

Design, Development, and Implementation of a National Medical Oxygen Grid (NMOG) Platform

Umar Aulia, Class of 2024, Princeton School of Public and International Affairs
One Health Trust (formerly the Center for Disease Dynamics, Economics & Policy) – Bengaluru, India
Funded by CHW under the Internships in Global Health program

Introduction

Oxygen is considered a lifesaving essential medicine by the World Health Organization (WHO).

Increased medical oxygen demand in India during the COVID-19 pandemic, coupled with infrastructure and supply chain challenges, resulted in widespread shortages and caused many deaths.

Objective of the Study

Researchers and public health experts at One Health Trust (OHT) are working to develop a National Medical Oxygen Grid (NMOG) platform to aid health authorities in monitoring and regulating medical oxygen consumption in India.

Intended to operate during both pandemic and non-pandemic times, the NMOG will be capable of accounting for oxygen demand fluctuations as needs vary.

Methods

A concept blueprint of the NMOG was released by OHT in Oct. 2022, a preliminary version of the platform was completed in May 2023, and a pilot was launched in July 2023.

Our goal this summer was to establish proof of concept for the NMOG using oxygen consumption data from real medical facilities in Karnataka and Uttar Pradesh, the two states in which the pilot was conducted.

Results

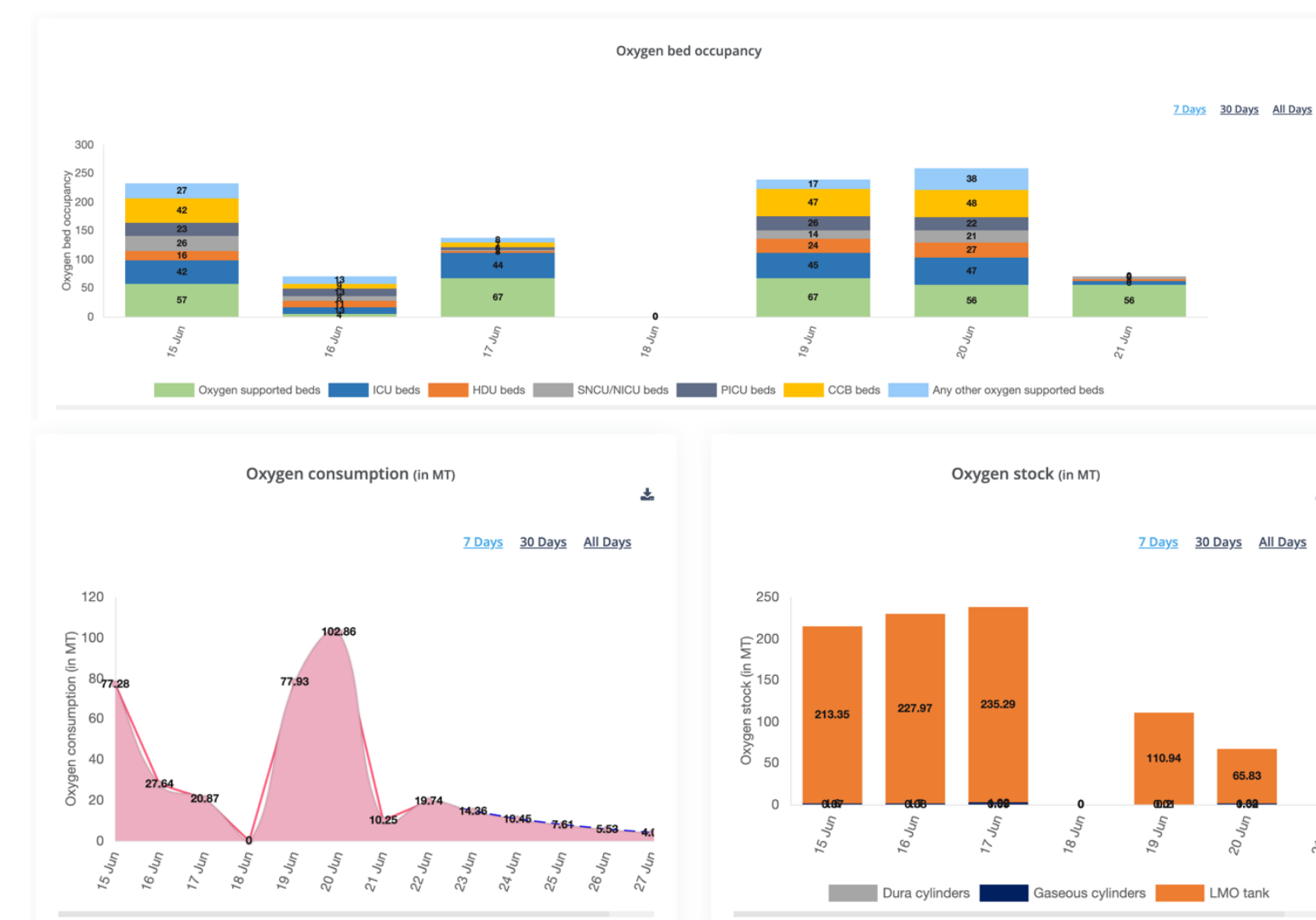
The NMOG takes the form of a **state-of-the-art IT platform** and is—to date—the **most sophisticated oxygen management tool in existence**.

The platform employs features such as **demand predictive modeling, resource inventory management, financial analysis, and supplier-consumer linkage** to help ensure the efficient and appropriate availability of oxygen to medical facilities throughout the country.

For security reasons, I am prohibited from publicly releasing any sensitive oxygen infrastructure or consumption data collected for the real medical facilities in the pilot. However, I have included graphics here which demonstrate the NMOG's functionalities, all of which were generated using purely fictional data.

NMOG dashboard with graphs displaying oxygen infrastructure and consumption information (right).

NMOG graphs showcasing bed occupancy, oxygen consumption data & future projections, and oxygen stock information (below).



The NMOG currently grants medical facility staff and health authorities access to the following features:

- Multi-tiered user framework promoting intra-facility task delegation, error reduction in entered data (due to supervisor review requirement), and access control of sensitive health information.
- Oxygen infrastructure and equipment functionality status monitoring.
- Bed occupancy and disease-wise patient admission monitoring, as well as 7-day future oxygen demand projections.
- Cost analysis of oxygen consumption from various sources and geographic visualization of oxygen asset locations.

Discussion

- Our results collected during the Karnataka and Uttar Pradesh pilot have established proof of concept for the NMOG.
- The NMOG is a user-friendly platform capable of arming health authorities with the tools needed to make appropriate, data-based asset allocation decisions to support the rational and effective use of medical oxygen throughout India.

Next Steps

- As a result of comprehensive progress reports submitted to government officials (authored by myself along with other OHT employees), we have received approval to significantly expand NMOG implementation to additional facilities.
- Based on feedback received from the project's primary funder (the Bill & Melinda Gates Foundation), we are working to add additional functionalities to the NMOG to further expand its arsenal of tools.

Conclusion

The NMOG will significantly facilitate medical oxygen management in India and may prevent future deadly oxygen shortages.

Acknowledgements

I would like to extend my sincere gratitude to Dr. Varun Manhas and Dr. Ramanan Laxminarayan for the immense privilege of being able to support this impactful work. I would also like to thank the Princeton CHW and Internships in Global Health program for providing me with an incredible summer experience.