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COVID-19 pandemic effects on the distribution of healthcare services in India: A systematic review

COVID-19 and Healthcare

Abstract

BACKGROUND

Corona Virus Disease-2019 (COVID-19) pandemic has brought fundamental changes to our problems and priorities, especially those related to the healthcare sector. India was one of the countries severely affected by the harsh consequences of the COVID-19 pandemic.

AIM

To understand the challenges faced by the healthcare system during a pandemic.

METHODS

The literature research for this review was conducted using PubMed, EMBASE, Scopus, Web of Science, and Google Scholar. We focused on the published scientific articles concerned with two major vital areas: (1) The Indian healthcare system (2) The COVID-19 pandemic effects on the Indian healthcare system.

RESULTS

The Indian healthcare system was suffering even before the pandemic. The pandemic has further stretched the healthcare services in India. The main obstacle of the healthcare system was to combat the rising communicable as well as non-

communicable diseases. Besides the pandemic measures, there was a diversion of focus of the already established healthcare services away from the chronic conditions and vaccinations. The disruption of the vaccination services may have more severe short and long-term consequences than the pandemic's adverse effects.

CONCLUSION

Severely restricted resources limited the interaction of the Indian healthcare system with the COVID-19 pandemic. The re-establishment of primary healthcare services, maternal and child health services, Non-communicable diseases (NCD) program, National Tuberculosis Elimination Program (NTEP), *etc.* are of the utmost importance to prevent serious long-term consequences of this pandemic.

Core Tip: The interaction of the Indian healthcare system with the COVID-19 pandemic was limited by the restricted recourse. Lack of infrastructure, low percentage of GDP expenditure on health, deficiency of skilled manpower play a critical role in healthcare system to manage infectious diseases, NCDs and MCH services.

INTRODUCTION

The COVID-19 pandemic, since its start at the end of 2019 in Wuhan, China, has changed the face of our planet. The pandemic affects almost every detail in our daily life, from dietary consumption to education and obviously to healthcare utilization, the primary sector affected by the pandemic [1]. The evolution of the pandemic has created extra challenges to the different healthcare sectors across the world, either those dealing

with patients directly or those responsible for logistic supplies to the healthcare facilities [2]. The healthcare sectors in the developing countries were especially affected, suffering from the limited public health infrastructure and medical supplies even before the pandemic [3-5]. In India alone, COVID-19 infected more than 10 million citizens, and more than 45,000 have passed away by the end of September 2021, and the number is increasing every day [6].

The straining and fast changes created by the pandemic have put the Indian healthcare services in an impending collapse due to destructive waves of the pandemic [7]. Before the pandemic, the Indian healthcare services were struggling to meet the primary healthcare demands of the public affected by a variety of communicable and non-communicable diseases [8]. Besides COVID-19, other medical conditions with a public health concern like acquired immune deficiency syndrome (AIDS), tuberculosis (TB), and malarial outbreaks continue to pose a strain on the shoulders of healthcare services that require continuous monitoring to detect and manage these conditions at an early stage [9]. Also, non-communicable diseases (NCDs) are now the leading cause of death in India, accounting for about 60% of all deaths across the country [10]. The emergence of the COVID-19 pandemic at the end of 2019 has forced many secondary and tertiary healthcare centers designated to receive millions of daily patients to be dedicated only for COVID-19 presumptive cases. These above effects created a huge gap in the provision of healthcare services in managing chronic cases [11].

A recent multi-center survey conducted by Raman *et al* have demonstrated that the COVID-19 pandemic has a significant negative effect on health care providers with an exaggerated feeling of inadequacy: (Odds Ratio (OR) = 3.015), inappropriateness: (OR = 2.225), and discontinuity of care: (OR = 6.756) together with associated depression and social loneliness [12]. India, which was already suffering from an unacceptably high maternal mortality rate of 41.4 per 1,000 Live births in 2013, developed a significant interruption in the maternal and child health services during the pandemic [13,14]. This negative effect has extended to almost all established maternal/child healthcare services, including antenatal care and immunization services.

For instance, some regions have demonstrated a decrease in institutional deliveries by about 2.26%. Antenatal health services were tremendously affected, with a decline estimated to be 22.9% [15]. Prenatal care visits in China have dropped, healthcare infrastructure has been stretched, and possibly damaging practices have been introduced with insufficient proof [16]. Garg *et al* has demonstrated that primary healthcare (PHC) services were severely disrupted. They have also surveyed the readiness of PHCs across India and demonstrated a severe shortage in infection control measures, i.e., infection prevention and control (IPC). Authors found that 29 out of 51 participating PHCs had inadequate ventilation in the workplace, while NK95 masks were available only in half of the centers [15,17]. During the pandemic in Australia, healthcare utilization fell by roughly a third, with significant variance, and with more considerable decreases among persons with less severe disease [18].

This narrative review will review the different factors associated with the unavailability of resources in healthcare facilities during the COVID-19 pandemic in India. We will also highlight how the deficiency of primary healthcare services may contribute to the sustainability of the COVID-19 pandemic in India.

MATERIALS AND METHODS

The narrative review was carried out through the following methodological steps. Different search terms related to the Indian healthcare system formulated two health strategies. The first health strategy was used to target the characteristics of the Indian healthcare system before the pandemic together with its associated challenges, which include: (((("India"[Mesh]) AND "Delivery of Health Care"[Mesh]) OR "Community Health Planning"[Mesh]) OR "Health Services"[Mesh]) AND "Epidemiology"[Mesh]. The second health strategy was centered on the Indian healthcare system and health situation during the pandemic using the following terms ((("India"[Mesh]) OR ("COVID-19"[Mesh] OR "SARS-CoV-2"[Mesh])) AND "Delivery of Health Care"[Mesh]) OR "Delivery of Health Care, Integrated"[Mesh]. PubMed, EMBASE, Scopus, Web of Science, and Google Scholar were used to search the related literature. All of the papers

were stacked and screened initially by title to categorize the papers into 'eligible' or 'non-eligible. Eligible literature was further screened using full text to exclude any irrelevant information. References of the relevant studies were also screened to track any missed helpful literature. The above methodology was consistent with the previously reported methodology of narrative reviews studies.

RESULTS

The healthcare situation in India before the pandemic

India has a large and diverse healthcare system that suits the cultural diversity of the Indian community [5]. The healthcare system in India was initially built to ensure that all citizens will have access to essential healthcare services regardless of their socioeconomic status [19]. However, the ambitious healthcare system plans were not associated with considerable funds from the governmental agencies. In 2015, India spent only 1.2% of its GDP on health, considered among the lowest in the world [20]. The inadequacy of government healthcare services has resulted in the simultaneous evolution of the private health sector [21]. Subsequently, India has one of the highest proportions of household out-of-pocket expenditures on health globally, estimated at 71.1% in 2008–2009 [22]. In addition, India has the lowest doctor-patient ratio as it has one doctor for 1,000 and a specialist for every 1445 people [23]. The lowest healthcare expenditure in India had a severe negative impact on the health status even before the COVID-19 pandemic. In contrast, pandemics further overstretched the fragile non-immune Indian healthcare system leading to a collapse in providing healthcare services to contain COVID-19.

Through its 1.3 billion citizens, non-communicable disease (NCD) is responsible for 5.78 million (60%) of all deaths in India each year. The significant NCD-related deaths are usually attributed to cardiovascular disease, cancer, and diabetes [24]. The rising NCD trend is a common phenomenon seen in developing countries where rapid urbanization leads to an overall economic improvement and has considerable adverse effects on public health [25]. The Indian health system has adopted multiple changes

aiming to bring down NCD-related mortality by less than 25% by 2025 [26]. Although some progress has been achieved in decreasing tobacco and alcohol consumption, an increasing trend was found for overweight and obesity among Indian adults between 15-49 years of age [24]. Reddy et Al. have demonstrated that the Indian government's efforts were insufficient to achieve its ambitious targets by 2025, even before the pandemic [26].

Since the start of the epidemiological transition in 1970, there have been significant changes in the pattern of different diseases across every state in India over decades [27]. Omran's theory describes the epidemiological transition as a shift in the causes of morbidity and mortality, primarily from infectious disease to NCD [28,29]. However, the situation was different in India, where the burden of the NCD has been added to the burden of the infectious disease resulting in a double burden of NCD and communicable disease over the undeveloped Indian healthcare system [27,30]. In India, the epidemiological transition has led to the development of a new theory based on the concept of the double burden of both infectious diseases and NCD [31]. The burden of communicable diseases has declined from 47.7% to only 22.1% between 1970 to the mid of 1990s [31].

Even after 40 years from the start of the epidemiological transition in 2011, infectious diseases still pose a challenge to the Indian health system and account for about 30% of the disease burden [32]. It was estimated that an Indian citizen had 15 times the greater burden of infectious diseases than UK citizens in 2004 and that about 30% of the disease burden in India is attributable to infections [32]. The lack of strong staple public healthcare infrastructure has contributed largely to the "stagnation" of infectious disease burden in addition to the burden of NCD [30,32]. For instance, in 2009, India recorded about two million new cases of TB, which is considered as one of the highest TB incidences globally [32]. After ten years in 2019, India has reported about 2.9 million new cases of TB, contributing to about 27% of all TB cases worldwide [33]. However, India started its TB control program quite early in 1960 but failed to significantly reduce the incidence of new TB cases compared to other countries with similar epidemiological

transitions [34,35]. Concerns have been raised about the spread of TB and NCDs, specifically, diabetes mellitus (DM), which are associated with a more fulminant course of TB [36,37].

Besides TB, multiple endemic infections affect Indian cities and states, such as cutaneous anthrax, dengue fever, malaria, cholera, and viral hepatitis (A, B), *etc.* [38–43]. Some of these infections are substantially preventable by vaccines [44]. Unfortunately, India contributes to about 10% of 20 million unimmunized and partially immunized populations [45]. Additionally, India is considered one of the largest endemic for Hepatitis B infections with the second largest burden of chronic hepatitis B infections with more than 50 million cases [46]. Despite being integrated into the Indian national immunization program in 2011, about 23.2% of children aged 5-8 Years were vaccinated against the Hepatitis B virus [47]. Different causes have been proposed behind the low vaccination coverage of hepatitis in India; for instance, major causes are related to the poor management of the available health resources such as poor record-keeping, improper management of vaccine stocks and lack of inventory control, lack of staff training, and use of multi-dose vials. Strikingly, health care workers have been reported to be reluctant to open a vial of the vaccine when there are a few children to be vaccinated for fear of wastage [48]. It is well noted that even before the COVID-19 pandemic, India's healthcare system was strained in a nutcracker between the pre-existing communicable disease challenges and the evolving NCD pattern created by the epidemiological transition. All of the above challenges are further aggravated by the limited government funds allocated to developing the healthcare system.

DISCUSSION
COVID-19 situation in India

The number of people infected with COVID-19 has exceeded 9 million since the report of the first cases in the state of Kerala on January 30, 2020 [1,6]. Following this, the country has witnessed a drastic increase in the total number of reported cases. The recovery rate across India was 80.83% as of September 22, 2020, with a case fatality rate

of 2.82% as of June 1, 2020 [49]. The development of the pandemic has primarily affected the rapidly developing Indian economy with shrinkage of the Gross Domestic Product (GDP) by about 23.9% in April – June (2020) period [50]. Today, Indian citizens continue to be frightened into compliance and are "afraid to restart their lives normally." Though many states of India have flattened their COVID-19 infection curve, authorities across the nation are now in fear from the onset of other subsequent waves of the COVID-19 pandemic secondary to a decreased commitment of health directives of taking precautionary measures, i.e., social distancing and wearing of face masks. Governmental authorities have advised citizens to take precautionary measures like social distancing and wearing masks during public gatherings. Further, few states like Maharashtra, Rajasthan, Gujarat, *etc.*, had introduced new restrictions such as travel restrictions and night curfew to battle the subsequent waves of the COVID-19 pandemic [50].

Lack of health resources to fight the COVID-19 pandemic

In India, besides the chronic shortage of health care workers, there were significant deficiencies in different domains of healthcare services and their logistic determinants [51]. For instance, healthcare facilities have severe deficiencies in infection control measures, i.e., advance infection prevention and control (IPC) facilities to contain infected patients and prevent the spread of COVID-19 infections. In 2010, the Indian government adopted national guidelines on airborne infection control (AIC) in health care facilities with a special focus on preventing TB transmission [52]. Five years later, a baseline survey of healthcare facilities has demonstrated poor adherence to infection control measures aimed to control air-born infection [53]. Multiple studies have demonstrated several loopholes in the infection control policy, including insufficient training of staff, unavailability of protective masks, poor compliance to personal protective practices by health workers, i.e., proper use and disposal of PPEs and other control measures, inadequate disinfection, and sterilization of equipment, lack of health workers surveillance mechanism, lack of counseling of cough etiquette and sputum disposal at registration of hospitals [54–56].

In 2020, Indian health authorities recently updated the comprehensive national guidelines for infection control [51]. However, infection control measures across different primary healthcare centers in Indian districts were grossly deficient, especially related to air-born infection [15]. The shortage was limited to the infection control measure, but it further extended to the personal protective equipment (PPE) intended to protect the health workforce from infection during the COVID-19 pandemic. It was reported that there is a persistent dearth of PPE in two private hospitals of the city of Mumbai, India [57]. Reports from different areas across India have reported that doctors treat patients suspected of SARS-CoV-2 infection without masks or with less protective surgical masks instead of recommended Nk95 masks for healthcare providers [58]. Unfortunately, the shortage of PPE and high demands have forced health care workers to reuse or extend the use of PPE, which increases their risk of COVID-19 infections [59]. The above behavior, despite being expected, highlights a lack of proper knowledge and training regarding infection control measures, usage of PPE, and their proper disposal. In fact, it is one of the rights of health care workers to be adequately trained before exposure to COVID-19 infected patients [60]. The lack of essential training of health care workers has been reported in multiple South Asian countries, including India [61]. Multiple studies have previously highlighted suboptimal knowledge and practice regarding infection control measures across Indian health workers [62,63]. Arun *et al* have reported that only less than half of the healthcare workers of Kerala, India, were trained on proper infection control practices [54].

COVID-19 pandemic and provision of childhood and maternal healthcare services

The growing distribution of the pandemic across different countries has delayed or even stopped the basic childhood vaccination programs as a response to the lockdown or the stretching of the healthcare resources as a response to the COVID-19 pandemic [64]. WHO has reported that more than 80 million children did not receive the routine vaccination globally [65]. This may have serious long-term consequences even more than the COVID-19 itself. For instance, the evolution of the Ebola outbreak in Africa has resulted in halting multiple essential health care services, which resulted in

the increased mortality related to multiple other infections, including tuberculosis, HIV, and measles which have exceeded the mortality rate from Ebola [66].

In India, the evolution of the pandemic has initially enforced complete stoppage of the whole childhood vaccination programs secondary to the major lockdown. It was estimated that about 27 million children missed diphtheria tetanus pertussis, resulting in a 40% increase in mortality in the next year. It has also been estimated that there is an expected 49000 child deaths and 2,300 maternal deaths within a month if the primary healthcare services continue to be disrupted [67,68]. As a response, the Indian governments have approved the continuation of the vaccination services and consider it an essential health service [69]. The resumption of the immunization activities was based on the WHO guidelines to minimize both morbidity and mortality from other diseases [70,71].

Maternal healthcare services have also been severely affected by the development of the pandemic. Globally, healthcare services have restrained pregnant women's access to healthcare facilities for fear of virus transmission and the unknown adverse effects on the newborn, considering the Zika virus in the background [72,73]. The health and family welfare ministry has declared pregnant women as high risk during the COVID-19 pandemic and provides guidelines to provide essential maternal healthcare services to pregnant women, including the suspected and confirmed cases of COVID-19 [74]. Manu *et al* have demonstrated a 45.1% decline in deliveries during the pandemic at their center. Interestingly, they have also noticed a surge in the number of high-risk pregnancies with about 7.2%. Additionally, more than one-third of women had no or inadequate prenatal visits, with more than half of them mentioning the lockdown as a cause of inadequacy of antenatal care [75].

Effects of COVID-19 pandemic on the management of patients with chronic diseases

Since reporting the first case of COVID-19, patients with chronic disease have had significant difficulties accessing their routine healthcare services worldwide [76]. The presence of chronic conditions like chronic kidney disease (CKD), cardiovascular disease (CVD), hypertension (HTN), diabetes mellitus (DM), chronic obstructive

pulmonary disease (COPD), and malignancy in a patient infected with the COVID-19 virus has been tied to poorer outcome with about ten folds higher risk than those without associated comorbid condition [77,78]. WHO has reported that half of 163 countries have attempted partial or complete disruption of healthcare services for hypertension, diabetes mellitus, and related complications during the pandemic. Additionally, one-third of the countries have reported disruption of healthcare services designated for cardiovascular emergencies [79].

Low and middle-income countries have sustained considerable difficulty in assuring access to healthcare services to patients with chronic conditions compared Western countries [80]. Sanghamitra *et al* have conducted a community-based study in Odisha, India, and found that 43% of the patients with comorbid conditions have reported difficulty in accessing healthcare services. They have also reported that the most challenging problem was the physician consultation accounting for 43% of cases [81]. Another telephone-based survey targeting more than 1000 chronic patients has reported that more than 80% of the participants found it challenging to access healthcare services, and 17% of the participants found it difficult to get their medications. The same study has also reported that more than 50% of the participants reported a loss of income, with 38% have completely lost their jobs [82]. These clear negative impacts have forced health authorities to search for more cost-effective approaches to continue healthcare services to those patients with chronic medical conditions.

Telemedicine is defined by the WHO as the delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for the diagnosis, treatment and prevention of disease and injuries, research, and evaluation, and for the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities [83]. Before the evolution of the COVID-19 pandemic, India has a few worthy examples of telemedicine models, including mammography services at Sri Ganga Ram Hospital, Delhi, and oncology at Regional

Cancer Center, Trivandrum [84,85]. During the COVID-19 pandemic, the contribution of telemedicine in healthcare management has been highlighted. Sandeep *et al* reported that 71.43% of the orthopedic patients were managed without needing any physical visits to the outpatient clinics. Additionally, they have reported that 92% of the patients were satisfied with the telemedicine intervention [86].

Health centered solutions learned from the COVID-19 pandemic

The catastrophic health expenditure of less than 2% of the GDP in India must be increased at least to meet the expenditures done by the surrounding developing Asian countries [87]. The COVID-19 pandemic has indicated that dependence on the private healthcare sector, assuming that an increase in the overall income of the individuals can cover their health expenditures, cannot be a good approach to health care management [88]. India also needs to establish a national stock level of PPE and other essential medical supplies like ventilators together with an efficient network to monitor and deliver upon need [89]. Learning from other Asian neighbors, both Taiwan and Singapore have established a similar network of PPE management which proved to be critical and efficient in the PPE management during the pandemic [90,91].

Establishing national manufacturing units is also essential to maintain an adequate supply to the Indian hospitals and other healthcare facilities even at times of global catastrophes. The enhancement of local manufacturing on a mass scale should be essentially accompanied by maintaining the ban of PPE exportation [89,92]. Together with providing adequate equipment to fight the pandemic, there is an impending need to enhance and maintain the training of healthcare workers (HCWs) regarding critical topics like infection control practices [93]. Vishal *et al* have reported that attending training sessions have significantly impacted and improved hand hygiene among HCWs in rural India [94]. In adjacent countries like Singapore, Japan, and Hong Kong, a high level of readiness of healthcare workers has played a critical role in early controlling the pandemic [95].

Besides empowering the healthcare system, it is also essential to engage the health care professionals in decision making to avoid collateral, sometimes fatal,

damages of halting essential services like vaccination and maternal healthcare services even for a short period. Establishing and empowering telemedicine is another crucial lesson that should be considered in the future. Integration of telemedicine even after the pandemic should be encouraged and continue as it has proved to be effective in the diagnosis, management of chronic disease, and guiding the treatment for different medical conditions in a cost-effective way [96,97].

CONCLUSION

During the COVID-19 pandemic, India's healthcare system is overstretched in terms of resources, with all essential healthcare services, including maternal and child healthcare services, jeopardized. India needs to increase the investment and proportion of GDP in developing and improving its universal healthcare system to accommodate future pandemics/disasters or outbreaks. Inter-sectorial coordination and partnership with private entities, at a fast pace, are needed to meet the demands of the healthcare delivery system and provide universal standard healthcare to every citizen of India.

ARTICLE HIGHLIGHTS

Research background

India was one of the countries worst hit by the COVID-19 pandemic's devastating effects. The healthcare system was unable to manage the situation of pandemic.

Research motivation

The underperformed healthcare system during the pandemic exposed the crisis.

Research objectives

To identify the challenges Indian healthcare system faced during the pandemic.

Research methods

The review was conducted using a literature search from the database of PubMed, Web of Science, EMBASE, Scopus, *etc.* The main focus was on the Indian Health care system and the impact of a pandemic.

Research results

The Indian health care system was already under pressure before pandemic. The overburden of patients and essential health services were not handled efficiently. Many healthcare facilities were lacking the basic standards of patient care. The vaccination and chronic disease services were hampered due to the shifting of focus to COVID-19.

Research conclusions

Universal Health Coverage should be provided to each person. Increase in percentage expenditure of GDP for the health sector, escalate infrastructure development, and increment of skilled manpower required.

Research perspectives

To meet the incremental demand in health care services during and after the pandemic, India needs to invest more in this sector with a goal of Universal Health Coverage.

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