

Series 2 – Social Pillar: Health – Equitable, Affordable and Quality Healthcare of the Highest Standards

Oxygen Access and Affordability in Health Facilities in Kenya

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Key Messages

Medical oxygen should be available in all health facilities to reduce mortality arising from conditions that reduce the levels of oxygen in the blood.

New strategies should be put in place and new models employed to address the recurrent costs associated with the consistent continuous supply of oxygen.

Affordable subsidised supply of medical oxygen may increase its availability by providing a revenue stream in support of funding shortfalls in the public health system.

Context

Insufficient oxygen levels in the blood, referred to as *hypoxaemia*, is a potentially fatal complication of many causes of mortality. A topical example is the current COVID-19 pandemic, a result of the Coronavirus disease (COVID-19), a respiratory tract infection that started in Wuhan province, China, in December 2019, and has rapidly spread around the world. By February 2021, there were 112 million confirmed cases worldwide and 2.47 million deaths. During the same period, Kenya recorded 104 thousand cases and 1,827 deaths (Worldometers, 2021). Although most people develop only mild symptoms, approximately 19% develop severe to critical disease requiring hospitalisation. Of these, approximately 14% need oxygen support and 5% require admission to intensive care, often requiring ventilator support (WHO, 2020).

Medical Oxygen can represent a significant cost to hospitals in low- and middle- income countries (LMICs). Contributors to the high cost include logistical challenges in transporting oxygen that also leads to intermittent availability. The high oxygen cost to the patient can limit use or lead to early discharge. Even where oxygen is

subsidised or provided at no cost at government health facilities and hospitals, its high cost often leads to periods of unavailability. Oxygen concentrators are portable devices that remove nitrogen from the air and are able to produce oxygen at concentrations of 85%-95%. Although the use of concentrators could solve the supply chain problems of oxygen cylinders, concentrators come with their own host of challenges. These include the need for a continuous, reliable supply of electricity (often not available in LMICs), a robust system for monitoring, maintenance and repair, and a clinical staff trained in their use (Gray et al, 2017).

Study Approach and Results

An exploratory survey was carried out in Level 2 and Level 3 health facilities in 11 counties in Kenya in December 2020 to establish the availability and affordability of oxygen; and, where available, the challenges faced by the facilities with the oxygen delivery systems. Level 2 facilities include medical clinics, dispensary, and mobile clinics. Level 3A includes basic health centres, while Level 3B includes comprehensive health centres, medical centres, nursing homes, and cottage hospitals. The respondents were drawn from both public and private hospitals in

Oxygen Concentrator developed at the University of Nairobi in 2020



Kakamega, Kilifi, Kirinyaga, Kisii, Kisumu, Nairobi, Meru, Nyandarua, Mombasa, Taita-Taveta, and Uasin-Gichu Counties. A total of 285 hospitals were surveyed (193 public, 84 private, and 23 faith-based).

Availability of Oxygen. On availability of oxygen, 65% (192) facilities did not have any oxygen at all and 35% (103) did. Segregation by category revealed that 57% of private hospitals had oxygen, compared to 25% of public and the same percentage of faith-based hospitals. Where oxygen was available, it was delivered through one or a combination of the following: piped oxygen (PI), oxygen cylinders (CY), or oxygen concentrators (CO). The distribution of oxygen sources for the different hospital categories is presented in Figure 1 (faith-based hospitals have been combined with private.)

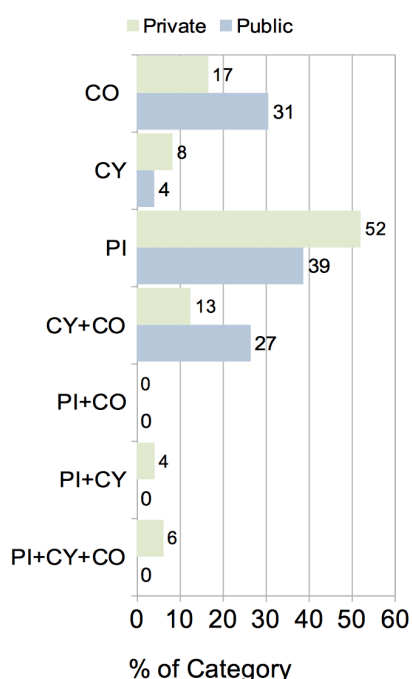


Figure 1-Oxygen source distribution

Patient Cost of Oxygen. Of the 103 hospitals with oxygen, 50 (49%) charged for the oxygen and 53 (51%) did not. Of those that did not charge, the majority were public hospitals. The patient cost varied widely among those who charged, ranging from as low as KES 500 (\$4.70) to over KES 34,000 (\$312) per day. The table below provides a summary of the patient cost distribution.

Table 1-Oxygen source distribution

Patient Cost (KES)	Number Hospitals
500-1000	9
1001-4000	7
4001-8000	9
8001-12000	6
12001-16000	2
16001-20000	3
20001-24000	8
>24,000	7
Total Respondents	51

Major Challenges Faced

The study also sought to determine the major challenges faced by hospitals that used either oxygen cylinders and/or oxygen concentrators. The literature suggests that these sources present the biggest challenges, yet they are the most available for smaller and rural hospitals who may not be able to afford installation of piped oxygen systems.

Oxygen Cylinders. The top four challenges faced by the hospitals on usage of oxygen cylinders were as follows:

1. **Access and availability** (22% of all respondents to this question cited this problem) Typical statements included, "long periods between refills" and "supply inefficiency".
 2. **Short duration of cylinder use** (22%) Typical statements included, "The oxygen runs out without notice and there is a patient in need".
 3. **Portability** (15%) Typical statements included, "they are too heavy to move from one place to another" and "difficult to carry".
 4. **Cost of oxygen cylinders** (11%) Typical statements included, "Sometimes the oxygen runs out and there are no funds to refill".
- Seventy-two hospitals responded to this question.

Oxygen Concentrators. The top four challenges faced by the hospitals on usage of oxygen cylinders were as follows:

1. **Maintenance Issues** (29%) Typical statements included, "fail to produce therapeutic levels of oxygen because of common problems: the air-intake system, malfunctioning sieve-control valves, and contaminated sieve materials".
2. **Loss of electricity** (29%) Typical statements included, "Moving them when electricity is off to where there is generator backup".
3. **Portability** (24%) Typical statements included, "In case of multiple patients in need of oxygen at the same time it will be difficult to administer because the facility has only one concentrator".
4. **Cost of concentrators** (8%) Typical statements included, "they are expensive".

Forty-nine hospitals responded to this question.

Policy Recommendations

Short-Term

- Where oxygen is available, non-financial challenges were found to outweigh financial and are not adequately addressed. New models, therefore, must be developed to enable hospital

staff to focus on the administration of oxygen therapy to their patients, and not on the oxygen delivery systems.

- For many medical conditions, lack of medical oxygen means certain death. The majority of Kenyans are in proximity to Level 2 and 3 health facilities most of which do not have oxygen. Efforts, therefore, must be made to ensure oxygen is available at all these facilities.
- Affordability remains a key barrier to access for patients who need oxygen. In many instances, where oxygen is not provided at no cost, charges far exceed the costs incurred by the facilities to administer the oxygen. Guidelines should be developed for reasonable patient costs and should be enforced in public health facilities, and private facilities encouraged to comply.

Medium-Term

- Though desirable to provide oxygen to patients at no cost, lack of sufficient funding in the public health system has resulted in the unavailability of oxygen in the majority public facilities. New models should be developed that offer oxygen at highly subsidised rates thus providing a secondary revenue stream to strengthen health facilities finances.

Acknowledgements

This work was supported by the Open Society Initiative East Africa (OSIEA).

References

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