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Journal of Management Research and Analysis

Journal homepage: <https://www.jmra.in/>

Review Article

Evaluating the effectiveness of government policies and interventions in addressing the demand and supply gap of oxygen beds in India

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ARTICLE INFO

Article history:

Received 15-02-2023

Accepted 23-03-2023

Available online 12-04-2023

Keywords:

Government policies

Interventions

Oxygen beds

Demand

Supply gap

India.

ABSTRACT

Corona virus pandemic has impacted a few countries in different degrees, however for most governments, managing the issue has been an unrivalled trouble. This section plans to depict the change in perspective that the Corona virus pandemic has caused in India's essential medical care industry throughout the last 1.5 years. The pandemic has impacted even the world's most exceptional medical services frameworks, affected India's medical services area, and altogether affected government and corporate partners' arrangements for medical services change. This section talked about the first and second rushes of the Covid in India and endeavoured to dissect the issues with general wellbeing during that time. It gives a course of events of urgent minutes in the spread of the scourge in India and all over the planet; as well as how India's financial and medical care policies managed the issue. The review proposes an essential methodology for controlling the spike in demand for clinical oxygen that encourages independence at the state level to fulfil the gauge necessity while at the same time using different wellsprings of oxygen creation and conveyance to satisfy the pinnacle need.

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1. Introduction

While the Corona virus pestilence has impacted a few countries in different degrees, most governments in the OECD have had an exceptional trouble in responding to the emergency because of the extension and profundity of its consequences for wellbeing, the economy, and the prosperity of its occupants. Simultaneously, the pandemic has featured primary and social issues, incorporating as the decrease in open trust in power figures and expert counsel, which was exacerbated by a flood of deception and disinformation. To resolve these issues, OECD governments quickly activated significant human, monetary, and specialized assets to oversee and diminish the emergency's belongings.¹⁻⁵

The Corona virus pandemic has differently affected the medical care frameworks in many countries. Wellbeing foundation frameworks are under pressure the whole way across the world, especially as to oxygen supply and dissemination as well as basic consideration beds. Various countries, like India, Brazil, Nepal, and Sudan, have been endeavouring to stay aware of the demands put on the wellbeing framework by the expected pandemic wave in 2021.

With the Corona virus pandemic following climbing propensities among April and May 2021, the supply of clinical oxygen and emergency clinic beds has been among the most squeezing infrastructural needs for Corona virus treatment. The new spike in demand for clinical oxygen can't be met by pre-Corona virus strategies for creation, supply, and appropriation. Likewise, contrasted with pre-Corona virus courses of action, patient consideration offices required updates and extension in huge sums. To work

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on the accessibility and openness of these assets for the Corona virus reaction, this situation has set off a thorough assessment and once again designing of present techniques and frameworks.^{6–10}

This archive makes an endeavour to compute India's expected third wave's possible ascent in demand for clinical oxygen and emergency clinic beds. This report focuses on likely short-, medium-, and long haul techniques and answers for satisfying the ascent in need for oxygen and ICU beds. It draws on the encounters of the second flood of Corona virus in India. While formulating a far reaching reaction procedure that integrates other clinical and non-clinical assets outside the domain of this paper, key partners at the region, state, and public levels might consider these strategies and arrangements.

2. Demand and Supply Gap for Oxygen and Beds During Surge

The CDRI has really tried to make a situation based assessment of the expected future requirement for oxygen and emergency clinic beds, in case of a third rush of the pandemic, in view of verifiable information and master connections. Except if the contamination is welcomed on by a new, extraordinarily unique rendition of the infection, the evaluation considers the information and patterns that are presently accessible for significant components that might influence the spread of the sickness later on. These factors incorporate the by and large Corona virus cases/past contaminations, immunization rates, assault rates, side effect appearance rates, and illness seriousness across all age classifications in the few Indian states.

Seven Indian states — Uttar Pradesh, Bihar, West Bengal, Tamil Nadu, Andhra Pradesh, Maharashtra, and Madhya Pradesh — are projected to supply roughly 65% of this demand, as displayed in Figure 1. Centred consideration ought to be given to these states so they can be sufficiently ready to deal with the creation, supply, and dissemination of oxygen.

Arranging quantities of a "significant degree" are given by the oxygen demand situations framed in this exploration. These are the most dependable projections conceivable given what we presently have some familiarity with the plague. These assessments are dependent upon some vulnerability. For the third wave's earlier planning, these appraisals are useful. These figures act as a general arranging guide for a three to half year time span.

3. Crisis Management

In 12 of the example nations, somewhere around one part of government the executives of the Corona virus emergency reaction has been analyzed. Three significant classes of policies or drives have been the focal point of these assessments:

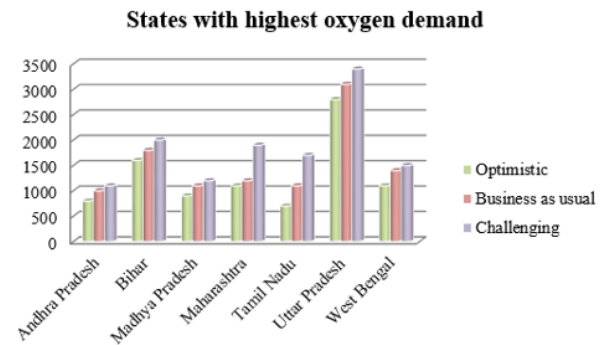


Fig. 1: Among several situations, the states with the highest anticipated peak oxygen demand

1. The emergency the executives administration structures (otherwise called "administration courses of action");
2. Emergency correspondence procedures and assets (in some cases known as "emergency correspondence");
3. Moreover, there are methods to support a "entire of-society response" in dealing with the pandemic, which incorporates partners, residents, sub national governments, the business area, and so on (see Figure 2).

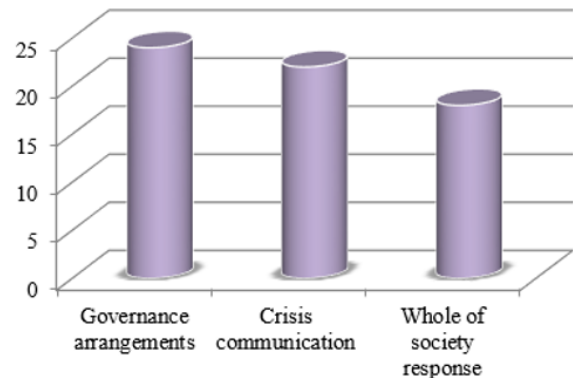


Fig. 2: Reviews of crisis management strategies' primary objective

3.1. Governance arrangements

In the example of 22 assessments, it was analyzed the way that governments coordinated their reaction to the emergency, including the utilization of instruments to work on inner correspondence or the foundation of helpful designs to arrange endeavors among offices and secure logical data on the pandemic. Generally speaking, these investigations feature how rapidly and deftly governments have carried out these techniques. In any case, there is space to smooth out a portion of these devices and designs and

increment the responsibility and straightforwardness of their dynamic cycles.

The OECD's information shows that there is an abundance of data with respect to the effectiveness of interagency collaboration in dealing with the emergency (OECD, 2020). Many examinations portray how governments set up specific boards or elements to coordinate interagency collaboration in dealing with the emergency on specific approach subjects.

3.2. Crisis communication

The assessments in the example additionally offer excellent evidence on the governments' emergency related correspondence methodologies with different partners. As a matter of fact, 20 out of 67 surveys from 11 countries saw issues associated with government transmission of Corona virus reactions.

Governments might have been especially worried about what these new correspondence channels and methods would mean for the productivity of their emergency the board and the agreeableness of the moves initiated to reduce the emergency's belongings. This was the situation, for example, in Switzerland, where the Swiss Government Chancellery took a gander at the impacts of its emergency the executive's correspondences plan. This is a pivotal activity on the grounds that, as per 58% of government focuses that partook in the OECD 2020 Comprehension Public Correspondence Study, emergency correspondence is the most troublesome correspondence capability to dominate as a result of issues with coordination and HR. Most of countries answered the inquiry by saying they utilize additional faculty or ability to work with correspondence during emergencies.

3.3. Whole-of-society response

The 'entire of-society' part of governments' Corona virus reactions was analyzed in sixteen audits. These evaluations take a gander at how various degrees of government teamed up to deal with the pandemic reaction, how partners and residents partook in dynamic cycles connected to emergency the executives, and what shields could have been set up to safeguard popularity based standards.

Assessments suggest that governments ought to put forth a more grounded attempt to include partners and public in emergency the executives choices, particularly considering the likelihood that vote based responsibility systems were compromised in most of countries during the pandemic's extreme stage. Empowering and engaging other public entertainers to reuse data to assist residents can be accomplished by making it freely available to residents. For example, the "Corona virus Canada Open Information Working Gathering," a common society association in Canada, fostered a solitary intuitive dashboard to

illuminate people on information made accessible by open organizations (Corona virus Canada Open Information Working Gathering, 2021). The US province of Oregon, where a public gathering was held to address the Corona virus recuperation, is an illustration of a sub-public government directing web-based deliberative techniques during a pandemic that gives interesting models to nations to consider.

4. Managing Surge Demand of Oxygen

In India, there were around one lakh cases recorded day to day at the level of the principal wave in mid-September 2020. Until the second wave with the new B.1.617 type of the infection arose, this continuously diminished to around 9000 cases each day right off the bat in February 2021; day to day cases crested at generally 4.1 lakh toward the beginning of May. The quantity of Coronavirus cases expanded fifty-overlap in a concise time of close to 80 days, from February to May 2021, making the second wave more troublesome than the first. This abrupt, outstanding expansion in examples made a few startling hardships:

1. Since there was little information about the subsequent wave's conjecture, speed, or pinnacle, the circumstance was at that point flighty. This caused a sensational expansion in the quantity of patients requiring oxygen and basic consideration, burdening the framework's now compelled assets.
2. Quick expansions in patients over a brief timeframe seriously compelled endeavours to increment emergency clinic bed limit and the accessibility of pivotal supplies like oxygen and different necessities.
3. A compelled supply chain for oxygen, relies upon few cryogenic big haulers to move this fundamental asset from east coast states with oxygen overflows to north and focal Indian expresses that are neglecting to fulfil need. Long transportation runs that expected every big hauler to pivot for somewhere around 6-7 days introduced a surprising issue.
4. A general sensation of disquiet brought about the storing of fundamental supplies like oxygen chambers, which further limited supply frameworks.

4.1. Enhancing production and storage of oxygen

Restorative grade oxygen is bought and kept in fluid or vaporous form⁸ by outside makers and revilers or on location producing offices. Numerous clinics in India utilize the two frameworks because of the emergency. Numerous medical clinics have been fruitful in laying out their own public service announcement plants, which have expanded nearby oxygen creation and eliminated travel time.

Clinics should work on their independence to be prepared for flood demands on account of a third Corona virus wave by:

1. Confined oxygen creation at the emergency clinic and wellbeing focus level.
2. Expanding clinic level nearby stockpiling ability to reserve fluid clinical oxygen (LMO).
3. Laying out areas for goliath oxygen chamber capacity.

4.2. Strengthening storage and distribution systems

A reviewed procedure for decentralized capacity and conveyance networks the country over is expected on account of a demand increment.

4.2.1. Systematizing state, regional storage, and distribution systems

States that are projected to experience a huge expansion in demand for oxygen might fabricate storage spaces near popularity regions in light of the examples mastered during the subsequent wave. To decrease going from assembling offices, a group approach for capacity and dissemination of clinical oxygen might be utilized.

States might pick reasonable regions for laying out more oxygen creation offices or feeder units utilizing a centre point and-talked model construction, which is as often as possible utilized in the supply and coordinated factors industry. In the event of a demand spike, the feeder units should be associated with different clinics. To guarantee an organization across the express, these may be arranged. Contingent upon the demand, territorial hubs (centre points) for oxygen creation, which might serve two to five encompassing regions, would give oxygen to mass storerooms arranged inside the area, which would then supply close by emergency clinics and Corona virus focuses. Subsequently, there would be a critical lessening in postponements, risk, and the cost of moving oxygen. Subsequently, new Corona virus care offices might be worked close to current or future oxygen creation offices. Whenever judged possible, introducing an organization of pipelines between clinics with a high case load and close by oxygen plants might be thought about.

4.2.2. Streamlining interstate distribution system

States could keep on utilizing oxygen delivered in different states during seasons of appeal. The operationalization of highway strategies requires a lead season of no less than three days. States might lay out "green passages for oxygen" as a team with the middle to accelerate creation and conveyance. The relating State Team might create "green courses" related to the railroads and transportation divisions to guarantee continuous oxygen transportation inside and between states. Carrying void oxygen big haulers is one more choice for accelerating circle back.

5. Strategic Framework of Actions for Managing Surge Demand of Oxygen

States should adjust the supply of oxygen with a rising demand to be decisively ready. The tables in this segment exhibit the assessed oxygen demand for different situations utilizing wellsprings of modern and restorative oxygen (in light of CDRI examination).

5.1. *The following recommendations for Central and State government minimum preparation are*

5.2. *Surge reaction requires the additional activities listed below in addition to the efforts advised for state and central government for minimum readiness:*

6. Response and Recovery

Most of the proof with respect to Corona virus reactions that the OECD has gotten comprises of assessments of reaction and recuperation systems. Policies targeting lessening the Corona virus pandemic are monetary, monetary, social, and wellbeing repercussions, as well as those connecting with lockdowns and restrictions, are remembered for reaction and recuperation measures. In 62 assessments (93% of the example), policies connected with these actions were surveyed in some way, and everything except one nation assessed the emergency help measures.

Four essential sorts of strategy or measure have gotten most of consideration in investigations of response and recuperation:

1. Economic and financial support,
2. Social policies,
3. Health policies,
4. And lockdown and restriction measures.

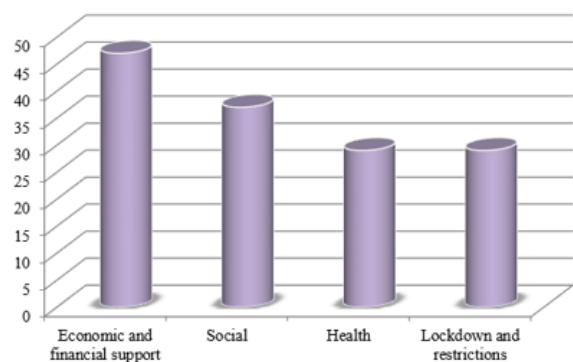


Fig. 3: Evaluations of reaction and recovery actions are primarily concerned with

Table 1:

Central government	
Establish a national oxygen portal.	Monitor the supply and demand for oxygen in each state utilizing a web-based information entryway to assist states with getting it reasonably.
Plan for emergency oxygen	Foster an oxygen supply chain the board procedure for highway oxygen supply to satisfy flood demands from public and confidential sources.
Create green arteries	Plan crisis transport courses utilizing rail-or street based green passages with the divisions of transportation in your state.
Improve human resources	Make preparing projects and teachers to prepare and guarantee extra crisis work force, like oxygen specialists and logisticians, in the recharging, taking care of, and transportation of fluid and vaporous clinical oxygen across the supply chain.
State government	
Storing oxygen	Fabricate extra rooms nearby at all area medical clinics (DHs). Give mandates to the production of the equivalent to private clinics with in excess of 50 beds. Give transitory secure storage spaces to chambers at regions determined by the government that are not clinics, Devoted Corona virus Medical clinics (DCH), Corona virus Care Focuses (CCC), and so forth.
Transportation	Interfacing oxygen sources (enterprises and public service announcement plants) to objections is an effective method for sorting out the supply and transportation chain (DHs, confidential emergency clinics and other Corona virus care offices) Assign elective industry hotspots for fluid or vaporous oxygen and make supply arrangements in view of need.
System for digital monitoring and decision-making	Construct a state oxygen dashboard to follow oxygen assets continuously. Introduce frameworks for continuous answering to offer updates on oxygen utilization and demand for brief conveyance. Sort out and watch out for supply operations, including reverse coordinated factors, by checking chambers and oxygen big haulers with RFID or standardized identifications to get continuous data on the supply, demand, and course.
Increase oxygen usage	Teach and set up a group of clinical and paramedic trained professionals, for example, oxygen medical caretakers, to really oversee supply.
Behaviour Change Campaigns (BCC)	Teach and set up a group of clinical and paramedic subject matter experts, for example, oxygen medical caretakers, to really oversee supply.
Use medicinal oxygen produced by industrial oxygen production	Send off BCC missions to bring issues to light about the openness of restorative oxygen and deflect individuals from putting away oxygen chambers. Recognize expected modern destinations for delivering oxygen ahead of time and make suitable arrangements to deal with an expansion in demand. Increment the accessibility of oxygen by laying out agreements with business, like petrochemicals, steel, oil, shipbuilding, material, and so on, to reuse their hardware to create clinical oxygen when demand is at its most noteworthy.

Table 2:

Central government	
Control oxygen distribution	Lay out the rules and system for disseminating oxygen among the states to satisfy the fluctuating need Lay out highway coordination for designating oxygen as per the course. Confirm that distribution rules are kept and that no state restricts the shipment of oxygen.
State government	
Use of human resources	Initiate prepared faculty, including oxygen medical attendants, specialists, and different experts, for the best framework execution. Track and resolve transportation, supply, and calculated bottlenecks. Decide the judicious utilization of oxygen in medical care organizations.
Utilize therapeutic oxygen created by modern oxygen creation	At popularity, limit the creation of modern oxygen to just vital purposes and reuse the plants for the assembling of clinical grade oxygen. Prepare oxygen dissemination from the state's inside oxygen holds put away before the beginning of flood.
From other states' supply	Utilize current concurrences with states that have additional oxygen to prepare oxygen express.

6.1. Economic and financial support

Most of assessments of response and recuperation estimates focus on the policies that the government executed to help the economy (45 assessments from 15 nations). As a matter of fact, after the economy was closed down, most of OECD governments rapidly and comprehensively acted to monetarily support families and organizations. These assessments currently tend to focus on the handiness and viability of these actions, with some thinking about middle effects. Most of examinations agree that measuring these policies' effects is too soon. More data regarding this matter may likewise open up from here on out, as most of OECD part countries pronounce their aim to survey the monetary and monetary crisis measures carried out toward the beginning of the pandemic, however they might not have had the opportunity or assets to do as such at this point.

Nations have considered three essential classifications of measures in their examinations of monetary and monetary systems to reduce the impacts of the Corona virus issue:

1. Tax-based measures,
2. Balance-sheet measures,
3. Spending measures.

A more careful survey of assessments of monetary and monetary measures uncovers that there is more proof supporting the outcome of use based measures for these objective gatherings than there is for charge based help and accounting report measures (see Figure 4). Assessments of monetary record measures and expense based help, specifically, centred basically on what they meant for endeavours. This accentuation is in accordance with the essential goal of monetary record changes, which was to guarantee corporate liquidity and backing credit markets, demonstrating that there is right now a strong collection of information supporting these policies. Be that as it may, in the forthcoming long stretches of time, it will be important to do further examination of what monetary and monetary measures would mean for families, workers, and undertakings.^{11–18}

6.2. Social policies

Some Corona virus reaction assessments likewise referred to social measures (35 assessments more than 13 nations). Eight of these investigations, notwithstanding, were ex risk investigations that inspected the emergency's anticipated and forthcoming impacts on disparity and neediness. Ex bet assessments were performed, for example, by the Public Committee for the Evaluation of Social Improvement Policies (CONEVAL) in Mexico to decide what the scourge will mean for neediness and how the social wellbeing frameworks currently set up would assist with reducing its belongings. The need for more noteworthy social insurance for the weakest populace bunches is featured.

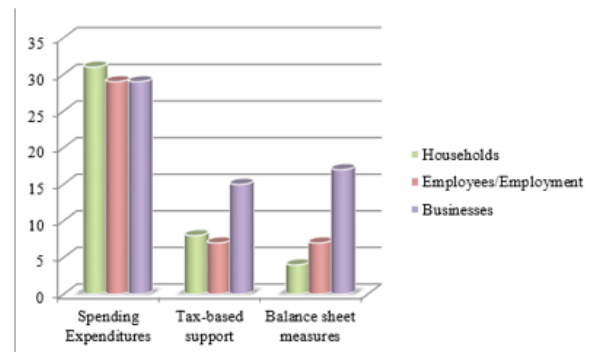


Fig. 4: Evaluations of how various beneficiary groups are affected by economic and financial support measures

A few ex post or ex durance investigations regarding this matter notice that the pandemic could an affect disparity and destitution without assessing how or why this could have been the situation. In any case, various assessments have analyzed these results. The arrangement of school feasts, transitory housing during lockdown and restriction periods, and government drives to assist with homing pay were a portion of the subjects analyzed in these assessments.

Different countries could choose to look at the pandemic's social impacts over the long haul. A few countries have previously begun doing this, for example with regards to what the pandemic has meant for youngsters (OECD, 2020). From the perspectives of its Orientation Based Examination In addition to (GBA+) philosophy, the Canadian government is exploring the way in which government spending and policies, including crisis help and recuperation measures for the Corona virus circumstance, would influence ladies and men in an unexpected way. The structure is expected to assess what policies and projects mean for various gatherings while considering crossing personality factors like orientation and age. Home-grown maltreatment, expanding joblessness, and the emergency's general impacts on youth have not for the most part been examined in any of the assessments in the example, despite the fact that it very well may be advantageous to do as such from here on out.

6.3. Health measures

Twenty seven surveys spreading over 12 nations took a gander at the wellbeing drives carried out by OECD countries because of Corona virus. As well as analyzing capacities with respect to basic consideration and routine clinical treatment during the intense period of the emergency, these assessments additionally consider issues connected to measures for disease control. The assessments that are principally worried about wellbeing measures analyze process-related concerns, for example, information gathering or the arrangement of immunizations. A few

of these examinations believe that a more profound examination of the pandemic's impacts on wellbeing is required. For example, there is right now no data on the outcome of public inoculation programs or the impacts of telemedicine on significant wellbeing measurements. The example of assessments makes little notice of different issues, like the pandemic's impacts on liquor utilization and emotional wellness, especially in youngsters. However, information from the OECD uncovers that the Corona virus emergency has expanded risk factors usually connected to drinking liquor and having a terrible emotional well-being.

6.4. Lockdown and restriction

Twenty seven assessments were out by 10 nations examined limitations on individuals' opportunity of development. As indicated by OECD information, curfews and disallowances on open social occasions (14), school impediments (16 assessments), and travel limitations (13) were significant issues for nations. The typical rigidity record, not set in stone by the Corona virus Government Response Tracker of the College of Oxford, is irrelevant to the amount of assessments of lockdown and limitation estimates that have been delivered. Assessments demonstrate that lockdown and limitation measures were costly for society, yet they likewise encourage proceeding with endeavours to gauge the benefits and disservices of such measures to further develop them later on. Given the boundless impacts of these sorts of policies, a few investigations really do recognize that assessing this balance will challenge. Process-wise, lockdown methodology was thought to sometimes be incongruous or ineffectively did.

7. Conclusion

The world was hit hard by the COVID, and we are as yet faltering from it. The government expanded its monetary apportioning for wellbeing from 52,800 crores in 2018-19 to over 2.2 lakh crores in 2021-22 to battle this immense disease. Indian individuals approach in excess of 15 distinct sorts of medical coverage plans and policies as per the government of India. The emergency, which affected all aspects of society, has brought about significant endeavours from countries. Notwithstanding being under time and monetary limitations, OECD governments assessed their Corona virus replies. The data from these audits, nonetheless, zeros in more on the significance and productivity of these policies than on their viability on the grounds that the emergency is as yet unfurling and deciding the genuine ramifications of large numbers of the executed measures is still too soon. The proportionality and rationality of policies are additionally yet to a great extent neglected, which makes them basic to remember for strategy conversations while financing is restricted and cross-government coordination is fundamental.

India specifically still has far to go in this race. India should do whatever it may take to support how much assets and interests around here. It is important to inspect the norm of medical services gave, everybody's admittance to medical care offices, and the condition of availability for future circumstances of this nature. It is essential to foster our autonomy concerning innovation, unrefined components, and creation. Be that as it may, chiefs can utilize the ongoing collection of data to lay out tentative arrangements to reinforce governments' capacity to endure emergencies as well as their ongoing recuperation endeavours.

8. Source of Funding

None.

9. Conflict of Interest

None.

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Cite this article: Mishra R. Evaluating the effectiveness of government policies and interventions in addressing the demand and supply gap of oxygen beds in India. *J Manag Res Anal* 2023;10(1):3-10.