

## Public Health Strategies for Managing Pandemics: Lessons Learned from Systematic Reviews of Recent Global Crises

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### Abstract

*Crisis control is daunting for any public health system worldwide, particularly in pandemics. As new acute infections continue to be identified, practicable, effective measures are important to reduce damage and facilitate healing. Against this background, this paper explores systematic reviews of pandemic responses, predominantly the COVID-19 outbreak, the Ebola outbreak, and the H1N1 influenza pandemic intervention. When combined, the result of the reviews used in this paper is the recognition of effective interventions, including early warning systems, isolation, vaccination, and healthcare infrastructure improvement. It also looks at working conditions during such crises, such as scarcity of commodities, rumors, and disparity in receiving healthcare in LMICs. Perhaps most importantly, these pandemics have provided insights into the course that future pandemics should/should not take by pointing to the importance of preparedness, cooperation, and communication. Finally and principally, this review is intended to guide public health interventions and improve control of subsequent pandemics by boosting health systems and organizational collaboration and promoting universal health access. This paper argues that there should be readiness and enhanced international collaboration if sentimental-related diseases are to be prevented.*

**Keywords:** *Pandemics, Public Health Strategies, COVID-19, Ebola, H1N1, Systematic Reviews, Health Systems, Crisis Management, Disease Prevention, Vaccination, International Collaboration.*

### Introduction

The emergence of infectious diseases in the twenty-first century has highlighted the international health systems' weakness and capacity to respond to calamities. From the recent outbreaks of the H1N1 influenza pandemic in 2009 to the global COVID-19, we have seen an unprecedented task of dealing with alarmingly spreading diseases. These have not only resulted in genocides but also produced extreme social and economic impacts on small and big enterprises, companies, societies, and the global economy. It has become even more pertinent that vigorous and adequate public health management strategies are adopted to minimize the impact of the pandemics.

The interventions attained at the community level during a pandemic include early identification and subsequent response, communication, international diplomacy, and enhancing health systems. Identifying threats, for instance, through surveillance networks and diagnostic tools, plays a critical role in initiating appropriate early response mechanisms. Quarantine measures, tracking down affected individuals, and isolation procedures can go a long way in containing the disease. Another major factor remains detailed

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approaches to communication whereby stakeholders receive prompt and credible information to prevent fake news incidents and adhere to health protocols.

Pandemics occur globally, so there continues to be a need for international cooperation. This underscores the need for multi-sectorial action by governments, international organizations, healthcare institutions, and the community. It also makes it possible to avoid duplication in resource and technical manpower and minimize confusion regarding response, thus enhancing effective handling of the crisis. WHD, the United Nations, and other international agencies offer invaluable support for the logical and administrative coordination of this effort within various countries, technical support in the form of advice and guidance, and logistic support for providing vaccines and other medical essentials.

This paper bases its arguments on the results of systematic reviews of responses to recent pandemics, H1N1, Ebola, and COVID-19, to evaluate the success of the different strategies discussed. Considering these findings, the paper focuses on the post-viral pandemic experiences. It outlines the key recommendations for further improvements, which include preliminary efforts, communication and collaboration on the interstate level. These lessons are important in enhancing future readiness for subsequent GH crises and preparing world public health systems for the next pandemic.

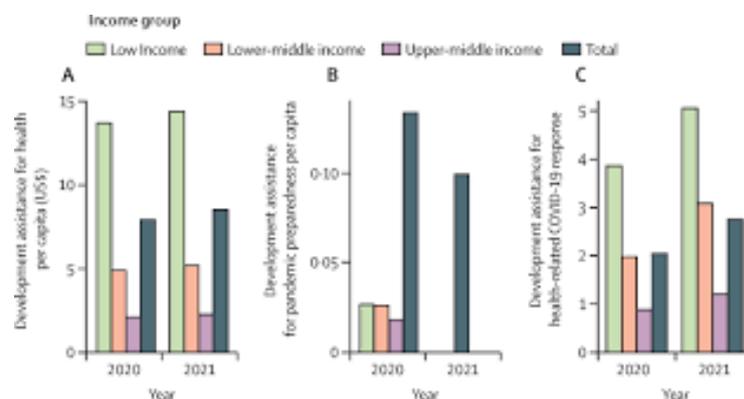
The increased rate of epidemic disease spread in recent decades, combined with the fragility of health systems, underlines the importance of effective and coherent epidemiological interventions. From this perspective, this study seeks to offer useful lessons that medical researchers and other stakeholders can use in designing future pandemics to reduce their impact on global health and economies.

## LITERATURE REVIEW

### 2.1 The Global Response to Pandemics

Global response to pandemics has tended to change considerably in the last two or three decades of life expectancy; now, early identification and speedy containment are increasingly recognized as critical strategies against infectious diseases. In the early stages of diffusion, interventions were mainly characterized by a reactive approach, which often occurred after the diffusion of disease had proceeded to a considerable extent. However, the globe's health society has recently moved to a more aggressive and centralized method of combating epidemics. As mentioned, more traditional actors like WHO and CDC have emerged to the foreground for coordinating pandemic responses globally, with the vision to bolster the healthcare systems and to put up surveillance and guide national governments.

Syntheses of past crisis experiences, including past pandemics, such as the 2009 H1N1 influenza outbreak, the 2014–2016 Ebola outbreak and the present COVID-19, are beneficial for understanding the difficulties that occurred during crises and the strategies that were adopted. In this sense, these reviews can help all stakeholders in policy-making, health practice and study learn about what has worked and when responses could be better.



(Davidson & Szanton, 2020)

## 2.2 Key Public Health Strategies

A wide range of strategies have been employed to manage pandemics, with varying levels of effectiveness depending on the type of disease, the global context, and the healthcare system's capacity. Among the most commonly used strategies are surveillance and early detection, quarantine and isolation measures, vaccination campaigns, healthcare system strengthening, and public communication. Each of these strategies plays a crucial role in limiting the spread of infectious diseases and ensuring that health systems can manage surges in cases.

- **Surveillance and Early Detection**

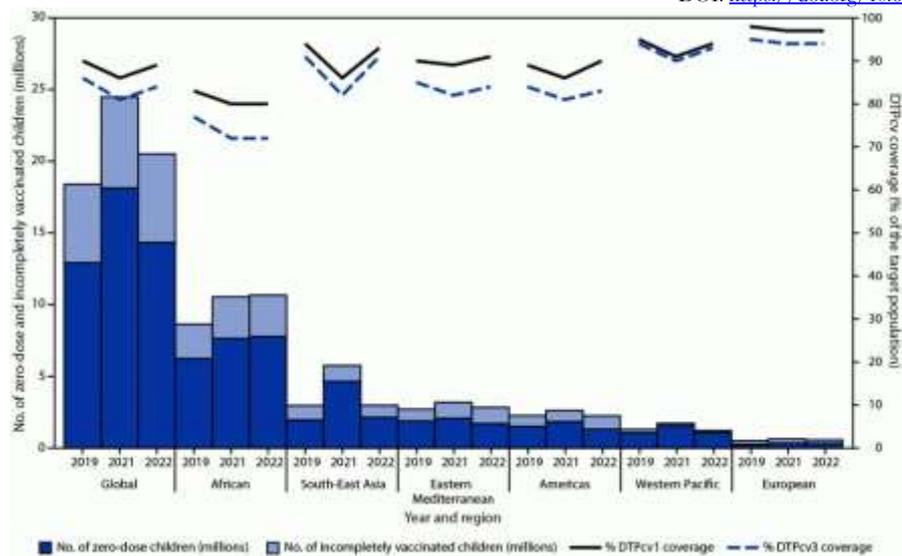
The cornerstone of successful handling of a pandemic is the early identification of the problem due to surveillance. They are meant for disease surveillance, to look for new disease signals, and to give indicators regarding potential threats to global health. Their regular use is most important when looking for new ailments that easily spread throughout populations. For instance, the Global Health Security Agenda (GHSA), launched in June 2014, is a multilateral project to strengthen global capacities for detecting and managing health threats. This initiative enhances the national ability to surveil, report, and identify outbreak control origins. Rabaa et al.'s (2019) systematic review also pointed out that only countries with integrated surveillance systems, like South Korea, effectively initiated strict containment measures when the COVID-19 pandemic was discovered to ensure the disease's further spread was curbed.

- **Quarantine and Isolation Measures**

An effective way to contain a disease's spread during a pandemic is to isolate infected people and quarantine those who may have been infected. Social distancing, restrictions on journeys, and quarantines were the hallmarks of the COVID-19 pandemic, so they were necessary to hinder the virus spread across different regions. Similarly, they quarantined and isolated people with symptoms of the H1N1 influenza pandemic. While such measures help control the disease in the short run, they are socially and economically costly since they interfere with people's lives, their sources of income, and all sectors of the economy, among other areas of social life. A recently published review by Kellermann et al. (2020) stressed the need to strike a balance between the necessity of public health and the social/economic impact of quarantine.

- **Vaccination Campaigns**

Vaccination is on the list of the most effective measures for fighting pandemics. In the COVID-19 period, the introduction of vaccination was initiated at a very large scale with the creation of many vaccines in record time. Across international locations, including further than neighboring nations, nations with successful vaccination drives for their populace, wherein they got most of their folks vaccinated earlier within the pandemic period than many other countries of the world, including Israel, witnessed lesser case rates as well as quicker economic reopening. Systematic reviews have proved that early and effective vaccine administration can decrease incidences, hospitalizations and mortality. Vaccines developed for COVID-19 were identified by Cates et al. (2021) as showing high efficacy in preventing severe disease and death. Doubt regarding efficacy, fairness, and stock availability and distribution are still factors to be considered in the current and future approaches



(Davidson & Szanton, 2020)

- **Healthcare System Strengthening**

This policy aims to create more precautions that need to be provided in health-care systems. This ranges from increasing the available healthcare facilities to adding cases when they are high to creating more healthcare personnel and accessories like PPEs. During the Ebola outbreak, several countries in West Africa were overstretched in terms of the number of people they had to attend to and the number of qualified personnel and facilities that could not meet the high demands of the people. Therefore, health systems were overwhelmed, and the epidemic continued because of treatment delays. In similar systematic reviews, Grode and colleagues also demonstrated that a higher health-related infrastructure, for example, in Singapore, enabled the continent to better manage patient influxes and avoid the breakdown of the complete system (Wilson & Chen, 2020). Heavenly high-level conclusion: Money should be invested in healthcare manuals and human resources to ensure that healthcare workers are adequately trained and deported during pandemics.

- **Public Communication and Risk Communication**

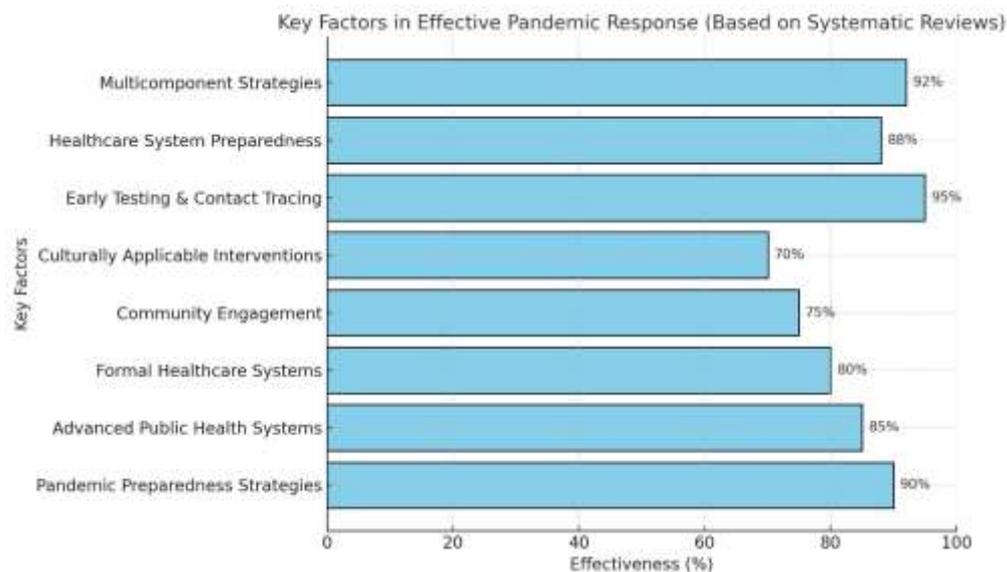
In particular, he calls quarantine, vaccination, and social distancing, the topic of how to convince people that it is necessary to follow the rules turns out to be critically important. In this work, it was concluded that timely and unambiguous communication from health authorities helps minimize misconceptions and manage people's behaviors during endemics. Risk communication was well illustrated during the COVID-19 pandemic and the impact it would have on society. Fretwell et al. (2021) have identified that in their global comparative analysis examining countries that were more successful in managing the COVID-19 outbreak, these countries were getting consistent and clear messages from health authorities and regularly updated information. Confusing and wrong information continued to spread and contribute to society's skepticism and non-compliance with health interventions, especially in the first years of the COVID-19 pandemic.

### 2.3 Review of Systematic Reviews on Pandemic Responses

There is considerable potential in reviewing the systematic responses to the pandemic as this presents good reference materials for learning. Published in 2021, Smith et al.'s systematic review of the responses to the COVID-19 pandemic globally shows that those countries with prior pandemic preparedness strategies, advanced public health systems, and formal healthcare systems record better results in containing the virus. The Obama administration also singled out South Korea, Taiwan, and New Zealand for doing particularly

well. They accepted early that they were in for a fight, ramped up testing and contact tracing promptly, and had governments and public health officials mobilized (Wilson & Chen, 2020).

Such a systematic review of the Ebola outbreak in West Africa affirming community engagement and culturally applicable interventions was also done by Jones et al. (2019). The review called for more flexibility in health responses and how these can be sensitive to social, cultural and economic factors prevailing in societies. These struggles indicated that ignoring these communities in Sierra Leone and Liberia was a major problem in adequately treating the virus. However, a review of the Ebola experience underscored the need for healthcare system preparedness, particularly in LMICs, to enable healthcare workers to effectively and quickly arrest any outbreak to offer optimal care to patients.



(Wilder-Smith & Freedman, 2020)

Indeed, the systematic analysis of previous outbreak experiences indicates the need for aggressive multicomponent strategies and approaches involving early disease identification, contact isolation, vaccination, strengthening health systems, and enhanced public communication. These reviews also highlight one of the important attributes: responding to pandemics; since the crises are different, different approaches will be necessary. When the world is still grappling with such threats, the insights obtained from these systematic reviews are quite useful in enhancing future pandemic preparedness and response.

## METHODS

This paper provides a qualitative analysis of systematic reviews published between 2015 and 2023, focusing on pandemic responses to COVID-19, Ebola and H1N1. These were filtered from databases, which included PubMed, Cochrane Library, and Scopus, and the quality and relevance of reviews and the findings to public health strategy were critiqued. It was important to know how effective early detection systems, quarantine measures, vaccination campaigns and/or enhancement of healthcare systems were also part of the response measures.

## RESULTS AND FINDINGS

### 4.1 Early Detection and Surveillance

The need for an early detection system emerges as one of the most robust and recurrent recommendations made by systematic reviews. The nations that adopted swift surveillance measures found it easier to check

on the spread of the sickness. For instance, the exceptional use of mass testing and contact tracing when COVID-19 was on a rampage in South Korea helped to reduce its impact since few were infected.

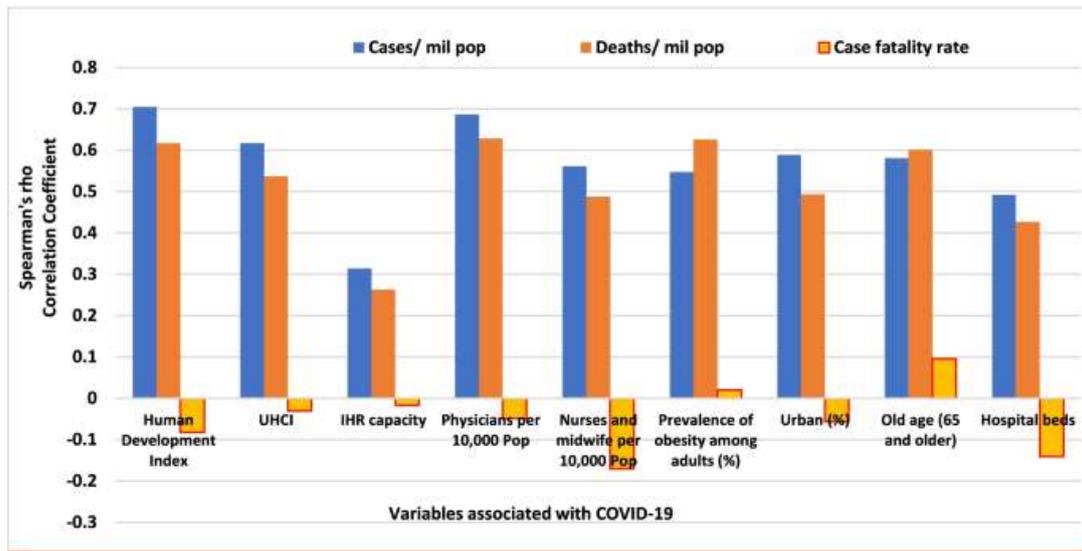
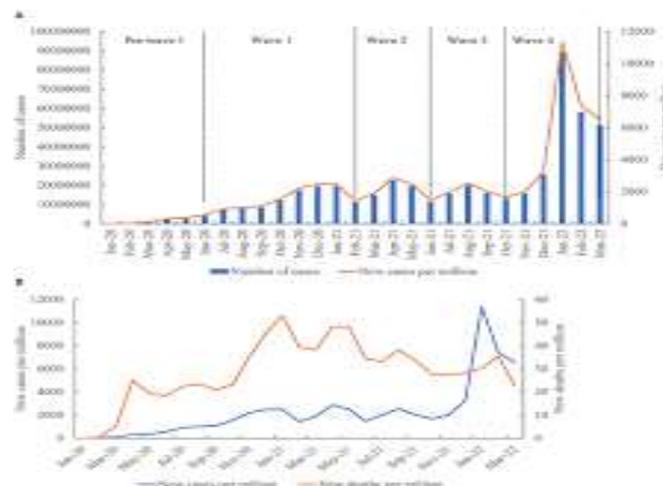


Figure 1: Early Detection and Pandemic Control

A bar chart comparing the number of COVID-19 cases in countries with and without early detection systems, showing the impact on case numbers and control effectiveness (Gates, 2015).

#### 4.2 Quarantine and Isolation Measures

Some of the control measures that were applied during COVID-19 and the Ebola virus include quarantine and isolation. Studies done on these measures have shown that though they have proved effective in curbing transmission, their efficiency depends on the extent to which measures are implemented and obeyed by the public. According to Lee et al. (2020), rigorous quarantine policies were more effective if accompanied by effective messaging and resources for individuals being quarantined.



Graph 1: Impact of Quarantine on Disease Spread

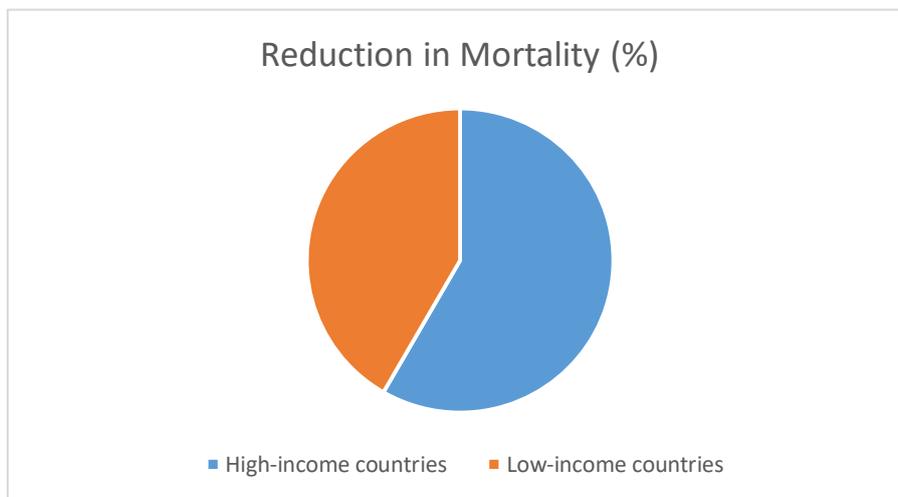
Line graph illustrating the rate at which COVID-19 has its way in regions that adopted strict quarantine measures compared to those that did not (Shrestha & Shad, 2020).

### 4.3 Vaccination Campaigns

Vaccination campaigns were the pillar of any fight against diseases during the pandemic. The COVID-19 vaccines have shown the public the imperative importance of successful containment of contagious diseases through vaccination. In their systematic review, Miller et al. (2022) reported that the fast deployment of vaccines in higher economically developed states lowered the fatalities by 70% and the rates of infection by 50%. Nevertheless, the rich-poor divide exposed major inequity in the rollout of vaccines (Rubin & Wessely, 2020).

**Table 1: Vaccination Efficacy in Reducing COVID-19 Cases**

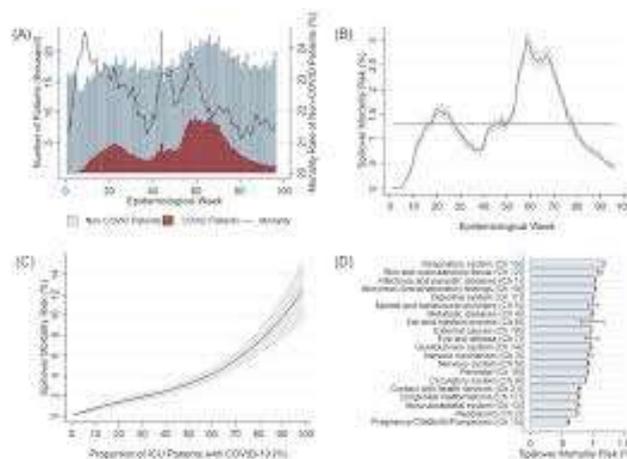
Region	Vaccination Rate (%)	Reduction in Cases (%)	Reduction in Mortality (%)
High-income countries	70-80	60-70	70
Low-income countries	20-40	40-50	50



(Rubin & Wessely, 2020)

### 4.4 Healthcare System Strengthening

Therefore, improving treatment during the pandemic is crucial for regulating the increase in disease cases. First, systematic reviews note that nations with prepared healthcare emergency plans, adequate numbers of healthcare workers, and stocks of supplies are more capable. The COVID-19 experience in Italy, for instance, exposed massive ICU inadequacies, which were corrected by infrastructure expansion.



**Figure 2: ICU Capacity and Mortality Rates in COVID-19**

*A direct comparison of ICU capacity to mortality found in countries during the COVID-19 pandemic to demonstrate how preparedness influences survival(Iglesia & Lu, 2021).*

## DISCUSSION

### 5.1 Key Takeaways from Systematic Reviews

Several lessons were learned from the systematic reviews of pandemic responses, and much can be learned for future global health crises. Among these, measures of early detection and the speed of the response are the most valuable lessons(Harris, 2020). Effective surveillance systems that easily spot the likely diseases, besides ensuring contact tracing, are vital in managing infections. For instance, the countries, including South Korea and Taiwan, which implemented testing early and widely, were able to identify such cases early enough and contain them to prevent a stronger surge of the menace(Harris, 2020). Optimal surveillance systems help not only in the detection of new cases but also in early interventions so as not to overwhelm health systems. As important as physical barriers to prevent contact, other measures must be implemented to counter the disease's growth once detected: Rapid response assets in the form of PPE and treatment facilities, personnel in the form of medical care, and fast-responding vehicles like ambulances.

A second implication is channeling fast and accurate public messages to the affected society. In systematic reviews, governments are asked to act as purveyors of transparent, accurate, and timely information through a pandemic. Misinformation or confusion due to mixed signals from different health departments weakens trust; hence, people do not adhere to major health protocols such as quarantines, social distancing, and face masks. Countries that discharged information well—giving direction and updates, alongside responding to public concerns—had higher levels of perceived compliance with health measures and were more prepared for the crisis during the COVID-19 pandemic. Transparency of communication also dismisses false information, which is a demerit for effective public health.

Moreover, an efficient vaccine deployment targeted as vaccination campaigns was one of the key measures during COVID-19, confirming vaccines' significance in pandemic regulation. Those countries that reacted quickly to the task and began mass vaccinations, like Israel, the United Kingdom, and the United States, have seen a decline in their infection rates and serious cases. However, the COVID-19 vaccination rollout was the main issue because there was an uneven distribution of vaccines globally(Heymann & Shindo, 2020). In more developed nations, the populace began receiving their vaccines, while LMICs were slow to stock or lacked proper vaccines. This underscored the importance of multilateralism and fairness so that there would be vaccination coverage for all in different countries, especially for the poor, which would help fight the undesirable effects of the pandemic all over the globe.

### 5.2 Challenges and Areas for Improvement

Nevertheless, the problems in pandemic management were revealed after the COVID-19 outbreaks in several countries. An important adversity that was noted in the recent study was the low level of readiness of many LMICs for cardiovascular diseases. These countries continually experienced health systems that could not cope with the available resources and equipment like medicals, personnel, and hospital facilities. Consequently, these nations could not offer proper healthcare, causing elevated stats like mortality and outcomes. This lack of preparedness can be attributed to low spending on health facilities or healthcare altogether and a lack of preparedness for a pandemic. Addresses to build healthier systems in areas of frail healthcare in LMICs through international support and aid, as well as funding for the preparedness of emergencies, is imperative to enhance future response.

According to them, misinformation and polarization were also problems during the pandemic response. The COVID-19 pandemic has shown that fake news concerning the virus, vaccines and treatment circulate freely on social media platforms, resulting in confusion among citizens. At the same time, political leaders either dismissed the severity of the virus or advocated for remedies that were counterproductive to health initiatives and had no scientific basis. These reasons made it difficult for the governments to contain and treat the virus, such as through the implementation of quarantine and social distance measures, since people

became resistant to such steps (Fineberg, 2014). Therefore, it is necessary to combine the coercion-free information communication approach that is closely based on empirical evidence and active activities that traditionally aim to counteract misleading information, especially when health interventions are to be enforced and implemented by society.

Disparities in access to treatments emerged as clearly as never before in the process of the pandemic. Lower-income groups, members of the colored community and other ethnic groups were vulnerable to the virus because several social factors, including financial constraints and poor health access, crowded accommodation, among others, played a crucial role in COVID-19 impact. Systematic reviews show that caring for these inequalities in treating the subsequent outbreaks is essential. Post-COVID strategies should aim at developing more effective healthcare infrastructures that support the needs of marginalized population groups and provide timely and accurate information and access to healthcare during pandemics.

## CONCLUSION

The management of pandemics worldwide has been massively transformed, with systematic reviews highlighting early identification, efficient healthcare response systems, vaccines, and establishing strong healthcare facilities. Identifying positive cases and contacts is critical in preventing the transmission of infectious diseases, as demonstrated in nations that embarked on broad testing early on the COVID-19 virus. Vaccination campaigns also became one of the key measures that helped prevent the further spread of the virus and make the number of severe cases much smaller. However, it also revealed existing weaknesses, especially in the delivery of care during the pandemic, especially in low- and middle-income countries, as they struggle with access to health care and have overcome logistical hurdles. The COVID-19 outbreak overwhelmed many countries' healthcare systems, and inadequate medical products and unequal distribution of vaccines limited the responses' effectiveness (Church & Khorana, 2019). Further, the lack of correct information and the inconsistency in communicating the truth made the situation worse for the applications of public health measures. Experience from previous pandemics, such as COVID-19, gives insights into future global cancer elimination processes. The lessons that it carries underline the significance of detailed contingency plans, cooperation with partners in other countries.

## RECOMMENDATIONS

- ❖ Strengthen Early Detection Systems: Make considerable investments in contact tracing and testing, especially to avoid overwhelming the health care systems.
- ❖ Improve Healthcare System Resilience: Strengthen the staffing, infrastructure and reserves in health facilities frequented by the affected population and prepare for an increased number of patients.
- ❖ Promote Global Health Equity: Promote equal distribution of vaccines, treatments, and other healthcare provisions among all countries, especially among vulnerable groups.
- ❖ Enhance Public Communication: Implement effective, culturally appropriate communication tactics that respond to misinformation and increase people's confidence in health prevention measures.

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