Strengthening primary health care for effective response to pandemics: a systematic review

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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

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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:

Table 1 Complete search strategy for PubMed database

Database	Search strategy
PubMed	(("Primary Health Care"[TIAB] OR PHC[TIAB] OR "Primary Care"[TIAB] OR "Primary Healthcare"[TIAB] OR "First-line health care"[TIAB]) AND ("Communicable Disease*"[Title] OR "Infectious Disease*"[Title] OR "Respiratory illness*"[Title] OR "Respiratory disease*"[Title] OR "Widespread disease*"[Title] OR epidemic*[Title] OR pandemic*[Title] OR Zika[Title] OR Ebola[Title] OR SARS-CoV[Title] OR MERS-CoV[Title] OR SARS-CoV-2[Title] OR 2019-nCoV[Title] OR covid-19[Title] OR HIV[Title] OR HIV/AIDS[Title] OR AIDS[Title] OR Flu[Title] OR Measles[Title] OR Plague[Title] OR Emergenc*[Title] OR Hazard*[Title] OR Disaster*[Title] OR "natural disaster*"[Title] OR "Biological disaster*"[Title] OR earthquake*[Title] OR flood*[Title] OR storm*[Title] OR famine*[Title] OR tsunami*[Title]) AND (rehabilitation*[TIAB] OR reconstruction*[TIAB] OR "natural disaster risk management"[TIAB] OR "Risk management"[TIAB] OR "Risk reduction"[TIAB] OR "Risk transfer"[TIAB] OR "Risk elimination"[TIAB] OR "Risk acceptance"[TIAB] OR Resilience[TIAB] OR Prevention*[TIAB] OR Intervention* [TIAB] OR Mitigation*[TIAB] OR Preparedness[TIAB] OR Respons*[TIAB] OR Recover*[TIAB]) AND (Guideline*[TIAB] OR Model*[TIAB] OR Standard*[TIAB] OR experience*[TIAB] OR "best Practice*"[TIAB] OR "lesson* learned"[TIAB] OR "evidence-based management"[TIAB] OR Policy[TIAB] OR Policies[TIAB]))

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

Figure 1 PRISMA flow diagram

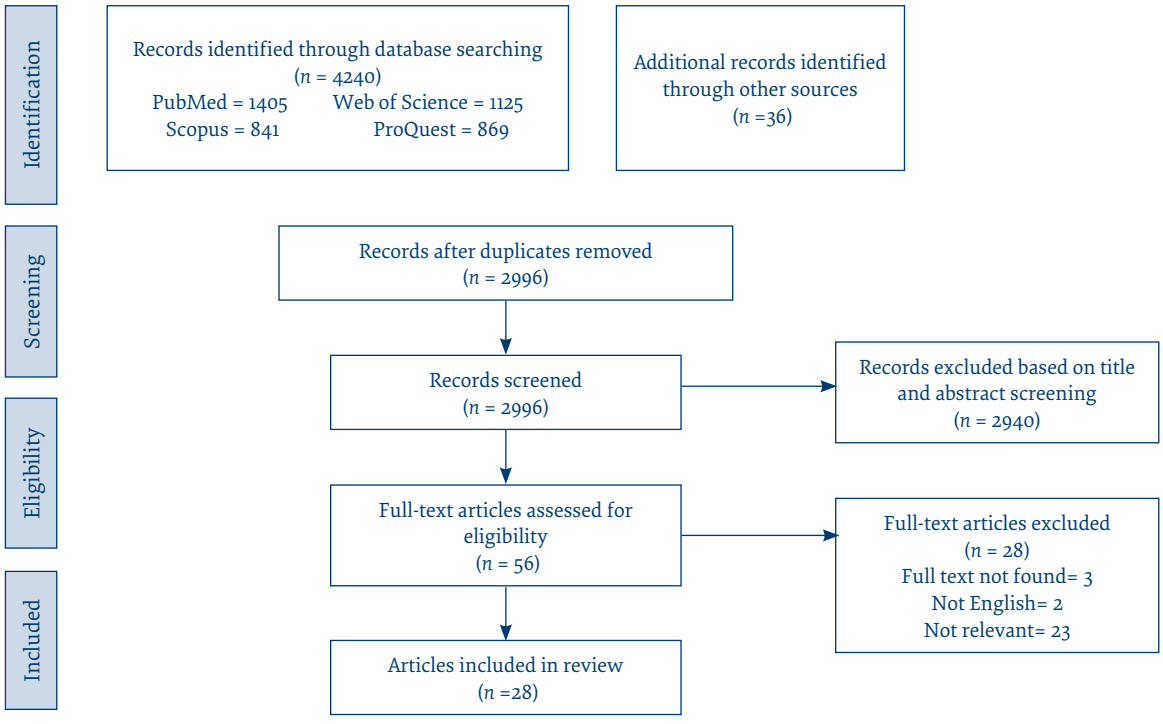
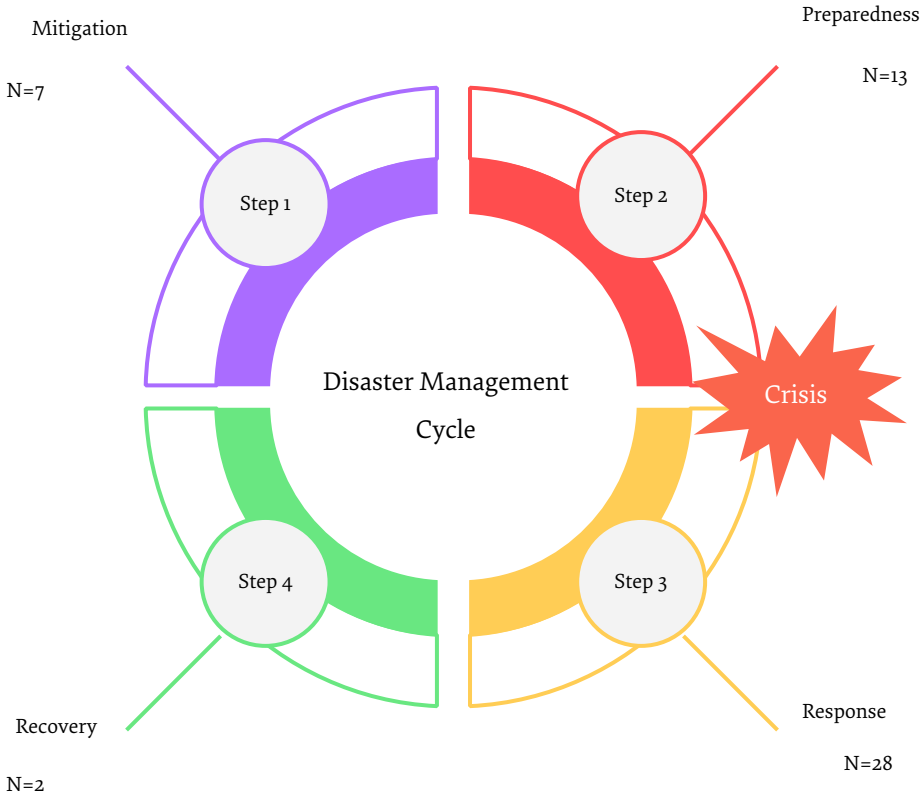


Figure 2 Numbers of studies that addressed the different stages of the risk management cycle



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

Table 2 Challenges and facilitators to strengthening primary health care against epidemics and pandemics based on 6 building blocks

Building blocks	Challenges	Facilitators
Service delivery	• Increasing demand for services • Late detection of outbreaks • Fear of communicable disease transmission by staff and the public • High density of population • Shortage of personal protective equipment • Lack of access	• Community involvement • Digital health and telemedicine • Triage • Home care • Partitioning the room of healthcare centres • Continuum of care
Health workforce	• Heavy burden of work • Shortage of human resource • Lack of willingness to work • Mental health issues • Conflicts between patients and physicians due to socioeconomic issues caused by epidemics • Unnecessary referrals to the hospitals	• Using mobile apps to compile clinical notes • Involving community health workers • Scheduled working programme • Recruitment of external staff and volunteers • Formalizing the rapid response team • Isolation and quarantine
Health information systems	• Lack of guidelines • Poor documentation (data gathering) • Difficulty accessing prior vaccination history • Absence of data governance	• Robust surveillance system • Individual and population data sharing • Electronic health records
Medical products, vaccines, technologies	• Improper infrastructure • Non-acceptability • Lack of transparency • Cost ineffectiveness • Lack of testing kits • Low logistical capacity	• Artificial intelligence • Affordability • Telephone and video consultation • Using thermal images of people to detect contaminated individuals
Financing	• Non-affordability • Out-of-pocket payments • Fee-for-service	• Strategic resource allocation • Applying insurance plans • Fee-for-value
Leadership/governance	• Bureaucratic difficulties • Inversion of healthcare pyramid	• Intersectoral collaboration • Strengthening the surveillance systems' function

Table 3 Key considerations for health policymakers related to strengthening primary health care against epidemics and pandemics

Considerations	Refs
• Telephone consultation and telemedicine reduce workload and risk of infection transmission, offer to bridge existing gaps in health services delivery and participants want it to continue after COVID- 19 pandemic	(16,28,33)
• Mobile applications improve tracing, access to testing, people's awareness and partnership and supports healthcare providers	(17)
• Involving people as vaccine advocates promotes vaccination	(18)
• Implementing community-based health strategies	
• Integrating primary care and public health strengthens the surveillance function of the former	(20)
• Efficient primary health care aligned with population health needs is the basis for any intervention proposal	(26)
• Relationship between service providers and community in decision-making process	
• In rural areas, pre-existing trust between people and healthcare workers strengthens rural resilience	(29)
• Using integrated medical system provides patients' access to all their medical records at different institutions	(30)
• Prioritizing interventions is crucial for following risk assessment	(36)
• The long-standing relationship between the health clinic and neighbourhood residents facilitated ongoing management of chronic physical and mental health conditions	(37)
• Accepting patients in 2 stages of disease (early and recovery phase) helps refining admission criteria and progressing of workflow	(42)
• Risk communication and community engagement are priority actions and deserve greater attention for the next stage in developing an integrated healthcare system	(30)

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.

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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.

تعزيز الرعاية الصحية الأولية من أجل الاستجابة الفعالة للجوائح: استعراض منهجي

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الخلاصة

الخلفية: يمكن أن تُسهم القدرة على تحمُّل تكاليف الخدمات التي يقدمها نظام الرعاية الصحية الأولية وإتاحتها وجودتها إسهامًا كبيرًا في التخفيف من وطأة الجائحة أو فاشية المرض وإدارتها. ومن شأن نظام الرعاية الصحية الأولية القوي أن يخفف وطأةَ الضغط على النظم الصحية أثناء الأزمات.

الأهداف: هدفت هذه الدراسة الى تحديد القدرات المحددة اللازمة لإنشاء نظام رعاية صحية أولية قادر على الصمود، ويمكنه الاستجابة بفعالية لأي أزمة صحية، وتسليط الضوء على أي فجوات بحثية.

طرق البحث: أُجري بحثٌ ببليوجرافي على كل من PubMed، وScopus، وWebofScience، وProQuest في المدة من عام 2000 إلى عام 2021. وباستخدام البيانات المُستخرجة، حددنا الدِّراسات وصنفنا الأبحاث المنشورة إلى إطار يتألف من 6 ركائز. ثم قُدم تمثيلٌ بيانيٌّ وجدوليٌّ للبيانات.

النتائج: تم الحصول على ما مجموعه 4276 دراسةً، استوفت 28 منها معايير الإدراج النهائي للاستعراض المنهجي. واعتمد استخراج البيانات على تصميم الدراسة، وسنة النشر، والبلد، ونوع المرض الساري، والتدخلات الرئيسية المُستخدمة لبناء نُظم قادرة على الصمود للرعاية الصحية الأولية. وأجريت معظم الدراسات في عامي 2020 و2021 خلال جائحة كوفيد-19 وشدد كثيرٌ منها على أهمية توفير الخدمات الصحية عن بُعد.

الاستنتاجات: يُلخص الاستعراض أكثر من 20 عامًا من البحوث عن كيفية استجابة نظم الرعاية الصحية الأولية لطوارئ الصحة العامة. وهو يُقدم نظرةً عامةً واسعة النطاق على الموضوع والفجوات البحثية القائمة لتخطيط التدخلات ورسم السياسات.

References

1. Shi P. Disaster risk science: Springer Singapore; 2019.
2. Yew YY, Delgado RC, Heslop DJ, González PA. The Yew Disaster Severity Index: a new tool in disaster metrics. Prehosp Disaster Med. 2019 Feb;34(1):8–19. https://doi.org/10.1017/S1049023X18001115 PMID:30600793
3. Garrido J, Saunders W, editors. Disaster risk reduction and land use planning: Opportunities to improve practice. IAEG/AEG Annual Meeting Proceedings, San Francisco, California, 2018. Volume 5; Springer; 2019.
4. Willson K, Lim D. Disaster management in rural and remote primary healthcare settings: a scoping review protocol. JBI Evid Synth. 2020 Jan;18(1):81–6. https://doi.org/10.11124/JBISRIR-D-19-00029 PMID:31343495

5. Cabarkapa S, Nadjidai SE, Murgier J, Ng CH. The psychological impact of COVID-19 and other viral epidemics on frontline healthcare workers and ways to address it: a rapid systematic review. Brain Behav Immun Health. 2020 Oct;8:100144. https://doi.org/10.1016/j.bbih.2020.100144 PMID:32959031

6. Jordà Ò, Singh SR, Taylor AM. Longer-run economic consequences of pandemics? Cambridge, MA: National Bureau of Economic Research; 2020 (working paper 26934; http://www.nber.org/papers/w26934, accessed 8 April 2023).

7. Meskarpour-Amiri M, Shams L, Nasiri T. Identifying and categorizing the dimensions of Iran's health system response to the Covid-19 pandemic. J Military Med. 2020;22(2):108–14.

8. Derakhshani N, Doshmangir L, Ahmadi A, Fakhri A, Sadeghi-Bazargani H, Gordeev VS. Monitoring process barriers and enablers towards universal health coverage within the sustainable development goals: a systematic review and content analysis. Clin-icoeconom Outcomes Res. 2020 Aug 25;12:459–72. https://doi.org/10.2147/CEOR.S254946. PMID:32922051

9. Nafar H, Aghdam ET, Derakhshani N, Sani'ee N, Sharifian S, Goharinezhad S. A systematic mapping review of factors associated with willingness to work under emergency condition. Human Resour Health. 2021;19(1):1–10. https://doi.org/10.1186/s12960-021-00622-y

10. Derakhshani N, Maleki M, Pourasghari H, Azami-Aghdash S. The influential factors for achieving universal health coverage in Iran: a multimethod study. BMC Health Serv Res. 2021 Jul 22;21(1):1–13. https://doi.org/10.1186/s12913-021-06673-0 PMID:34294100

11. Furber C. Framework analysis: a method for analysing qualitative data. Afr J Midwifery Womens Health. 2010;4(2):97–100. https://doi.org/10.12968/ajmw.2010.4.2.47612

12. Gale NK, Heath G, Cameron E, Rashid S, Redwood S. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. BMC Med Res Methodol. 2013 Sep 18;13(1):1–8. https://doi.org/10.1186/1471-2288-13-117 PMID:24047204

13. Organization, WHO. (2007). "Strengthening health systems to improve health outcomes: WHO's framework for action." Geneva: WHO.

14. Mutale W, Bond V, Mwanamwenge MT, Mlewa S, Balabanova D, Spicer N, et al. Systems thinking in practice: the current status of the six WHO building blocks for health system strengthening in three BHOMA intervention districts of Zambia: a baseline qualitative study. BMC Health Serv Res. 2013 Aug 1;13(1):1–9. https://doi.org/10.1186/1472-6963-13-291 PMID:23902601

15. Zeng W, Li G, Ahn H, Nguyen HTH, Shepard DS, Nair D. Cost-Effectiveness of health systems strengthening interventions in improving maternal and child health in low-and middle-income countries: a systematic review. Health Policy Plan. 2018 Mar 1;33(2):283–97. https://doi.org/10.1093/heapol/czx172 PMID:29253136

16. Al Hasani S, Al Ghafri T, Al Lawati H, Mohammed J, Al Mukhainai A, Al Ajmi F, et al. The Use of Telephone Consultation in Primary Health Care During COVID-19 Pandemic, Oman: Perceptions from Physicians. J Prim Care Community Health. 2020 Jan–Dec;11: 215013272097648O. https://doi.org/10.1177/2150132720976480 PMID:33307943 PMCID: PMC7739075

17. Bassi A, Arfin S, John O, Jha V. An overview of mobile applications (apps) to support the coronavirus disease 2019 response in India. Indian J Med Res. 2020 May;151(5):468–73. https://doi.org/10.4103/ijmr.IJMR_1200_20 PMID:32474557

18. Bell S, Saliba V, Ramsay M, Mounier-Jack S. What have we learnt from measles outbreaks in 3 English cities? A qualitative exploration of factors influencing vaccination uptake in Romanian and Roma Romanian communities. BMC Public Health. 2020 Mar 23;20(1):381. https://doi.org/10.1186/s12889-020-8454-x PMID:32293379

19. Desborough J, Hall Dykgraaf S, Davis S, Kidd M. Reflecting on Australia's five principles for pandemic response in primary care through the lens of early international experiences of COVID-19. Aust J Gen Pract. 2021 Feb 5;50. https://doi.org/10.31128/AJGP-COVID-46 PMID:33543152

20. Kinder K, Bazemore A, Taylor M, Mannie C, Strydom S, George J, et al. Integrating primary care and public health to enhance response to a pandemic. Prim Health Care Res Dev. 2021 Jun 10;22:e27. https://doi.org/10.1017/S1463423621000311 PMID:34109936

21. Miller NP, Milsom P, Johnson G, Bedford J, Kapeu AS, Diallo AO, et al. Community health workers during the Ebola outbreak in Guinea, Liberia, and Sierra Leone. J Glob Health. 2018 Dec;8(2):020601. https://doi.org/10.7189/jogh.08.020601 PMID:30023054

22. Subba SH, Pradhan SK, Sahoo BK. Empowering primary healthcare institutions against COVID-19 pandemic: a health system-based approach. J Fam Med Prim Care. 2021 Feb;10(2):589–94. https://doi.org/10.4103/jfmpc.jfmpc_1416_20 PMID:34041046

23. Siekmans K, Sohani S, Boima T, Koffa F, Basil L, Laaziz S. Community-based health care is an essential component of a resilient health system: evidence from Ebola outbreak in Liberia. BMC Public Health. 2017 Jan 17;17(1):84. https://doi.org/10.1186/s12889-016-4012-y PMID:28095824

24. Pan Z, Yang T, Chi C, Wang C. The role of CARDPC in response to COVID-19 in primary care in China. NPJ Prim Care Respir Med. 2020;30:41. https://doi.org/10.1038/s41533-020-00199-4

25. Rawaf S, Allen LN, Stigler FL, Kringos D, Quezada Yamamoto H, van Weel C, et al. Lessons on the COVID-19 pandemic, for and by primary care professionals worldwide. Eur J Gen Pract. 2020 Dec;26(1):129–33. https://doi.org/10.1080/13814788.2020.1820479 PMID:32985278

26. Prado N, Rossi TRA, Chaves SCL, de Barros SG, Magno L, dos Santos H, et al. The international response of primary health care to COVID-19: document analysis in selected countries. Cad Saude Publica. 2020 Nov 20;36(12):e00183820. https://doi.org/10.1590/0102-311X00183820: PMID:33237251

27. Schmidt ME, von Fricken ME, Wofford RN, Libby RC, Maddox PJ. Access to care during a pandemic: improving planning efforts to incorporate community primary care practices and public health stakeholders. World Med Health Policy. 2020 Sep;12(3):274–81. https://doi.org/10.1002/wmh3.369

28. Javanparast S, Roeger L, Kwok Y, Reed RL. The experience of Australian general practice patients at high risk of poor health outcomes with telehealth during the COVID-19 pandemic: a qualitative study. BMC Fam Pract. 2021 Apr 8;22(1):69. https://doi.org/10.1186/s12875-021-01408-w PMID:33832422

29. O'Sullivan B, Leader J, Couch D, Purnell J. Rural pandemic preparedness: the risk, resilience and response required of primary healthcare. Risk Manage Healthc Policy. 2020 Aug 17;13:1187–94. https://doi.org/10.2147/RMHP.S265610 PMID:32904086

30. Gong FF, Hu GY, Lin HQ, Sun XZ, Wang WX. Integrated healthcare systems response strategies based on the Luohu Model during the COVID-19 epidemic in Shenzhen, China. International Journal of Integrated Care. 2021 Feb 2;21(1):1. https://doi.org/10.5334/ijic.5628 PMID:33597832

31. Ku SS, Choe YJ. A public-private partnership model to build a triage system in response to a COVID-19 outbreak in Hanam City, South Korea. Osong Public Health

Res Perspect. 2020 Oct;11(5):339–42. https://doi.org/10.24171/j.phrp.2020.11.5.11 PMID:33117640

32. Al-Zaidan M, Mohamed Ibrahim MI, Mohamed Ghaith A-K, Azza Mustafa M, Mansoor Nawaz M, Samya Al A. Qatar's Primary Health Care Medication Home Delivery Service: A Response Toward COVID-19. J Multidiscip Healthc. 2021 Mar 17;14:651–7. https://doi.org/10.2147/JMDH.S282079 PMID:33762825

33. Gudi N, Konapur R, John O, Sarbadhikari S, Landry M. Telemedicine supported strengthening of primary care in WHO South East Asia region: Lessons from the COVID-19 pandemic experiences. BMJ Innov. 2021;7(3):580–5. http://dx.doi.org/10.1136/bmjinnov-2021-000699

34. Jin H, Lu L, Liu J, Cui M. COVID-19 emergencies around the globe: China's experience in controlling COVID-19 and lessons learned. Int J Qual Health Care. 2021 Feb 20;33(1): mzaa143. https://doi.org/10.1093/intqhc/mzaa143 PMID:33320189

35. Liaw ST, Kuziemsky C, Schreiber R, Jonnagaddala J, Liyanage H, Chittalia A, et al. Primary care informatics response to Covid-19 pandemic: adaptation, progress, and lessons from four countries with high ICT development. Yearb Med Inform. 2021 Aug;30:44–55. https://doi.org/10.1055/s-0041-1726489 PMID:33882603

36. Rosewell A, Bieb S, Clark G, Miller G, MacIntyre R, Zwi A. Human resources for health: lessons from the cholera outbreak in Papua New Guinea. Western Pac Surveill Response J. 2013 Jul 3;4(3):9–13. https://doi.org/10.5365/WPSAR.2013.4.2.006 PMID:24319607

37. Pingel ES, Llovet A, Cosentino F, Lesser J. Committing to continuity: primary care practices during COVID-19 in an urban Brazilian neighborhood. Health Educ Behav. 2021 Feb;48(1):29–33. https://doi.org/10.1177/1090198120979609 PMID:33322924

38. Williams D, Dilcher M, Dong HF, Lester B, Marshall K, Pink R, et al. Lessons from a system-wide response to a measles outbreak, Canterbury, February-April 2019. N Z Med J. 2020 Sep 25;133(1522):71–83. PMID:32994618

39. Eisele M, Pohontsch NJ, Scherer M. Strategies in primary care to face the SARS-CoV-2 / COVID-19 pandemic: an online survey. Front Med. 2021 Jun 2;8: 613537. https://doi.org/10.3389/fmed.2021.613537 PMID:34150788

40. Ohrling M, Øvretveit J, Lockowandt U, Brommels M, Sparring V. Management of the emergency response to the SARS-CoV-2 (COVID-19) outbreak in Stockholm, Sweden, and winter preparations. J Prim Health Care. 2020 Sep;12(3):207–14. https://doi.org/10.1071/HC20082 PMID:32988442

41. Stikova E, Gjorgjev D, Karadzovski Z. Strengthening the early-warning function of the surveillance system: the macedonian experience. NATO Science for Peace and Security Series A: Chemistry and Biology. Springer; 2010:45–58.

42. Goei A. Community care facility-a novel concept to deal with the COVID-19 pandemic: a Singaporean institution's experience. J Public Health Manag Pract. 2020 Jan/Feb;26(6):613–21. https://doi.org/10.1097/PHH.0000000000001306 PMID:33239528

43. Joulaei H, Honarvar B, Zamiri N, Moghadami M, Lankarani KB. Introduction of a pyramidal model based on primary health care: a paradigm for management of 2009 H1N1 flu pandemic. Iran Red Crescent Med J. 2010;12(3):224–30. https://archive.ircmj.com/article/12/3/70846-pdf.pdf

44. Chauhan V, Galwankar S, Arquilla B, Garg M, Di Somma S, El-Menyar A, et al. Novel coronavirus (COVID-19): Leveraging telemedicine to optimize care while minimizing

exposures and viral transmission. J Emerg Trauma Shock. 2020 Jan–Mar;13(1):20–4. https://doi.org/10.4103/JETS.JETS_32_20 PMID:32308272

45. Wax RS, Christian MD. Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-nCoV) patients. Can J Anaesth. 2020 May;67(5):568–76. https://doi.org/10.1007/s12630-020-01591-x PMID:32052373

46. Papadimos TJ, Marcolini EG, Hadian M, Hardart GE, Ward N, Levy MM, et al. Ethics of outbreaks position statement. Part 2: family-centered care. Crit Care Med. 2018 Nov;46(11):1856–60. https://doi.org/10.1097/CCM.0000000000003363 PMID:30312225

47. Monaghesh E, Hajizadeh A. The role of telehealth during COVID-19 outbreak: a systematic review based on current evidence. BMC Public Health. 2020 Aug 1;20(1):1193. https://doi.org/10.1186/s12889-020-09301-4 PMID:32738884

48. Current health expenditure per capita, PPP (current international $) [website]. World Bank; 2021 (https://data.worldbank.org/indicator/SH.XPD.CHEX.PP.CD, accessed 8 April 2023).

49. Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. Milbank Q. 2005;83(3):457-502. https://doi.org/10.1111/j.1468-0009.2005.00409.x PMID:16202000

50. Macinko J, Starfield B, Shi L. The contribution of primary care systems to health outcomes within Organization for Economic Cooperation and Development (OECD) countries, 1970–1998. Health Serv Res. 2003 Jun;38(3):831–65. https://doi.org/10.1111/1475-6773.00149 PMID:12822915

51. Rezapour R, Dorosti AA, Farahbakhsh M, Azami-aghdash S, Iranzad I. The impact of the Covid-19 pandemic on primary health care utilization: an experience from Iran. BMC Health Serv Res. 2022;22:404. https://doi.org/10.1186/s12913-022-07753-5

52. Stange KC, Ferrer RL. The paradox of primary care. Annals Family Med; 2009 Jul–Aug;7(4):293–9. https://doi.org/10.1370/afm.1023 PMID:19597165

53. Rezapour R, Letaief M, Khosravi A, Farahbakhsh M, Ahmadnezhad E, Azami S, et al. Primary health care quality assessment frameworks: state of the art review. Health Scope. 2022;11(3):e126407. https://doi.org/10.5812/jhealthscope-126407..

54. Moosavi A, Sadeghpour A, Azami-Aghdash S, Derakhshani N, Mohseni M, Jafarzadeh D, et al. Evidence-based medicine among health-care workers in hospitals in Iran: a nationwide survey. J Educ Health Promot. 2020 Dec;9:365. https://doi.org/10.4103/jehp.jehp_335_20 PMID:33575401

55. Koohpayezadeh J, Azami-Aghdash S, Derakhshani N, Rezapour A, Alaei Kalajahi R, Sajjadi Khasraghi J, et al. Best practices in achieving universal health coverage: a scoping review. Med J Islam Repub Iran. 2021 Dec 30;35:191. https://doi.org/10.47176/mjiri.35.191 PMID:36042832

56. Berger L, Berger N, Bosetti V, Gilboa I, Hansen LP, Jarvis C, et al. Rational policymaking during a pandemic. Proc Natl Acad Sci US A.. 2021 Jan 26;118(4):e2012704118. https://doi.org/10.1073/pnas.2012704118 PMID:33472971

57. Sharp A, Jain V, Alimi Y, Bausch DG. Policy and planning for large epidemics and pandemics - challenges and lessons learned from COVID-19. Curr Opin iInfect Dis. 2021 Oct 1;34(5):393–400. https://doi.org/10.1097/QCO.0000000000000778 PMID:34342301

58. Naghibi D, Mohammadzadeh S, Azami-Aghdash S. Barriers to evidence-based practice in health system: a systematic review. Evidence Based Care. 2021 Dec;11(2):74–82. https://doi.org/10.1111/jep.12222 PMID:25130323

59. Karimi Dehkordi N, Abbasi AF, Radmard Lord M, Soleimanpour S, Goharinezhad S. Interventions to improve the willingness to work among health care professionals in times of disaster: a scoping review. Inquiry. 2021 Jan–Dec;58:469580211059959. https://doi.org/10.1177/00469580211059959 PMID:34903077

60. Medina MG, Giovanella L, Bousquat A, Mendonça MHMd, Aquino R. Primary healthcare in times of COVID-19: what to do? Cad Saude Publica. 2020;36:e00149720. https://doi.org/10.1590/0102-311x00149720 PMID:32813791

61. Thomas S, Sagan A, Larkin J, Cylus J, Figueras J, Karanikolos M. Strengthening health systems resilience: key concepts and strategies. Geneva: World Health Organization; 2020 (Health systems and policy analysis; policy brief 36; https://apps.who.int/iris/handle/10665/332441, accessed 8 April 2023).

62. Ardalan A, Rajaei MH, Masoumi G, Azin A, Zonoobi V, Sarvar M, et al. 2012-2025 roadmap of IR Iran's disaster health management. PLoS Curr. 2012 Jul 16;4: e4f93005fbcb34. https://doi.org/10.1371/4f93005fbcb34 PMID:22953239