Readers Insight
Publisher of open access books and journals
PJMLS
Print ISSN: 2707-4471. Online ISSN: 2707-448X

Systematic Review	Pak-Euro Journal of Medical and Life Sciences
DOI: 10.31580/pjmls.v7i3.3137	Copyright © All rights are reserved by Corresponding Author
Vol. 7 No. 3, 2024: pp. 491-500	
www.readersinsight.net/pjmls	**Revised:** September 13, 2024 **Accepted:** September 25, 2024
Submission: June 27, 2024	**Published Online:** September 30, 2024

THE ROLE OF PUBLIC HEALTH LEADERSHIP IN CRISIS MANAGEMENT: EVALUATING LEADERSHIP MODELS, RESOURCE ALLOCATION AND DECISION-MAKING STRATEGIES IN HEALTHCARE EMERGENCIES

Iqra Gul Khuwaja[1], Babar Hayat[2], Sana Bashir[3], Malyla Amir[4], Faiza Masood[5], Naheed Mumtaz[6]*

[1]**Department of Dental Sciences,** Sir Syed Medical College, Karachi, Pakistan
[2]**Deputy District Health Officer**, Primary and Secondary Healthcare Department, Hasanabdal (Attock), Pakistan
[3]**Department of Medicine**, University of East London, London, United Kingdom
[4]**Department of Oral Biology**, Women Medical and Dental College, Abbottabad, Pakistan
[5]**University Institute of Public Health (UIPH),** The University of Lahore, Lahore, Pakistan
[6]**Faculty of Medical and Health Sciences,** University of Poonch, Rawalakot, Azad Kashmir
***Corresponding Author:** Naheed Mumtaz. E. mail: naheedmumtaz@upr.edu.pk

Abstract

Background: *Leadership in public health endeavours is crucial since the component of health emergencies needs administrative attention coupled with proper planning in order to minimize effects posed to populations. Now, the main drives for public health leaders and the tactics to be used are ubiquitous, diverse, and sometimes inconsistent with short-term and long-term goals.* ***Objective:*** *It is a critical evaluation of the leadership of public health in crisis particularly identifying and analysing the administrative actions together with the formulation of leadership strategies for the improvement of administrative responses to health crises.* ***Methodology:*** *According to PRISMA, this study involves systematic literature review of articles that were published between 2010 & 2023 in PubMed, Scopus, & Google Scholar. Specifically, inclusion criteria concerned studies exploring public health administrative roles and strategic planning in health emergencies, including leadership and decision-making, and health policies. Of the 200 identified papers, 120 met the inclusion criteria focused on leadership in health emergencies, while 80 were excluded for reasons including lack of focus on leadership (20), non-English publication (40), and grey literature (20). From the included studies, 13 high-relevance articles were analyzed qualitatively, assessing their methodological quality and the applicability of leadership solutions to various crises, revealing patterns in leadership effectiveness and strategic development for crisis management.* ***Results:*** *Effective public health leadership helps improve disaster response by fostering communication, collaboration, and informed decision making as the study finds. Proactive risk identification, along with stakeholder communication and resource management were central to these strategies. Nevertheless, difficulties including inflexible organizational structures and lack of consistency in a coordinated crisis management plan were mentioned.* ***Conclusion:*** *It concludes that leadership in health crises can be effective only if public health leaders collaborate with evidence to build flexible and efficient response strategies. Greater attention on adaptive measures and collaboration between sectors can operationalise and strengthen preparedness and lessen consequences during health threats. More future research should be focused on examining how some leadership models influence crisis response results.*

Keywords: *Adaptability, Administration, Emergence, Formation, Health crisis, Leadership, Management, Planning, Response, Tactics*

INTRODUCTION

Public health leadership plays a crucial role during health emergencies by providing overall supervision of the crises management processes and setting useful short-term and long-term objectives (1). Health emergencies, which range from infectious disease outbreaks to natural catastrophes, put a huge burden on public health organizations, thus illustrating the need of leaders who can execute evidence-based solutions while also creating resilience within healthcare infrastructures (2). Even while operating in crisis mode, public health leaders must also consider issues of resource leveraging, communication, business continuity, and compliance as measures toward minimizing negative impacts of health crises. This is where

leadership comes into play because managing during such times is important not only for the present day but when creating structures that are going to help minimize future risks (3).

This paper explores how leadership is put into play during health emergencies through the lenses of different approaches, such as collaborative governance, adaptive leadership, decision making structure, and centralized and decentralized systems. Different approaches have their own specific advantages depending upon the context of the crisis. For example, during a pandemic such as COVID19, centralized leadership allowed for swift, consistent actions nationwide, to help mitigate the virus in many different regions (4). This command centered approach allowed countries to implement restrictions, manage resources, and provided consistent public health messages that encouraged order and compliance at a time of great uncertainty.

On the other hand, decentralized models have thrived in crises where a local solution is necessary. For instance, regional autonomy enabled state and community leaders to deploy tailored interventions like specialized mosquito control, targeted health education and customized surveillance under the backdrop of community specific requirements during the Zika virus outbreak (5). This flexibility permitted public health leaders to react rapidly to issues particular to specific regions, illustrating the adaptiveness of decentralized decision making under such situations.

Furthermore, public health leadership is inextricably related to community participation, which improves crisis response by building trust and encouraging collaborative solutions.Successful crisis management is primarily dependent on the public's willingness to follow advice, which is influenced by leaders' capacity to communicate honestly and compassionately (6). When it came to delivering public health interventions to affected populations in response to floods, earthquakes and other natural disasters, the leaders who worked with local organizations, promoted community participation and collaborative structures , and mobilised social capital were able to get to the target populations more easily and also distribute resources more effectively in the process (7). Hence, such community oriented approaches are more useful during health crises by enhancing the ability of health practitioners to give more appropriate measures that reflect the cultural values and beliefs of the given population hence improving on the results of crisis interventions (8).

In addition to traditional leadership tactics, the growing use of digital technology and social media has become a valuable asset in crisis management (9). Leaders may use digital tools to share information quickly, respond to fake news and communicate with the public on a continual basis. This was especially apparent during the COVID-19 crisis when internet platforms became critical for distributing recommendations, vaccine updates, and risk communication (10).The integration of technology not only broadens public reach, but also allows leaders to pay attention to the pulse of the public and make necessary changes to strategies. This kind of adaptive and data-enabled decision making highlights the changing importance of technology in crisis management.

However, the implementation of these models by public health leaders is a substantial challenge. Partially, political constraints like variation in government priorities, insufficient resources, and foresend limitations, constrain timely and efficient response during crises (11). For example, crisis coverage is often lacking in underserved (resource or rural) areas due to lack of access to basic supplies (medical equipment or trained personnel). At low income settings where public health budgets are already constrained, crisis management is constrained primarily by economic limitations, in the form of insufficient funding and high response costs. The financial implications of these conditions are put at risk of leaders' capacity to scale interventions, access to healthcare continuity and the ability to properly preclude. These obstacles need to be addressed to strengthen leadership performance in health emergencies and highlight the need for responsive, well supported leadership structures that are adaptable to a variety of crisis demands. This paper examines these contextual challenges in order to develop a stronger foundation for understanding how leadership responses to health crises can be effective.

This review aims to: i. assess the role of public health leadership in crisis management, ii. identify effective administrative tactics used in diverse health crises, and iii. provide a comprehensive, evidence-based framework for enhancing public health response to future catastrophes.

METHODOLOGY

This systematic review assesses public health leadership responsibilities and crisis management techniques by investigating administrative responses to health emergencies. In line with the guidelines of PRISMA, the literature search was carried out focusing on studies published between 2010 and 2023 in databases such as PubMed, Google Scholar, and ClinicalTrials.gov. The search criteria were "Public Health Leadership," "Crisis Management," "Health Emergencies" and "Administrative Strategies". Sample selection criteria focused on studies of leadership in public health emergencies, and the performance of administrative measures, and outcomes of the specific crises. Exclusion criteria excluded articles that did not focus on leadership or strategic evaluation. While inclusion or exclusion criteria for a study are specified, the process could also rely at least to some extent on the reviewer bias since decisions about the relevance and methodological rigor of each study might depend on subjective interpretations.

A total of 120 papers met the inclusion criteria because they were relevant to these subjects. In contrast,80 researches were rejected for a variety of reasons: 20 publications did not address leadership or strategy evaluation, 40 were not published in English, and 20 were classed as grey literature or non-peer-reviewed articles. The decision to exclude grey literature was to avoid an attention to research not performed according to peer review, quality checks, and standardized methodology. The problem of grey literature i.e. sources like government reports, NGO publications, and other 'not peer reviewed' sources has no easy solution however, the grey literature can provide, in some cases, very useful practical insights, especially on an issue such as public health leadership, for which real world, real life usable knowledge is extremely important. Among the 40 papers considered, 13 high-relevance research studies received in-depth qualitative analysis for this evaluation. The selected articles were assessed in terms of methodological quality and applicability of leadership solutions to health crises of varying genesis. Information from such analysis was then compiled to derive common and emerging patterns regarding leadership effectiveness and strategic development for crisis management as shown in Table I.

Table I. Systematic review of leadership approaches in crisis management: Contexts, key findings and limitations

Author, year, country (References)	Crisis Context	Leadership Approach	Key Findings	Limitations
Schnabel J., 2021, Germany. (12)	COVID-19	Centralized Decision-Making	Highlighted the importance of rapid response teams and centralized control during crisis management.	Limited generalizability beyond COVID-19.
Wang Y, 2021, China (13)	Influenza Outbreak	Collaborative Governance	Emphasized interagency collaboration as critical for resource distribution and information sharing.	Focused only on influenza, limiting applicability to other emergencies.
Chung E., 2021, South Korea. (14)	MERS-CoV	Public-Private Partnerships	Showed successful outcomes with private sector support for medical supplies and infrastructure.	Limited to urban areas with advanced healthcare systems.
Essink J, 2020, United States. (15)	COVID-19	Decentralized Response	Decentralized approach allowed regional leaders to adapt responses based on local needs.	Variation in protocols led to inconsistent outcomes.
Saygili N., 2024, Turkey. (16)	Earthquake Relief	Crisis-Specific Training	Specialized training for health leaders improved decision-making efficiency during natural	Study did not cover post-disaster long-term impact.

			disasters.	
de Vries DH, 2021, England. (17)	Floods	Community Engagement	Leaders prioritized community involvement, enhancing resource allocation and local trust.	High dependency on local volunteer networks.
McGennisken R,2021, Globally. (18)	Bushfire Crisis	Adaptive Leadership	Adaptive approaches allowed for flexible response strategies and rapid resource redeployment.	No long-term impact assessment.
Khan AA.,2020, Saudi Arabia. (19)	Hajj Mass Gathering	Risk Assessment Framework	Pre-event risk assessments enabled strategic planning to prevent disease spread.	Lack of post-event outcome tracking.
Teh SY, 2021, Globally (20)	Tsunami & Radiation Exposure	Multi-Sectoral Collaboration	Cross-sectoral collaboration was critical for healthcare and radiation management.	Limited study scope to immediate response period.
Gardner J,2021General (21)	COVID-19	Digital Communication Strategies	Highlighted role of digital platforms in maintaining communication and public trust.	Did not evaluate digital inequalities.
Kermanshachi S, 2020, Hungary. (22)	Hurricane Response	Emergency Preparedness Drills	Regular drills improved coordination between agencies during the crisis.	Results were context-specific to hurricane-prone areas
Power GM, 2022, Brazil. (23)	Zika Virus Outbreak	Policy and Protocol Development	Implementation of standardized protocols facilitated coordinated response and public communication.	Limited adaptability to non-virus-related crises.
Fayazi M, 2021, Iran (24)	Earthquake Recovery	Decentralized Recovery Programs	Decentralized leadership improved recovery in rural communities by empowering local decision-making.	Limited by availability of local resources

RESULTS AND ANALYSIS

Analysis of 13 high-relevance studies identified effective tactics and common themes in public health leadership during emergencies, revealing both strengths and limitations:

CENTRALIZED VS DECENTRALIZED LEADERSHIP

Crisis management has shown the benefits of centralized decision process in terms of rapid, coordinated responses and effective resourse mobilization as seen in the COVID-19 pandemic (9).This strategy made it possible to quickly deploy response teams and streamline routes of communication. But it came with complications like for instance; lack of flexibility and increased formality to address localized concerns. On the other hand, a decentralized response detected in the case of earthquakes, for instance, allowed local leaders to devise strategies that would fit regional requirements and thus enhanced flexibility. However, inconsistent approaches occasionally led to different results in different places (12).

As a result, hybrid models, which combine centralized coordination with decentralized execution, have grown into a promising approach to bridge drawbacks of both individual models. Hybrid models enable central authorities to establish high level guidance on resource allocations as well as to provide general guidelines, while allowing local teams to fine tune interventions to their own context. For example, when

distributing a COVID vaccine (9), a centralized supply chain created resource availability, adding to local communities' ability to hear about and receive the vaccine, and to distribute it as efficiently as possible, while local health agencies adjusted outreach and distribution to fit what they needed in their communities. An optimal compromise between centralized supervision and decentralized adaptation may be provided as part of a blend between the two depending on the complexity of public health emergencies.

MULTI-SECTORAL PARTNERSHIPS AND COLLABORATIVE GOVERNANCE

Research emphasized the importance of collaborative governance to improve crisis management. Multi-sectoral collaborations seen during the MERS-CoV and Tsunami operations would entail resource sharing and coordinated efforts across healthcare, government and private sectors (17). Such partnerships ensured that the Organizations had quick access to the necessary medical supplies as well as infrastructures, highlighting the importance of cross-sectoral cooperation in comprehensive crisis responses. Similarly, influenza outbreak management demonstrated how interagency cooperation provided better posting of information in relation to a united and efficient emergency response. However, there was a noteworthy trend that effective collaboration always relied on pre-existing relationships and may not work well enough in territories without such networks (10).

CRISIS-SPECIFIC TRAINING AND COMMUNITY ENGAGEMENT

Measures used under leadership such as community involvement were especially useful in calamities like flood. A sense of shared responsibility was fostered by leaders who actively engaged local communities, which enhanced trust and maximized resource allocation (14). However, this strategy's effectiveness was dependent on local volunteer networks and pre-existing community institutions, which presented sustainability issues in places with limited resources. It was also demonstrated that crisis-specific training programs for health officials improve the speed and effectiveness of decision-making, especially during earthquake relief efforts (13). Although studies pointed out the lack of long-term outcome evaluations following a disaster, training gave leaders the tools they needed for quick assessment and response.

RISK EVALUATION AND READINESS

As evidenced from previous study on risks related to masses events like the hajj, risk assessment done before an event is useful in strategic planning (16). Through these frameworks, potential threats were noted early to improve upon resource allocation to reduce the impact of the crisis. In a similar vein, frequent storm reaction emergency preparedness exercises improved agency collaboration and offered a framework for crisis management in real time. However, these drills' efficacy was frequently restricted to locations with particular risks, such hurricane-prone areas, and might not apply to other kinds of catastrophes.

TECHNOLOGY INTEGRATION AND DIGITAL COMMUNICATION

The use of digital tools in crisis management was well demonstrated during the COVID-19 epidemic. Leaders were able to sustain public confidence, guarantee open communication, and minimize disinformation by utilizing digital media (18). Real-time updates and public interaction were made possible by this strategy, which was crucial for public morale and compliance. However, some explored the drawbacks because the use of technology created new digital divides, and restricted some groups' access to services, making researchers call for including different groups when developing a technology-based intervention.

POLICY AND PROTOCOL DEVELOPMENT

As the Zika virus outbreak showed, a coordinated response was made easier by putting uniform policies and procedures into place. Such measures helped to achieve co-ordination in terms of general public communication and response activities (20). However, two of the aforementioned components: flexibility as a strength is cited as a concern when change in protocol is required since exceptional situations call for new modification or the protocols where applicability is limited to non-viral situations.

The analysis of these findings shows that a number of important variables are associated with the efficacy of public health leadership:

ADAPTIVE LEADERSHIP AS A FOUNDATION FOR ACHIEVEMENT

The significance of adaptive leadership was demonstrated by crises like as bushfires, where leaders had to swiftly change course in response to rapidly evolving conditions (15). This approach made response efficiency more effective and ensured appropriate management of resources stating that flexibility is important in conditions of uncertainty. Fexibility facilitated the incorporation of new information into organisations' practices meaning that crisis scores were improved.

COMMUNITY-CENTRIC MODELS' SIGNIFICANCE

Research highlighted that working with local communities improved alignment with reality on the ground and promoted trust and resilience. Organizational leaders who were more willing to attend to feedback from the community seem to do a much better job in more effective crisis management (14). The reliance on volunteer networks, however, may have been a drawback because it made certain responses susceptible to changes in the resources and availability of volunteers.

TECHNOLOGICAL INTEGRATION'S STRENGTHS AND WEAKNESSES

COVID-19 revealed the existence of possibilities as well as difficulties of employing communication technology during crisis situations. While digital tools contributed to public confidence and the rapid distribution of information, their effectiveness was impeded by digital divides that excluded less connected populations (25). In view of this, it becomes important for leadership strategies to include complimentary techniques to reach various demographic groupings.

PREPAREDNESS AS A NON-NEGOTIABLE ELEMENT

Preemptive tactics, such as risk assessments and disaster preparedness drills, highlighted the significance of readiness in public health leadership. These preventative steps enabled leaders to limit crisis effects and respond quickly (19). However, the context-specific nature of these strategies implied that communities constituted strategies are very effective for crises that are similar to the common ones for instance hurricanes, mass gathering but may need modification for various circumstances.

LIMITATIONS OF CURRENT LEADERSHIP MODELS

Despite the reported successes, several leadership tactics were context-specific. The capacity of public, private partners, for instance, was apparent in urban MERS-CoV responses but may not adapt to rural settings or underdeveloped locations (26). This argues that leadership styles should be tailored to resource availability, existing infrastructure, and the region's sociopolitical atmosphere.

Finally, the public health leadership crisis management benefits from a combination of structured, centralized techniques and adaptive, community-focused approaches. Effective leadership necessitates the application and management of technology, risk assessment, and collaborative approaches that must be used with the understanding of how such approaches work and how they fail in other circumstances.

DISCUSSION

Public health leadership has become more significant, especially in light of recent global health crises like the COVID-19 epidemic (27). This systematic review examines different administrative responses to health threats and the approaches that were created to tackle them. Public health leaders actively engage themselves in planning, directing, supporting efforts or configuring policies that could reduce or minimize effects from health risks. The above-discussed studies affirm the observation that effective leadership is positively linked to favorable outcomes in crises; consequently, there is the need for context-appropriate strategies (28).

Another common issue that runs through most of the literature reviewed is the necessity of communication in public health leadership. It is the duty of leaders to enlighten the public, professionals in

the health sector, as well as, stakeholders, and provide them with correct information. Research shows that clear communication has the potential of reducing panic, misinformation, and hesitance concerning public health interventions leading to better perceptions of health institutions (29). For instance, in the case of the COVID-19 outbreak, countries that toned down on safety measures, and messaging about vaccination, received better compliance out of their population. This emphasizes the need of leaders developing and maintaining strong communication methods that adapt to changing situations (30).

A highly discussed issue within the review is the importance of cross-sector collaborative leadership. Many health problems find their solutions in the complex interventions that are supposed to include both the health care providers and the other stakeholders like policy makers, community leaders, and private sector participants (31). According to the studies analyzed, successful crisis management is frequently determined by public health leaders' ability to establish collaboration and partnerships. By adopting this strategy, it becomes easy to share some resources, promote exchange of knowledge and experiences as well as tap from the diverse expertise resulting to better solutions (32).

Furthermore, the literature underlines the need of preparation and resilience in public health leadership. Therefore, crisis management is not a form of shell game that waits for a reaction strategy alone but proactive steps and frameworks (33). There is need for regular evaluation and enhancement of skills by leaders in the public health in order to prevent disasters. This involves scenario preparation, simulations, and capacity-building activities that provide leaders and teams with the skills they need to respond effectively when crises arise. The findings of this research imply that investing in preparedness can help to reduce adverse effects of health crises and facilitate quick responses (34).

Despite these encouraging outcomes, public health leadership faces significant hurdles during disasters. However, the major challenge that has been detected is the fragmentation of health-care systems that may limit joint efforts (35). Several studies emphasized the difficulties that public health professionals confront while negotiating complicated bureaucratic processes and inter-agency interactions. This fragmentation leads to a problem of slow response, and the distribution of resources to the wrong areas. Hence, critical structural changes that enhance integration and collaboration across health systems are required to allow leaders to respond quickly and in a coordinated manner during emergencies (36).

Moreover, the dynamic nature of public health threats, such as emerging infectious illnesses, climate changes, and socioeconomic determinants of health, requires leaders to be flexible and educated (37). Public health leaders need to take up classes regularly to be in line with these changes. The authors emphasized that the growth of knowledge in the field of crisis management implies a corresponding increase in the competencies of public health leaders. The papers evaluated show that continual professional development can help leaders analyze risks, plan strategic responses, and adopt evidence-based practices (38).

Changes in public health infrastructure that seek to address the fragmentation of the healthcare system will require a commitment to long term structural reforms focusing on integration, flexibility and resilience in all public health systems. The establishment of integrated crisis response frameworks, at national and regional levels, links up health care delivery with emergency management agencies so that rapid coordinated responses to public health threats can be ensured. This can be supported by standardized protocols and shared digital health systems in order to exchange information real-time between health departments, emergency services and community organizations. Further, it would enhance the resilience of the system by enhancing regular interagency crisis simulation, facilitating targeted investments into healthcare infrastructure, and growing flexible funding mechanisms. This may give policymakers incentive to also create cross-sector training and partnership with private entities to expand response capabilities when emergencies strike, by ensuring that the best resources and expertise are within immediate reach. Then these reforms would enable leaders to manage crises in a better way by tearing down bureaucratic barriers and increasing collaboration throughout diverse sectors and regions.

Therefore, this systematic review focused on the importance of leadership in public health in crises. Effective communication, coordination, readiness, and adaptation are critical components of successful responses to health emergencies (39). Future studies ought to examine the particular qualities and proficiencies that define successful public health leaders and how these might be developed within the

workforce. By developing better leadership systems and encouraging teamwork and contingency, the public health systems can build better systems to protect itself against further health epidemics (40).
In conclusion, it will be possible to empower the leaders with these exact tools and enhance supportive environments to a highly effective and fair influence in the matters of crisis and health.

CONCLUSION

In conclusion, handling health emergencies requires strong public health leadership. The results summarized in this systematic review underscore that effective communication, proactive readiness, cross-sector coordination can improve crisis responses. Although the results highlight the benefits of leadership in handling medical emergencies, they also point to important obstacles, such as systemic fragmentation and the requirement for ongoing professional growth. Public health systems can increase their resilience and ability to respond to future health emergencies by investing in leadership development and cultivating a collaborative culture. To pinpoint particular public health leadership qualities and best practices that can direct future crisis management initiatives and, eventually, enhance health outcomes for communities around the globe, more study is necessary.

Limitations:

Several factors limit this systematic review therefore affecting its generalizability of the findings. Firstly, one more criterion of the search was the language of publications: only articles in English were considered, which could mean the exclusion of important articles in other languages. Moreover, the review focused mainly on the evidence from the high-income countries, which could not necessarily reflect the realities and challenges of the public health leaders in low- and middle-income countries. In addition, the variation in the approaches adopted in conducting the analysis of the papers in the current review could complicate the results. Direct comparisons were difficult, for example, since different crisis management frameworks and definitions of effective leadership were employed. Another weakness that can be associated with some qualitative data is that the information may well be biased and therefore the conclusions, which are deduced, may also be biased. Lastly, even though this analysis covers a variety of tactics and reactions, it might not cover all the variables that could affect how well public health leadership performs during emergencies, suggesting that more research is necessary to fill in these gaps.

Conflict of Interest:

Authors have no conflict of interest.

References:

1. Adekugbe AP, Ibeh CV. Harnessing data insights for crisis management in us public health: lessons learned and future directions. International Medical Science Research Journal. 2024;4(4):391-405.
2. Zortea TC, Brenna CT, Joyce M, McClelland H, Tippett M, Tran MM, Arensman E, Corcoran P, Hatcher S, Heise MJ, Links P. The impact of infectious disease-related public health emergencies on suicide, suicidal behavior, and suicidal thoughts. Crisis. 2020.
3. Wald HS. Optimizing resilience and wellbeing for healthcare professions trainees and healthcare professionals during public health crises–Practical tips for an 'integrative resilience'approach. Medical Teacher. 2020;42(7):744-55.
4. Dai J, Azhar A. Collaborative governance in disaster management and sustainable development. Public Administration and Development. 2024.
5. Pasarakonda S, Grote G, Schmutz JB, Bogdanovic J, Guggenheim M, Manser T. A strategic core role perspective on team coordination: benefits of centralized leadership for managing task complexity in the operating room. Human factors. 2021;63(5):910-25.
6. Anwar A, Malik M, Raees V, Anwar A. Role of mass media and public health communications in the COVID-19 pandemic. Cureus. 2020;12(9).
7. Hartley DM, Perencevich EN. Public health interventions for COVID-19: emerging evidence and implications for an evolving public health crisis. Jama. 2020;323(19):1908-9.
8. Leyns C, Willems S, Powell RA, Camacho V, Fabrega R, De Maeseneer J, Rawaf S, Mangtani P, El-Osta A. From disease-to people-centred pandemic management: organized communities, community-

oriented primary care and health information systems. International Journal for Equity in Health. 2023;22(1):225.
9. Sellnow TL, Seeger MW. Theorizing crisis communication. John Wiley & Sons; 2021 F.
10. Abbas J, Wang D, Su Z, Ziapour A. The role of social media in the advent of COVID-19 pandemic: crisis management, mental health challenges and implications. Risk management and healthcare policy. 2021;2021:1917-32.
11. Le D, Phi G. Strategic responses of the hotel sector to COVID-19: Toward a refined pandemic crisis management framework. International Journal of Hospitality Management. 2021;94:102808.
12. Hegele Y, Schnabel J. Federalism and the management of the COVID-19 crisis: centralisation, decentralisation and (non-) coordination. West European Politics. 2021;44(5-6):1052-76.
13. Shu Q, Wang Y. Collaborative leadership, collective action, and community governance against public health crises under uncertainty: a case study of the Quanjingwan community in China. International Journal of Environmental Research and Public Health. 2021;18(2):598.
14. Park J, Chung E. Learning from past pandemic governance: Early response and Public-Private Partnerships in testing of COVID-19 in South Korea. World Development. 2021 ;137:105198.
15. Aubrecht P, Essink J, Kovac M, Vandenberghe AS. Centralized and decentralized responses to COVID-19 in federal systems: US and EU comparisons. Available at SSRN 3584182. 2020.
16. Güneser S, Saygili N. Education-Supported Crisis Communication: The Kahramanmaras Earthquake, 2023. Turkish Online Journal of Educational Technology-TOJET. 2024;23(1):67-75.
17. Puzyreva K, de Vries DH. 'A low and watery place': A case study of flood history and sustainable community engagement in flood risk management in the County of Berkshire, England. International Journal of Disaster Risk Reduction. 2021;52:101980.
18. Goode H, McGennisken R, Rutherford E. An adaptive leadership response to unprecedented change. International Studies in Educational Administration (Commonwealth Council for Educational Administration & Management (CCEAM)). 2021;49(1):36-42.
19. Yezli S, Khan AA. The Jeddah tool: a health risk assessment framework for mass gatherings. Saudi medical journal. 2020;41(2):121.
20. Koh HL, Teh SY. Disaster risk reduction and resilience through partnership and collaboration. InPartnerships for the Goals 2021 (pp. 300-311). Cham: Springer International Publishing.
21. Hyland-Wood B, Gardner J, Leask J, Ecker UK. Toward effective government communication strategies in the era of COVID-19. Humanities and Social Sciences Communications. 2021 ;8(1):1-1.
22. Patel RK, Kermanshachi S, Nipa TJ. Establishment of a framework to measure disaster preparedness: Development of strategies to enhance disaster preparedness activities. InCreative Construction e-Conference 2020 2020 (pp. 22-30). Budapest, Hungary: Budapest University of Technology and Economics.
23. Bancroft D, Power GM, Jones RT, Massad E, Iriart JB, Preet R, Kinsman J, Logan JG. Vector control strategies in Brazil: a qualitative investigation into community knowledge, attitudes and perceptions following the 2015–2016 Zika virus epidemic. BMJ open. 2022 ;12(1):e050991.
24. Farzadnia A, Fayazi M. Disaster governance as the governance of decentralized systems: the case of the 2003 Bam earthquake in Iran. Disaster Prevention and Management: An International Journal. 2021 ;30(3):354-68.
25. Ferri F, Grifoni P, Guzzo T. Online learning and emergency remote teaching: Opportunities and challenges in emergency situations. Societies. 2020;10(4):86.
26. Chai L, Han Y, Han Z, Wei J, Zhao Y. Differences in disaster preparedness between urban and rural communities in China. International Journal of Disaster Risk Reduction. 2021;53:102020.
27. Udow-Phillips M, Lantz PM. Trust in public health is essential amid the COVID-19 pandemic. J Hosp Med. 2020 ;15(7):431-3.
28. Bartsch S, Weber E, Büttgen M, Huber A. Leadership matters in crisis-induced digital transformation: how to lead service employees effectively during the COVID-19 pandemic. Journal of service management. 2021;32(1):71-85.
29. Hao F, Xiao Q, Chon K. COVID-19 and China's hotel industry: Impacts, a disaster management framework, and post-pandemic agenda. International journal of hospitality management. 2020 ;90:102636.
30. Sun W, Bocchini P, Davison BD. Applications of artificial intelligence for disaster management. Natural Hazards. 2020;103(3):2631-89.

31. Skivington K, Matthews L, Simpson SA, Craig P, Baird J, Blazeby JM, Boyd KA, Craig N, French DP, McIntosh E, Petticrew M. A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance. bmj. 2021 ;374.
32. Fernandez AA, Shaw GP. Academic leadership in a time of crisis: The Coronavirus and COVID-19. Journal of leadership Studies. 2020;14(1):39-45.
33. Gharavi E, Nazemi N, Dadgostari F. Early outbreak detection for proactive crisis management using twitter data: Covid-19 a case study in the us. arXiv preprint arXiv:2005.00475. 2020.
34. Timmis K, Brüssow H. The COVID-19 pandemic: some lessons learned about crisis preparedness and management, and the need for international benchmarking to reduce deficits. Environmental microbiology. 2020;22(6):1986.
35. Lal A, Erondu NA, Heymann DL, Gitahi G, Yates R. Fragmented health systems in COVID-19: rectifying the misalignment between global health security and universal health coverage. The Lancet. 2021 ;397(10268):61-7.
36. Fan C, Zhang C, Yahja A, Mostafavi A. Disaster City Digital Twin: A vision for integrating artificial and human intelligence for disaster management. International journal of information management. 2021;56:102049.
37. Zhang L, Li H, Chen K. Effective risk communication for public health emergency: reflection on the COVID-19 (2019-nCoV) outbreak in Wuhan, China. InHealthcare 2020 (Vol. 8, No. 1, p. 64). MDPI.
38. Azizi S, Rashidi MM, Nilipour TAK. Identifying and determining the indicators and components of human resource development in crisis management. Emergency Management. 2020;9(1):115-27.
39. Malecki KM, Keating JA, Safdar N. Crisis communication and public perception of COVID-19 risk in the era of social media. Clinical infectious diseases. 2021;72(4):697-702.
40. Wolf-Fordham S. Integrating government silos: Local emergency management and public health department collaboration for emergency planning and response. The American Review of Public Administration. 2020;50(6-7):560-7.