

The right to breathe: COVID-19 and the scarcity of medicinal oxygen for the developing world

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The singularly most important treatment for patients with severe COVID-19 is medicinal oxygen. However, this life-saving treatment is not ubiquitous as it has tragically been shown. Recent reports that oxygen supplies were exhausted in Manaus, Brazil, and Egypt, while patients suffocated in their pulmonary fluid, shocked the world that a lack of oxygen so plentiful in the world could be in short supply.

Patients with severe or critical COVID-19 cannot get enough oxygen into their bloodstream by simply breathing in room air. They need a higher concentration of oxygen and support to get it into their lungs to survive. But these particular types of equipment and supplies are lacking in much of the developed world. The oxygen demand is so high in COVID-19 patients that even the United States, the wealthiest nation on the planet, took stock of the oxygen crisis that put Los Angeles hospitals in extremis in the first week of January when hospitals were overwhelmed with COVID-19 cases.

The first month of the new year was horrifically brutal. There were 18.75 million new cases of COVID-19 and over 400,000 further deaths worldwide. The most recent global tally stands at 103.3 million cases of COVID-19 and 2.23 million deaths.

While the ruling classes are impatiently demanding a return to economic normalcy, the more level-headed and impartial scientists are raising concerns that the variants' spread will reignite a spring surge with grim consequences. Many low-income countries experiencing the pandemic first-hand for the first time lack the resources to make oxygen, let alone access to the global supply chains.

On Friday, Dr. Michael Osterholm of the University of Minnesota, a member of Biden's coronavirus task force, spoke at a press conference with Minnesota Governor Tim Walz. "Now we're down to 150,000 cases, which surely feels better than 300,000 cases," he said. "But this is our new baseline. And this is what we'll jump off on with the next challenge. And these new variants, we're seeing these

mutated viruses are much more infectious and do actually produce much more serious illness. And I anticipate over the next six to 14 weeks, the darkest days of the pandemic are going to occur."

During the initial onslaught, many patients with low blood oxygen levels were immediately placed on ventilators, leading to difficulties weaning them off the breathing device and extensive lung injury from the high pressures that had to be used. The move to delivering oxygen through helmets, masks and nasal tubes shifted the survival curves. Patients found to be stable are now being sent home from hospitals with portable oxygen canisters and asked to monitor their symptoms and oxygen levels with affordable pulse-oximeters.

The rate of hospitalized COVID-19 patients on ventilators has declined from a high of 18.6 percent in March to 1.5 percent in September. Additionally, the use of blood thinners and steroids have contributed significantly to survival. But, as witnessed over the winter surge, the health system's lack of capacity, despite these measures, increased the fatality rate. In countries with direly limited health resources, a rapid rise in cases can be catastrophic.

Back in June 2020, the director-general of the World Health Organization, Dr. Tedros Adhanom Ghebreyesus, had raised the alarm: "Many countries are now experiencing difficulties obtaining oxygen concentrators. Demand is currently outstripping supply." Medicinal oxygen is made using oxygen concentrators, which extract and purify oxygen from the air. When the number of cases rose by 1 million a week, the demand for medicinal oxygen had climbed to 88,000 large cylinders per day (620,000 cubic meters of oxygen). Just a few companies own close to 80 percent of the market. Little headway has been made in the intervening months.

A report published last week in the *Wall Street Journal* notes, "As COVID-19 cases increase sharply in much of the world, a scarcity of oxygen is forcing hospitals to ration it

for patients and is driving up the coronavirus pandemic's death toll. The problem is especially acute in the developing world.”

In Europe and North America's wealthy countries, liquid oxygen is brought in tankers and piped into the hospital's internal oxygen system directly to patient beds. In June, when Spain was facing a catastrophic death toll, engineers were able to lay seven kilometers of piping delivering oxygen to 1,500 beds in a make-shift hospital. For much of the rest of the world, however, the right to breathe is tied to economic status. Oxygen remains expensive and difficult to obtain.

It has been estimated that approximately 20 percent of people infected with COVID-19 suffer from some level of respiratory distress necessitating oxygen therapy. And without that therapy, the situation can turn fatal. A *Lancet Global Health* report published last summer found that across health care systems in sub-Saharan countries, only 43.4 percent had both continuous power and oxygen available. More than 70 percent would experience more than two hours of power outage per week. As the report notes, critical patients on oxygen concentrators rely on an uninterrupted oxygen supply.

The South African variant of the virus has begun to drive infections in neighboring countries. John Nkengasong, director of the Africa Centers for Disease Control and Prevention, told the *Wall Street Journal*, “[T]he second wave is here with a vengeance, and our systems are overwhelmed.” A concerning statistic recently reported was that the death rate across Africa due to COVID-19 had surpassed the global average. Many countries like Senegal and Zambia have seen recent daily cases double those experienced in their first wave. Yet, these nations have still not received the life-saving vaccines.

In Lagos, Nigeria, the number of people infected requiring oxygen surged fivefold by mid-January, increasing from 70 to 350 six-liter cylinders per day. Bloomberg reported that on January 17 there had been over 41,000 confirmed cases of COVID-19. A total of 227 patients had been admitted to treatment centers, and more than 9,000 were receiving care at home. President Muhammadu Buhari has approved \$17 million in US dollars as emergency funding to construct 38 oxygen plants. According to *Africa News*, the oxygen demand has now doubled.

Though much has been said about Africa having dodged the bullet with the pandemic's first wave, the evidence is mounting that the opposite is true. In countries like Zambia, testing of bodies at the main morgue in Lusaka found that 19 percent of the recently deceased over the summer had tested positive for the coronavirus, with a peak of 31 percent in July.

Tanzania's John Magufuli declared god had eliminated COVID-19 from his country. With a country of 60 million, it had stopped updating its COVID-19 infection cases in April when the number had reached 509. Health care workers who have attempted to speak to the issue have been fired from their positions.

In mid-January, Zimbabwe, a country with just over 14 million people, saw a surge in cases reaching a daily peak of over 1,000 new cases. The country's hospitals were quickly running short of space and medicinal oxygen. People turned to social media looking to purchase oxygen cylinders. Private suppliers were selling overpriced oxygen concentrators at between \$2,000 and \$3,700 per unit, a price beyond the vast majority in Zimbabwe.

Latin American countries have also faced a scarcity of medicinal oxygen.

With 1.86 million cases and 158,000 deaths (a crude case fatality rate of 8.5 percent), Mexico continues to suffer a massive number of deaths, which may in part be due to a health system that is too overwhelmed to care for its population during the pandemic. The number of deaths is likely an undercount.

The price of oxygen has climbed fourfold in Mexico City, with 22 million people, where the pandemic has pummeled inhabitants. According to Reuters, 20 medical oxygen distributors they had consulted said they had no tanks in stock. People are waiting hours in line at the few stores that still have supplies on hand. Prices can run up to \$160 to refill a 24-hour tank. Many who need oxygen will require such treatment for up to a week, in a country where the minimum daily wage of a worker is about \$7.

In the populous city of Villa El Salvador, Peru, it has become an everyday routine for friends and families of people infected with severe COVID-19 to carry empty canisters of oxygen, searching for places that might sell it at a reasonable price. Most hospitals in Peru don't have oxygen concentrators, leading to price gouging and black-market exchange. A young woman speaking to the Associated Press said, “It's so sad to see that all people go through this. It is sad to see that not only I, but all people are waiting for oxygen for their family.”



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