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## Review Paper

## Factors influencing international collaboration on the prevention of COVID-19

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## ARTICLE INFO

## Article history:

Received 18 March 2022

Received in revised form

20 August 2022

Accepted 29 August 2022

Available online 9 September 2022

## Keywords:

Collaboration

Cooperation

Coordination

Prevention of COVID-19

Coronavirus

Global

International

## ABSTRACT

**Objectives:** COVID-19 has spread rapidly throughout the world, which has highlighted the importance of collaboration between countries to prevent further transmission of the virus. This review aims to identify the factors that influence international collaboration between policymakers for COVID-19 prevention and consider strategies to manage pandemics in the future.

**Study design:** A scoping review was conducted using the Arksey and O'Malley framework for scoping reviews.

**Methods:** A literature search was performed across PubMed, Google Scholar, Scopus and Embase databases using relevant keywords. The initial search identified 1010 articles; after selection criteria were applied, 28 studies were included in the review.

**Results:** Most of the selected articles were literature reviews, and China had the greatest contribution of articles to this study. The following seven key categories influencing international collaboration were identified: political, structure, infrastructure, leadership and governance, knowledge and information sharing, community engagement, and process/action.

**Conclusion:** Leadership and governance was the most important factor identified in international collaboration between countries. In addition, knowledge and information sharing were seen to help avoid repetition of negative situations experienced in other countries. Moreover, controlling COVID-19 on a global scale is more likely to be achieved when there are sufficient structures and resources and when appropriate communication between countries, health systems and communities is used. This collaboration can also greatly benefit low- and middle-income countries where resources and expertise are often limited.

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## Introduction

The COVID-19 pandemic has spread rapidly throughout the world over the last 2 years. According to the World Health Organisation (WHO), as of February 2022, there have been more than 396 million confirmed COVID-19 cases worldwide and more than 5

million deaths.<sup>1</sup> In addition to COVID-19 spreading rapidly, 12 new variants of the disease have been identified by the WHO and the Centers for Disease Control and Prevention, necessitating a global prevention strategy.<sup>2</sup>

Current global policies seek to reduce the spread, morbidity and mortality, as well as prevent the harmful side-effects of COVID-19 through various means, including prompt testing and treatment of patients, travel restrictions, contact tracing, quarantine measures and cancellation of events involving large gatherings.<sup>3</sup>

Global health can be thought of as a notion (the current state of global health), an objective (a world of healthy people, a condition of global health) or a mix of scholarship, research and practice (with many questions, issues, skills and competencies).<sup>4</sup> There are six

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types of cross-border flows that both threaten and provide opportunities for improved health globalisation: environmental elements, people, goods and services consumption, information, knowledge and culture, and transnational rules.<sup>5</sup>

In addition, there are five metaphors that can be applied to global health. The first metaphor is global health as foreign policy. The second metaphor, global health as security, is where health policy seeks to protect one's own population. Third, global health as charity involves the promotion of health as a key element in the fight against poverty. In the fourth metaphor, global health is seen as an investment and involves the use of health as a means of maximising economic development. The final metaphor, global health as public health, seeks to decrease the worldwide burden of disease, with priority given to those risk factors and diseases that make the greatest contribution to this burden.<sup>6</sup> The fight against COVID-19 requires this final approach.

The transcontinental spread of COVID-19 has shown the interconnectedness of the world and hence the importance of collaborations between countries internationally. There are many reasons for cooperation, three of which include (1) greater relations between countries and increasing collective health risks, (2) the rapid spread of diseases justifying the need for global communication, and (3) accelerating global learning and progress by sharing knowledge and experience.<sup>7</sup>

Collaboration is contributed to by multiple founders at several levels, beginning with the participation of diverse countries in multilateral organisations, such as the WHO, where the World Health assembly provides a platform for sharing the best practices, debating healthcare reforms and pledging support for collective resources. The launch of the WHO COVID-19 Solidarity Response Fund, the External WHO Foundation and the Accelerator to COVID-19 Tools (ACT) has helped the entire world with the technology, accessibility and availability of diagnostic tests, medications and vaccination against COVID-19.<sup>8</sup>

Achieving success in tackling the COVID-19 pandemic requires strong leadership and health advocates to forge both intercontinental and transcontinental alliances. This can be made possible by linking the COVID-19 pandemic response strategies to existing structures for better healthcare delivery. Increased investments to research would enable the study of the disease in more detail and develop scientific collaboration through the involvement of international networks.<sup>9,10</sup> Thus, this review aims to identify the factors that influence international collaboration between policymakers to prevent the spread of COVID-19 and consider strategies to manage pandemics in the future.

## Methods

This scoping review was conducted to explore the factors influencing international collaboration in COVID-19 prevention. This review aims to identify current progress, existing evidence and key concepts and identify gaps in the literature.<sup>11,12</sup>

### Research design

The Arksey and O'Malley methodological framework for scoping reviews<sup>12</sup> was used to derive the research design. This framework consists of six key components: identification of research questions; identification of related studies; study selection; charting the data; collection, summarising and reporting the results; and optional expert consultation (not conducted in our study).<sup>13</sup>

### Research questions

The following research questions were chosen on agreement with all the contributing authors:

1. What are the factors that influence the international collaboration to prevent COVID-19?
2. What has been done so far regarding COVID-19 prevention?
3. What can be done?

### Identification of related studies

The initial keywords were chosen based on a search in PubMed and Google scholar databases. The final combination of terms included communication, collaboration, cooperation, coordination, prevention of COVID-19, SARS-CoV-2, coronavirus, outbreak, international, global, WHO, governance and one health approach. Four databases were searched (PubMed, Google Scholar, Scopus and Embase) with no restriction on starting date. The Scopus search strategy is provided in [Table 1](#).

### Study selection

Relevant studies were screened by two reviewers (M.N. and S.D.) according to the following inclusion criteria: studies published in English, studies mentioning data pertinent to research questions, and full-text availability. Discrepancies were resolved on agreement of both reviewers. Full articles that did not fulfil all the inclusion criteria were excluded.

In total, 1010 articles were identified using the keywords; initial screening resulted in the exclusion of 545 studies. In the title and abstract screening stage, a further 349 articles were excluded due to irrelevance to the topic, and 88 articles were excluded as they did not answer the research questions. After full-text screening, 28 articles were selected for the current review ([Fig. 1](#)).

### Collection, summarisation and reporting of results

In a scoping review, an overview of the existing studies is provided irrespective of the quality of the studies included.<sup>14</sup> The present study reports the available information on the factors influencing international collaboration in the prevention of COVID-19.

The data were analysed using the Braun and Clarke's six-step thematic analysis method. This includes familiarity with the data, identifying the source code, searching for themes, reviewing themes, defining themes and reporting.<sup>15</sup>

## Results

This review included 28 articles; the majority being review articles ([Fig. 2](#)). In terms of country of origin of the included studies, most were published in China (six papers), Canada (five papers), and the United States (three papers; [Fig. 3](#)).

Seven categories influencing international collaboration in COVID-19 prevention were identified, as follows: (1) political, (2) structure, (3) infrastructure, (4) leadership and governance, (5) knowledge and information sharing, (6) community engagement, and (7) process/action.

### Political

Political commitment<sup>16,17</sup> and regulations<sup>18–20</sup> are necessary to address pandemic needs in the long term. Enforced rules improve accountability through inclusive participation.<sup>21</sup> In addition, a pandemic response built on global diplomacy, including strategic global health, vaccine and science policies, which can lead to both political and economic benefits, advancing development, health security and justice, has been identified.<sup>22</sup>

**Table 1**  
Scopus search strategy.

Query
TITLE-ABS-KEY ((communication OR collaboration OR cooperation OR coordination) AND (prevention of COVID-19 OR SARS COV 2 OR coronavirus OR outbreak) AND (international OR global OR who governance OR one health approach))

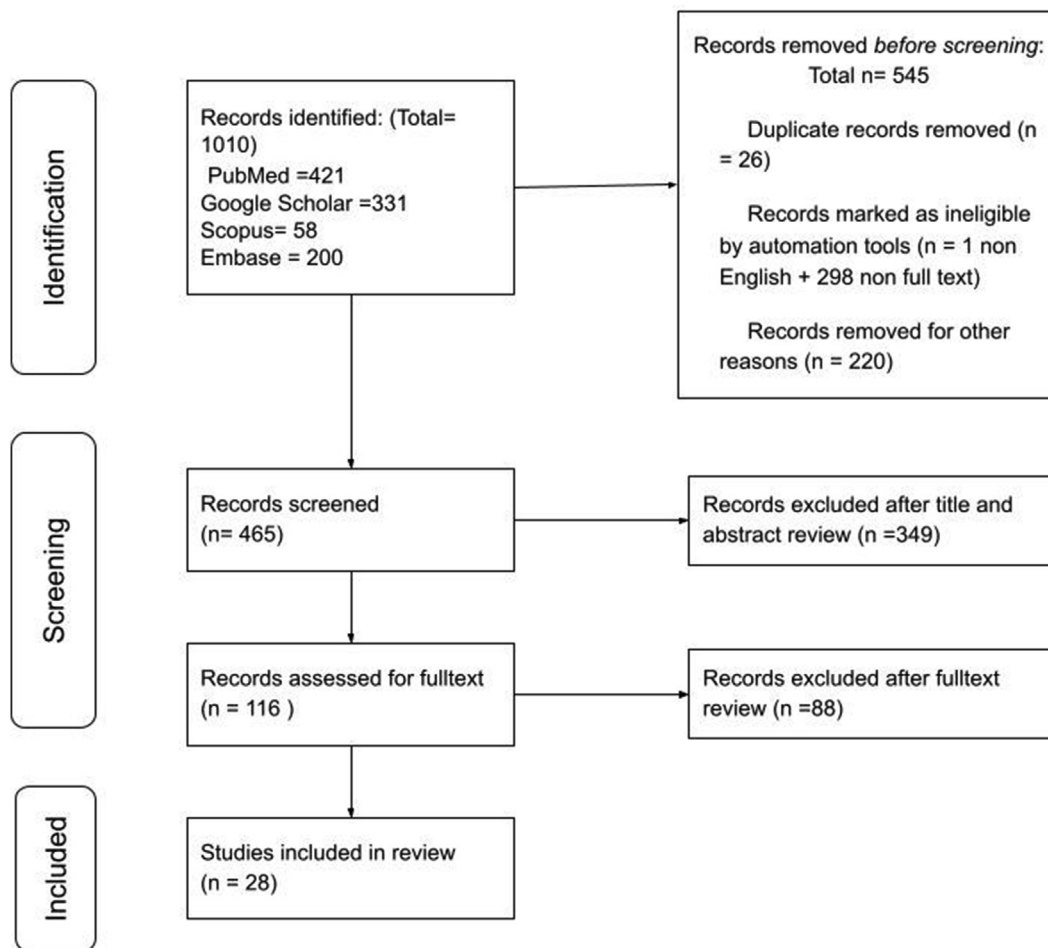


Fig. 1. PRISMA flow diagram.

**Structure**

A strong government structure,<sup>17</sup> a long-term mechanism for cooperation<sup>18</sup> and global or regional alliances<sup>23</sup> can all help to maximise the impact on sustainable development and support immunisation agendas and activities.

**Infrastructure**

The major personal protective equipment (PPE) shortage in healthcare facilities, particularly the lack of resources in low-income settings,<sup>24</sup> should be addressed by strengthening coordinated international efforts. Building human and physical capacity, strengthening regional manufacturing,<sup>19</sup> price adjustment, shipment, resource supplement, personal training<sup>25</sup> and pharmaceutical availability<sup>26</sup> are all long-term issues that must be addressed systematically. Partnerships can also help in the global supply and transition of affordable vaccines through different supporting programmes (e.g. Gavi/polio<sup>23</sup>). Long-term and sufficient

financing<sup>17,27</sup> and the sustainability of an early warning system are also required.<sup>28</sup> Health systems must start “shifting their focus from reactive sick care to the proactive management of health”.<sup>29</sup>

**Leadership and governance**

Planning and guidelines<sup>29–33</sup> are needed for good leadership and governance. Enforced rules and improved accountability are principles of good governance.<sup>21</sup> Also, by building capacity and establishing collaborative platforms, improvements and facilitated international coordination can be achieved.<sup>24,27,34,35</sup> Developing support among international organisations requires managers, coordinators and decision-makers from different international organisations to cope with international issues using well-developed technical advantages.<sup>36</sup> Additional examples include human solidarity<sup>37</sup> through electronic patient monitoring and telemedicine programmes to support colleagues around the world and provide the necessary expertise and continuing mobilisation<sup>38</sup> of vaccines to low- and middle-income countries (LMICs).

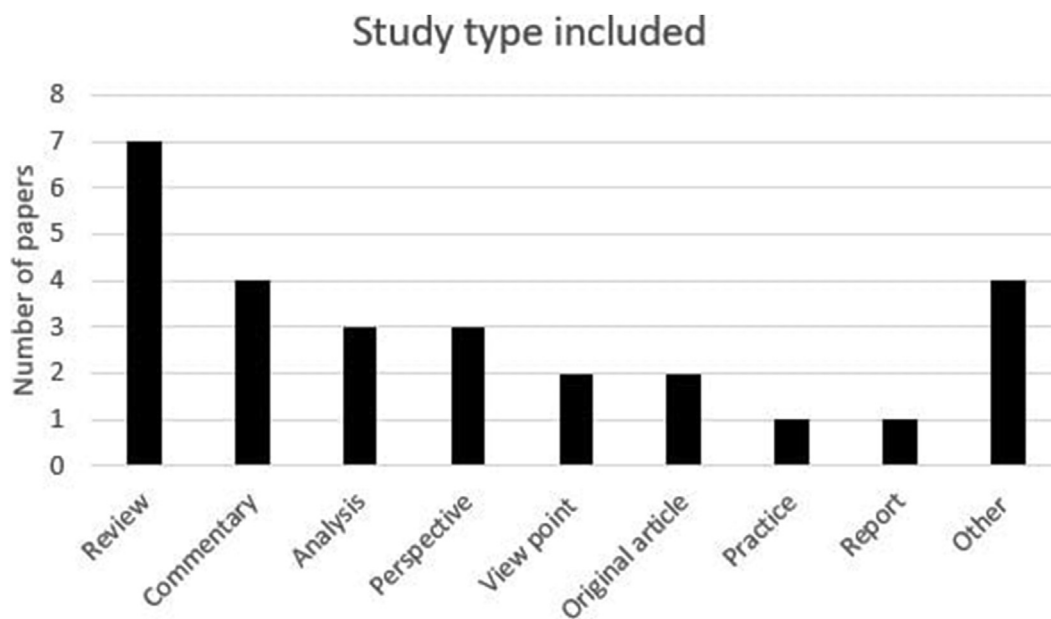


Fig. 2. Study type included in the review.

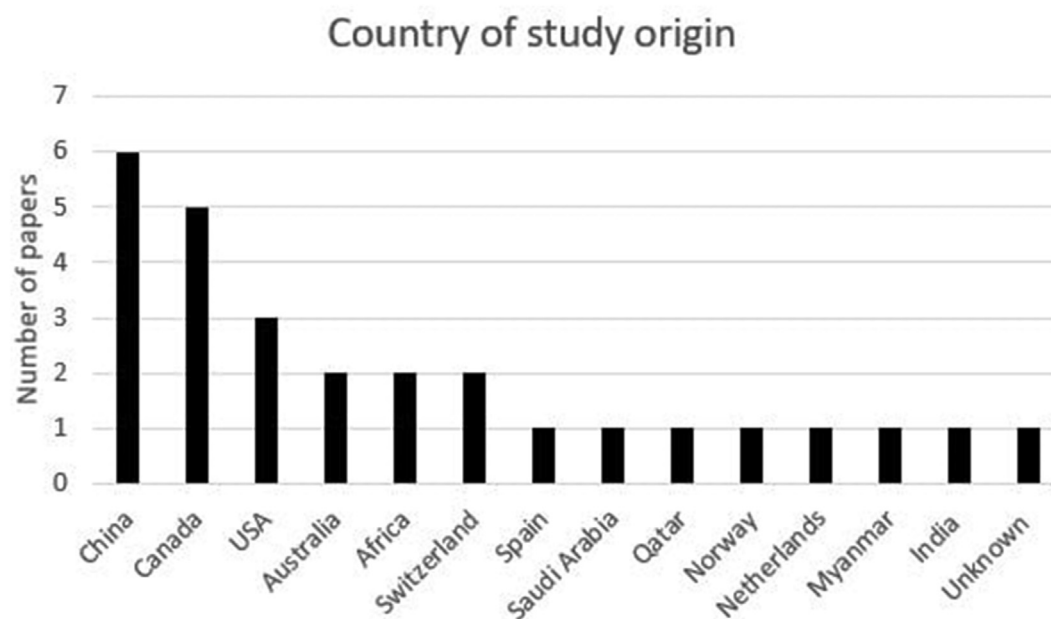


Fig. 3. Country of origin of the included studies.

However, rather than expressing a shared vision for a common future,<sup>16</sup> some countries are now undermining global cooperation through rising nationalism, open hostility toward multilateral institutions and a growing tendency to look after their own interests (e.g. rushing to secure supplies of potential COVID-19 vaccines), which is why global leadership and governance is required.

*Knowledge and information sharing*

This review underlines the vital role of the international research community, from the implementation of diagnostics and contact tracing procedures to the collective search for prevention measures.<sup>28,39</sup> This is achievable through worldwide collaboration

and rapid dissemination of trustworthy information that is critical to mitigating harm to population health<sup>37,40,41</sup> and by reliable communication through the media.<sup>24</sup> It is also essential to facilitate international cooperation in LMICs to efficiently answer priority clinical research questions<sup>35</sup> and help complete trials<sup>42</sup> quickly to provide results that will save lives and can change the trajectory of a pandemic.

*Community engagement*

This study emphasises the importance of community engagement in joint prevention and control, confronting uncertainty, countering rumours effectively<sup>34</sup> and enhancing health literacy.

Sophisticated and sustained communication campaigns<sup>18</sup> and addressing populist concerns by helping states address public health threats that emerge within their borders are essential.<sup>43</sup>

#### Process/action

Multisectoral action,<sup>18</sup> as well as rapid development and equal distribution<sup>16,25,27</sup> of the vaccine supply, should be a priority. In addition, four articles emphasise the need for international collaboration to support LMICs. In these countries, building capacity<sup>35</sup> and continued mobilisation by the WHO and other key stakeholders in providing and distributing vaccines,<sup>38</sup> taking into account the shortage in healthcare facilities, and lack of financial and human resources,<sup>24,26</sup> is essential in the COVID-19 pandemic response.

#### Discussion

Most articles included in the present study were literature reviews, indicative of the holistic approach taken internationally by the 14 countries of study origin. The current review identified seven categories that influenced international collaboration in COVID-19 prevention and were included in the majority of articles. The distribution of countries covered by the selected studies was also considered. China had the greatest contribution of studies in this review, and the category that all countries reported in the most context was 'Leadership and governance'.

China published the most reviews on international collaboration in the prevention of COVID-19, primarily focussing on infrastructure and the knowledge and sharing categories. Infrastructure has been discussed in terms of shipments, resource supplements and personal training,<sup>25</sup> as well as in the context of the need for infrastructure for the global exchange of data.<sup>28</sup> Infrastructure has also been referred to in other articles in terms of the high-tech tracking systems involving smartphone applications and street camera systems.<sup>43</sup>

The category of knowledge and sharing in the context of China has been through the collective search for vaccines and antiviral therapies sustained by unique information sharing efforts.<sup>28</sup> In addition, collaborative projects between China, the WHO and other countries, including two volunteer expert teams from the Red Cross Society of China to Iran and Iraq,<sup>41</sup> have contributed to this knowledge sharing. Such rapid response measures undertaken by China to not only develop relevant infrastructure for the benefit of its population but also other countries through information sharing are indicative of China's stricter public health measures compared with other countries.

Canada also provided a large number of articles in this review. Similar to China, Canada's focus was mainly on the knowledge and information sharing category, with global collaboration to complete trials faster,<sup>42</sup> as well as data dissemination, crowdsourcing and artificial intelligence.<sup>40</sup> However, infrastructure was not mentioned at all in the prevention of COVID-19, indicating the focus in Canada was greater on knowledge sharing rather than the implementation of facilities and systems.

The United States was the third-largest contributor to this review, reporting primarily within the infrastructure category. The United States has also helped LMICs from a financial standpoint, supporting the COVAX programme,<sup>33</sup> as well as supporting Europe and other countries globally with ventilator distribution.

#### Leadership and governance

Leadership and governance was the most reported category influencing international collaboration by all countries, indicating

the need for policies, rules and regulations in the global drive to prevent the spread of COVID-19. It is only with the help of governments that resources to fund vaccine research, either directly or by commitments developed with private funding, can we truly establish the effectiveness of COVID-19 vaccines.<sup>33</sup>

One article outlined key factors regarding the state of Georgia's (in the United States) governmental role that contributed to the relatively low number of COVID-19 cases and subsequent mortality rates, which included (1) an early governmental response that was also multisectoral; (2) strict adherence to International Health Regulations guidelines from the emergence of the initial epidemic; (3) monitoring, early laboratory detection and diagnosis; (4) contact tracing and forecasting; and (5) daily reports to the government and (6) raising awareness through the use of media coverage.<sup>18</sup> Myanmar has also been noted to have had strong political leadership to strengthen its International Health Regulations compliance.<sup>21</sup>

Governments need to develop risk-reduction strategies that can also be supported by educational institutions for data access and information sharing to be applied effectively.<sup>30,35</sup> In addition, government agencies should ensure communication with the public of relevant information on risk assessment and measures being taken to combat COVID-19.<sup>34</sup> A number of recommendations have been made to policymakers and world leaders, including the need to implement a system inclusive of high-quality standardised data and advanced artificial intelligence-powered processing; adopting global data standards and terminologies for all data inputs into the system; a multistakeholder and multidisciplinary system approach; and efforts to build a multinational collaboration for shared learning experiences.<sup>29</sup> In contrast, one cross-sectional study showed that political and economic influences were constantly perceived as inhibitors in controlling the spread of COVID-19.<sup>44</sup>

#### Building capacity

One study reviewed the importance of building capacity and international research collaboration in light of the rapid worldwide spread of COVID-19.<sup>35</sup> The international collaborative platforms must be further strengthened in LMICs to enable a positive change in the trajectory of the pandemic.

There have been achievements and failures of the international research collaboration in the COVID-19 response, but the main failure is that the high-income countries are not maintaining their commitment to equity. However, a positive step comes from the 20 projects funded by the Global Effort on COVID-19 Health Research by the UK National Institute of Health Research in May 2020 for LMICs. Such initiatives that aim to balance access to research funds between high- and low-income countries are required. Funding is an important issue in LMICs, the solution to which could be the creation of multilateral funding organisations, such as the Global Research Collaboration for Infectious Disease Preparedness (GLOPID-R) that funds research on new or re-emerging infectious diseases globally.

#### Shortage in healthcare facilities – financial and human resources

The impact of the lack of basic resources has been discussed,<sup>26</sup> and weak health systems with poor communication channels have been shown to have reduced chances of successfully combating COVID-19. Even developed countries with strong and well-established healthcare systems have experienced problems in treating and diagnosing COVID-19; this situation becomes worse in countries with weak healthcare systems.

Epidemics and pandemics with highly infectious viruses undermine a health system's ability to provide adequate health care when it is needed the most. A recently conducted multinational survey involving 63 countries showed that low-income countries reported a higher shortage of PPE kits than high-income countries. There was also a lack of guidelines and concerns over insufficient PPE supplies in both high- and low-income countries. The findings of this study alerted national health authorities to increase the implementation of infection prevention and control measures and focus on long-term preparedness.<sup>24</sup>

#### Knowledge and information sharing

Knowledge and information sharing are vital for the international research community working on the various aspects of COVID-19, such as the implementation of diagnostics, contact tracing procedures, vaccines and antiviral therapies. To promote international data sharing, many journals and publishers have made all relevant peer-reviewed research open access, allowing quicker access to relevant information.<sup>28</sup>

Connectivity and knowledge sharing are key components of research preparedness for pandemics. The WHO is responsible for coordinating global research efforts during the current COVID-19 pandemic. Other pre-existing consortia of trusted partners can immediately coordinate the formation of focus groups and the sharing resources. Some of these, such as the Platform for European Preparedness Against Re-emerging Epidemics, specifically train research preparedness concepts to the next generation of scientists. This novel virus has revealed our strengths and weaknesses, which we need to address to prepare for future responses.<sup>39</sup>

By mid-February 2020, the WHO had recognised that the COVID-19 outbreak was accompanied by an info-demic, of which only some parts were accurate. The WHO created a framework to manage this info-demic and, based on online crowdsourced technical consultations, also helped collect and analyse data, manage contact tracing and produce PPE by sharing open designs for 3D printing. A ventilator was also designed based on an open source design.<sup>40</sup> To overpower COVID-19, action must be taken as a global community with no borders.<sup>37,41</sup>

#### Limitations

Although multiple structured searches were conducted to include the most relevant and recent literature, as the studies included were hand searched, human error is possible. In addition, because of the length of time taken to complete the review, new studies may have been published on the topic that have not been included in this scoping review. More comprehensive reviews in the future, inclusive of systematic reviews or meta-analyses, are therefore warranted.

#### Conclusion

International efforts against COVID-19 and, thereby, future pandemic prevention, are dependent on various dimensions. In this review, political, structure, infrastructure, leadership and governance, knowledge and information sharing, community engagement and process/action were identified as the main factors essential to building this international collaboration. Leadership and governance was identified as the most prominently reported factor, with knowledge and information sharing seen as equally important in assisting countries in avoiding repeated mistakes and in learning from each other's success. Moreover, controlling COVID-19 on a global scale is more likely to be achieved by countries with sufficient structural resources, as well as

appropriate communication between countries, health systems and communities. International collaboration can also greatly benefit LMIC countries, where the necessary resources and expertise are often limited. Thus, only with awareness and knowledge of these factors can pandemics be managed and equity around the world be achievable.

#### Author statements

##### Ethical approval

None sought.

##### Funding

None declared.

##### Competing interests

None declared.

##### Author contributions

M.N. conceptualised this scoping review. M.N. and S.D. searched across databases and selected relevant documents for this scoping review. M.N. and S.C. analysed and summarised selected documents. All authors were involved in the writing and final review of the manuscript.

##### Data availability

The authors declare that data supporting the findings of this study are available within the article.

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