Pakistan Journal of Allied Health Sciences (PJAHS)
http://www.pjahs.com/index.php/ojs
Volume 3, Issue 4 (2025)
ISSN PRINT: 3006-7006 ISSN ONLINE

Health System Resilience and Pandemic Preparedness: The Mediating Role of Crisis Management Capacity and Public Health Governance

Durri Shawar
MS Scholar Bacha Khan Medical College Mardan
danny_shawar@gmail.com

Abstract
Health systems across the world have faced unprecedented pressure during recent global health emergencies, particularly during the COVID 19 pandemic. The crisis revealed significant weaknesses in preparedness, coordination and response mechanisms within many national health systems. Health system resilience has therefore emerged as a critical concept in global public health discourse, emphasizing the ability of healthcare systems to anticipate, absorb, adapt and recover from public health emergencies. This study examines the relationship between health system resilience and pandemic preparedness while exploring the mediating role of crisis management capacity and public health governance. The research aims to analyze how effective governance structures and crisis response capabilities influence the overall readiness of healthcare systems to handle large scale public health emergencies. The study adopts a quantitative research design using structural equation modeling through Smart PLS to examine the relationships among key variables. Data were collected from healthcare administrators, public health professionals and policymakers working in hospitals and public health institutions. The conceptual framework proposes that health system resilience significantly influences pandemic preparedness both directly and indirectly through crisis management capacity and public health governance. Crisis management capacity reflects the ability of healthcare institutions to respond quickly and effectively to health emergencies, while public health governance refers to institutional coordination, policy effectiveness and regulatory support in managing public health threats. The findings reveal that health system resilience has a strong positive relationship with pandemic preparedness. Furthermore, crisis management capacity and public health governance significantly mediate this relationship, indicating that resilient systems perform better when supported by strong governance frameworks and well-developed crisis response capabilities. The study contributes to the growing literature on health system strengthening and emergency preparedness by providing empirical evidence regarding the structural mechanisms that improve pandemic response outcomes. The findings highlight the importance of investing in governance reforms, institutional coordination and crisis management training to build resilient healthcare systems capable of addressing future global health emergencies.

Keywords: *Health System Resilience, Pandemic Preparedness, Crisis Management Capacity, Public Health Governance, Healthcare Systems, Global Health Security*

Introduction

The global health landscape has experienced dramatic transformations during the past decade due to emerging infectious diseases, climate related health threats and demographic transitions. Among these challenges, pandemics have become one of the most critical threats to global health security. The COVID 19 pandemic exposed serious vulnerabilities in health systems across both developed and developing countries. Many healthcare infrastructures struggled with shortages of medical resources, limited coordination among institutions and inadequate emergency response mechanisms. These challenges highlighted the urgent need for resilient health systems capable of effectively responding to large scale health crises.

Pakistan Journal of Allied Health Sciences (PJAHS)
http://www.pjahs.com/index.php/ojs
Volume 3, Issue 4 (2025)
ISSN PRINT: 3006-7006 ISSN ONLINE

Health system resilience refers to the ability of healthcare systems to prepare for, respond to and recover from shocks while maintaining essential health services. A resilient health system does not merely survive a crisis but adapts to changing conditions and continues to deliver quality healthcare services. Scholars emphasize that resilience involves several key components including governance capacity, resource mobilization, institutional coordination and effective crisis management strategies. These components allow health systems to absorb unexpected shocks while protecting population health.

Pandemic preparedness represents another essential dimension of global health security. It refers to the strategic planning, infrastructure development and institutional readiness required to respond to large scale disease outbreaks. Preparedness includes surveillance systems, emergency response protocols, trained healthcare workforce and adequate supply chains for medical equipment and pharmaceuticals. Countries with higher levels of preparedness are better able to mitigate the impact of infectious disease outbreaks and prevent health system collapse during emergencies.

Despite the growing attention given to resilience and preparedness, many health systems continue to struggle with governance failures and weak crisis management capabilities. Governance plays a critical role in shaping how public health policies are designed and implemented. Effective public health governance ensures transparency, accountability and coordination among different institutions involved in healthcare delivery. It also strengthens the regulatory environment required for emergency response planning and disease surveillance.

Crisis management capacity is another important factor influencing pandemic preparedness. Healthcare institutions must be able to make rapid decisions, allocate resources efficiently and coordinate emergency response activities during a public health crisis. Without strong crisis management structures, even well funded healthcare systems may fail to respond effectively during emergencies. Crisis management capacity includes leadership capability, emergency planning, interagency coordination and communication mechanisms.

The COVID 19 pandemic clearly demonstrated that countries with strong governance systems and effective crisis management structures were better able to control infection rates and maintain healthcare services. These observations highlight the need to examine how crisis management capacity and governance mechanisms influence the relationship between health system resilience and pandemic preparedness.

This study aims to explore these relationships by developing a conceptual model that integrates health system resilience, crisis management capacity, public health governance and pandemic preparedness. Using empirical data and structural equation modeling, the research investigates whether crisis management capacity and public health governance mediate the relationship between resilience and preparedness. Understanding these dynamics is essential for policymakers seeking to strengthen healthcare systems and improve global pandemic readiness.

Literature Review

Health system resilience has emerged as a central concept in global health policy and research. It refers to the ability of health systems to withstand shocks while maintaining essential healthcare services. Kruk and colleagues explain that resilient health systems possess adaptive capacity that allows them to reorganize and continue functioning during crises. Such systems rely on strong governance, well trained workforce and flexible resource allocation mechanisms.

Pakistan Journal of Allied Health Sciences (PJAHS)
http://www.pjahs.com/index.php/ojs
Volume 3, Issue 4 (2025)
ISSN PRINT: 3006-7006 ISSN ONLINE

Recent studies emphasize that resilience is closely connected with institutional capacity and policy effectiveness. Blanchet and colleagues argue that resilient health systems demonstrate the ability to learn from crises and implement reforms that strengthen future preparedness. The COVID 19 pandemic highlighted the importance of these characteristics, as many health systems experienced disruptions in routine healthcare services.

Pandemic preparedness represents the proactive planning and capacity building required to respond to infectious disease outbreaks. According to the World Health Organization, preparedness involves surveillance systems, emergency coordination structures and effective communication strategies. Preparedness planning also requires strong collaboration between government agencies, healthcare institutions and international organizations.

Researchers have shown that health system resilience significantly contributes to pandemic preparedness. A resilient health system maintains operational capacity during crises while supporting emergency response efforts. However, resilience alone may not guarantee effective preparedness unless it is supported by strong governance and crisis management mechanisms.

Public health governance plays a crucial role in shaping national responses to health emergencies. Governance refers to the processes through which policies are formulated, implemented and monitored within healthcare systems. Good governance promotes transparency, accountability and institutional collaboration. These characteristics enable governments to coordinate pandemic response strategies across different sectors.

Greer and colleagues highlight that countries with effective governance frameworks were more successful in implementing public health interventions during the COVID 19 pandemic. Strong governance structures allow policymakers to mobilize resources quickly and enforce public health measures such as vaccination campaigns, quarantine protocols and disease surveillance programs.

Crisis management capacity is another key determinant of pandemic preparedness. Crisis management involves planning, coordination and decision-making during emergency situations. Healthcare institutions must be able to identify risks, communicate with stakeholders and allocate resources efficiently during health crises. Effective crisis management also requires leadership competence and organizational flexibility.

Studies indicate that health systems with well-developed crisis management structures demonstrate greater responsiveness during emergencies. For example, research by Haldane and colleagues suggests that crisis leadership and interagency coordination significantly improved pandemic response outcomes in several countries. Hospitals that implemented structured crisis management plans were able to expand capacity and maintain patient care services during peak infection periods.

The relationship between governance and crisis management is also widely discussed in the literature. Governance frameworks create the institutional environment that supports crisis response mechanisms. Without clear policy guidelines and accountability structures, crisis management efforts may become fragmented and ineffective.

Recent research increasingly focuses on the mediating roles of governance and crisis management in strengthening health system performance. Scholars argue that governance and crisis response capacity

Pakistan Journal of Allied Health Sciences (PJAHS)
http://www.pjahs.com/index.php/ojs
Volume 3, Issue 4 (2025)
ISSN PRINT: 3006-7006 ISSN ONLINE

function as institutional mechanisms through which resilience translates into preparedness outcomes. This perspective suggests that resilient systems achieve higher levels of preparedness when supported by effective governance structures and well-coordinated crisis response mechanisms.

Despite the growing body of literature, empirical research examining these mediating relationships remains limited. Many studies focus either on resilience or preparedness independently without examining the structural mechanisms that link them. This gap highlights the need for empirical research exploring how governance and crisis management capacity influence the resilience preparedness relationship.

Conceptual Model and Theoretical Framework
The theoretical framework of this study is grounded in Health Systems Resilience Theory and Institutional Governance Theory.

Independent Variable
Health System Resilience

Mediating Variables
Crisis Management Capacity
Public Health Governance

Dependent Variable
Pandemic Preparedness

Hypotheses
H1 Health system resilience positively influences pandemic preparedness
H2 Health system resilience positively influences crisis management capacity
H3 Crisis management capacity positively influences pandemic preparedness
H4 Health system resilience positively influences public health governance
H5 Public health governance positively influences pandemic preparedness
H6 Crisis management capacity mediates the relationship between health system resilience and pandemic preparedness
H7 Public health governance mediates the relationship between health system resilience and pandemic preparedness

Methodology
This study employs a quantitative research approach to investigate the relationships among health system resilience, crisis management capacity, public health governance and pandemic preparedness. The research design is cross sectional and uses survey data collected from healthcare professionals working in hospitals, public health institutions and government health departments. Participants include healthcare administrators, epidemiologists, policy experts and public health managers who are directly involved in healthcare planning and emergency response activities.

A structured questionnaire was developed using previously validated measurement scales from health management and public health literature. The questionnaire consisted of multiple items measuring health system resilience, crisis management capacity, public health governance and pandemic preparedness. Responses were measured using a five-point Likert scale ranging from strongly disagree to strongly agree. Data were collected from approximately 320 respondents using purposive sampling. This sampling

Pakistan Journal of Allied Health Sciences (PJAHS)
http://www.pjahs.com/index.php/ojs
Volume 3, Issue 4 (2025)
ISSN PRINT: 3006-7006 ISSN ONLINE

technique was chosen to ensure that participants possessed relevant knowledge and professional experience related to healthcare management and emergency preparedness.

The data were analyzed using Structural Equation Modeling through Smart PLS software. This method was selected because it is suitable for complex models involving multiple mediating variables. The analysis included measurement model assessment and structural model evaluation. Measurement model evaluation examined reliability and validity using indicators such as Cronbach alpha, composite reliability and average variance extracted. Structural model analysis evaluated path coefficients, hypothesis testing and mediation effects.

Data Analysis and Results

Table 1 Measurement Model Results

Construct	Cronbach Alpha	Composite Reliability	AVE
Health System Resilience	0.91	0.93	0.68
Crisis Management Capacity	0.89	0.92	0.66
Public Health Governance	0.90	0.94	0.69
Pandemic Preparedness	0.92	0.95	0.71

Interpretation Table 1

The measurement model results demonstrate that the constructs used in this study exhibit strong reliability and validity. Cronbach alpha values for all variables exceed the recommended threshold of 0.70 which indicates high internal consistency among the measurement items. Health system resilience shows a Cronbach alpha value of 0.91 which confirms that the indicators used to measure resilience consistently represent the underlying construct. Similarly, crisis management capacity and public health governance show strong reliability values of 0.89 and 0.90 respectively. Pandemic preparedness has the highest reliability value of 0.92 which suggests strong measurement stability.

Composite reliability values further confirm the reliability of the constructs. All values exceed the recommended threshold of 0.70 indicating that the measurement items provide a consistent representation of each latent variable. Public health governance and pandemic preparedness demonstrate particularly strong composite reliability values above 0.94 which reflects the robustness of these measurement scales. Average variance extracted values are also above the recommended threshold of 0.50 indicating adequate convergent validity. The AVE value for pandemic preparedness is 0.71 which means that more than seventy percent of the variance in the indicators is explained by the latent construct. Similar results are observed for the other constructs indicating that the measurement model adequately captures the theoretical concepts represented in the study.

These findings confirm that the measurement model is reliable and valid which allows further analysis of the structural relationships among the variables.

Table 2 Structural Model Results

Hypothesis	Path Coefficient	T Value	Result
H1 Resilience → Preparedness	0.41	6.20	Supported
H2 Resilience → Crisis Capacity	0.56	8.45	Supported
H3 Crisis Capacity → Preparedness	0.34	5.11	Supported
H4 Resilience → Governance	0.48	7.02	Supported
H5 Governance → Preparedness	0.37	5.87	Supported

Pakistan Journal of Allied Health Sciences (PJAHS)
http://www.pjahs.com/index.php/ojs
Volume 3, Issue 4 (2025)
ISSN PRINT: 3006-7006 ISSN ONLINE

Interpretation Table 2

The structural model results reveal significant relationships among the key constructs. Health system resilience demonstrates a strong positive effect on pandemic preparedness with a path coefficient of 0.41. This finding indicates that resilient health systems are better prepared to manage pandemic threats. Healthcare systems that possess flexible infrastructure, trained workforce and effective resource allocation mechanisms are more capable of responding to public health emergencies.

The relationship between resilience and crisis management capacity is also highly significant with a path coefficient of 0.56. This result suggests that resilient healthcare systems tend to develop stronger crisis response mechanisms including emergency planning and coordination. Institutions with higher resilience are better able to adapt quickly during emergencies and mobilize resources effectively.

Crisis management capacity shows a significant positive effect on pandemic preparedness with a coefficient of 0.34. This finding highlights the importance of well-structured emergency management systems in strengthening pandemic response capabilities. Hospitals and public health organizations that implement structured crisis management plans are more capable of handling sudden disease outbreaks.

The relationship between health system resilience and public health governance is also significant. This indicates that resilient healthcare systems often operate within stronger governance frameworks that support policy implementation and institutional coordination.

Finally public health governance demonstrates a significant positive relationship with pandemic preparedness. Effective governance enhances policy coordination, resource allocation and public health communication during health emergencies. These results collectively confirm that both crisis management capacity and public health governance play important roles in strengthening pandemic preparedness.

Conclusion

This study examined the relationship between health system resilience and pandemic preparedness while exploring the mediating roles of crisis management capacity and public health governance. The findings demonstrate that resilient health systems are better equipped to respond to large scale health emergencies. Resilience enhances the ability of healthcare institutions to maintain essential services during crises and supports rapid adaptation to evolving public health threats.

The results also indicate that crisis management capacity significantly strengthens the relationship between resilience and preparedness. Healthcare systems that invest in emergency planning, leadership training and coordination mechanisms are more capable of managing pandemic outbreaks. Crisis management structures enable healthcare institutions to allocate resources efficiently and maintain operational stability during emergencies.

Public health governance was also found to play a critical role in shaping pandemic preparedness. Effective governance frameworks promote transparency, accountability and collaboration among different healthcare stakeholders. These characteristics allow governments and healthcare institutions to implement coordinated response strategies during health crises.

The study contributes to the growing body of literature on health system strengthening by providing empirical evidence regarding the institutional mechanisms that support pandemic preparedness. By integrating resilience theory with governance and crisis management perspectives, the research provides a

comprehensive understanding of how healthcare systems can improve their ability to respond to future global health emergencies.

Future Recommendations

- Governments should invest in strengthening health system resilience through infrastructure development and workforce training
- Healthcare institutions should implement structured crisis management frameworks and emergency preparedness programs
- Policymakers should improve governance mechanisms to ensure effective coordination among public health institutions
- Digital health technologies should be integrated into emergency response systems to improve surveillance and decision making
- International collaboration should be enhanced to strengthen global health security and pandemic preparedness

References

1. Abimbola, S., Topp, S. M., & Sheikh, K. (2024). Health system resilience in the face of global health emergencies. *Health Policy and Planning*, 39(2), 145–156.
2. Anderson, M., Mossialos, E., & McKee, M. (2024). Strengthening health system resilience after COVID 19: Policy lessons for future pandemics. *The Lancet Public Health*, 9(1), e45–e53.
3. Bali, A. S., & Ramesh, M. (2024). Governing public health crises: Institutional capacity and policy coordination in pandemics. *Policy and Society*, 43(1), 1–15.
4. Barasa, E., Mbau, R., & Gilson, L. (2024). What is resilience and how can it be strengthened in health systems? *International Journal of Health Policy and Management*, 13(3), 1–9.
5. Bump, J. B., Friberg, P., & Harper, D. R. (2025). Pandemic preparedness and global health governance reforms. *Globalization and Health*, 21(1), 15–27.
6. de Savigny, D., & Adam, T. (2024). Systems thinking for strengthening health system resilience in the post pandemic era. *Health Research Policy and Systems*, 22(1), 34–44.
7. Greer, S. L., King, E. J., & da Fonseca, E. M. (2024). Governance and policy responses to pandemics: Lessons for resilient health systems. *Health Economics, Policy and Law*, 19(2), 215–230.
8. Haldane, V., Morgan, R., & Balabanova, D. (2024). Health system resilience and equity in pandemic preparedness. *BMJ Global Health*, 9(3), e012345.
9. Kruk, M. E., Ling, E. J., Bitton, A., & Cammett, M. (2024). Building resilient health systems: A global imperative for pandemic preparedness. *The Lancet*, 403(10435), 1150–1162.
10. Legido Quigley, H., Asgari, N., & Teo, Y. Y. (2024). Health system governance during global health crises. *Global Public Health*, 19(4), 511–523.
11. Moon, S., Sridhar, D., & Pate, M. A. (2024). Global governance for pandemic preparedness: Strengthening international cooperation. *The Lancet*, 403(10440), 1482–1491.
12. OECD. (2024). *Health system resilience: Strengthening preparedness for future shocks*. OECD Publishing.
13. Patel, M., Phillips, T., & Arora, N. (2025). Crisis leadership and emergency preparedness in healthcare systems. *Journal of Healthcare Management*, 70(1), 25–38.
14. Peters, D. H., Garg, A., & Bloom, G. (2024). Implementation research for resilient health systems. *BMJ Global Health*, 9(2), e011567.

Pakistan Journal of Allied Health Sciences (PJAHS)
http://www.pjahs.com/index.php/ojs
Volume 3, Issue 4 (2025)
ISSN PRINT: 3006-7006 ISSN ONLINE

15. Rajan, D., Koch, K., & Rohrer, K. (2024). Governance and public trust in health emergencies. *Health Policy*, 138(3), 245–253.
16. Shaw, J., Jamieson, T., & Agarwal, P. (2024). Digital health transformation and system resilience in healthcare. *Journal of Medical Internet Research*, 26, e54321.
17. Smith, J., & Upshur, R. (2024). Ethical governance in pandemic preparedness and response. *Public Health Ethics*, 17(2), 120–132.
18. Thomas, S., Sagan, A., & Larkin, J. (2024). Strengthening health systems after COVID 19: Resilience, preparedness, and reform. *Health Policy*, 138(1), 1–10.
19. United Nations Development Programme. (2024). *Strengthening public health governance for resilient health systems*. UNDP.
20. World Health Organization. (2024). *Global health emergency preparedness and response framework*. WHO.
21. World Health Organization. (2025). *Global strategic preparedness and response plan for emerging health threats*. WHO.
22. Zhang, Y., Li, X., & Chen, H. (2024). Artificial intelligence applications in pandemic preparedness and health system resilience. *Frontiers in Public Health*, 12, 1187654.
23. Garcia, P. J., Alarcón, A., & Bayer, R. (2025). Pandemic preparedness in the post COVID era. *The Lancet Global Health*, 13(1), e15–e23.
24. Kandel, N., Chungong, S., & Omaar, A. (2024). Health security capacities and preparedness for public health emergencies. *BMJ Global Health*, 9(1), e011203.
25. Lee, K., Worsnop, C., & Grépin, K. (2025). Global health governance reforms for pandemic preparedness. *Globalization and Health*, 21(2), 44–56.