of costs, affordability, reliability and flexibility.

² World Health Organization (2021), *WHO technical consultation on oxygen access scale-up for COVID-19*, Genève, Switzerland: World Health Organization, <https://apps.who.int/iris/handle/10665/342817> (accessed 28 October 2022).

SUSTAINING LONG-TERM ACCESS TO MEDICAL OXYGEN

ENABLING VISIBILITY OF DEMAND

Despite this already being flagged as a key issue in the [Access to Medical Oxygen Roundtable](#) co-hosted in June 2021 by the Every Breath Counts Coalition and the Access to Medicine Foundation, participants agreed that low visibility of demand, resulting from a lack of data, continues to be a significant challenge for access to medical oxygen. While it is an effective treatment for a significant number of medical conditions, the lack of quantifiable data on oxygen need and service capacity is resulting in a hidden significant demand for medical oxygen. Additionally, patients and health systems do not necessarily 'demand' a drug or commodity which has never been available in their setting.

Low visibility of demand has significant implications for policymakers, as well as for medical oxygen manufacturers, who are unable to measure the potential opportunity for oxygen production.

Participants agreed that global health partners need to play a primary role in collating such data. [Quantifying the burden of disease would provide an estimate of the true potential unmet needs for medical oxygen.](#) One participant cited a major ongoing collaboration between academic experts and public health partners in the Lancet Global Health Commission on medical oxygen security to produce estimates on the amount of oxygen needed to treat conditions in each country over the next two years. [Another recommended annual or biannual market reports](#) as a low-cost solution that has been effective in other sectors.

Significant progress was made in filling data gaps during the pandemic, with baseline assessments created to map which oxygen sources existed. Systems and dashboards were also established to monitor the supply of oxygen and COVID-19 cases. Some participants highlighted the need for more detailed and granular information on existing oxygen systems and their status on the ground. It was argued that to capitalise on these gains, [systems need to be institutionalised, for example, by integrating them into national data platforms.](#)

SUSTAINABLE PUBLIC FINANCING

Participants recognised the need for continued public financing for medical oxygen provision in LMICs, [acknowledging that this was ultimately the responsibility of the public health sector,](#) to allow governments subsidies when needed. There has been a large injection of financing through recognised funding mechanisms during the COVID-19 pandemic. However, there is a need to ensure that this emergency-based funding is transformed into sustained funding. These discussions reflected those held during the June 2021 roundtable.

The World Bank, UNITAID, the Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund), USAID, the US government, and private philanthropic organisations were recognised sources of funding.

Participants repeatedly acknowledged the role of the Global Fund, currently responsible for the majority of oxygen procurement, and highlighted that reduced treatment costs for HIV/AIDS, malaria and tuberculosis will present fiscal space for increased oxygen funding. However, [participants recognised the need to integrate oxygen more meaningfully and rationally in the grant-making process.](#) Credible, rational proposals are a specific challenge for the sector due to the low visibility of local demand. An example of good practice was a collaboration between partners of the ACT-A Oxygen Emergency Taskforce and national governments to construct rational proposals for the Global Fund's C19RM request. Participants highlighted the need for grant proposals for the new Global Fund funding cycle to be submitted soon.

The discussion focused primarily on external aid financing and subsidisation for equipment procurement and infrastructure, [but participants also recognised a need for domestic financing, specifically for resupply and operational costs](#) to ensure capital expenditure (CAPEX) investments and infrastructure does not fall into disrepair. It was also argued that helping the public sector to pay its medical oxygen bills would incentivise companies to focus on supplying medical oxygen, rather than on providing industrial oxygen, for which bills get paid more quickly. This was a common issue, according to one smaller medical oxygen manufacturer, which often encountered late bill payments by hospitals. [It was suggested that national governments should be involved in future discussions on the topic.](#)

REDUCING COST

The cost of medical oxygen is considered a significant barrier to access in LMICs, with prices up to five times higher in sub-Saharan Africa than in the US.³ In particular, some participants highlighted the high cost of LOX in LMICs.

Participants agreed that analyses from global health organisations are needed to understand why prices were high and to address how prices affect the market.

However, several explanations were offered during the discussion. The first was that only a handful of major gas manufacturers dominate the market, which leads to monopolistic tendencies. Some participants also highlighted the fact that these companies have been shown to price their medical oxygen higher than their industrial oxygen, despite both types coming from the same plants. In Africa, there have been efforts to address this risk through the African Continental Free Trade Area Protocol on Competition Policy. [Participants highlighted the need to leverage these types of local initiatives, where they exist.](#)

A further explanation was the uncoordinated ordering of oxygen during the COVID-19 pandemic, which led to a distortion of the market. The multiple routes for medical oxygen into a country, as well as the lack of data on oxygen need, also make it very difficult for national governments to forecast demand. Several participants suggested that [pooled procurement could help to resolve this issue and enable medical oxygen demand aggregation.](#)

It was suggested by some participants that [industry should follow the pharmaceutical industry model to establish low-cost pricing](#), with agreement that price reduction consistently increases demand. It was also suggested that [transparency on pricing at the ASU plant gates and for the next three to five years](#) from industry would help to facilitate market planning by global health partners who want to ensure that investments in local distribution and health systems infrastructure continue.

³ Davies M., Mednick S., Onwuzoo A. (2020), *Lack of oxygen leaves patients in Africa gasping for air*, The Bureau of Investigative Journalism, <https://www.thebureauinvestigates.com/stories/2020-08-09/lack-of-oxygen-leaves-covid-19-patients-in-africa-gasping-for-air> (accessed 28 November 2022)

PUBLIC-PRIVATE COORDINATION

Attendees highlighted the necessity of public-private cooperation to increase access to medical oxygen, with repeated calls for better communication between industry and global health partners. Though a few thought that global health organisation collaboration with industry had so far been positive.

It was recommended that global health partners continue with the coordination work of the ACT-A Oxygen Taskforce as it transitions to a Global Oxygen Alliance. A participant noted that this alliance helps to reduce complexity for industry and provide them with a “one-stop shop” for discussions with global health partners.

It was also suggested that industry and public health should continue to meet to share ideas and opportunities.

LESSONS AND ACCESS OPPORTUNITIES FOR INDUSTRY

The growing demand for medical oxygen presents a business opportunity for industry and the discussion focused on the role of industry in ensuring sustained long-term access to LOX.

There was recognition that pharmaceutical companies have faced similar challenges to medical gas companies, such as difficulties with local infrastructure, funding and lack of demand visibility, but are further ahead in terms of the access-to-medicine journey. It was agreed there are lessons to be learned from these access programmes that can be applied to medical oxygen. However, some new solutions will be needed.

A representative from the pharmaceutical industry offered several examples of how the industry has expanded access to medicines. Those listed included high-level interventions, such as supranational organisation procurement, an equivalent to the GAVI Alliance for vaccines, which enables better demand forecasting and pooled procurement. Other mid-level interventions included tiered pricing and the use of commercial routes in LMICs to supply essential medicines, as well as working with medical representatives in-country and local distributors to ensure accurate and long-term demand planning. The implementation of pilot programmes has been used to assess the need of incorporating new vaccines into country immunisation schedules. To facilitate longer-term access, the pharmaceutical company has also been supporting additional strategies including voluntary licensing and technology transfers.

The pharmaceutical company representative noted that improving access to medicines had resulted in a higher number of patients being treated, increased revenue for the company, and has attracted more talent and greater investor interest. This was echoed by an investor who praised ESG-related approaches, such as improving access to medicine, even if they are not revenue-generating, as they have a beneficial long-term impact on how companies perform.

Participants emphasised that the medical oxygen industry should integrate access to oxygen goals and targets into their business strategies and make them publicly available to allow for better tracking of access-related initiatives.

One participant also noted that it would be beneficial to have dedicated access teams within businesses, who could navigate the complex global health system, and create flagship access initiatives.

BUILDING CAPACITY

Improving cooperation with LMIC governments

Participants agreed on the need for improved cooperation of industry and global health partners with LMIC governments to increase access to medical oxygen, although the [absence of government representation at the discussion was noted and agreed to be essential for future engagement](#).

Participants recognised the improved coordination at the national level during the COVID-19 pandemic. This was achieved through emergency response strategies and roadmaps for oxygen established by governments, with the support of global health partners. Good communication between industry and governments, as well as health providers, allowed for alignment on health facility needs. Several participants highlighted the importance of building on this progress and [institutionalising national oxygen strategies](#) with the help of governments and in-country technical working groups, where they exist, to enable long-term and effective policy planning.

There was consensus that [oxygen-related investments need to be country-led](#), with one participant querying which market-shaping opportunities were being left off the table because of donor-specific priorities or interests.

Some attendees highlighted the lack of clarity on how decisions are made at a country level regarding local oxygen investment priorities and modality choices. A participant questioned whether standardised guidance was available to help direct investment priorities and decisions on different oxygen sources at the country level. Others were working on resources and tools to help guide these decisions, including an oxygen assessment tool, which now includes LOX, that helps ministries of health to calculate oxygen need and thus the most suitable modality. Others highlighted an existing summary of the advantages and disadvantages of each modality, and they are collaborating with other partners to ensure these tools work in conjunction and do not complicate the issue.

Some attendees also identified a need for better communication and alignment between manufacturers and governments on access to medical oxygen strategies to ensure complementary and comprehensive investments, demand generation and manufacturing scale-up.

Local production capacity

Participants agreed on the need to scale up in-country production of LOX as an effective way to improve access to medical oxygen, and to reduce reliance on unsustainable importations from abroad. The discussion focused on the challenges in building local production infrastructure and highlighted the need for an ecosystem of local suppliers for the production and distribution of LOX within and between LMICs. An example of this network building was a company working to install new LOX plants in one African country which will also supply the Economic Community of West African States (ECOWAS).

The LOX production capacity of the major medical gas companies was considered key, as was reduced pricing of their LOX. However, several participants highlighted the need for smaller LOX ASUs as smaller-scale plants are unlikely to be commercially viable for the large gas manufacturers, which will typically produce 80-90% of their oxygen for industrial use. It was argued that smaller plants could be profitable by selling 80-90% of their capacity to the medical market, if the demand was there.

Participants therefore recognised a need to continue financing and providing technical support to smaller LOX-producing companies. One participant also noted that it would be helpful to have a database of small- to medium-sized LOX companies and of effective strategies to work with them to support them in scaling up LOX manufacturing capacity in LMICs.

Investment in biomedical engineering capacity and health systems

As was previously raised in the June 2021 roundtable, lack of health system capacity, weak medical oxygen infrastructure and lack of human resources pose persistent challenges in LMICs – with urgent action required to address these issues.

There was agreement that global health investments to date have primarily focused on capital expenditure (CAPEX) and equipment, with a need for comparative investment in increasing clinical and biomedical engineering capacity and health systems strengthening.

This was highlighted by participants who noted that in sub-Saharan Africa, the lack of biomedical engineers is one of the main reasons behind the deterioration, and ultimately the non-use of medical oxygen equipment. Examples of good practice shared in this area include larger medical gas companies lending biomedical engineering support on the ground to support national programmes.

One participant added that these investments should include ‘post-sale’ servicing of new solutions and products, for example, training for health workers on the safe use of medical oxygen and increasing biomedical engineering capacity to maintain whichever medical oxygen solution is put in place. Others highlighted the potential value of global long-term service agreements in setting a reference for negotiations and, consequently, in ensuring sustainability of LOX access.

Several participants noted the continued challenges that hospitals in LMICs face with piping networks that deliver medical oxygen to patients’ besides. In remote areas there is often a lack of these piping networks and in settings where this infrastructure is available, it is often not fit for purpose and cannot supply large volumes of oxygen – as was required during the COVID-19 pandemic.

Participants also recognised the need for investment in reliable energy infrastructure, without which volumes of medical oxygen supply cannot be increased. One smaller LOX company commented that energy accounted for up to 80% of its production costs. It was recommended that investments need to be made in next-generation equipment and renewable energy alternatives. Some solutions currently being assessed include heat exchangers and heat pumps. Solar-powered production was offered as another potential solution, although that would involve improvements in battery and energy storage to allow for production at scale.

Regarding whom should be responsible for this investment, participants highlighted the role of the different stakeholders.

There is a need for continued donor investment in health systems strengthening in areas such as local distribution, pipe installation, tanks, equipment, cylinders and local health facility storage in LMICs.

It was suggested that industry could also provide support, and some gas manufacturers highlighted efforts undertaken during the pandemic to install new tanks and extend the capacity of pipeline systems in hospitals. To solve issues with delivery and overcome the lack of pipeline networks in hospitals, one company created a cylinder filling unit in a mobile LOX tank. This enables them to travel to communities and small cities, fill cylinders at local health facilities, avoiding high costs of moving cylinders, and then re-filling at the LOX plant to visit further sites.

CONCLUSION

This discussion covered a breadth of issues relating to sustainable access to liquid medical oxygen in LMICs, with participants proposing multiple long-term solutions. There were several common themes throughout the discussion, most notably:

- Continued public-private cooperation;
- Information sharing and transparency;
- Country-led prioritisation and planning.

Co-hosts

The Access to Medicine Foundation is an independent non-profit organisation that seeks to transform the healthcare ecosystem by motivating and mobilising companies to expand access to their essential healthcare products in low- and middle-income countries. The Foundation is funded by the Dutch and UK governments, the Bill & Melinda Gates Foundation, the Leona M. and Harry B. Helmsley Charitable Trust, and AXA Investment Managers.

The Centre for Universal Health, Chatham House's global health programme, is a global leader in the specialist area of the political economy of Universal Health Coverage reforms, global health security and the social determinants of health. It adopts a multi-disciplinary approach by bringing together leading experts in public health, health systems reforms, health economics, and health security. Exploiting its comparative advantage, the Centre works with global, regional, national and subnational actors across government and non-government sectors to enact effective and efficient health policies and strategies, which are amplified through Chatham House's convening power.

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