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## Abstract

**Background**: Affordability, accessibility and quality of services provided by a primary healthcare system can contribute significantly to the mitigation and management of a pandemic or disease outbreak. A strong primary healthcare system will mitigate the pressure on health systems during crises.

**Aims**: We aimed to identify the specific capabilities required to establish a resilient primary healthcare system that could respond effectively to a health crisis, and highlight any research gaps.

**Methods**: A bibliographic search was conducted on PubMed, Scopus, Web of Science, and ProQuest from 2000 to 2021. Using extracted data, we mapped the studies and categorized published research into a framework of 6 building blocks. A graphical and tabular representation

of the data was then provided.

**Results**: A total of 4276 studies were retrieved, out of which 28 met the inclusion criteria for the systematic review. Data extraction was based on the study design, year of publication, country, type of communicable disease, and main interventions used for building resilient primary healthcare systems. Most of the studies were conducted in 2020 and 2021 during the COVID-19 pandemic and many of them emphasized digital health.

**Conclusion**: This review summarizes more than 20 years of research on how primary healthcare systems responded to public health emergencies. It provides a broad overview of the subject matter and existing research gaps for intervention planning and policymaking.

Keywords: primary healthcare, crisis, disaster, resilience, pandemic, mapping review, Iran

Citation: Bajoulvand R, Ramezanlou M, Derakhshani N, Goharinezhad S, Gholami M, et al. Strengthening primary health care for effective response to pandemics: a systematic review. East Mediterr Health J. 2023;29(7):530–539. https://doi.org/10.26719/emhj.23.080 Received: 12/6/22; Accepted: 08/12/22

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## Introduction

Over the next 50 years, the number of disasters is expected to multiply 5-fold (1). WHO defines a disaster as serious disruption of the function of a community or society, which causes widespread human, social, economic, or ecological losses that cannot be resolved (2,3). Disasters are divided into 3 broad groups: natural, human-made, and pandemic (4).

The global population is currently in the midst of the COVID-19 pandemic, which has spread rapidly across the world (5). On 22 February 2021, according to Johns Hopkins University, the global death toll from COVID-19 was ~2 500 000, making it the second most devastating event in a century and one of the 15 deadliest pandemics in history (6). Infectious disease epidemics are so widespread and complicated that health systems must have effective programmes to deal with them, otherwise, they will place a lot of pressure on the health systems (7–10). Most of the efforts to control COVID-19 have focused on laboratories and hospitals, and the role of primary health care in mitigation, preparedness, response, and recovery has been ignored. The concept of primary health care means making essential health care available to the community at large in a way that is acceptable to them, with their full participation, and at an affordable cost.

Globally, primary health care is recognized as a foundation for health systems due to its unique ability to deliver accessible, cost-effective, and equitable care. During the COVID-19 pandemic, health systems have faced extreme levels of morbidity and mortality, and primary health care has been pivotal in reducing hospital burden, screening, and monitoring. There is no single way to create a resilient primary healthcare system; it depends on the background and context of each country. Some systems have been able to deal with crises more effectively, and along with controlling the pandemic, they have relieved the pressure on hospitals. A pandemic is a major health crisis that occurs over a large geographical area, crosses international borders, and affects large numbers of people. There is no doubt that the COVID-19 pandemic is a public health crisis and a social, economic, and political crisis affecting all areas of health and human life.

This review aimed to identify strategies to strengthen the primary healthcare system during disasters by reviewing previous literature and empirical evidence, and to provide guidance to policymakers in designing a more resilient system. By taking into account the literature and new research related to the ongoing COVID-19 pandemic, strategies for strengthening resilience in primary health care were identified and mapped according to 6 building blocks of leadership and governance; health workforce; medical products, vaccines, and technologies; service delivery; health information systems; and health financing.

## Methods

### Study design

We conducted a systematic mapping review of studies that reported interventions to improve primary health care during health crises, especially pandemics. The review visually summarized evidence production and publication patterns, trends, and themes by categorizing, classifying, and describing the data. Mapping reviews can be helpful especially when there is an abundance of literature. Standard methodology was followed for screening, data extraction, data analysis, and visualizing the findings in systematic mapping. Two main themes were explored in this

mapping review: interventions proposed for strengthening primary health care, and research gaps that need to be addressed.

### Search strategy

We searched PubMed, Web of Science, Scopus and ProQuest for English-language articles published between 1 January 2000 and 11 July 2021. The search strategy was developed in consultation with a medical librarian ( Table 1 ). The keywords were: primary health care, communicable diseases, epidemic, pandemic, SARS-CoV, MERS-CoV, SARS-CoV-2, disaster, resilience, risk reduction, response, model, best practice, and policy. Additional searches were performed on the WHO website and in Google Scholar. A review of the final list of articles for inclusion in the study was done manually.

### Inclusion and exclusion criteria

We included studies that investigated primary health care, disasters (particularly communicable disease epidemics), risk management, and best practices. The following types of study design were included: reviews, reports, perspectives, qualitative, descriptive, mixed-method studies, case studies, and commentaries. Studies that examined similar cases in health sectors other than primary health care, studies published in languages other than English, and conference abstracts were excluded. We only included papers published after 2000 because of the greater diversity of epidemics and pandemics of communicable diseases in the current century.

### Study selection process

Two of the authors screened all the retrieved articles. After elimination of duplicate studies, the titles and abstracts were reviewed and articles that were not consistent with the objectives of the study were excluded. Full texts of the articles were reviewed, and those that did not meet the inclusion criteria or were not related to the study objectives were excluded. A third author appraised the final summary. Endnote X9 reference management software was used to organize the documents.

### Data extraction

To identify any flaws in the data extraction form and reach a finalized version, a pilot study was conducted on 5 studies. The final data extraction form included: title, author, country, year, study type, aim of study, type of disaster, disaster management cycle, intervention/experience, barriers/challenges, facilitators, and results. Two reviewers entered the data in Microsoft Excel and resolved any disagreement, with the help of a third author if needed.

### Data analysis

The extracted information was analysed using framework analysis, which is a hierarchical approach used to categorize data based on key themes and concepts (11,12). We used the 6 building blocks of a health system framework for strengthening health systems (13). The components of this framework were: (1) service delivery: access and barriers to health services; (2) health human resources: availability, gender, and attitude of health workers; (3) medical supplies: availability and stock of selected medical supplies; (4) governance: accountability and community participation; (5) health information: information flow from health facility to the community; and (6) finance: user fees and indirect payments. The data coding process followed predetermined themes according to the 6 building blocks. These formed the basis for broader themes that were subcategorized to increase the explanatory ability of the data (14,15) using the following steps: (1) familiarization with the data; (2) coding the data to systematically identify and document similarities, differences, and patterns; (3) collecting the coded data and organizing them into a thematic framework by developing a matrix, chart, or table; (4) analysing the data by comparing and contrasting, summarizing, and synthesizing the key issues and themes, and exploring the relationships between them; and (5) drawing conclusions and validating the findings.

## Results

### Search results

We extracted 4276 articles from the database searches, and reviewed 28 that were relevant to primary health care resilience against communicable disease pandemics (16–43) ( Figure 1 ). During the screening process, 1280 articles were removed because of duplication. In the next phase of screening, the articles were reviewed by title and abstract and 2940 were removed. Finally, during full-text review, 28 articles were excluded because of insufficient information and lack of relevance. Twenty-two studies were conducted in 2020 or 2021 during the COVID-19 pandemic and the remainder in 2010–2019. Most of the studies (75%) of communicable diseases were related to COVID-19, and other diseases were measles, Ebola, cholera, and H1N1 influenza.

### Disaster risk management cycle

Only 7 studies were related to the prevention/mitigation phase of disaster management, and 13 to the preparedness phase ( Figure 2 ). All 28 studies addressed the response phase but only 2 mentioned the recovery phase.

### Country of study

Oman, Liberia, America, South Korea, Qatar, Germany, Sweden, Greece, Papua New Guinea, Singapore, and Islamic Republic of Iran had 1 study each. India, England, Australia, New Zealand, and Brazil had 2 studies each. There were 3 studies in China. There was 1 study from the WHO South-East Asia Region; 1 collaborative study in Australia and Canada; 1 joint study in Australia, Canada, England, and United States of America (USA); and 1 joint study in Guinea,

Sierra Leone, and Liberia.

### Interventions, challenges, and facilitators identified

In the studies of interventions for strengthening primary health care against epidemics and pandemics, 10 themes were identified: digital health, clinical interventions, vaccination, strengthening health workers (e.g. skills, knowledge, motivation, and capacity to deliver quality health services), continuity of care, policymaking, guidelines, equipment availability, appropriate infrastructure, and education. We classified these into 6 main categories based on the WHO building blocks framework. For each intervention, some challenges and facilitators were identified ( Table 2 ). A list of essential considerations for health policymakers is shown in Table 3 .

## Discussion

This study was conducted to identify the best practices and interventions made by countries to establish strong and resilient primary health care to tackle communicable disease pandemics and health emergencies. In this systematic mapping review, 28 articles from 20 countries were identified and reviewed. The WHO 6 building blocks framework was used to classify the identified categories. Ten subcategories were identified to strengthen primary health care against epidemics and pandemics: digital health, clinical interventions, vaccination, strengthening health workers' capacity, continuity of care, policymaking, guidelines, equipment availability, appropriate infrastructure, and education.

The use of teleconsultation reduces crowding and infection risk in primary health care facilities, especially for high-risk populations (16,17,19,25,28) . Epidemics and pandemics present many challenges to provision of primary health care. One of the innovative solutions for population health coverage is the use of technological advances and digital health (44,45). Digital health is one of the most effective and important interventions during epidemics to reduce transmission, especially in quarantine conditions (47,46). Many high-income countries, such as Australia and the USA have digital health systems (48).

Continuity of healthcare, equipment availability, and education were identified as important strategies in strong primary healthcare systems. These can reduce treatment costs, improve community health, increase patient satisfaction, and reduce unnecessary hospitalization, especially during pandemic and epidemic situations (49,51). Screening and follow-up are widely used for diseases in primary health care and can meet the needs of patients with multiple morbidities (52).

Another strategy identified in our study was strengthening health workers' skills, knowledge, motivation, and capacity to deliver quality health services. Proactive training of community health workers is necessary to maximize the effectiveness of interventions during a crisis, as well as strengthening the supply chain management of drugs and finding suitable methods of providing supportive supervision when movements are restricted (23,53,54). The most important factors in emergency and disaster planning are encouraging healthcare personnel to provide effective services, and enhancing motivation of the workforce (10).

In epidemic and pandemic situations, primary health care centres and hospitals have to provide services for a large number of patients. The continuity of these services requires meticulous planning by officials, formulation of guidelines, and policymaking (10,55). Decision-making during epidemics and pandemics is not easy. When an infectious disease emerges, policymakers take early actions to control transmission of the disease. However, decision-making in these situations brings many problems that must be investigated and resolved (56). Countries need to develop rapid and comprehensive research and strengthen strategies for evidence-based policymaking that can handle uncertainty (54, 57, 58).

Medical emergencies pose significant challenges to health systems because of heavy workloads, labour shortages, and reduced willingness of health workers to participate (10, 59). Volunteers can assist health workers in a variety of roles, including patient triage, treatment, and rehabilitation, and can carry out primary health care activities if they receive proper training (59). Other necessities during epidemics and pandemics are comprehensive individual and family support programmes, attention to the needs of health workers, involvement of community members in addressing challenges, and the design and implementation of preventive planning, according to the number of employees in the primary healthcare system (10).

The COVID-19 pandemic disrupted routine primary care for various reasons, including fear of infection, travel restrictions, lack of monitoring systems, repurposing of facilities, personal decisions, and restriction of movement (60). This disruption will have negative consequences for the health system in the future. Recurrence of some diseases has resulted due to delays in routine vaccination of children under the age of 5 years. It is essential to distribute vaccines and drugs according to the needs of each region and to establish acute care centres rapidly in areas where hospitals are unable to provide adequate care for patients with infection (60).

Effective leadership and good governance are key factors in strengthening the health system during epidemics and pandemics, so that it can respond in various ways, including intersectoral cooperation and construction of appropriate infrastructure. To achieve inter- and intrasectoral cooperation, we have to go beyond isolated thinking. Adoption of a social participation approach

to improving health is one aspect of strengthening governance and leadership (61).

The health system needs to establish clear mechanisms to promote better coordination and cooperation among its different components. This can be achieved by fostering a trusting environment and strengthening information management. Another recommendation to improve collaboration across sectors is to adopt the health in all policies approach, which involves assessing the potential impact on health of every policy before it is implemented, and making it a standard institutional practice (62).

Globally, pandemics and health emergencies have become a major burden on health systems, affecting other health services as well. Countries have adjusted their primary healthcare systems in response to crises and in proportion to their needs and capabilities. Several of these measures indicate the effectiveness of policies and in some cases the need to implement compensatory policies.

This review had some limitations. First, only English-language studies were included; therefore, other important studies in other languages were not retrieved. Second, potentially important studies published before 2000 were not included. Third, there was limited access to Embase and the full text of some studies in our region.

## Conclusion

There has been little research showing how to build resilient primary healthcare systems. Digital health infrastructure needs to be strengthened because the COVID-19 pandemic is ongoing, and there may be other pandemics in the future that will require people to stay at home or avoid visiting health care facilities. To improve primary health care, the workforce plays a vital role; therefore, it is important to address the challenges they face such as heavy workload, lack of protective equipment, and mental and emotional issues. Continuity of routine care during disasters promotes a more resilient public health system; however, this is challenged by an inefficient surveillance system, which can be mitigated with electronic health records. Primary health care becomes more resilient when there is community involvement and intersectoral collaboration. Finally, this review highlights that more research into primary health care resilience is needed to inform future plans and policy recommendations for the response to a global pandemic.

## Acknowledgements

We would like to thank the Student Centre at Iran University of Medical Sciences for its support. We acknowledge the assistance of the anonymous reviewers which led to an improved version of the paper.

**Funding**: None

**Competing interests**: None declared.

## Renforcement des soins de santé primaires pour une riposte efficace aux pandémies : analyse systématique

### Résumé

**Contexte** : L'accessibilité physique et économique ainsi que la qualité des services fournis par un système de soins de santé primaires peuvent contribuer de manière significative à l'atténuation et à la gestion d'une pandémie ou d'une flambée épidémique. Un système de soins de santé primaires solide permet d'atténuer la pression exercée sur les systèmes de santé en temps de crise.

**Objectif** : Identifier les capacités spécifiques requises pour mettre en place un système de soins de santé primaires résilient, capable de répondre efficacement à une crise sanitaire, et à mettre en évidence les éventuelles lacunes en matière de recherche.

**Méthodes** : Une recherche bibliographique a été effectuée sur PubMed, Scopus, Web of Science et ProQuest de 2000 à 2021. À l'aide des données extraites, nous avons cartographié les études et classé les recherches publiées selon un cadre formé de six blocs constitutifs. Une représentation graphique des données sous forme de tableau a ensuite été produite.

**Résultats** : Au total, 4 276 études ont été extraites, dont 28 répondaient aux critères d'inclusion pour l'analyse systématique. L'extraction des données a eu lieu sur la base du plan de l'étude, de l'année de publication, du pays, du type de maladie transmissible et des principales interventions utilisées pour édifier des systèmes de soins de santé primaires résilients. La plupart de ces études ont été menées en 2020 et 2021 pendant la pandémie de COVID-19 et bon nombre d'entre elles mettaient l'accent sur la télésanté.

**Conclusion** : Cette analyse résume plus de 20 années de recherche sur la réaction des systèmes de soins de santé primaires face aux situations d'urgence de santé publique. Elle donne un aperçu général du sujet traité et des lacunes existantes en matière de recherche pour la planification des interventions et l'élaboration des politiques.

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