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HOW DID WE GET HERE? UGANDA'S MEDICAL OXYGEN CRISIS



JUNE 2021

As Uganda faces a surge of COVID 19 reporting more than ten thousand cases in ten days, oxygen shortages have been reported countrywide. People have recounted moving from hospital to hospital and being sent away or patients dying before they are helped. Private hospitals have asked patients to come with their oxygen. Some hospitals are rationing oxygen between patients. Even if available in private, it remains unaffordable for many. Oxygen has been the driving force for catastrophic out of pocket health expenditure during this pandemic. The average cost for a cylinder is UGX1.7 million without including cost of oxygen. Others have reported paying UGX 3 million (approximately \$850) for oxygen cylinders but then have to figure out how to refill. According to doctors, a Covid 19 patient needs two to three cylinders a day. The poor are detrimentally affected, failing to access it in public and failing to afford it in private. Poverty has worsened with the lockdowns imposed decimating incomes.

Yet, oxygen is the most essential medicine for severe and critical Covid 19 patients. Insufficient supply of oxygen combined with low vaccination rates has left many gasping for air. People are paying the price for this insufficient supply, and the price is their life. The following accounts are coming in through messages, interviews and social media.

"Someone struggled to find oxygen for their parent around all hospitals in Kampala and Wakiso then ended up driving up to Jinja"

"oxygen is being rationed between patients. Each patient has like ten minutes with a cylinder then they go to the next patient. Oxygen plants in hospital can't keep up with the demand."

"Yesterday we buried our mother in law. She was a medical worker and two of her biological daughters are Incharges in government health centers, they contacted every government facility in Kampala and Entebbe and failed to get oxygen and she died."

"Oxygen shortage. No available ICU beds. My friend's parents died because of this. Doctors made all manners of calls to every hospital but there was no space, no oxygen. They shouldn't have died. A lot more could've been done. But Uganda! Uganda!"

"My father has died on our way to Kisubi hospital as we were trying to find oxygen."

"Some places don't even have. We are on surviving on vibes."

Access to oxygen is a fundamental human right, integral to protecting the right to life.

Ugandans are being failed twice. They are unable to access Covid 19 vaccines that would ensure curtailment of the spread. They are also unable to access oxygen should they contract Covid 19. The poor are particularly affected, failing to get it in public facilities and unable to afford the exorbitant price in private facilities. Yet medical oxygen is the most important priority for COVID 19 patients. It is imperative equitable access to oxygen is prioritized. Not just to address the country's dire need in a pandemic but also because patients with respiratory illness, neonatals rely on it. Even as numbers stabilize, there will be other surges as variants develop. The government's rhetoric must be matched by swift action. We do not have the luxury of time.

RECOMMENDATIONS

1. **Address governance gaps and adopt a multi sectoral government coordination mechanism to rapidly address the Oxygen shortage.**
2. **Enhance coordination to ensure hospitals that need are able to get supply.**
3. **Resourcing and investment in oxygen infrastructure should be prioritised. Ensure all regional referral hospitals have functional equipment**
4. **Immediately step up production and supply for oxygen including:**
 - **building more oxygen plants, mass production by every facility under stewardship of government.** UPDF's National Enterprise Corporation should continue to rapidly supply oxygen.
 - **Mobilise industrial oxygen producers to purify industrial oxygen and divert it for medical use.** This was done in India. However, care must be taken to ensure medical oxygen purity.
 - **Consider nationalizing oxygen supply and production if situation necessitates.**
5. **Remove tax barriers on importation of industrial cylinders and address transportation and other barriers.**
6. **Engage development partners including countries and international agencies to buy and install oxygen or offer oxygen cylinders, concentrators, cryogenic tanks to transport the oxygen.**
7. **Oximeters should be in all lower health facilities to enable timely diagnosis. Invest in oxygen concentrators, which provide a low flow oxygen solution.**
8. **Separate areas to treat patients in critical condition that need high flow oxygen to take pressure off intensive care and high dependency units.**
9. **Explore innovative ways to increase oxygen capacity.** In South Africa, to increase capacity, oxygen concentrators were linked. In Democratic Republic of Congo, oxygen cylinders were linked together to create central oxygen bank.
10. **Regulate private sector to ensure they are not inflating oxygen costs and investigate information provided by whistleblowers.**
11. **Provide accountability for COVID 19 funds**
12. **Ensure widespread Covid 19 vaccination by increasing access to Covid 19 vaccines since vaccination reduces the risk of severe illness and hospitalization.**
13. **Train healthcare workers on detection of hypoxemia and appropriate administration of oxygen and management of equipment.**

HOW DID WE GET HERE?

The Ministry of Health has blamed Uganda's oxygen crisis on the surging Covid 19 cases that have outgrown the current supply. Uganda's cases have exponentially increased within the last two weeks. Mass vaccination could have prevented this with increasing recognition that Covid 19 vaccination significantly interrupts spread. However, the country was only able to access limited supplies of Covid vaccines as a result of global vaccine nationalism, failure to pass the patent waiver for Covid vaccines resulting in poorer countries having to rely on COVAX and only one manufacturer, the Serum Institute. This coupled with the Ministry of Health's [inconsistent approach](#) to Covid vaccination which enabled queue jumping meant priority groups especially lower income quintiles were not adequately reached and [equitable vaccination](#) severely undermined. As of the [President's Address](#) last week only 35,995 received a second dose while 712,681 have received a first dose only thereby exposing many Ugandans to the risk of severe hospitalization. This coupled with the multiple variants and [insufficient testing](#) due to the prohibitive cost has contributed to a surge in cases and accordingly increased demand for oxygen.

However, while it is tempting to blame the insufficient supply of oxygen on the recent surge of cases, Uganda's oxygen crisis has been in the making for a while. Even before the pandemic, only 4% of children who died from pneumonia received oxygen therapy.¹

There are three ways oxygen is delivered in Uganda: cylinders, concentrators and oxygen plants.

1. Portable cylinders are delivered to health facilities which can then exchange them if they run out. This is usually for lower level health facilities. They require peripheral equipment including pressure regulator and gauge, flowmeter, humidifier, nasal prongs/catheter, cylinder key. Some of the manufacturers include oxygas, oxygen Uganda, Mulago hospital.
2. Concentrators, while also bedside and portable, supply oxygen enriched gas by entraining air from the environment and through pressure swing absorption to remove nitrogen. These often require a health facility with reliable power source. They require peripheral equipment like a humidifier, nasal prongs/catheter. Unfortunately, their low oxygen output makes them insufficient for ICU. Some of the manufacturers include DeVillbis, AirSep.
3. Oxygen plants are often the source of oxygen supplying through a network of copper pipes. They are often at regional referral hospitals and require reliable infrastructure, skilled personnel to deliver high output flow and pressure. They, however, require access to reliable power source, skilled technicians, and can be hazardous if not well managed. Manufacturers include OGSi, Oxymat, Ozcan Kardesler.

¹ [National Scale-Up of Medical Oxygen Implementation Plan 2018-2022](#)

The [National Scale-Up of Medical Oxygen Implementation Plan 2018-2022](#) warned about insufficient supply of oxygen, noting that Uganda Services Availability and Readiness assessment found only 36% of facilities offering services for chronic respiratory diseases had medical oxygen. It found that even when oxygen delivery and therapy equipment are available, lack of proper maintenance results in frequent non-functionality and thus inconsistent supply. Only 47% of the oxygen supply equipment was operational out of 78% of facilities providing some form of oxygen supply (either through concentrators or cylinders). Only 17% of regional referral hospitals, 30% of General Hospitals and 45% of Health Centre IVs had a sufficient number of concentrators in accordance with the National Medical Equipment Policy.

The proportion of oxygen systems availability was even lower when facilities were assessed on availability of diagnostic equipment and dropped further when assessment of staff trained on oxygen equipment was taken into account. Oxygen systems availability was lowest at general hospital and HCIVs compared to regional referral hospitals.

DID UGANDAN GOVERNMENT DO ENOUGH? FAILURE TO PRIORITISE AND ACT.

1. CHRONIC STRUCTURAL UNDERINVESTMENT IN OXYGEN INFRASTRUCTURE

Prior to the pandemic, the health sector was faced with several challenges stemming from inadequate planning, lack of prioritization and financial resources. The emergency of the pandemic exacerbated these challenges and created new ones that needed immediate attention and prioritization, particularly emergency infrastructure, like assorted intensive care unit and oxygen therapy apparatus. Below are some key findings:

Oxygen Access Unfunded Priority That Needs Investment In Resourcing

Uganda's health budgets have repeatedly failed to prioritise Oxygen. Overall, the FY 2020/21 budget was largely silent about this. While MFPED allocated a supplementary budget of UGX.43 billion in FY 2019/2020 to expand infrastructure at various RRHs, it did not take into consideration of remodeling and expanding ICUs at all in RRHs. An analysis of FY 2020/21 budget showed that there was a budget cut of over UGX. 2.8 billion on medical equipment and at least 3 RRHs including Mubende, Entebbe and Kirudu did not have any allocation towards medical equipment.

Even in the middle of the pandemic, Oxygen is listed as an unfunded priority for the health sector in FY2021/22, despite the dire need. UGX 1.4 billion is needed for the maintenance of oxygen plants under the regional referral hospitals. Each of the 14 regional referral hospitals require an additional Ushs100 million to cater for maintenance needs of the oxygen plants including piping and procurement of oxygen cylinders. Masaka and Jinja RRH and Naguru Rehabilitation Referral Hospital have no funding for oxygen plant maintenance costs, for its high electricity consumption and cylinder heads, in addition to the costs of production for provision to other health facilities in

their respective region both Public and Private use. Within supplementary budgets passed to deal with pandemic, from the publically available information, it was not always earmarked specifically as an expense. It is more than a year since the pandemic started and at the time this budget was passed, government should have been aware of the need for Oxygen given the detection of super spreader variants like the Delta variant and the way in which they were affecting neighbors like Kenya and India. Government should have budgeted it as a funded priority rather than leaving it.

Underequipped Lower Health Facilities Resulting In Delay To Refer Patients

Pulse oximeters and oxygen analysers are in short supply at lower level health facilities yet these are particularly critical since the patient may not be gasping for breath and may present with “silent hypoxemia.” Oxygen concentrators, which may not be used for a severely ill patient, but can be used if a patient presents with early symptoms are often not present. The National Scale-Up of Medical Oxygen Implementation Plan 2018-2022 notes the lack of availability of diagnostic equipment and low numbers of staff trained on oxygen equipment at HCIV and General Hospitals, which are often closer to the community. It quotes an inventory of the health infrastructure department which found that only 17% of regional referral hospital, only 30% of general hospitals and 45% of Health Centre IVs had a sufficient number of concentrators in accordance with the National Medical Equipment Policy. The result is a delay to promptly refer patients given the inability of lower health facilities to promptly assess if patients will need oxygen and poor referral pathways. Studies have [shown](#) that to reduce severity of disease, early and adequate access to oxygen essential. Mulago National Referral has admitted that the delay to refer COVID 19 patients means patients arrive when oxygen therapy is no longer as effective.

Limited Maintenance

The only oxygen Plant at Masaka that feeds the greater Masaka sub-region of the central district of Masaka recently broke down leaving the region in crisis. According to the 2020/21 Ministerial Policy Statement, Masaka and Jinja Regional referral hospital and Naguru Rehabilitation Referral Hospital have no funding for oxygen plant maintenance costs. The Hospital and Health Centre IV survey found only 37% of the health facilities had a budget line item for routine maintenance and repair of medical equipment.

Understaffing and limited knowledge among health workers

There is a shortage of medical staff. Medical staff need to be trained in oxygen therapy to be able to ensure oxygen therapy balances the percentage of pure oxygen per minute, quantity administered per minute flow, and pressure at which air is given. This includes putting in place oxygen treatment protocols. The [National Scale Up of Oxygen Implementation Plan](#) found low levels of utilization and reduced durability of oxygen equipment due to limited knowledge among health workers in the use, operation, care, handling and basic preventative maintenance of oxygen therapy equipment. Less than 50% were knowledgeable about operations and basic routine maintenance protocols for oxygen therapy equipment. Only 62% of health workers knew how to use a pulse oximeter.

2. LIMITED ACCESS DUE TO COST, INFRASTRUCTURE, TAX AND LOGISTICAL BARRIERS.

UNITAID has noted that globally cost, limited infrastructure and logistical difficulties are constraining oxygen supply. In Uganda, while medical equipment is tax exempt, industrial cylinders are subject to a tax. In March, before this surge, manufacturers including oxygas, [asked](#) government to waive tax on medical gases like they did for liquid petroleum.

It is not enough to set up an oxygen plant. Operational aspects such as delayed delivery and limited storage capabilities, maintenance of infrastructure and electricity supply must be addressed. Oxygen plants often have high electricity consumption. Using solar energy rather than generators at oxygen plants given unreliable electricity supply could also bring down cost. Oxygen concentrators require an electricity source, which can be direct, generator or batteries.

Transport poses a key barrier if cylinders, that are often bulky, have to be transported on poor roads or in island facilities. They pose risk of explosion if incorrectly handled. Transportation must be addressed. However, this is not a feasible long term solution. Oxygen plants must be installed closer to mitigate this.

3. POOR GOVERNANCE AND ACCOUNTABILITY FOR COVID 19 OXYGEN MONEY.

The Minister of Health in 2020, at the onset of the COVID 19 pandemic appeared before Parliament and noted Uganda was ill equipped to deal with COVID 19. Among the priorities was access to oxygen and ICU beds. One of the strategic interventions in the [Covid 19 Preparedness and Response Plan \(March 2020-June 2021\)](#) was to: procure and install oxygen plants, cylinders and accessories for Mulago National Referral Hospital, Entebbe Regional Referral Hospital, Bombo Hospital before July and to equip Covid 19 treatment centres with oxygen delivery accessories by November.

Money was allocated to the health sector to deal with COVID 19 from the government, donors and international financial institutions like the World Bank.

- The budget for the Multi-Sectoral COVID-19 Response (March 2020 to June 2021) was Ug shs 2,221,990,315,936. Ug shs 766,732,429,404 was disbursed by 30th June 2020. These funds included:
 - Ug shs 386,608,640,216 already disbursed by the government to the various sectors, on-budget support by development partners and contributions from individuals.
 - Ug shs 25bn from the Government Emergency and Consolidated Funds to the Ministry of Health for emergency medical response towards the pandemic.
 - A 94.1 bn supplementary budget was passed.
 - The ministry of health also received in-kind and cash contributions from the public, private sector, and development partners among others amounting to over US\$109,736,160.
- The World Bank committed a total of US\$ 15million and disbursed US\$12million (80%), approximately 84% of the expenditures were made on logistics, and the rest shared among

Coordination (2.3%), Risk Communication and Community Engagement (3%), ICT and Innovation (2.3%), Case Management (3%), Mental Health and Psychosocial Support (0.4%) and Surveillance and Laboratory (5%). This included the management of Severe Acute Respiratory Illness (SARI) sentinel sites on management of suspect and confirmed cases established.

As part of the COVID 19 response, the Ministry of Health set out to contract for oxygen plants and equipment.

- Ministry of Health issued a request for quotations and awarded the contract under procurement number, MOH/SUPLS/19-20/137 to install and supply 7 oxygen plants. The company, M/s Silver Bucks Pharmacy Ltd was contracted to supply and install oxygen plants for Mulago and Entebbe hospitals at a cost of Ug shs 6.4bn. The contract was signed on 6th May 2020, it provided a two-year warranty including spare parts.
- Two contracts were supposed to supply 145 ventilators, 143 ICU beds, 137 patient monitors and 150 oxygen therapy apparatus to various hospitals.
 - Ug shs 26bn to M/S Elsmeed EA Ltd on 18th June 2020 to supply equipment. The supplier was expected to supply 1,553 units of equipment to 17 regional referral hospitals. These included defibrillators, suction and infusion pumps, nebulizers, mobile x-rays, oxygen concentrators, weighing scales, portable ultrasounds, patient trolleys, ventilators, icu beds among others.
 - Ug shs 10.5bn between Ministry of Health and Joint Medical Stores (JMS) signed on 24 May 2020 to procure ICU equipment worth.

The [COVID 19 Interventions Report Financial Year 2019/20](#) found a number of delays and questioned the inflated cost. The supply of equipment was delayed. M/S Elsmeed EA Ltd Initial deliveries were expected in August 2020, however due to high demand of the same equipment internationally, delivery period was extended to December 2020. For the oxygen plants, although 100% of the invoice value of number R1658/MAY20/01 was paid to M/s Silver Bucks Pharmacy Ltd by 30th June 2020, deliveries and installations had not commenced by September 2020. It also questioned the inflated cost.

“ It is worth noting that the same supplier M/s Silver Backs installed oxygen plants in 13 RRHs in 2017 at the same amount cost that the GoU is spending on only two oxygen plants today (FY 2019/20). A contract was signed between M/s Silverbacks and Naguru Hospital to install 13 oxygen plants at a sum of US\$ 1,800,347 in May 2016 (this translated into 6.0billion at a then going exchange rate of Ug shs 3,370).”

The company denied this, noting, “This procurement also included three filling stations, 450 cylinders, 450 regulators, humidifier bottles and cannulas at a cost of Uganda Shillings 6.4 Billion.”

Despite the investment in oxygen plants, a media investigation in 2020 found that there were unnecessary deaths from faulty oxygen plants. The government and [hospital administrators deny](#) this, noting it had four fully functioning oxygen plants. They should have been seven procured by

the Ministry of Health. In December when queries were raised about oxygen supply, the executive director of Mulago [assured](#) the public they had reliable oxygen supply, noting that patients who died as alleged by the media faced severe organ malfunction. On June 14th, Mulago's Principal Director [admitted](#) the oxygen plant at Mulago hospital can only supply efficient oxygen at the recommended pressure to only 30 patients since it can only produce 2,083 litres per minute and if each oxygen patient requires 70 litres, noting COVID 19 patients required increased supply. However, in the [earlier statement](#) when justifying the cost, the hospital noted that the inflated cost necessary due to "higher specifications due to demand for high flow and high purity oxygen necessary for treating Covid 19 patients" and the "high production capacity of 125 cubic metres for plant as compared to the old ones, which are a lower production of 20 cubic metres." The national referral hospital [is now using oxygen cylinders](#) to supplement their oxygen supply that they buy from private providers. Of the 180 patients admitted, 15 were in intensive care and others in the High Dependency Unit. If this plant breaks down, the country will face a catastrophic situation. Most regional referral hospitals have run out of oxygen.

To take pressure off intensive care and high dependency units, Namboole could have been used as a separate area to treat patients that need high flow oxygen but not in very critical condition. However, the [COVID 19 Interventions Report Financial Year 2019/20](#) audit found sleeper tents procured for the National Quarantine Centre at Namboole Stadium at a cost of Ug shs 3.8bn were pulled down by the wind. They could not effectively be utilised by end August 2020. Besides, only 13 tents out of the contracted 20 were delivered at Namboole.

To date, there has been no comprehensive accountability for COVID 19 funds. While the Office of the Auditor General found gaps with regard to COVID 19 accountability, no action has been taken. This is essential because the failure to account has eroded public trust, which is needed to mobilise resources and ensure adherence of the population to preventative measures. The Global Fund has recently [donated](#) 7 million USD, about UGX25bn, to install seven oxygen plants for Mbarara, Hoima, Fort Portal, Kampala (to serve Entebbe and central region), Mbale, Lira and Arua to be completed by August. However, the public has already begun to raise concerns about whether this money will be misused.

4. ABDICATING STEWARDSHIP OF HEALTH SECTOR

Failure To Adequately Monitor Government Facilities

The failure to monitor government facilities has enabled corruption and double dealing. [Media reports](#) indicate Mbale regional referral hospital missing oxygen cylinder was found in a private clinic, Life General Clinic and Laboratory. Some people have alleged that the national referral hospital, Mulago, despite the shortage, is supplying oxygen to those outside the facility for a fee.

Failure To Regulate Private Facilities

In private facilities, the price of oxygen has to be regulated. The average cost for a cylinder is 1.7 million without including cost of oxygen. Others have reported paying 3 million with oxygen but then have to figure out how to refill. A Covid 19 patient needs two to three cylinders a day. Poverty has worsened with the lockdowns imposed decimating incomes. Reports are coming in of some

private facilities instructing health workers to put patients on oxygen regardless of whether they need it since it substantially increases the bill and raises revenue for the facility. [Media reports](#) indicate some clinics take patients who are ill and keep them and only bring them/refer them to regional referral hospitals when they are close to death to maximize profit.

WHAT NEEDS TO BE DONE?

RECOMMENDATIONS

1. *Address governance gaps and adopt a multi sectoral government coordination mechanism to rapidly address the Oxygen shortage.*
2. *Enhance coordination to ensure hospitals that need are able to get supply.*
3. *Resourcing and investment in oxygen infrastructure. Ensure all regional referral hospitals have functional equipment.*
4. *Immediately step up production and supply for oxygen including:*
 - *building more oxygen plants, mass production by every facility under stewardship of government. UPDF's National Enterprise Corporation should continue to rapidly manufacture oxygen supply.*
 - *Mobilise industrial oxygen producers to purify industrial oxygen and divert it for medical use.* This was done in India. At the start of May, desperate messages from hospitals in India begging for medical oxygen were flooding social media. The situation got so dire that hospitals took government to court. To meet the excessive demand for medical oxygen, the Indian government banned oxygen supply for industrial use from 22 April and all steel companies and oil refineries have to divert their oxygen production for medical relief. However, care must be taken to ensure medical oxygen purity.
 - *Consider nationalizing oxygen supply and production if situation necessitates.*
5. *Remove tax barriers on importation of industrial cylinders.*
6. *Engage development partners including countries and international agencies to buy and install oxygen plants or offer oxygen cylinders, concentrators, cryogenic tanks to transport the oxygen.*
7. *Oximeters should be in all lower health facilities to enable timely diagnosis. Invest in oxygen concentrators, which provide a low flow oxygen solution.*
8. *Separate areas to treat patients in critical condition that need high flow oxygen to take pressure off intensive care and high dependency units.*
9. *Explore innovative ways to increase oxygen capacity. In South Africa, to increase capacity, oxygen concentrators were linked. In Democratic Republic of Congo, oxygen cylinders were linked together to create central oxygen bank.*
10. *Regulate private sector to ensure they are not inflating oxygen costs and investigate information provided by whistleblowers.*
11. *Provide accountability for COVID 19 funds.*
12. *Ensure widespread Covid 19 vaccination by increasing access to Covid 19 vaccines since vaccination reduces the risk of severe illness and hospitalization.*
13. *Train healthcare workers on detection of hypoxemia and appropriate administration of oxygen and management of equipment.*

The failure to systematically invest in oxygen infrastructure and Uganda's public health sector as a whole, and lack of accountability for available funds is costing lives. The government's rhetoric must be matched by swift action. We do not have the luxury of time. Access to oxygen is a fundamental human right, integral to protecting the right to life. Ugandans are being failed twice. They are unable to equitably access Covid 19 vaccines that would ensure curtailment of the spread. They are also unable to access oxygen should they contract Covid 19. Yet medical oxygen is the most important priority for COVID 19 patients. It is imperative access to oxygen is prioritized. Not just to address the country's dire need in a pandemic but also because patients with respiratory illness, neonatals rely on it. Even as numbers stabilize, there will be other surges as variants develop.



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