



An overview of Covid-19 in Malawi:

Scotland-Malawi Oxygen Supply Coordination Group

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A report compiled for the SMP by the Chair of the Scotland-Malawi Oxygen Supply Coordination Group:

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MALAWI: Country Background

Known as “The Warm Heart of Africa” as a result of people’s friendliness, the Republic of Malawi was founded in 1964. It is a landlocked country in Southeastern Africa, bordered by Zambia to the west, Tanzania to the north and Mozambique to the east and south. It is a beautiful country covering 45,747 miles² with an estimated population of over 20 million. Lake Malawi covers a third of Malawi’s land mass. The largest city and capital is Lilongwe, in the Central Region, with Blantyre in the Southern Region the second largest and also the commercial centre, with Mzuzu in the Northern region the third largest.

The official language is English and it is a democratic multi -party state.

It is ranked as the 4th poorest country in the world, largely dependent on agriculture and with a rapidly expanding population. Life expectancy is 63.8 years and infant mortality is high (42.1/1000 live births (2018 data)) with a high prevalence of HIV/AIDS at 9.2%. It is heavily dependent on outside aid.

Malawi is composed of three regions (the Northern, Central, and Southern regions), which are divided into 28 districts and further into approximately 250 traditional authorities and 110 administrative wards.

Around 85% of the population live in rural areas, with 1/3 of GDP and 90% of export revenue dependent on agriculture. Agriculture is the main source of employment in the country with subsistence agriculture playing an important part.

The GDP per capita of US\$1200 is the 4th lowest (Global Finance) in the world.

Malawi has only 495 miles of railway track, and of its 15,451 miles of roads only 4,322 are paved.

The Covid 19 Pandemic in Malawi

The second wave of the pandemic in Malawi likely represents the effect of the highly transmissible variant B.1.351 or 501.V2 known as the South African strain. This is reflected by the greater numbers of cases and deaths seen in this second wave compared to the first wave. Reaching a peak at about this time in terms of active new cases, the hospitalisation and death rate will likely decrease in the coming weeks in both Malawi and South Africa. (see appendix)

Assessment and Treatment of Covid 19

Treatment of Covid-19 depends on the severity of infection.

The disease is more likely to adversely affect older patients often with other health challenges such as diabetes. An essential part of the assessment of patients with Covid-19 requires measurement of the body's oxygen saturation levels, normally over 96%. The remarkable observation in Covid -19 infection is that patients may seem relatively healthy despite very low Oxygen saturation levels however they may suddenly deteriorate developing respiratory failure resulting in death .

Essential treatment involves administering Oxygen . This is normally given via nasal prongs initially, with Oxygen coming from either cylinders of compressed oxygen or Oxygen Concentrators (bedside machines which essentially take oxygen out of room air and deliver it directly to the patient). The efficacy of treatment is measured by the raised oxygen blood saturation along with other clinical parameters. The amount of oxygen delivered is titrated against the oxygen saturation level. The ability to measure oxygen saturation is essential both for optimising treatment but also allows efficient use of what has proven throughout the world to be a commodity in short supply. Increased oxygen requirements require the use of Oxygen face masks of different types and supplemental breathing support such as CPAP machines and ventilators. The use of ventilators is associated with poor outcomes and prolonged periods of hospitalisation throughout the world. Ventilators are not readily available for Covid treatment in Malawi

Other essential treatments for particularly ill patients include blood thinners, antibiotics and physiotherapy. Treatment is particularly staff intense and requires the use of PPE (Personal Protective Equipment). All of these are also in short supply, The Ministry of Health has responded to this crisis by bringing together all players in the Healthcare delivery field including large international agencies such as UNICEF, Medecins Sans Frontieres, USAID and smaller NGOs such as Health Cluster and Oxygen Taskforce. Such team working has facilitated the coordination of need and resources avoiding unnecessary duplication of effort and resources.

From an Oxygen provision perspective we should note the following:

Oxygen Provision.

Oxygen can be provided from a variety of sources.

Oxygen Plants and Cylinders

These are large scale complex production units which are normally either commercial producers for multiple applications in medicine and industry (supplying Oxygen either into large tanks or cylinders), or hospital plants that can supply oxygen directly through a fixed array of pipes throughout the hospital or into cylinders filled by a compressor. Cylinders can be distributed widely to provide Oxygen at remote and mobile sites and can be used without any electricity, Cylinders also provide high pressure delivering around 100% pure oxygen.

Most hospital plants include backup electrical supply to allow continuous running in the event of power outages, a common problem in Malawi with its precarious electrical supply. Interrupted running can damage the plant and should be guarded against.

Fixed plants can cost over £100,000 and take several months to plan and install. Pipeline supply networks involve more complexity but an element of convenience. The hospital fabric must be sufficiently solid and well maintained to allow piping to be installed.

Transportable container housed plants are available.

Transport of cylinders is a challenge in a country where vehicles and fuel remain problematic for healthcare facilities.

To fill a full size cylinder costs about £65. They require regular maintenance and valves and regulators which are relatively robust.

High flow oxygen delivered by piping or cylinders usually requires the use of humidifiers.

Maintenance for these plants is essential both for a reliable production of oxygen but more importantly for safety and efficiency. Over pressurised or poorly maintained cylinders can in effect become large lethal pipe bombs.

Oxygen Concentrators

An alternative method of delivering oxygen to the patient involves using a bedside unit which derives 85-95% pure oxygen from room air and delivers it directly to one or two patients. It does not provide oxygen at high pressure and is limited to about 10-12 litres per minute (most will not power ventilators that are pressure driven). Concentrators require a constant electrical supply to work. An advantage of concentrators in the Malawian environment is that they do not normally need the use of a humidifier.

Concentrators require routine maintenance, with regular filter changes especially in the humid and dusty environment present in Malawi. These regular checks also look at whether the concentrator is working as expected and delivering an appropriate concentration of

oxygen. Our experience is that many poorly maintained provide insufficient oxygen concentration and sometimes air only. Many rural or district hospitals have no reliable backup power supply either through generators or solar panel/battery bank back up. Fuel for generators remains a problem. Again maintenance is often lacking and generator control panels do not kick in as they are designed to do.

All of these oxygen systems require accessories to do their job properly. Pressure regulators, valves, splitters, spanners, tubing, nasal prongs, masks and humidifiers are needed.



Oxygen concentrators

Many smaller hospitals and health centres have these as do all District and bigger CHAM (Faith based) hospitals, but all sites report insufficient functioning units with the added challenge of variable electrical supply, and a lack of portable or fixed backup generators. Few solar electrical systems in place.

Reliable Electrical Supply

A constant problem faced by hospital administrators is the provision of a reliable power supply against the background of regular electrical load shedding. Generators if available should automatically start to replace the mains supply. These switches are often bypassed to save fuel or not functional. Few hospitals have sufficient alternative power sources such as solar panels with battery banks.

Current Situation in Malawi

Fixed Large Scale Oxygen Plant Sites Malawi

KCH - Kamuzu Central Hospital Lilongwe

Plant Operational Limited Capacity to distribute to other facilities. Piped Oxygen Supply into hospital (64 cylinders filled per day – max)

QECH-Queen Elizabeth Central Hospital Blantyre

Plant Fully Operational, Limited Capacity to distribute to other facilities. (64 cylinders filled per day – max)

MCH -Mzuzu Central Hospital Mzuzu

Plans to install an oxygen plant still at planning and technical stage. Resources available only to cover purchase but not to cover installation costs.

Nkhata Bay DH

Reported as operational and supporting oxygen needs for neighbouring districts. Repairs carried out in January only temporary fix. No electrical backup supply and other essential issues not fully addressed. Requires urgent corrective maintenance but not funded as yet. Still functioning erratically and not to full capacity as a result.

AFROX Mzuzu

Commercial plant supplying cylinder oxygen. Shortage of cylinders affecting ability to provide for requirements in Northern region.

Phalombe District Hospital

New build hospital not yet completed - Oxygen Plant finished but not commissioned.

Daeyang Hospital

Faith based hospital on outskirts of Lilongwe near airport has a fixed oxygen plant supplying piped oxygen to hospital. No compressor to allow filling of cylinders

Cylinders

Widespread shortage of cylinders given the heavy oxygen requirements throughout the country. Multiple agencies, donors and individuals have these on order to boost capacity. Delivery lag in order of 2 -3 weeks. Requirement for keys, valves and regulators to enable use - these have also been ordered.

Summary of Recommendations

Immediate

In order to help the current situation, any intervention needs to deliver to Malawi within 10-14 days. There are long 4--6 week lead times for delivery of large items (Cylinders, Oxygen concentrators) many of which have already been ordered by Aid partners. We believe that only items available now for delivery either in UK or in country should be sought by an SMP appeal.

Oxygen Saturation Monitors

The list of requested items noted by the MOH Health Cluster includes Oxygen Saturation Monitors. Medical grade Oxygen saturation monitors are currently available for immediate dispatch in the UK. Air freight remains a viable option despite the reduced number of flights from the UK. The provision of these monitors would also enhance the safe provision of Healthcare in the future for theatre, obstetric and medically ill patients.

Cost of Single Oxygen saturation Monitor complete with three reusable probes £250.
Quantity available in UK 250. Shipping costs airfreight £1300.



Oxygen Concentrator Repairs

Previous work by members of the group had highlighted the numbers of broken Oxygen Concentrators in hospitals throughout the country. A recent audit identified at least 350 throughout the country. A locally based charity run by engineers (www.openo2.org) has started repairing these pro bono initially in Lilongwe. The present rate of repair is well over 50% and rising as spares are sourced. The team has converted a minibus into a mobile workshop and plans to start the process next week in other towns. Funding of fuel and accommodation is sought as the program proceeds as at present it is self funded by the team members. Ideally a second minibus would help speed up the process in the North of the country as there are more volunteers than space in the minibus workshop!

We recommend support of this group to help expand their capacity and fund their costs. This would allow restoration of a significant number of concentrators to service quickly. This is both an economically and environmentally sound investment.

Cost of New Oxygen concentrator approx US\$1000 for delivered 10l/min unit.
Cost of repair per unit US\$ 20-50 depending on spares required.

Medium Term & Long Term *(for info)*

Planning to enhance maintenance is an essential part of sustainable healthcare support for Malawi and will need further work. There is a training program for Medical Physics Engineers in Blantyre. Current provision of maintenance remains a challenge for a variety of reasons. Looking at this in depth is outwith the remit of this short life group.

Provision of a Medical Oxygen Plant in Mzuzu has to be an essential part of a national oxygen provision strategy and is being addressed through the Ministry of Health. Within this plan regular maintenance of the plants in the MOH estate needs to be ensured.

APPENDIX

For latest figures, see:

- [Government of Malawi official Covid dashboard](#)
- [Daily and historic figures on new cases and deaths](#) (collated by Google, from JHU CSSE data)
- [Multiple graph options for Malawi covid data 'Our World in Data'](#)
- [Latest Malawi Covid news items](#)
- [UN & NGO report repository](#)

Covid 19 Status Malawi - Feb 9th 2021 (Worldometer.info)

Median Age 59yrs

69.7% Male

Daily New Cases in Malawi



 Malawi

Coronavirus Cases:

27,722

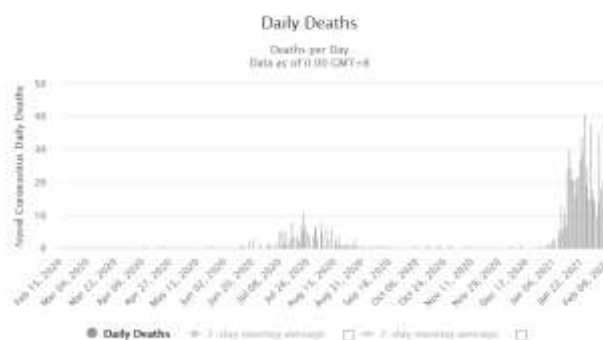
Deaths:

883

Recovered:

12,065

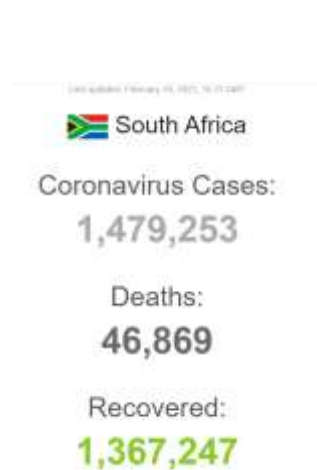
Daily New Deaths in Malawi



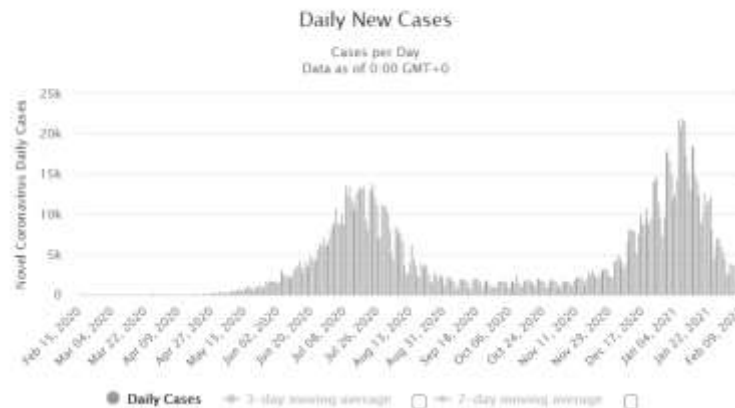
Covid 19 Status South Africa Feb 9th (Worldometer.info)

1,742 New Cases

396 New Deaths



Daily New Cases in South Africa



Daily New Deaths in South Africa

