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Strengthening Emergency Systems

Enhancing preparedness of health facilities: Using innovation, research and learning for emergency care systems

WHO Health facilities post-COVID-19 and beyond: safe, functional, climate-resilient and environmentally sustainable

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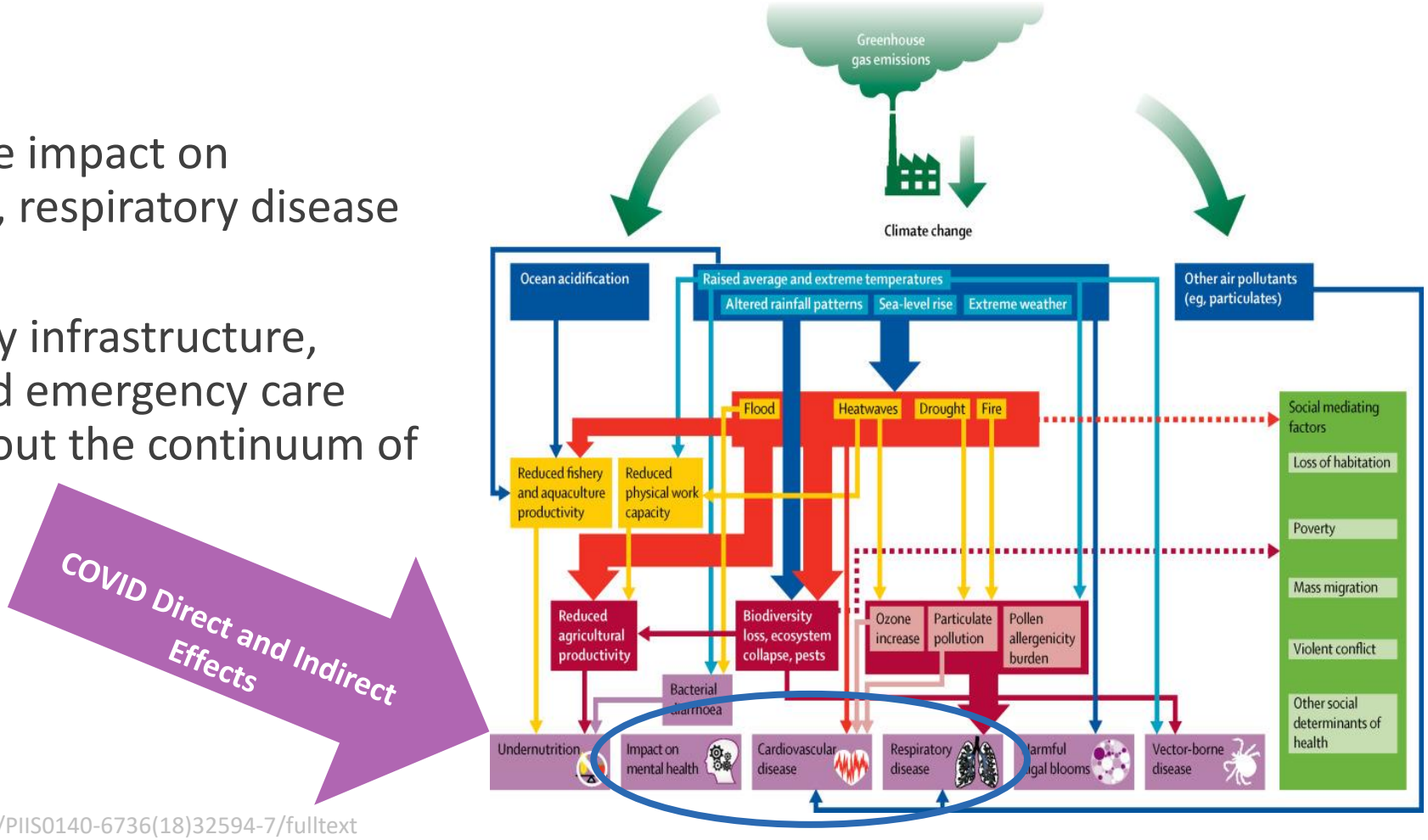
15 April 2021

COLUMBIA | MAILMAN SCHOOL OF PUBLIC HEALTH

COVID-19 and Climate Change Impact on Noncommunicable Disease and Injury (NCDIs)

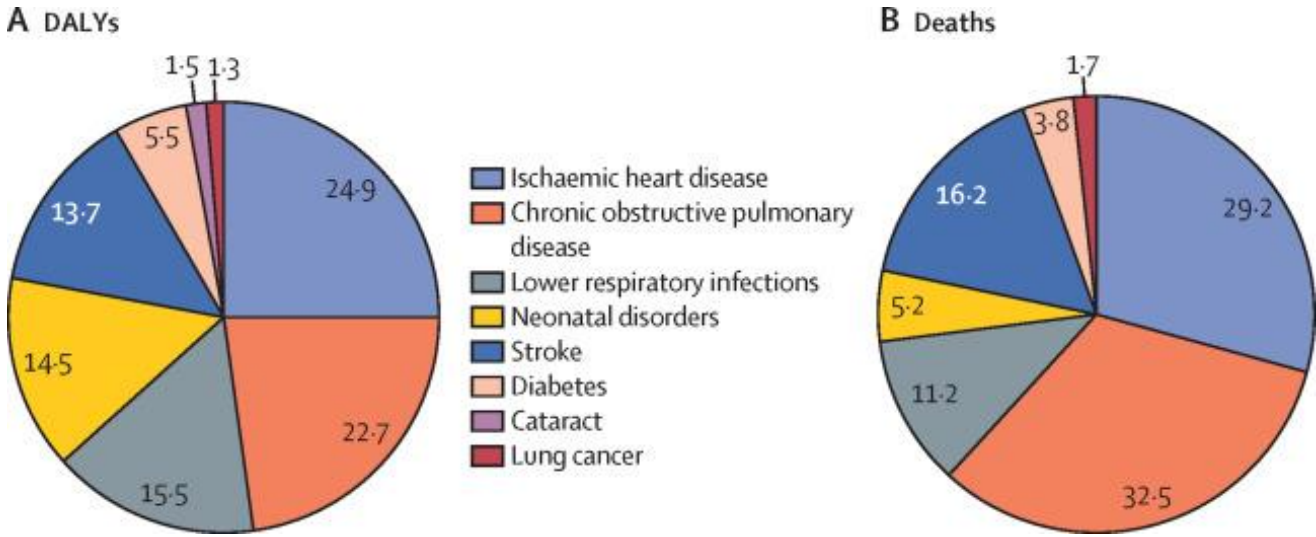
- COVID-19 and climate change impact on cardiovascular disease (CVD), respiratory disease and mental health
- Increased demands on facility infrastructure, consumables, equipment and emergency care health care workers throughout the continuum of care



Watts, Nick, et al. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)32594-7/fulltext

Example: DALYs / Deaths Attributable to Air Pollution in India: Global Burden of Disease Study 2019

- Need for enhanced emergency care system infrastructure as climate and respiratory pathogens converge to stress facility resources
- Task-shifting to anticipate and meet systems surges
- Equipment for COVID-19, CVD, respiratory disease require pulse oximetry, oxygen and skilled staff though the continuum of care



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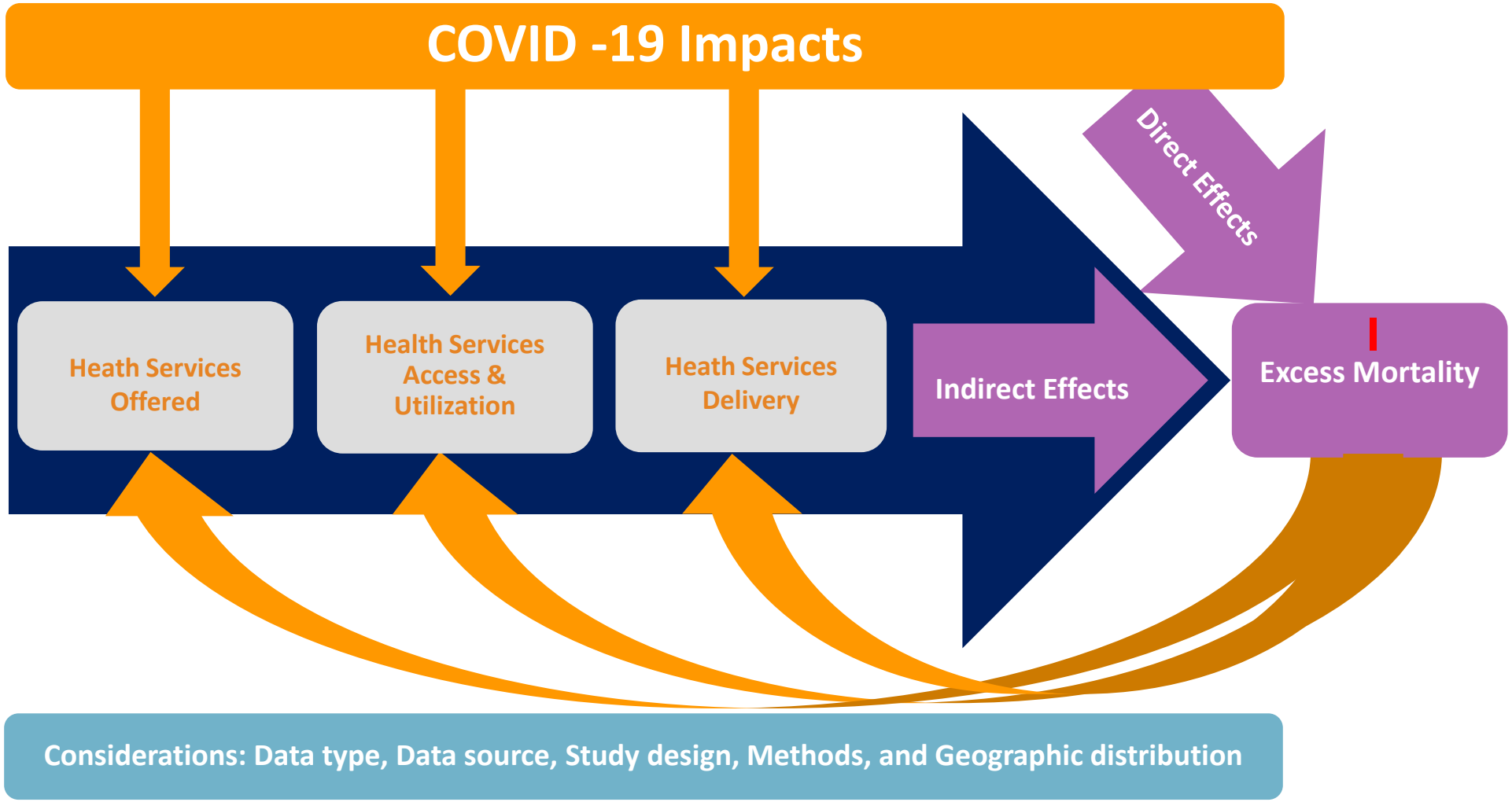
Pandey A, et al. Health and economic impact of air pollution in the states of India: the Global Burden of Disease Study 2019. The Lancet Planetary Health. 2021

Impact of COVID-19 on health systems and how this contributes to indirect effects and excess mortality



Charlotte M Roy, E Brennan Bollman, Laura M Carson, Alexander J Northrop, Elizabeth F Jackson, Rachel T Moresky, Assessing the Indirect Effects of COVID-19 on Healthcare Delivery, Utilization, and Health Outcomes: A Scoping Review, *European Journal of Public Health*, 2021 https://doi.org/10.1093/eurpub/ckab047

ACCEPTED MANUSCRIPT

Assessing the Indirect Effects of COVID-19 on Healthcare Delivery, Utilization, and Health Outcomes: A Scoping Review

Charlotte M Roy, E Brennan Bollman, Laura M Carson, Alexander J Northrop, Elizabeth F Jackson, Rachel T Moresky

European Journal of Public Health, ckab047, https://doi.org/10.1093/eurpub/ckab047
Published: 23 March 2021

- Global decrease in healthcare service utilization in both HIC & LMICs
- Irrespective of the degree of COVID-19 outbreak
  - e.g., Child health visits or EPI
- ~47% research to date includes only single health facility
  - 40% regional data and 13% national
  - Only 35% of studies representing LMICs
- 47% of studies on cardiovascular health outcomes (myocardial infarction and stroke)
- Impact on health outcomes may take years to demonstrate

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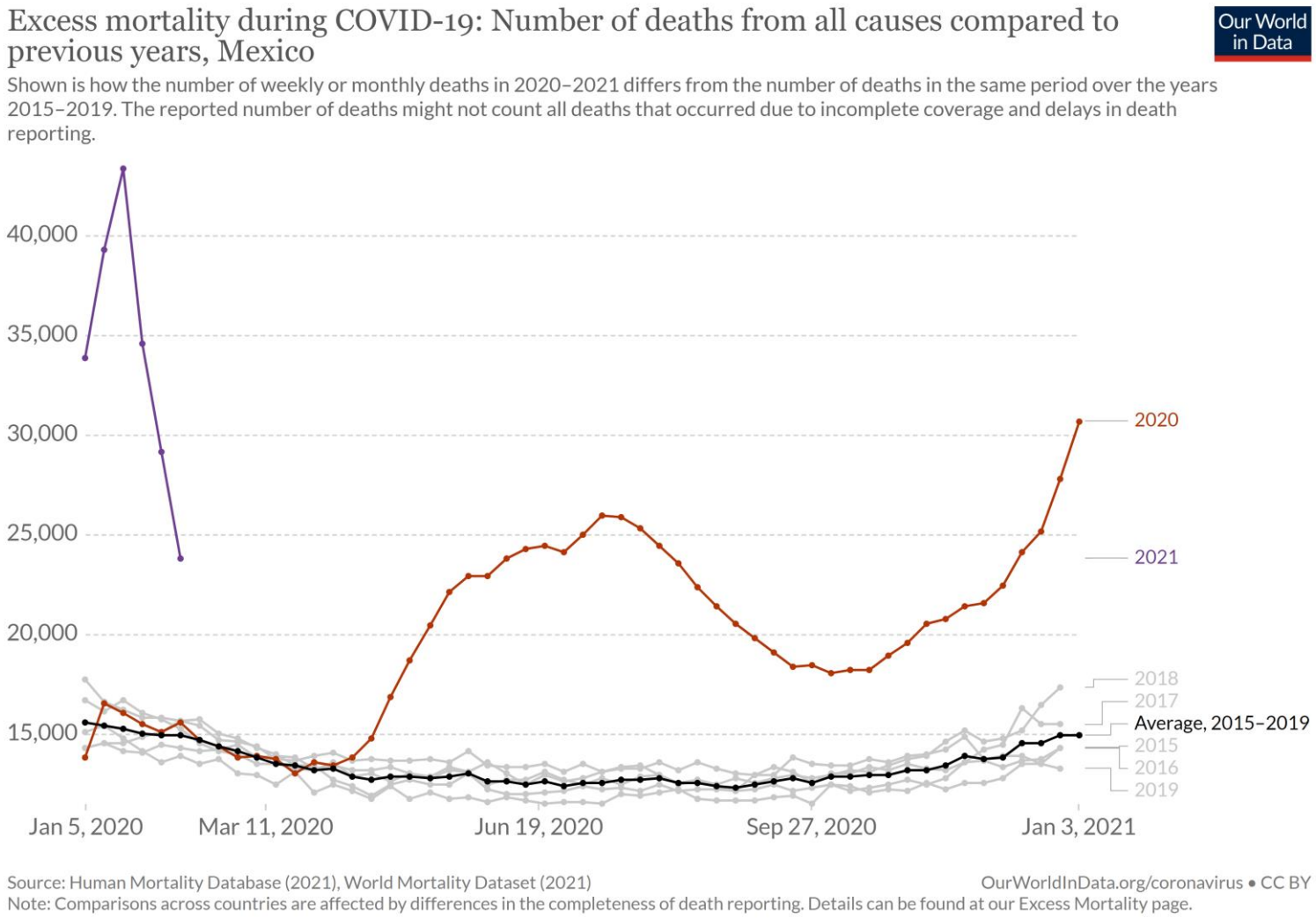
Example of Excess Mortality During COVID-19 - Mexico



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COVID-19 Exacerbated the Burden for Oxygen on Hospitals

Gap

- ~ 20% COVID-19 patients require hospitalization and O2
- > 500,000 COVID-19 patients in LMICs need O2/day
- 57% facilities in SSA have no (25%) or irregular supply (32%)

Sources of oxygen

- Cylinders, piped oxygen systems, concentrators (electricity)
- On-site oxygen plant – e.g., Ruhengeri Hospital, Rwanda

Human Resources

- Need biomedical engineers and technicians as well as HCW
- Task shifting oxygen care skills

Other Needs

- Transportation and electricity
- Need pulse oximetry supplies, protocols and training

Response

- Wellcome Trust, Unitaid, and WHO
  - COVID-19 Oxygen Emergency Taskforce, ACT-Accelerator Therapeutics pillar
- US $90 M is needed urgency for 20 LMICs /$1.6B target

THE LANCET

WORLD REPORT | VOLUME 397, ISSUE 10277, P868-869, MARCH 06, 2021

Medical oxygen crisis: a belated COVID-19 response

Ann Danaiya Usher

Published: March 06, 2021 • DOI: https://doi.org/10.1016/S0140-6736(21)00561-4 • Check for updates

Future Solutions:
Solar-Powered Oxygen Concentrator

INT J TUBERC LUNG DIS 20(5):696–703

http://dx.doi.org/10.5588/ijtld.15.0796

Solar-powered oxygen delivery: proof of concept

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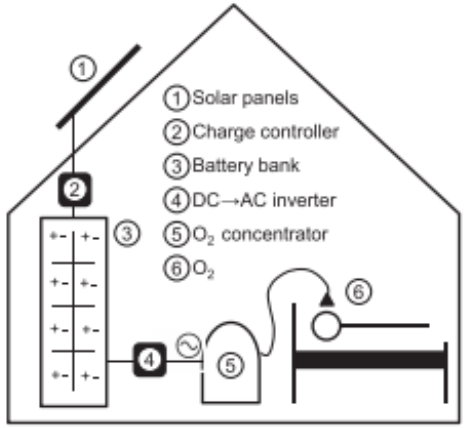
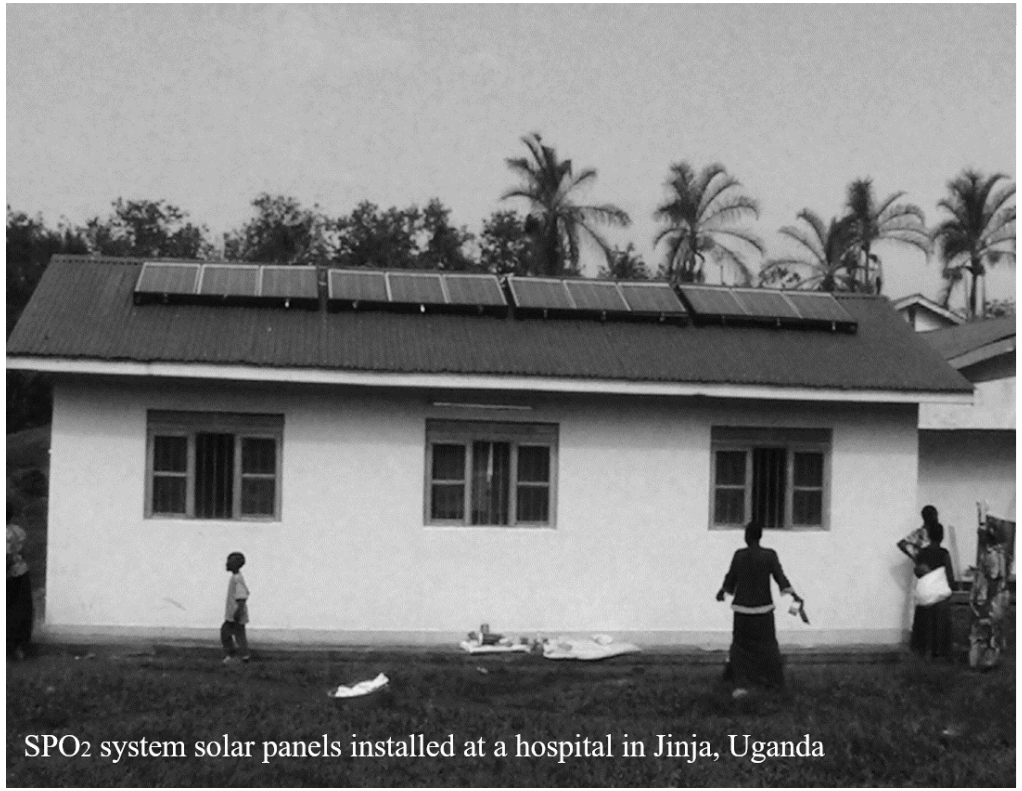


Figure 1 Diagram of SPO_2 delivery system. Numbered system components are described in detail in the text, and included 1) solar panels installed on the roof of the hospital ward; 2) a charge controller to optimise power output from the array of solar panels; 3) a bank of batteries to store the energy; 4) a DC→AC inverter to operate the concentrator; 5) a commercially available oxygen concentrator; and 6) oxygen stream delivered to patients via nasal cannula or mask. DC = direct current; AC = alternating current; SPO_2 = solar-powered oxygen.



SPO_2 system solar panels installed at a hospital in Jinja, Uganda

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Turnbull H et al Solar-powered oxygen delivery: proof of concept. The International Journal of Tuberculosis and Lung Disease. 2016

Questions

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