



Challenges and difficulties faced in low- and middle-income countries during COVID-19



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ABSTRACT

Objectives: The ongoing COVID-19 pandemic, caused by a novel coronavirus SARS-CoV-2, has created a severe threat to global human health. We are extremely lucky because within the first year of the COVID-19 pandemic, scientists developed a number of vaccines against COVID-19. In this paper, the authors discuss the difficulties and challenges faced in different low-and middle-income countries due to the ongoing pandemic.

Study design and methods: This research is primarily based on secondary data and existing literature reviews. The authors use maps and graphical representations to show information about vaccination coverage.

Results: The lacking vaccination coverage and insufficient supply of oxygen tanks in hospitals of low- and middle-income countries (LMICs) raise the likelihood of death of the critical COVID-19 patients. Developed countries vaccinate their citizens more quickly than LMICs. In comparison to wealthy countries, LMICs usually lack the resources and capacity to obtain the required vaccination doses.

Conclusion: It is frequently observed that hospitals in low- and middle-income nations with a dearth of oxygen tanks result in increased suffering and mortality. To avoid a worldwide disaster, LMICs urgently require COVID-19 vaccinations since viruses have no borders, and no one is safe until every one is protected in our interconnected world. Therefore, more national and international collaborative supports are urgently necessary for LMICs in this regard.

1. Introduction

The COVID-19 pandemic, caused by a novel coronavirus SARS-CoV-2, has created a severe threat to global human health. To control the ongoing pandemic, the lockdown has been implemented across high, middle, and low-income countries [1]. As a first step, several countries have enforced population-wide lockdowns to lessen the spread of the virus and to allow their health systems to manage it [2]. In LMICs, however, lockdown measures have the potential to have terrible impacts, such as hunger, economic collapse, and the ignoring of other critical health issues [3,4]. Moreover, policies such as curfews, district lockdowns, and personal protection equipment regulations can disproportionately affect socially and economically vulnerable populations. Social separation and curfews can put farmers and street vendors in low-and middle-income countries' livelihoods in peril and inflict suffering [5]. As a result, LMICs should focus their inadequate resources, insufficient infrastructure, and manpower on supporting and maintaining a package of structural and behavior-based interventions that will

help to avoid the need for forcible restrictive measures to be re-introduced [6].

Among the top disease burden, more than half of the countries are developing or low- and middle-income countries (LMICs) [5]. This is especially concerning in light of the fact that not only are COVID-19 cases on the rise but so are the public healthcare system and limited resources in those nations [7]. These countries are facing enormous problems to tackle the COVID-19 patients. A study pointed out that a significant number of kids in Bangladesh are experiencing mental health issues while the country is under lockdown [8]. Another study mentioned that more than 40 % percent of university students had moderate to high levels of perceived stress, and around 70 percent of respondents had clinically significant anxiety levels [9]. A previous study highlighted that among COVID-19-infected pregnant women the most common symptoms were fever, cough, myalgia, sore throat, and malaise. In some circumstances, COVID-19 infection causes severe maternal morbidity and perinatal mortality. Researchers suggest that pregnant women should concentrate on keeping good personal

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hygiene, healthy nutrition, and excessive social seclusion in these conditions to lower their risk of COVID-19 [10].

Even though many private hospitals are at critical risk of financial viability due to the postponement of all non-emergency elective surgery and the relegation of financing and compensation of care they put [11], and this perhaps restricts them to admit COVID-19 patients. Furthermore, a fear of becoming infected in a high-risk environment, such as a hospital, may lead to a refusal to consult with doctors. Despite the fact that oxygen is a critical drug for medication and is a prerequisite to preserve the lives of seriously Covid-19 afflicted patients, Oxygen tanks are frequently deficient in hospitals in LMICs [12]. Moreover, hospitals cannot manufacture Oxygen in many low-resource countries and imported from other countries. A study suggest that the burden of the ongoing epidemic could be reduced by improving health services [13].

We are extremely lucky because within the first year of the COVID-19 pandemic, safe and efficient vaccinations were developed [5]. However, in some countries there were some vaccine hesitancy. A study highlighted that male and perception of the danger of COVID-19 infection were determinants of vaccination acceptance and male as well as perception of the danger of COVID-19 infection were predictors of vaccination acceptance [14]. Researchers pointed out that about 30 % of the respondents had negative intent to receive a SARS-CoV-2 vaccine [15]. The results of a study demonstrated a relationship between definite intent and prior COVID-19 infection, perceptions of COVID-19 as serious, the conviction that vaccination would reduce their worry about contracting COVID-19, and concerns about the cost of vaccines [15]. Not every country has the capacity and technology to develop and manufacture new vaccines. As a result, many countries must rely on other countries for vaccination supply in the event of a pandemic. This provides the opportunity to vaccine nationalism, in which countries strive to use their purchasing power to get vaccination doses for their own citizens, leaving vulnerable countries in need behind [5]. In comparison to wealthy countries, LMICs usually lack the resources and capacity to obtain the required vaccination doses. In this paper, the authors discuss the difficulties and challenges faces in different low-and middle-income countries due to the ongoing pandemic.

2. Methods

This study is basically based on the existing literature reviews and secondary data. The authors present the information regarding vaccination coverage by maps and graphical illustration. The required secondary information is collected from different published papers and websites of a global database of COVID-19 vaccinations and Duke Global Health Innovation Center, COVID-19 and Worldometer.

3. Results and discussion

3.1. COVID-19 and oxygen supply in hospitals

Oxygen was discovered by Joseph Priestley in 1774 and has been used for treatment with a significant clinical benefit for over 100 years. However, it is still not extensively available in LMICs which are one of the causes of death due to lung disease [16–18]. World Health Organization (WHO) included oxygen as a necessary medicine and probably the only drug with no alternative agent. Its existence sustains life and in the history of medicine, improving the basal percentage of oxygen has enhanced some health states, improved outcomes, as well as saved lives. Despite the underlying role of oxygen to healthcare, it is often ignored, particularly in low-income countries [17]. Typically, hospitals cannot manufacture oxygen in many low-resource countries, and heavy tanks of gas are frequently shipped huge distance from factories or imported from other countries. According to some

limited surveys for USAID, only 2 %, 8 % and 7 % of healthcare service providers have Oxygen in Congo, Tanzania and Bangladesh respectively [19]. There are some deaths of COVID-19 patients have been happened in Egypt, India, Pakistan, Russia etc. [20–23]. In addition, many patients severely sick with Covid-19 and need assistance with breathing to some extent. Furthermore, WHO reports that at the present rate, the world requires about 620,000 cubic meters of oxygen per day, which demands about 88,000 large cylinders [24].

In wealthier countries like different countries of Europe and North America, Oxygen flows free all the way through hospitals and patients' bed is directly connected by a pipe. However, a scarcity of the lifesaving gas has already led the number of deaths due to COVID-19 in different developed countries [19]. COVID-19 patients in serious condition and place on ventilators demand higher flow rates of Oxygen [12]. Nevertheless, in developing countries, facilities are scarce even it is costly, which creates a massive challenge for government-funded medical hospitals [19]. Although it is a treatment that is an essential requirement to save the lives of seriously Covid-19 affected patients, however, it is often seen the lacking of Oxygen tanks in several hospitals of low- and middle-income countries [12] and recently observed in other countries such as India.

To reducing the COVID-19 related deaths, it is very much essential to give the priorities for importing or enhancing the capacity of storage of Oxygen in low-and middle-income countries rapidly. Health authorities should ensure that oxygen equipment is available for gasping the breath of COVID-19 patients. Already, WHO is backing numerous countries to purchase equipment that will facilitate them to produce their concentrated Oxygen in higher amounts [24]. Many hospitals of several countries have inadequate equipment as well as lack the ventilators, tanks and other equipment badly needed to save patients whose lungs are failing. Therefore, more national and international collaborative supports are urgently necessary for LMICs to ensure that all medical facilities should have an adequate level of oxygen supply to meet the accelerating demand due to COVID-19.

3.2. COVID-19 and vaccination coverage

The COVID-19 vaccination is designed to provide protective immunity against SARS-CoV-2 and to prevent serious as well as life-threatening illnesses, hospitalization, and fatality. Various COVID-19 vaccines have shown up to 95 % efficacy in stopping symptomatic COVID-19 infections to date [7]. The infection rate, as well as mortality, is observed to be higher in LMICs. Furthermore, vaccination supply and distribution differ between high-income and low-income countries [5]. Including the vaccine shortages and inequitable distribution, special limitations seen in LMICs include low vaccination awareness and hesitation, misinformation, stigma, and a lack of sufficient professionals for the population, and so on [7]. The vaccinations' accessibility to low-income countries (LICs) may be hampered, prompting numerous concerned authorities to raise concerns. It's because the majority of vaccines were seen to be held in reserve by wealthier nations [25,26]. Moreover, low- and lower-middle income countries (LMICs) continue to face challenges to care because of unequal access and vaccine hesitancy. Additionally, in low- and lower-middle-income countries, being male and believing that you are at risk of COVID-19 infection were predictors of willing to accept the vaccine [14].

Many LICs are poor socioeconomically, with a lack of education, incomes, and employment. These characteristics may have a direct impact on their people's vaccination purchasing and acceptance processes [27]. A previous study pointed out that there is no significant correlation between sociodemographic factors and the general population's definite intent to receive the SARS-CoV-2 vaccination varies depending on their COVID-19-related health beliefs [15]. Low- and middle-income counties do not have proper pricing regulations in place to enable affordable and fair access to vaccines that are urgently needed [28]. The interruption of existing immunization campaigns in

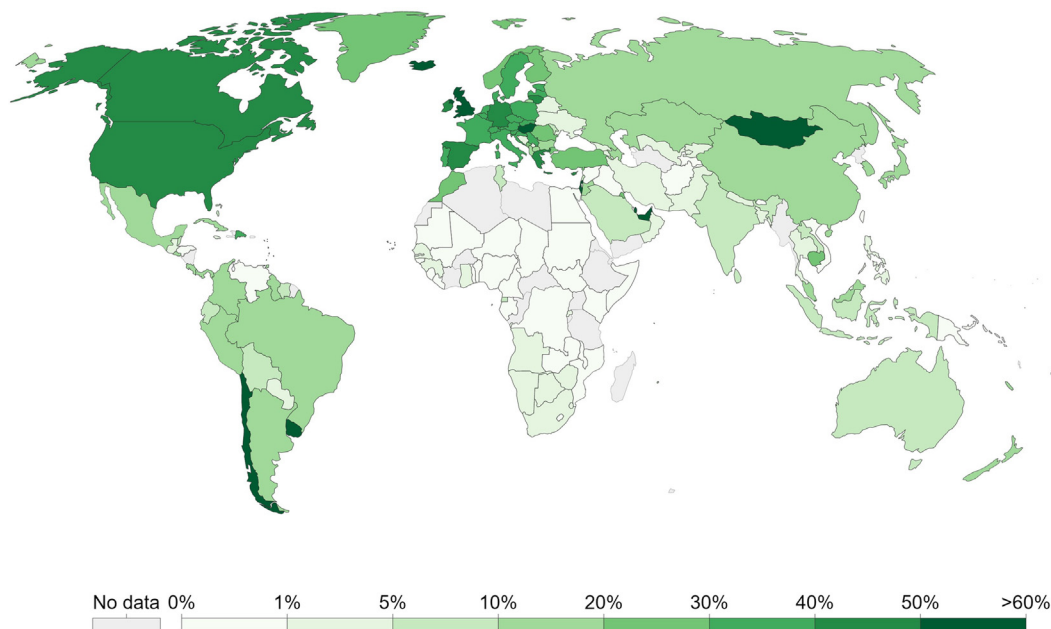


Fig. 1. Distribution of fully vaccination population by 09 July 2021 (Source: [33]).

low-income countries as a result of the COVID-19 pandemic threatens to impede recent progress against vaccine-preventable diseases (VPDs) [29]. Vaccine distribution is also challenging in rural areas and slums that are growing faster in developing countries. The efficiency, potency, and durability of vaccinations are all dependent on strict temperature controls. Due to a lack of cold chain infrastructure and modern technology to observe the cold chain for vaccine preservation, transportation, and distribution are significant issues in LICs, particularly in rural areas [27,30–32]. The following figure illustrates the distribution of the fully vaccinated population by 09 July 2021 and observed that the prevalence of receiving the COVID-19 vaccination is less than one-third of the population in LIMCs (Fig. 1) [33].

In comparison to low-income countries, the majority of vaccines have been provided in high-income and upper-middle-income countries [34]. The growing disparity between the number of vaccinated persons in high-income countries (HICs) and low-and middle-income countries (LMICs), resulting in worse pandemic control in the latter [35]. Therefore, more attention requires to be paid to challenges faced by countries at different income levels [36].

Fig. 2 illustrates the global percent distribution of COVID-19 burden (cases/million population), the number of doses procured, and population. As of data collected on 9th July 2021, it is seen that the number of cases is more in high and upper-middle-income countries than low and lower-middle-income countries. Most of the world's pop-

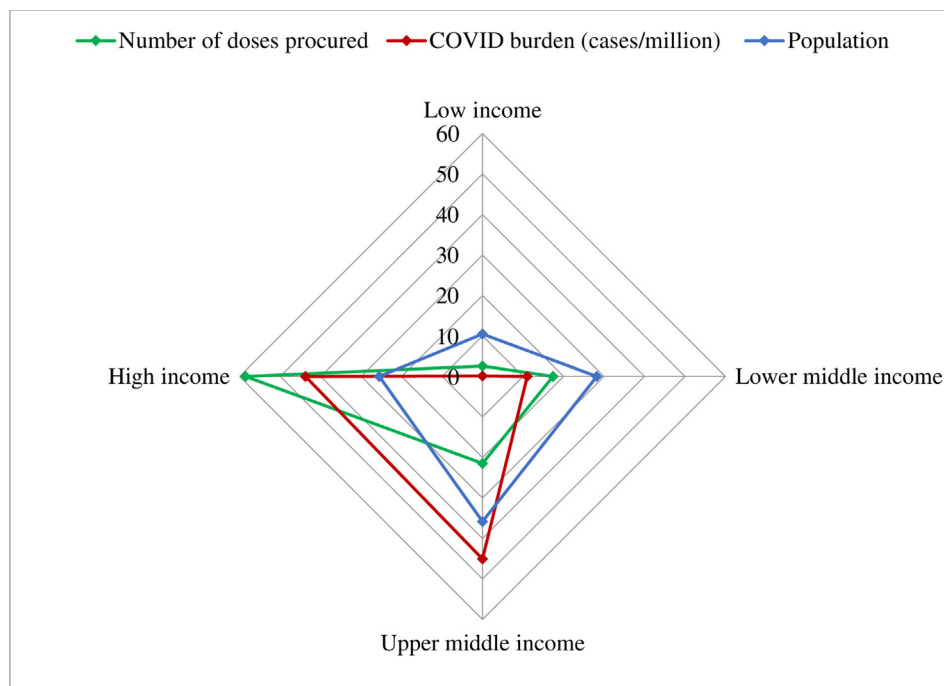


Fig. 2. Percent distribution of COVID-19 burden, number of doses procured and populations (Data Source [37]).

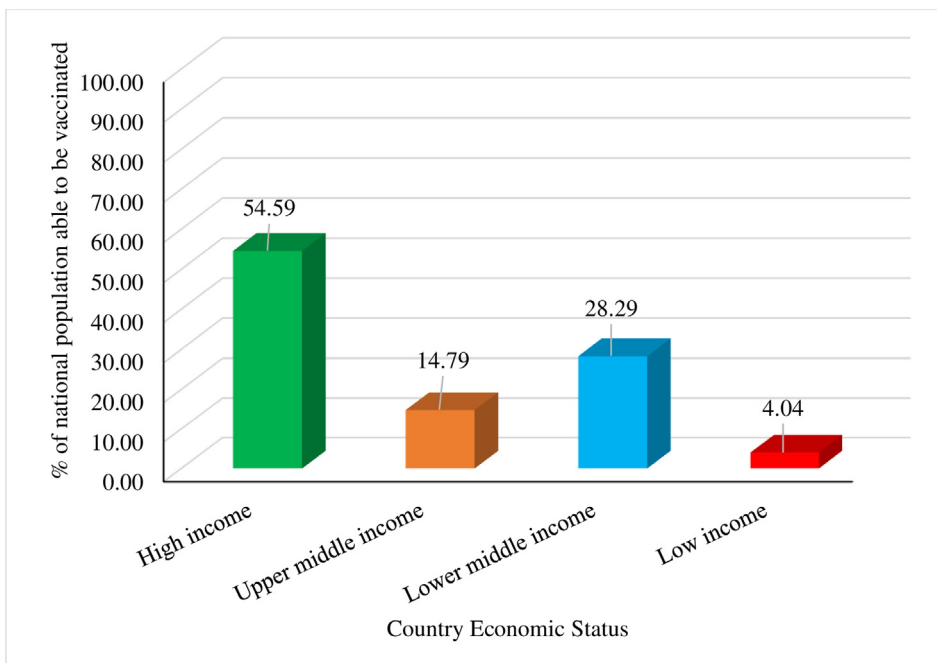


Fig. 3. Percentage of national population able to be vaccinated with doses procured (Data collection on by 07 July 2022; Source [37]).

ulation lived in upper-middle-income countries. As seen the highest number of COVID-19 vaccination is covered by the high-income countries. If we look at the scenario of upper-middle countries, there is a huge gap between the cases and the number of COVID-19 doses of vaccination. Therefore, it is necessary to pay more attention to middle and low-income countries [Fig. 2].

Fig. 3 displays the percentage of the population that may receive vaccinations with doses procured on July 7, 2022, according to the economic status of the country. In high income countries, it is noted that more than half of the population will be covered by the purchased doses, however in low income countries, just 4.04 percent of the population will be protected by the COVID-19 vaccination. In comparison to upper-middle income countries, lower-middle income countries were in a better position [Fig. 3].

Due to a lack of vaccine doses and underdeveloped healthcare systems, COVID-19 immunisation rates have remained low in low- and

middle-income countries [38]. Though previous studies highlighted that compared to higher-income countries, low- and lower-middle-income countries (LMICs) often have a higher willingness to take vaccinations [39–41]. In LMICs, the desire for personal protection against COVID-19 primarily explains vaccine acceptance, while worry about side effects is frequently cited as a deterrent [40]. A previous study suggest that to advance global vaccination coverage it should necessary to increase vaccine acceptance rates worldwide [14].

Fig. 4 illustrated the distribution of total COVID-19 infected cases by counties economic status. It is observed that by 12th July 2022, the highest percentage of COVID-19 infected cases were identified in high income countries and the lowest percentages of total infected cases in low-income countries [Fig. 4]. The identification of cases is one of the big concerns and difficulties in many nations, especially low- and middle-income nations [43]. Additionally, coexisting criteria and platforms may result in significant structural failures in the health

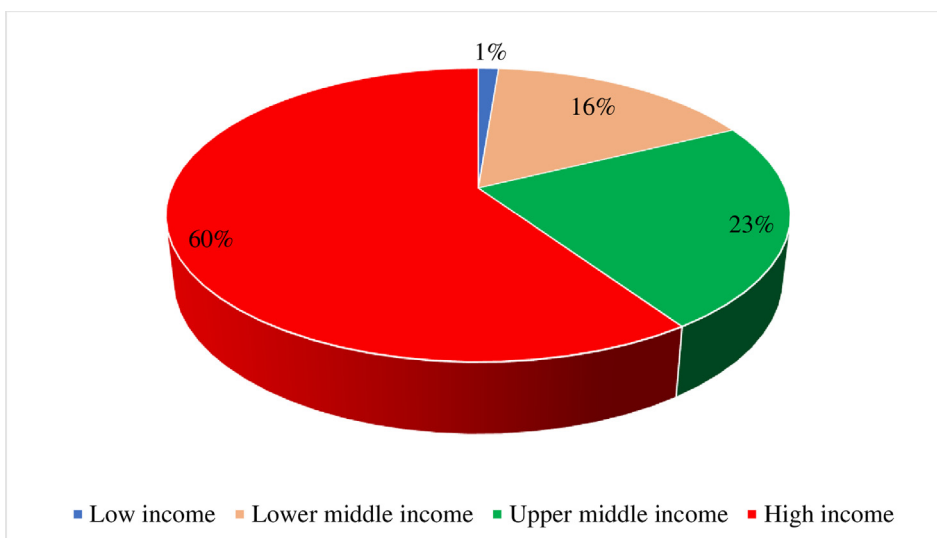


Fig. 4. Distribution of total COVID-19 infected cases (Data collection on by 12 July 2022; Source [42]).

surveillance system, leading to underreporting [44]. Therefore, the government efforts of different low-and-middle-income countries will perform a vital role in attaining global immunity to halt the spread of the virus. Moreover, the LMICs should receive assistance from high-income countries, individuals, NGOs, and other international organizations to have unbiased access to the COVID-19, which may help to get vaccines for all. These will be the best choices to combat the global ongoing pandemic.

3.3. Limitations

The findings of this study are based on secondary data and data from available countries. The authors made an effort to highlight the variations in the COVID-19 scenario amongst nations by classifying them according to their economic status. There are differences between countries, so further research is needed to ascertain the causes of these kinds of discrepancies.

4. Conclusion

Although Oxygen is a treatment that is an essential requirement to save the lives of seriously Covid-19 affected patients, however, it is often seen the lacking of Oxygen tanks in several hospitals of low- and middle-income countries. The authors discuss some circumstances including COVID-19 vaccination coverage and a lack of oxygen tanks in LMIC hospitals that increase the risk of COVID-19-related fatalities. Moreover, like many other countries, a shortage of medical personnel or equipment provide lessons that socio-political and health policy-makers can learn from this calamity is that health care services and resources are always essential for predominant health conditions and fatal diseases patients, so health system should build up some hospital care capabilities and reserves for an unusual tsunami because rare events also happen in health and biosecurity. The authors have concluded that an awareness campaign for COVID-19, hygiene, and sanitation practises is crucial before completing the whole vaccination.

Vaccines have evolved quickly, which is a great blessing for humankind, however LMICs currently have lower vaccination coverage than wealthy nations. Consequently, LMICs urgently required COVID-19 vaccines to prevent a further catastrophe because viruses have no boundaries and unless every one is vaccinated in today's interconnected world, no one is safe. Therefore, it is essential to take essential steps ensuring vaccination coverage in low- and middle-income countries in order to safe whole world. Furthermore, we should be conscious that for at least the next few years, COVID-19's overall disruptive impact won't be possible to measure. Therefore, the authors recommended that the combined efforts from high-income countries, individuals, NGOs, and other international organizations along with the government efforts of different low-and-middle-income countries will play a vital role in attaining global immunity to halt the spread of the virus and make safe the world as a whole.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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