



Oxygen Plant-in-a-Box

unicef 
for every child

Supply Division



Overview

The challenge

Access to oxygen can be the difference between life and death for patients with severe COVID-19. It is also a critical treatment for children with pneumonia, which remains the leading infectious killer of children under 5 years.

The COVID-19 pandemic turned an existing oxygen gap in many low- and middle-income countries (LMICs) into a crisis. The overwhelming number of patients in need of oxygen therapy far outstrips the existing capacity: [over half a million COVID-19 patients](#) in LMICs need oxygen therapy every day, with up to [20 per cent of all COVID-19 patients](#) requiring the treatment. An estimated [4.2 million children](#) with pneumonia also cannot access oxygen therapy each year.

Thousands of oxygen concentrators were delivered to health facilities in the global COVID-19 response. Although these devices are critical in treating COVID-19, they are limited in the number of patients they can reach at one time. Large-scale oxygen sources are needed to serve health facilities with hundreds of patients.

The response

UNICEF worked with industry to rapidly develop an innovative emergency solution: the Oxygen Plant-in-a-Box. A fully functional Pressure Swing Absorption (PSA) plant, the package includes everything needed to produce large volumes of medical oxygen, including accessories supplied in the right quantities, installation of equipment, pre-planned maintenance and staff training. Easily procured and rapidly deployed, plants can be

operational within days of arriving at a facility.

By providing this innovative off-the-shelf package UNICEF can help governments avoid lengthy, risky and costly efforts to design and procure custom-made plants.

Much like an oxygen concentrator, the Plant-in-a-Box 'concentrates' oxygen out of air. However, once set up, each plant can produce up to 25 to 60 times as much oxygen as a concentrator, enough to support 100 children with severe pneumonia or 50-60 COVID-19 patients at once. Plants are designed for health facilities in low-resource settings, and those faced with a crisis, such as rising COVID cases.

Oxygen is delivered to patients via cylinders placed at their bedside, which are then returned to the plant to be refilled.

Plants are designed to be compatible with ward piped systems, if available now or in the future. In this way, continuous medical oxygen can be an integrated service, making oxygen a standard part of health systems.

The impact

UNICEF worked with industry to take the package from idea to reality within just months. Now Oxygen Plant-in-a-Box packages are already on their way to support countries' response to the pandemic.

This innovation will help save the lives of thousands of patients. With oxygen a critical treatment for COVID-19, as well as children with pneumonia, mothers with birth complications and sick newborns, it will also help countries build back better after the pandemic.

Key figures

Issue

500,000 COVID-19 patients in LMICs need oxygen treatment every day ([WHO](#)).

20% of patients with COVID-19 require oxygen therapy ([WHO](#)).

4.2 million children with severe pneumonia are left desperate for oxygen each year ([UNICEF](#) and [Save the Children](#)).

Response

135 cylinders (20-liter bottles) can be filled in a 24-hour period.

720,000 liters of medical oxygen can be provided in a 24-hour period.

100 children with pneumonia or 50-60 COVID-19 patients can receive round the clock oxygen therapy at once.

Photo: In Malawi, UNICEF supported the installation of a PSA oxygen plant at Kamuzu Central Hospital to fight COVID-19 and respond to future health needs. © UNICEF/UN0461922



Oxygen Plant-in-a-Box

“Oxygen is a simple medical intervention that remains in short supply for far too many. The COVID-19 pandemic has taken this acute shortage and made it a full-blown emergency. Addressing the oxygen gap will not only help with COVID-19 treatment in countries that are losing far too many saveable lives. It will also help to improve health systems in the long term, including for the many newborns and children who require oxygen to survive.”

- Henrietta Fore, Executive Director, UNICEF

Key features



Robust design for tough environments

UNICEF oxygen plants have been specially modified to be more robust, able to operate in high heat and altitudes (up to 45 degrees celsius and 2500m above sea level).



Resilient to electrical power challenges

All plants come with automatic voltage stabilizer to protect key components from voltage fluctuations. A backup supply of oxygen is stored in large cylinders so patients continue to receive life-saving treatment in the event of a power outage or fault.



Includes all accessories

Plant packages include all necessary equipment to supply oxygen including cylinders, humidifiers and trolleys.



Maintenance plans for equipment longevity

Customized maintenance kits and spare parts are included in the package. Plants also receive preventative maintenance visits to ensure optimal performance and prevent unexpected breakdowns.



Customized design and sizes

Plant packages come in two configurations – standard and containerized – each in three sizes. Standard plants are shipped in parts and installed at a facility by the supplier in an existing indoor space. Containerized plants are installed in a container that can be set up outside, e.g. in a car park, at facilities that do not have indoor space available.



Future proofed for sustainability

All plants include cylinder filling stations allowing immediate delivery of oxygen to patients. They also include the necessary equipment to connect to a piping system if or when one is available. In this way, the plants are future proofed to become sustainable solutions.



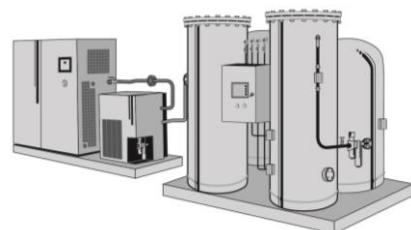
Rapid response options for emergencies

Standard plants can be shipped by air, arriving rapidly at health facilities within days. Due to their size, containerized plants can only be shipped by sea, with longer delivery times. However, once at the location both configurations can be operational within five days.

Funding needs

US \$400,000 can fund a medium sized Oxygen Plant-in-a-Box for a health facility, including accessories and maintenance services for up to two years.

This will mean COVID-19 patients can rapidly begin receiving oxygen treatment, whilst long term the plant can be integrated into health systems to help save the lives of premature newborns and young children with pneumonia.



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