International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 01 , January - 2026

Building Healthcare Systems: A Framework for Crisis Management

Manu R Dixit
Management Department, LNCT University
Bhopal, India

Dr. Sandeep Kumar Shivhare
Management Department, LNCT University
Bhopal, India

Abstract - This study emphasizes how important healthcare systems are, as evidenced by global health emergencies like the COVID-19 and Ebola epidemics. This study identifies a major gap in the availability of useful, implementable frameworks for healthcare resilience. Research presents a novel framework that combines heuristic methods with theoretical principles of resilience. It aims to improve healthcare systems' crisis management capacities and is based on the ideas of monitoring, anticipating, recognition, and learning. a thorough literature assessment that is sound from an academic and practical standpoint. Healthcare systems are equipped to handle crises at different phases because to this paradigm, which includes data collection, situation analysis, risk prediction, and reaction assessment. This paper provides a paradigm for better crisis response and recovery, which greatly improves the field. It is a significant step in the context of integrating theoretical resilience ideas with more practical approaches to implementation, which are needed to address todays and future healthcare issues.

Keywords: Resilience, crisis management, healthcare system

INTRODUCTION

Healthcare systems are central structures of community health, fulfilling multiple purposes beyond merely diagnosing and treating diseases, as well as providing preventive healthcare. The relevance of a healthy functioning healthcare system is heightened particularly during crises, whether it's a natural disaster, an infectious disease epidemic, or a man-made calamity.

A healthcare system is evaluated on two main fronts during such emergencies:

- **Its immediate** talents to respond, such as the ability to quickly administer medical treatment and distribute available resources, and
- **Its resilience** in the crisis's aftermath is distinguished by its capacity for improvement, adaptation, and recovery.

The recent global health crises have underscored the need for robust healthcare systems. In addition to putting a great deal of strain on healthcare infrastructures, incidents like the COVID-19 pandemic that started in 2019 and the West African Ebola outbreak in 2014 have revealed weaknesses and gaps that can have a far bigger effect than the activities carried out in hospitals and clinics.

These disparities have an effect on population health outcomes and may even have an influence on local and national economic stability. Against this background, an urgent and strong incentive is emerging to invest more resources in strengthening the resilience of healthcare systems, laying the basis for a more resilient, adaptable, and efficient crisis management system.

These works also strive to define the principal features of a robust healthcare system, providing theoretical and empirical examples of how resilience functions and how it can be improved. The complexities of implementing changes in diverse healthcare contexts, ranging from large urban hospital systems to rural clinics, are addressed in the issue of healthcare resilience.

In this study, the management of crisis plans is employed to incorporate a heuristic and conceptual framework that addresses this query. The study's main objective is to create a solid model that integrates the theoretical and practical facets of action. The framework will help health systems manage crises effectively and become more resilient in the future by providing a flexible approach to various healthcare settings with distinct features and requirements.

Through questioning this crucial divide, the research aims to balance theoretical frameworks with practical techniques, thereby enabling further academic dialogue and Effective measures that are essential for building healthcare communities.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 01 , January - 2026

LITERATURE REVIEW

Crisis Management and Resilience

A thorough examination of the first phase of study on resilience in healthcare systems requires an understanding of the underlying reasons.

This entails a thorough analysis of the ideas of **shock and crisis**

These often act as triggers that test the resilience of healthcare systems. A "crisis" is defined as a period of elevated risk, difficulty, or uncertainty that is usually brought on by unforeseen events that interfere with routine operations in healthcare environments.

Shocks, in turn, are classified into acute and chronic according to their time features. The vast bulk of scholarly research on the resilience of healthcare systems has concentrated on acute shocks, which are distinguished by their abruptness and swift consequences.

The idea of resilience becomes a paradigm shift from other paradigms that are generally reactive, pushing the town to adopt broadly anticipatory modes of crisis management.

Healthcare System Resilience

The idea of resilience in healthcare systems has become more important in both practice and academia since the West African Ebola outbreak. This disastrous incident served as an impetus, forcing global health governance systems to reframe resilience as a technological need and an urgent necessity for bolstering health systems against numerous acute and chronic shocks.

Therefore, creating a cohesive conceptual scheme that supports resilience-oriented strategies and interventions requires the creation of a coherent definitional framework that goes beyond academic pursuits.

There are several ways to conceptualize resilience, such as a trait, a skill, or a capability. These ideas are applied to a wide range of entities, such as communities, individuals, organizations, demographic groups, and infrastructure systems, all of which show differing levels of resilience when faced with crisis situations.

Frameworks of Resilience in the Healthcare System

There are several theories that have been put out in recent academic discussions to clarify what resilience in the healthcare industry is. make recommendations for measures and tactics that will strengthen healthcare systems' resilience and flexibility in the face of hardship.

The multifaceted character of resilience is a major subject that appears frequently throughout these academic publications; nonetheless, there are also significant differences in their particular foci, methodological decisions, and interpretive strategies.

Although these articles offer a multitude of views, they present diverse viewpoints on healthcare resilience from various perspectives, ranging from system-level issues to organizational psychology. However, there seem to be significant gaps in the field. A mostly theoretical stance is taken by the majority of these frameworks. Literature, however, noticeably lacks a paradigm that is both comprehensive and integrative as well as future focused. Research that comprehensively incorporates several key characteristics into It is obvious that a framework is required to guarantee its continued relevance and flexibility in response to emerging healthcare issues.

In this study, we are motivated by two overarching aims.

Firstly, by implementing crisis management techniques, developing and implementing a procedural framework specific to the healthcare system is our goal. It is anticipated that this framework would simplify the application of reactive treatments and foster an atmosphere that facilitates a quick, temporary recovery.

Secondly, focused on the future: enhancing the healthcare system's capacity for proactive measures. In this manner, we hope to develop resilience both towards the challenges that lie ahead in the near future and towards the anticipated changes that are to come. Ultimately, aim to suggest an overall solution that is flexible in nature, allowing it to fit perfectly within the specific complexities of any healthcare system.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 01 , January - 2026

METHODOLOGY

To develop a more resilient foundation for healthcare systems, we have determined that it is necessary to combine the wealth of information found in published literature. These simplify complicated decision-making processes, which is a very desirable quality in the ever-changing healthcare industry. They are characterized as algorithmic techniques or rules of thumb. It is a strategic synthesis that fills the gap between rigorous academic and practical value, as it seeks to provide a holistic yet practical solution for improving resiliency in healthcare facilities.

In contrast to more traditional methods, another study highlights the benefits of employing simplified decision-making heuristics in medical diagnosis, information-intensive analytical techniques. These heuristics help patients and doctors make better decisions more quickly and with fewer resources by concentrating on a small number of important variables. This approach works especially well when decision-making speed is critical or when an abundance of information can cause analysis paralysis. According to the findings, less really is more in some healthcare settings, providing a paradoxical yet incredibly powerful method of decision-making[**30**].

A thorough evaluation of peer-reviewed studies is an essential part of building conceptual frameworks because it makes it possible to identify recurring themes, trends, and insights. In preparation for this part, we reviewed 259 articles as part of our extensive scoping literature review on resilience [**31**]. We aimed to define the parameters that would enable decision-makers to make informed decisions that help enhance resilience during shocks. Notably, it is worth mentioning that these frameworks have been characterized by a detailed theoretical foundation. However, they cannot necessarily be practical in their application steps, as they often reside largely in the world of theory.

The heuristic framework, on the other hand, was specifically designed to offer simple and actionable instructions. Such a design will help medical workers to increase resilience without being bogged down in the thicket of theoretical consequences. Through a careful combination of heuristic concepts and the overall themes and information inferred from the literature, the framework we will create will hopefully possess both academic soundness and practical value. To ensure our model is flexible and applicable to improving healthcare resilience, we conducted trial implementations of the framework and concluded the study process by holding feedback sessions with important healthcare system stakeholders.

In the methodology, we placed a great emphasis on interaction with various stakeholders in healthcare, ensuring that our framework is relevant and applicable. Individuals from various backgrounds and roles, including Legislators, frontline staff, administrators, and patient advocates were carefully chosen to make sure a diverse range of viewpoints on the topic of healthcare resilience requirements.

The first thing we did was organize a feedback meeting, where we presented the initial framework to the stakeholders. The purpose of these sessions was to elicit detailed criticisms, recommendations, and potential improvements, and to motivate stakeholders to evaluate the framework's coverage, its relevance to reality, and its potential for integration into existing healthcare processes. We conducted small-scale tests of the framework using the knowledge-sharing network and treatment coordination capabilities of the European Reference Network (ERN) for rare illnesses, based on input from a range of medical specialists. Stakeholders carefully observed this pilot period, which enabled the evaluation and modification of the framework, ensuring its ongoing effectiveness in supporting healthcare resilience.

Thoroughly analyzing resilience-related literature allowed us to discover the features that contribute to strengthening resilience. To guarantee healthcare systems remain resilient during crises, we identified crucial qualities that must be continually present. For instance, possessing a monitoring system that can.

However, we recognized that certain features must only be improved when shocks occur, and that they would vary based on the unique characteristics of each healthcare system and the shocks' effects. In order to respond to enquiries such as "Does the system need a change in capacities?", this difference is essential in the decision-making process. Our goal is to integrate and bridge this realization from conceptual to heuristic.

In order to operationalize the resilience traits found in healthcare systems, we balanced contingent and constant properties. Continuous features are those that the system has at all times, whereas contingent characteristics are modified with the help of decision-makers in response to the conditions and particularities of the system.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 01 , January - 2026

This scientific approach, which emphasizes both continuous and contingent features of resilience, promotes a more sophisticated comprehension of the resilience of the healthcare system. Through the integration of theoretical insights from literature with real-world, heuristic applications, it enables a more successful and tailored implementation of resilience-enhancing techniques in a variety of healthcare contexts. By integrating these components, we want to create a framework that is both academically sound and practically applicable, guaranteeing the model's flexibility and usefulness in boosting healthcare resilience.

Holling's innovative architecture for critical infrastructure resilience served as the model for our framework's architectural structure [**32**]. The four pillars of this schema are monitoring, anticipation, recognition, and learning (**Figure 1**).

Figure 1. Four cornerstones of resilience at critical infrastructures.

The ability of the system to see and control its current status is included in monitoring, interdependencies, environment, and information flow. Improving situational awareness requires this capacity. Anticipation is the system's ability to foresee how it will behave, anticipate the effects on the environment, and simulate and evaluate the difficulties it may encounter in the event of a shock. Recognition indicates the system's ability to identify internal or external changes, as well as existing and emerging crises. This capability enables the evaluation of the likelihood of future disasters, providing crucial information for informed operational decision-making. Last but not least, learning comprises learning from trustworthy sources on crisis recognition, investigating potential crisis management strategies, identifying suitable countermeasures and providing assistance in making decisions. This process gives the system the knowledge, resources, and safeguards it needs to manage operational resilience.

In **Figure 2**, these four fundamental pillars form the basis of the healthcare system's resilience structure, as shown.

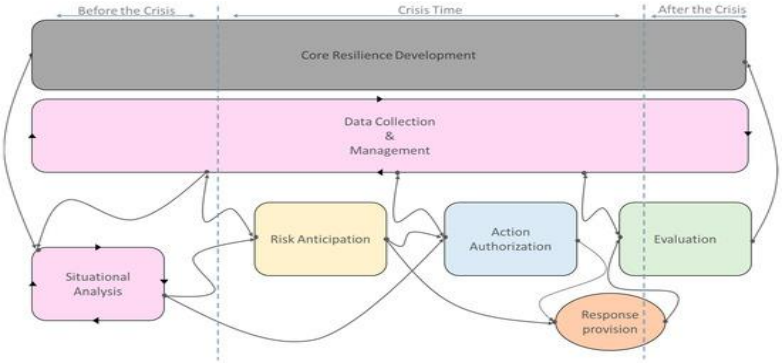

Figure 2. Fundamental Pillars of the Healthcare System's Resilience Structure

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 01 , January - 2026

Methods, Materials, and Data Collection

Experimental Setup

Algorithms and Models Used

Justification for the Chosen Methods

Results

Results: Presentation of Data and Findings

In contrast to more traditional methods, another study highlights the benefits of employing simplified decision-making heuristics in medical diagnosis, information-intensive analytical techniques. These heuristics help patients and doctors make better decisions more quickly and with fewer resources by concentrating on a small number of important variables. This approach works especially well when decision-making speed is critical or when an abundance of information can cause analysis paralysis. According to the findings, less really is more in some healthcare settings, providing a paradoxical yet incredibly powerful method of decision-making **[30]**. A thorough evaluation of peer-reviewed studies is an essential part of building conceptual frameworks because it makes it possible to identify recurring themes, trends, and insights. In preparation for this part, we reviewed 259 articles as part of our extensive scoping literature review on resilience **[31]**. We aimed to define the parameters that would enable decision-makers to make informed decisions that help enhance resilience during shocks. Notably, it is worth mentioning that these frameworks have been characterized by a detailed theoretical foundation. However, they cannot necessarily be practical in their application steps, as they often reside largely in the world of theory. The heuristic framework, on the other hand, was specifically designed to offer simple and actionable instructions. Such a design will help medical workers to increase resilience without being bogged down in the thicket of theoretical consequences.

Through a careful combination of heuristic concepts and the overall themes and information inferred from the literature, the framework we will create will hopefully possess both academic soundness and practical value. To ensure our model is flexible and applicable to improving healthcare resilience, we conducted trial implementations of the framework and concluded the study process by holding feedback sessions with important healthcare system stakeholders. In the methodology, we placed a great emphasis on interaction with various stakeholders in healthcare, ensuring that our framework is relevant and applicable. Individuals from various backgrounds and roles, including Legislators, frontline staff, administrators, and patient advocates were carefully chosen to make sure a diverse range of viewpoints on the topic of healthcare resilience requirements.

The first thing we did was organize a feedback meeting, where we presented the initial framework to the stakeholders. The purpose of these sessions was to elicit detailed criticisms, recommendations, and potential improvements, and to motivate stakeholders to evaluate the framework's coverage, its relevance to reality, and its potential for integration into existing healthcare processes. We conducted small-scale tests of the framework using the knowledge-sharing network and treatment coordination capabilities of the European Reference Network (ERN) for rare illnesses, based on input from a range of medical specialists. Stakeholders carefully observed this pilot period, which enabled the evaluation and modification of the framework, ensuring its ongoing effectiveness in supporting healthcare resilience.

Thoroughly analyzing resilience-related literature allowed us to discover the features that contribute to strengthening resilience. To guarantee healthcare systems remain resilient during crises, we identified crucial qualities that must be continually present. For instance, possessing a monitoring system that can. However, we recognized that certain features must only be improved when shocks occur, and that they would vary based on the unique characteristics of each healthcare system and the shocks' effects. In order to respond to enquiries such as "Does the system need a change in capacities?", this difference is essential in the decision-making process. Our goal is to integrate and bridge this realization from conceptual to heuristic.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 01 , January - 2026

In order to operationalize the resilience traits found in healthcare systems, we balanced contingent and constant properties. Continuous features are those that the system has at all times, whereas contingent characteristics are modified with the help of decision-makers in response to the conditions and particularities of the system. This scientific approach, which emphasizes both continuous and contingent features of resilience, promotes a more sophisticated comprehension of the resilience of the healthcare system. Through the integration of theoretical insights from the literature with real-world, heuristic applications, it enables a more successful and tailored implementation of resilience-enhancing techniques in a variety of healthcare contexts. By integrating these components, we want to create a framework that is both academically sound and practically applicable, guaranteeing the model's flexibility and usefulness in boosting healthcare resilience.

Holling's innovative architecture for critical infrastructure resilience served as the model for our framework's architectural structure **[32]**. The four pillars of this schema are monitoring, anticipation, recognition, and learning (Figure 1).

Discussion / Analysis

It is necessary to outline the healthcare system's resilience process in order to start creating the framework. The dynamic connections between resilience, the environment, and the healthcare system are highlighted by this paradigm, which is founded on process-oriented research **[33]**. Additionally, crisis management involves effective reactions to unanticipated occurrences not just during but even before the event **[34]**. Therefore, when establishing our stages, we consider these three temporal periods.

Furthermore, it is important that the healthcare system's limits are well defined and primarily based on its elements, capabilities, resources, and constraints. The suggested framework assists in anticipating or responding to events that may cause disruptions to the health system and makes it easier to make decisions based on the state of the system in order to provide suitable coping mechanisms.

Core Resilience Development

The core resilience-building stage examines the methods that the healthcare system has used in the past to survive crises and summarizes them in frameworks like crisis management plans or scenario planning. When knowledge, information, experiences, capacities, circumstances, and crisis management techniques are gathered and evaluated by the healthcare system, the results may be used as flexible resources for similar circumstances in the future, provided that the appropriate adjustments are made **[35,36]**. However, the healthcare system encounters difficulties when faced with a previously unheard-of hazard that presents distinct features, often necessitating new extensions or modifications. In these situations, it is crucial to make sure that the data and information already accessible continue to satisfy the needs brought about by the changed situation **[37,38]**. The core resilience development must thus be defined by the shocks' features, the goals, and the challenges relevant to the desired resilience management. (**Figure 3**)

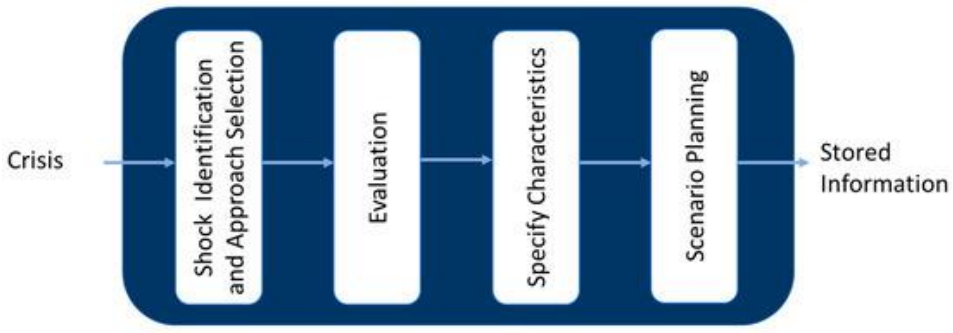

Figure 3. Flow chart of core resilience development.

Data Collection and Management

These two duties pertain to the environment and the healthcare system's capacity for monitoring **[6,39]**. The main goal of data management and collecting is to locate and acquire the information and data needed for the scenario analysis work at hand **[39]**. After acquiring data, it is crucial to confirm the availability, quality, and substance of validation **[40,41]**. The control system must be notified right away of any malfunctions or deviations that occur during the gathering and processing of data **[12,14]**.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 01 , January - 2026

Ultimately, the insights gained from the effective completion of data collection and processing are utilized for subsequent stages and other tasks **[20,42]**. (**Figure 4**).

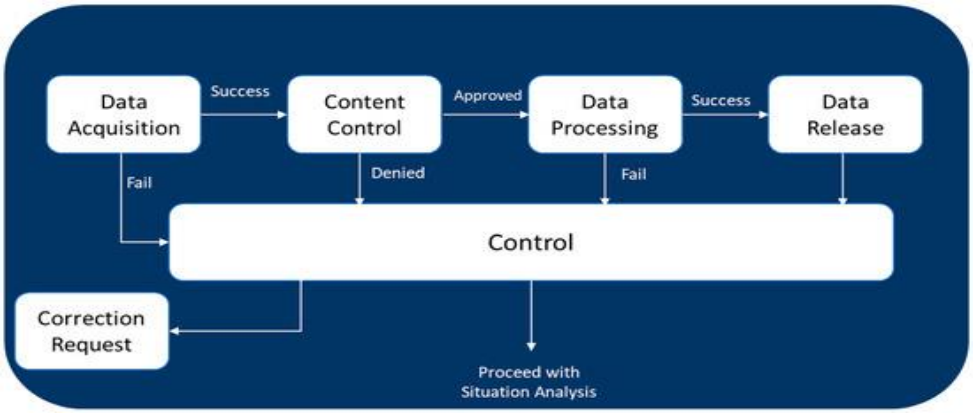

Figure 4. Flow chart of data collection and management.

Situation Analysis

A robust healthcare system requires accurate signal detection through surveillance that monitors real-time data **[2]**. Detection methods vary depending on system goals and data complexity **[8,23,43]**. New situations must be thoroughly examined to craft an accurate issue description **[12,14,44]**. (**Figure 5**).

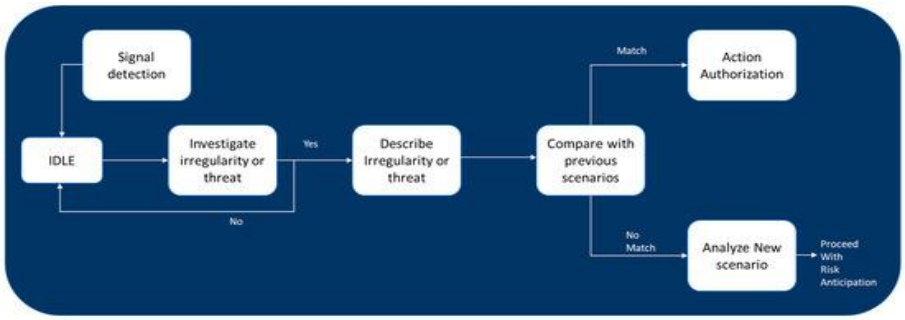

Figure 5. Flow chart of situation analysis.

Risk Anticipation

Risks often emerge through disruptions in services, declining quality, or lack of resources. The healthcare system must analyze the seriousness and likelihood of these hazards **[45]**. If high criticality is detected, additional resilience management measures must be implemented **[46,47,48]**.(**Figure 6**).

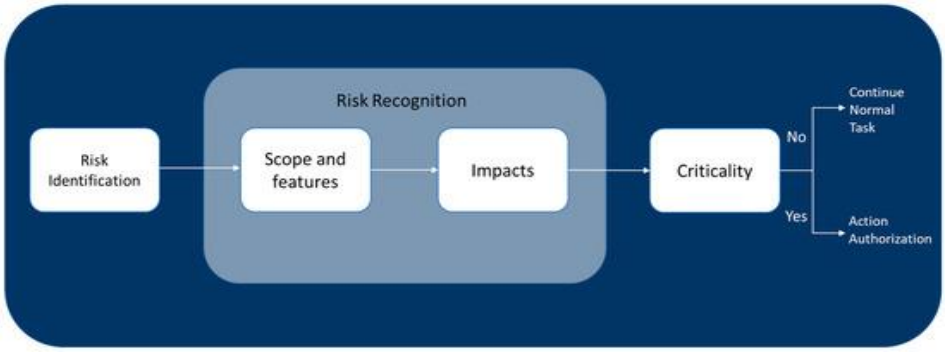

Figure 6. Flow chart of risk anticipation.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 01 , January - 2026

Action Authorization

A multitude of proposals for resilience-enhancing actions have emerged, backed by empirical evidence **[31]**. Decision-makers must prioritize actions based on unique system characteristics, goals, and limitations **[47,49]**. **Figure 7**.

Figure 7. Healthcare system resilience characteristics.

Evaluation

Evaluation assesses both immediate and long-term effects of crisis-response measures. Cost-effectiveness analysis supports objective assessment of resources, shortages, and outcomes **[45,49,50]**. Once validated, findings feed back into the information system to strengthen future resilience. **Figure 8**

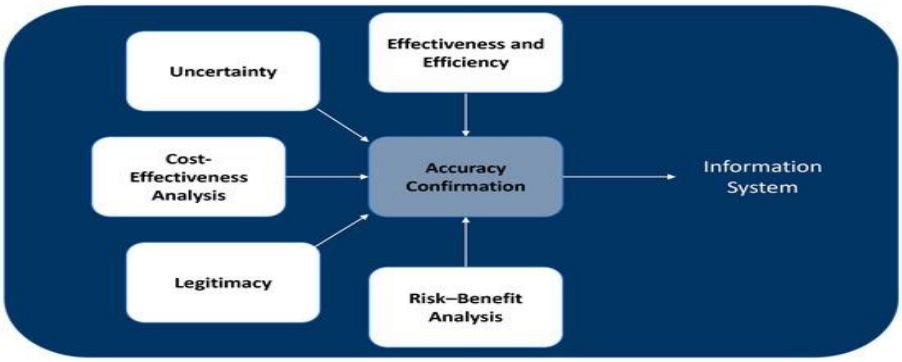

Figure 8. Flow chart for the evaluation stage.

CONCLUSION AND FUTURE WORK

Summary of Findings

In the research, we have come up with a new framework that will contribute greatly to the resilience of healthcare systems. This framework is particularly designed to analyze the healthcare systems in a comprehensive manner by going further than current models of crisis management. We have observed that there is a cyclical trend of improvement in these systems, considering the time of crisis, as well as the antecedents and consequences of every crisis. This cycle is divided into actionable strategies being given at each of the stages to improve our knowledge on how each incident was resolved, future predictions and understanding what happened to us before through insight accumulation.

The decision-making process in the context presented in our research is grounded in the main resilience-promoting features. The characteristics are arranged in the center of this paradigm, and they are organized into seven fundamental building elements that are

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 01 , January - 2026

intended to facilitate its use and guide judgment. This approach makes it possible to make various choices that are specifically dependent on the requirements and circumstances of the system. In essence, the qualities guide the plans for implementation, which helps the system adjust and continue to function in the event of a shock or crisis. It is through a clever incorporation of these factors in the various parts of the healthcare system that each of them possesses unique characteristics that we can create resilience that is highly sensitive to their specific needs. The methodology makes the difference between the theory and practice, ensuring a high degree of risk reduction in the implementation.

REFERENCES

[1] Barasa, E.; Mbau, R.; Gilson, L. What Is Resilience and How Can It Be Nurtured? A Systematic Review of Empirical Literature on Organizational Resilience. *Int. J. Health Policy Manag.* **2018**, *7*, 491–503. [**Google Scholar**] [**CrossRef**] [**PubMed**]

[2] Frandsen, F.; Johansen, W. *Organizational Crisis Communication*; Sage Publications Inc.: Thousand Oaks, CA, USA, 2017. [**Google Scholar**]

[3] Efstathiou, P. Crisis management in the Health Sector; Qualities and characteristics of health crisis managers. *Int. J. Caring Sci.* **2014**, *2*, 105–107. [**Google Scholar**]

[4] Boin, A.; McConnell, A. Preparing for Critical Infrastructure Breakdowns: The Limits of Crisis Management and the Need for Resilience. *J. Contingencies Crisis Manag.* **2007**, *15*, 50–59. [**Google Scholar**] [**CrossRef**]

[5] Blanchet, K.; Nam, S.L.; Ramalingam, B.; Pozo-Martin, F. Governance and Capacity to Manage Resilience of Health Systems: Towards a New Conceptual Framework. *Int. J. Health Policy Manag.* **2017**, *6*, 431–435. [**Google Scholar**] [**CrossRef**] [**PubMed**]

[6] Hanefeld, J.; Mayhew, S.; Legido-Quigley, H.; Martineau, F.; Karanikolos, M.; Blanchet, K.; Liverani, M.; Yei Mokuwa, E.; McKay, G.; Balabanova, D. Towards an Understanding of Resilience: Responding to Health Systems Shocks. *Health Policy Plan.* **2018**, *33*, 355–367. [**Google Scholar**] [**CrossRef**] [**PubMed**]

[7] Gilson, L.; Barasa, E.; Nxumalo, N.; Cleary, S.; Goudge, J.; Molyneux, S.; Tsofa, B.; Lehmann, U. Everyday Resilience in District Health Systems: Emerging Insights from the Front Lines in Kenya and South Africa. *BMJ Glob. Health* **2017**, *2*, e000224. [**Google Scholar**] [**CrossRef**] [**PubMed**]

[8] Clay-Williams, R.; Rapport, F.; Braithwaite, J. The Australian Health System Response to COVID-19 from a Resilient Health Care Perspective: What Have We Learned? *Public Health Res. Pract.* **2020**, *30*, e3042025. [**Google Scholar**] [**CrossRef**]

[9] Barasa, E.W.; Cloete, K.; Gilson, L. From Bouncing Back, to Nurturing Emergence: Reframing the Concept of Resilience in Health Systems Strengthening. *Health Policy Plan.* **2017**, *32*, iii91–iii94. [**Google Scholar**] [**CrossRef**]

[10] Fana, T.; Goudge, J. Austerity, Resilience and the Management of Actors in Public Hospitals: A Qualitative Study from South Africa. *BMJ Glob. Health* **2021**, *6*, e004157. [**Google Scholar**] [**CrossRef**]

[11] Lal, A.; Ashworth, H.C.; Dada, S.; Hoemeke, L.; Tambo, E. Optimizing Pandemic Preparedness and Response through Health Information Systems: Lessons Learned from Ebola to COVID-19. *Disaster Med. Public Health Prep.* **2020**, *16*, 333–340. [**Google Scholar**] [**CrossRef**]

[12] Ling, E.J.; Larson, E.; Macauley, R.J.; Kodl, Y.; VanDeBogert, B.; Baawo, S.; Kruk, M.E. Beyond the Crisis: Did the Ebola Epidemic Improve Resilience of Liberia's Health System? *Health Policy Plan.* **2017**, *32*, 40–47. [**Google Scholar**] [**CrossRef**] [**PubMed**]

[13] Blanchet, K. Thinking Shift on Health Systems: From Blueprint Health Programmes towards Resilience of Health Systems. *Int. J. Health Policy Manag.* **2015**, *4*, 307–309. [**Google Scholar**] [**CrossRef**] [**PubMed**]

[14] Kruk, M.E.; Ling, E.J.; Bitton, A.; Cammett, M.; Cavanaugh, K.; Chopra, M.; El-Jardali, F.; Macauley, R.J.; Muraguri, M.K.; Konuma, S.; et al. Building Resilient Health Systems: A Proposal for a Resilience Index. *Br. Med. J.* **2017**, *357*, j2323. [**Google Scholar**] [**CrossRef**] [**PubMed**]

[15] Russo, G.; Pires, C.A.; Perelman, J.; Gonçalves, L.; Barros, P.P. Exploring Public Sector Physicians' Resilience, Reactions and Coping Strategies in Times of Economic Crisis; Findings from a Survey in Portugal's Capital City Area. *BMC Health Serv. Res.* **2017**, *17*, 207. [**Google Scholar**] [**CrossRef**]

[16] Engelbrecht, B.; Gilson, L.; Barker, P.; Vallabhjee, K.; Kantor, G.; Budden, M.; Parbhoo, A.; Lehmann, U. Prioritizing People and Rapid Learning in Times of Crisis: A Virtual Learning Initiative to Support Health Workers during the COVID-19 Pandemic. *Int. J. Health Plan. Manag.* **2021**, *36*, 168–173. [**Google Scholar**] [**CrossRef**] [**PubMed**]

[17] Lal, A.; Patel, M.; Hunter, A.; Phillips, C. Towards Resilient Health Systems for Increasing Climate Extremes: Insights from the 2019–2020 Australian Bushfire Season. *Int. J. Wildl. Fire* **2021**, *30*, 1–5. [**Google Scholar**] [**CrossRef**]

[18] Olu, O. Resilient Health System As Conceptual Framework for Strengthening Public Health Disaster Risk Management: An African Viewpoint. *Front. Public Health* **2017**, *5*, 263. [**Google Scholar**] [**CrossRef**]

[19] Ziglio, E.; Azzopardi-Muscat, N.; Briguglio, L. Editorials: Resilience and 21st Century Public Health. *Eur. J. Public Health* **2017**, *27*, 789–790. [**Google Scholar**] [**CrossRef**]

[20] Rodríguez, H.; Aguirre, B.E. Hurricane Katrina and the Healthcare Infrastructure: A Focus on Disaster Preparedness, Response, and Resiliency. *Front. Health Serv. Manag.* **2006**, *23*, 13–2330. [**Google Scholar**] [**CrossRef**]

[21] World Health Organization. *Regional Office for Europe. Strengthening Resilience: A Priority Shared by Health 2020 and the Sustainable Development Goals*; World Health Organization: Geneva, Switzerland, 2017. [**Google Scholar**]

[22] Marinucci, G.D.; Luber, G.; Uejio, C.K.; Saha, S.; Hess, J.J. Building Resilience against Climate Effects-a Novel Framework to Facilitate Climate Readiness in Public Health Agencies. *Int. J. Environ. Res. Public Health* **2014**, *11*, 6433–6458. [**Google Scholar**] [**CrossRef**]

[23] Zhong, S.; Clark, M.; Hou, X.Y.; Zang, Y.L.; Fitzgerald, G. Development of Hospital Disaster Resilience: Conceptual Framework and Potential Measurement. *Emerg. Med. J.* **2014**, *31*, 930–938. [**Google Scholar**] [**CrossRef**] [**PubMed**]

[24] Agostini, L.; Onofrio, R.; Piccolo, C.; Stefanini, A. A Management Perspective on Resilience in Healthcare: A Framework and Avenues for Future Research. *BMC Health Serv. Res.* **2023**, *23*, 774. [**Google Scholar**] [**CrossRef**] [**PubMed**]

[25] Förster, C.; Duchek, S.; Geithner, S.; Krägler, M. Developing an Integrated Framework of Healthcare Leaders' Resilience. *Rev. Manag. Sci.* **2023**, *17*, 1765–1788. [**Google Scholar**] [**CrossRef**]

[26] Morse, J.M.; Kent-Marvick, J.; Barry, L.A.; Harvey, J.; Okang, E.N.; Rudd, E.A.; Wang, C.Y.; Williams, M.R. Developing the Resilience Framework for Nursing and Healthcare. *Glob. Qual. Nurs. Res.* **2021**, *8*, 23333936211005475. [**Google Scholar**] [**CrossRef**] [**PubMed**]

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 01 , January - 2026

[27] Haraldseid-Driftland, C.; Aase, K.; Wiig, S.; Billett, S. Developing a Collaborative Learning Framework for Resilience in Healthcare: A Study Protocol. *BMJ Open* **2021**, *11*, e045183. [**Google Scholar**] [**CrossRef**] [**PubMed**]
[28] Anderson, J.E.; Ross, A.J.; Macrae, C.; Wiig, S. Defining Adaptive Capacity in Healthcare: A New Framework for Researching Resilient Performance. *Appl. Ergon.* **2020**, *87*, 103111. [**Google Scholar**] [**CrossRef**] [**PubMed**]
[29] Roosan, I.; Weir, C.; Del Fiol, G. Heuristics in Managing Complex Clinical Decision Tasks. In Proceedings of the 2014 IEEE International Conference on Healthcare Informatics, Verona, Italy, 15–17 September 2014; pp. 186–193. [**Google Scholar**]
[30] Marewski, J.N.; Gigerenzer, G. Heuristic Decision Making in Medicine. *Dialogues Clin. Neurosci.* **2012**, *14*, 77–89. [**Google Scholar**] [**CrossRef**] [**PubMed**]
[31] Emami, S.; Lorenzoni, V.; Pirri, S.; Turchetti, G. What Are the Characteristics of a Resilient Healthcare System: A Scoping Review. *Int. J. Health Plann. Manag.* **2023**. *under review*. [**Google Scholar**]
[32] Hollnagel, E. Resilience Engineering Perspectives: Preparation and Restoration. In *Resilience Engineering Perspectives: Preparation and Restoration*; Nemeth, C.P., Hollnagel, E., Dekker, S., Eds.; Ashgate: London, UK, 2016; Volume 2, pp. 1–288. [**Google Scholar**] [**CrossRef**]
[33] O'Hara, J.K.; Canfield, C.; Aase, K. Patient and Family Perspectives in Resilient Healthcare Studies: A Question of Morality or Logic? *Saf. Sci.* **2019**, *120*, 99–106. [**Google Scholar**] [**CrossRef**]
[34] Barker, K.M.; Ling, E.J.; Fallah, M.; VanDeBogert, B.; Kodl, Y.; Macauley, R.J.; Viswanath, K.; Kruk, M.E. Community Engagement for Health System Resilience: Evidence from Liberia's Ebola Epidemic. *Health Policy Plan.* **2020**, *35*, 416–423. [**Google Scholar**] [**CrossRef**]
[35] Litke, N.; Weis, A.; Koetsenruijter, J.; Fehrer, V.; Koeppen, M.; Kuemmel, S.; Szecsenyi, J.; Wensing, M. Building Resilience in German Primary Care Practices: A Qualitative Study. *BMC Prim. Care* **2022**, *23*, 221. [**Google Scholar**] [**CrossRef**] [**PubMed**]
[36] Meyer, D.; Bishai, D.; Ravi, S.J.; Rashid, H.; Mahmood, S.S.; Toner, E.; Nuzzo, J.B. A Checklist to Improve Health System Resilience to Infectious Disease Outbreaks and Natural Hazards. *BMJ Glob. Health* **2020**, *5*, e002429. [**Google Scholar**] [**CrossRef**] [**PubMed**]
[37] Gupta, I. Relying on Serendipity Is Not Enough: Building a Resilient Health Sector in India. *Indian Econ. Rev.* **2020**, *55*, 125–147. [**Google Scholar**] [**CrossRef**] [**PubMed**]
[38] Collins, T.; Akselrod, S.; Bloomfield, A.; Gamkrelidze, A.; Jakab, Z.; Placella, E. Rethinking the COVID-19 Pandemic: Back to Public Health. *Ann. Glob. Health* **2020**, *86*, 133. [**Google Scholar**] [**CrossRef**]
[39] Makin, S.; Groves, S. Summary of Latest NHS England Emergency Preparedness Resilience and Response (EPRR) Guidance. *BMJ Mil. Health* **2020**, *166*, 12–16. [**Google Scholar**] [**CrossRef**] [**PubMed**]
[40] McKenzie, A.; Abdulwahab, A.; Sokpo, E.; Mecaskey, J.W. Creating the Foundation for Health System Resilience in Northern Nigeria. *Health Syst. Reform* **2016**, *2*, 357–366. [**Google Scholar**] [**CrossRef**] [**PubMed**]
[41] Lapão, L.V.; Silva, A.; Pereira, N.; Vasconcelos, P.; Conceição, C. Ebola Impact on African Health Systems Entails a Quest for More International and Local Resilience: The Case of African Portuguese Speaking Countries. *Pan Afr. Med. J.* **2015**, *22*, 15. [**Google Scholar**] [**CrossRef**]
[42] Khan, Y.; O'Sullivan, T.; Brown, A.; Tracey, S.; Gibson, J.; Généreux, M.; Henry, B.; Schwartz, B. Public Health Emergency Preparedness: A Framework to Promote Resilience. *BMC Public Health* **2018**, *18*, 1344. [**Google Scholar**] [**CrossRef**]
[43] Miller, N.P.; Milsom, P.; Johnson, G.; Bedford, J.; Kapeu, A.S.; Diallo, A.O.; Hassen, K.; Rafique, N.; Islam, K.; Camara, R.; et al. Community Health Workers during the Ebola Outbreak in Guinea, Liberia, and Sierra Leone. *J. Glob. Health* **2018**, *8*, 020601. [**Google Scholar**]
[44] Labarda, C.; Del Pilar Labarda, M.; Ellevera Lamberte, E. Hospital Resilience in the Aftermath of Typhoon Haiyan in the Philippines. *Disaster Prev. Manag.* **2017**, *26*, 424–436. [**Google Scholar**] [**CrossRef**]
[45] Marome, W.; Shaw, R. COVID-19 Response in Thailand and Its Implications on Future Preparedness. *Int. J. Environ. Res. Public Health* **2021**, *18*, 1089. [**Google Scholar**] [**CrossRef**]
[46] Lauriola, P.; Martín-Olmedo, P.; Leonardi, G.S.; Bouland, C.; Verheij, R.; Dückers, M.L.A.; Van Tongeren, M.; Laghi, F.; Van Den Hazel, P.; Gokdemir, O.; et al. On the Importance of Primary and Community Healthcare in Relation to Global Health and Environmental Threats: Lessons from the COVID-19 Crisis. *BMJ Glob. Health* **2021**, *6*, e004111. [**Google Scholar**] [**CrossRef**] [**PubMed**]
[47] Hunte, S.-A.; Pierre, K.; St Rose, R.; Simeon, D.T. Health Systems' Resilience: COVID-19 Response in Trinidad and Tobago. *Am. J. Trop. Med. Hyg.* **2020**, *103*, 590–592. [**Google Scholar**] [**CrossRef**] [**PubMed**]
[48] Ager, A.K.; Lembani, M.; Mohammed, A.; Mohammed Ashir, G.; Abdulwahab, A.; De Pinho, H.; Delobelle, P.; Zarowsky, C. Health Service Resilience in Yobe State, Nigeria in the Context of the Boko Haram Insurgency: A Systems Dynamics Analysis Using Group Model Building. *Confl. Health* **2015**, *9*, 30. [**Google Scholar**] [**CrossRef**] [**PubMed**]
[49] Therrien, M.-C.; Normandin, J.-M.; Denis, J.-L. Bridging Complexity Theory and Resilience to Develop Surge Capacity in Health Systems. *J. Health Organ. Manag.* **2017**, *31*, 96–109. [**Google Scholar**] [**CrossRef**]
[50] Gal, T.; Stewart, T.; Hanne, T. (Eds.) *Multicriteria Decision Making: Advances in MCDM Models, Algorithms, Theory, and Applications*; Springer Science & Business Media: Berlin, Germany, 2013. [**Google Scholar**]