Sciences du Nord Economics and Business
Vol. 2, No. 01, June 2025: pp. 30-39
E-ISSN: 3046-5168
P-ISSN: 3047-5643
DOI: 10.71238/sneb.v2i01.58

Crisis Management and Urban Resilience: A Bibliometric Study of Disaster Management Strategies in Metropolitan Cities

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ARTICLE HISTORY
Received April, 2025 **Revised May, 2025** **Accepted Jun, 2025**

ABSTRACT

Urban areas, particularly metropolitan cities, are increasingly exposed to complex and overlapping crises ranging from climate-related hazards to pandemics. This study aims to map the intellectual structure and thematic evolution of scholarly research on crisis management and urban resilience through a comprehensive bibliometric analysis. Using data from the Scopus database (2000–2024) and analyzed via VOSviewer, the study examines co-authorship networks, country collaborations, keyword co-occurrences, temporal trends, and density distributions. The findings reveal a shift from traditional disaster management approaches, focused on earthquakes, floods, and emergency response, toward integrative resilience frameworks that incorporate urban planning, climate adaptation, smart city infrastructure, and public health governance. The analysis identifies key authors, leading countries, and emerging themes such as COVID-19, food security, and digital resilience. While the Global North continues to dominate in publication volume and collaboration intensity, contributions from developing regions are gradually increasing. The study highlights the need for more localized, interdisciplinary, and technologically adaptive approaches to urban resilience in response to the growing complexity of metropolitan vulnerabilities. These insights are valuable for both academic development and policy innovation in disaster risk governance and sustainable urban management.

Keywords: *Crisis Management, Urban Resilience, Disaster Management, Metropolitan Cities, Bibliometric Analysis.*

INTRODUCTION

Urban areas, particularly metropolitan cities, are increasingly becoming focal points of demographic, economic, and infrastructural development. With over 55% of the world's population residing in urban areas cities face intensifying challenges related to sustainability, inequality, and, crucially, vulnerability to disasters [1], [2]. The high population density, complex infrastructure systems, and socio-economic interdependencies in these urban centers heighten the risk and impact of both natural and anthropogenic disasters. Consequently, the demand for robust crisis management and urban resilience frameworks has never been more critical [2].

Crisis management in metropolitan contexts entails systematic processes to anticipate, respond to, and recover from events such as earthquakes, floods, pandemics, terrorist attacks, and technological failures. Unlike rural or small urban settings, metropolitan areas require more sophisticated and multi-tiered coordination among stakeholders due to their administrative complexity and diversity of vulnerabilities [3]. Recent events like Hurricane Sandy in New York City, the COVID-19 pandemic's impact on megacities, and the recurring floods in Jakarta underscore the need for integrated and adaptive crisis management systems that can withstand both immediate shocks and long-term stresses [4]. The concept of urban resilience has gained traction as a guiding framework for managing and mitigating urban crises. Defined as the capacity of urban systems to survive, adapt, and thrive in the face of adversity, resilience encompasses preparedness, mitigation, response, and recovery phases of disaster management [5]. Resilience thinking goes beyond

traditional emergency response by emphasizing adaptive governance, community engagement, infrastructure robustness, and systemic learning. In cities where governance is fragmented and social vulnerabilities are high, resilience strategies serve as the linchpin for sustainable urban development [6].

The growing importance of crisis management and urban resilience has led to a proliferation of academic literature across disciplines such as urban planning, environmental science, public administration, and disaster risk reduction. However, the interdisciplinary and rapidly evolving nature of this field makes it difficult to capture the full scope of scholarly contributions and thematic trends. A bibliometric approach offers a powerful lens through which to systematically analyze the intellectual structure, publication dynamics, and collaboration patterns in the literature on disaster management in metropolitan contexts [7].

Despite the growing recognition of urban resilience and disaster management as strategic imperatives, the academic literature remains fragmented across disciplinary and geographical lines. The lack of a consolidated knowledge base makes it challenging for researchers and policymakers to formulate coherent and evidence-based crisis strategies. Moreover, there is insufficient understanding of how the field has evolved over time, which topics dominate the discourse, and where emerging gaps lie, especially concerning the unique vulnerabilities and capacities of metropolitan areas. Without a comprehensive bibliometric overview, the strategic alignment between academic output and real-world urban resilience efforts remains suboptimal. This study aims to conduct a comprehensive bibliometric analysis of global scholarly literature on crisis management and urban resilience, with a specific focus on disaster management strategies in metropolitan cities.

METHODS

This study employs a bibliometric analysis approach to explore the intellectual landscape, thematic trends, and collaboration networks in the literature on crisis management and urban resilience, specifically focusing on disaster management strategies in metropolitan cities. Bibliometric analysis is a quantitative method used to evaluate patterns in academic publications, helping researchers understand the structure, evolution, and influential components of a particular field [7]. It is especially suitable for capturing the interdisciplinary nature of urban resilience research, which spans domains such as urban studies, disaster risk reduction, environmental policy, and public administration.

The primary source of bibliographic data for this study is the Scopus database, due to its comprehensive coverage of peer-reviewed journals and its compatibility with bibliometric software such as VOSviewer. Scopus is widely recognized for its robust metadata quality and breadth across scientific disciplines. The search was conducted using a combination of keywords tailored to the study's scope: "crisis management", "urban resilience", "disaster management", "metropolitan cities", "urban disaster", "resilient cities". These keywords were searched in the title, abstract, and keywords fields to ensure inclusion of the most relevant literature. The search was refined to include articles published between 2000 and 2024, in English, and limited to peer-reviewed journal articles. Editorials, conference papers, and book chapters were excluded to maintain a consistent standard of academic quality. A total of 500 documents were retrieved and exported in .ris and .csv formats for further processing and visualization.

To process and visualize the bibliometric data, this study used VOSviewer version 1.6.20, a well-established tool for constructing and viewing bibliometric maps. VOSviewer enables the creation of network visualizations based on co-authorship, co-citation, and keyword co-occurrence. These visualizations allow for the identification of clusters, influential publications, and the thematic structure within the dataset [8]. Several analyses were performed using VOSviewer, including co-authorship analysis, co-occurrence analysis of keywords, and citation analysis. Prior to analysis, the raw data were cleaned to ensure consistency in author names, institutional affiliations, and keyword

entries. Variations in spelling, abbreviations, and name formatting (e.g., "United States" vs. "USA") were harmonized using a manual review and VOSviewer's built-in thesaurus file. Duplicates were removed to prevent data distortion. Additionally, stop words and non-thematic keywords (e.g., "study," "approach") were excluded to enhance the relevance of the co-occurrence analysis.

RESULT

Co-Authorship Network

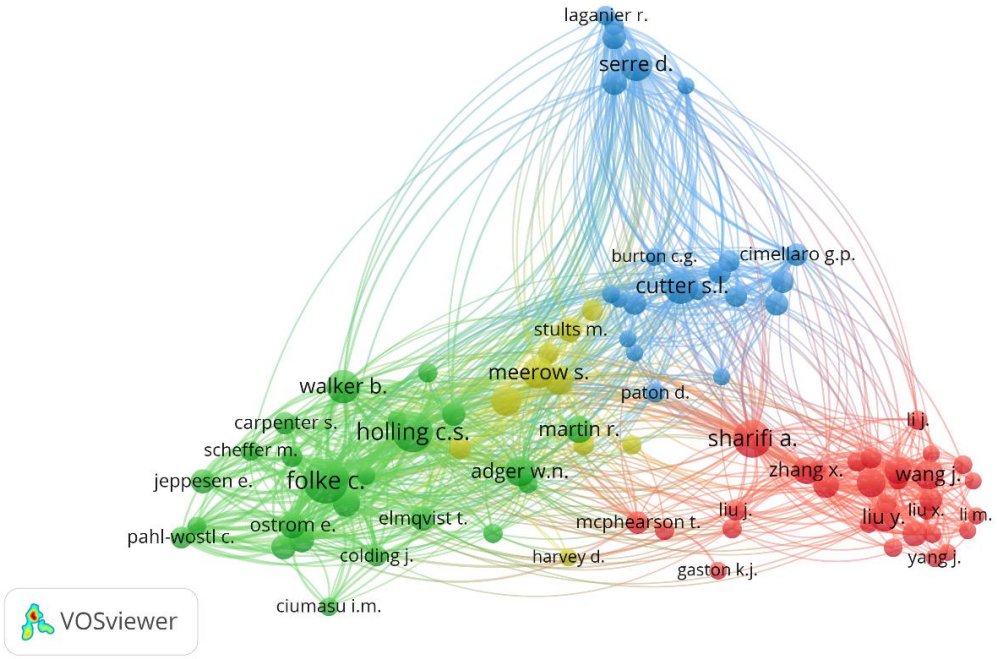

Figure 1. Author Collaboration
Source: Data Analysis

The network visualization map presented above illustrates the co-authorship network in the field of crisis management and urban resilience, focusing on disaster strategies in metropolitan cities. The map shows several clusters of researchers who frequently collaborate, as indicated by color-coded groupings. The green cluster—centered around authors such as Folke C., Holling C.S., Walker B., and Ostrom E.—represents foundational scholars in resilience theory and socio-ecological systems. The blue cluster, which includes Serre D., Laganier R., and Cutter S.L., highlights authors contributing heavily to urban vulnerability assessment and resilience metrics. The red cluster, anchored by Wang J., Liu Y., and Sharifi A., points to more recent and rapidly expanding research on urban disaster modeling, smart city resilience, and infrastructure planning, often from East Asia. The yellow nodes, such as Meerow S. and Martin R., serve as bridges between multiple clusters, indicating interdisciplinary influence. The thickness of the lines (edges) between nodes shows the strength of co-authorship ties, while node size reflects the number of publications or citation impact.

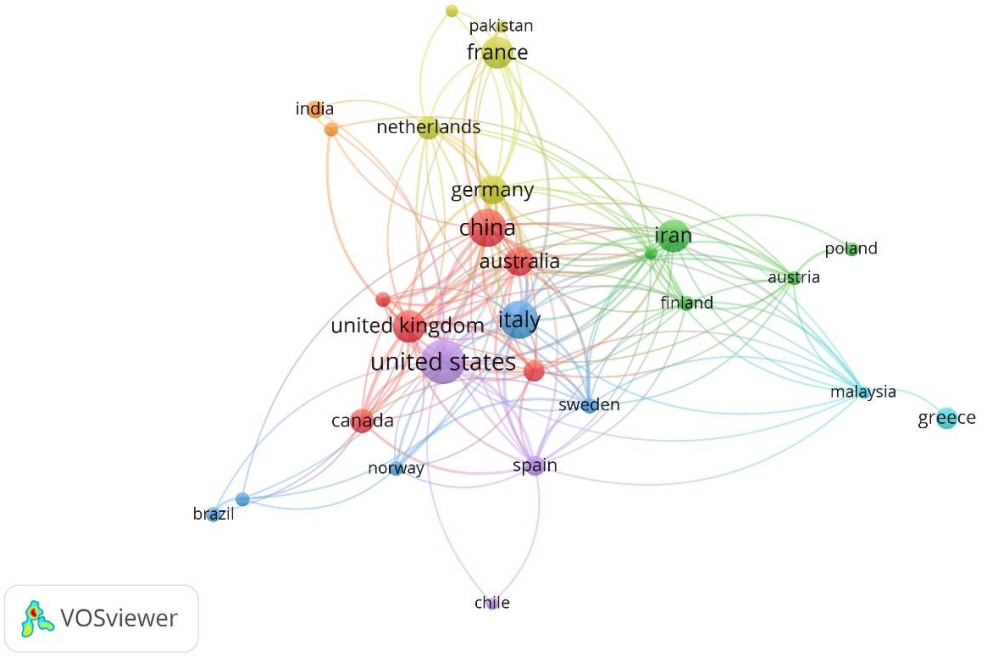

Figure 2. Country Visualization
Source: Data Analysis

Citation Analysis

The map above presents a country-level co-authorship network in the domain of crisis management and urban resilience. The visualization reveals strong international collaboration among major research-producing countries. The United States, United Kingdom, China, and Italy appear as central nodes with the largest circles, indicating their significant contributions and high frequency of collaboration in this field. These countries are positioned at the core of the network, forming a dense cluster that suggests intensive bilateral and multilateral partnerships. Distinct color clusters indicate regional or thematic research alliances. For example, Germany, France, Netherlands, and India form a closely connected cluster, suggesting strong European-Asian collaboration on urban disaster strategies. Similarly, Iran, Finland, Austria, and Malaysia form another regional group, often engaging in cross-border studies on resilience in developing urban environments. Peripheral nodes like Brazil, Pakistan, and Greece show emerging but still limited connectivity, representing either developing research activity or more isolated scholarly output.

Table 1. Most Cited Article

Citations	Author and Year	Title
2156	[9]	Managing the health effects of climate change. Lancet and University College London Institute for Global Health Commission
890	[10]	The 2021 report of the Lancet Countdown on health and climate change: code red for a healthy future
845	[11]	Genealogies of resilience: From systems ecology to the political economy of crisis adaptation
783	[12]	The COVID-19 pandemic: Impacts on cities and major lessons for urban planning, design, and management
438	[13]	Social-ecological memory in urban gardens-Retaining the capacity for management of ecosystem services
385	[14]	A review of informal volunteerism in emergencies and disasters: Definition, opportunities and challenges
383	[15]	Impacts of COVID-19 pandemic on urban park visitation: a global analysis

318	[16]	The challenges of water, waste and climate change in cities
285	[17]	Community Gardening: A Parsimonious Path to Individual, Community, and Environmental Resilience
170	[18]	Food first: COVID-19 outbreak and cities lockdown a booster for a wider vision on urban agriculture

Source: Scopus, 2025

Keyword Co-Occurrence Analysis

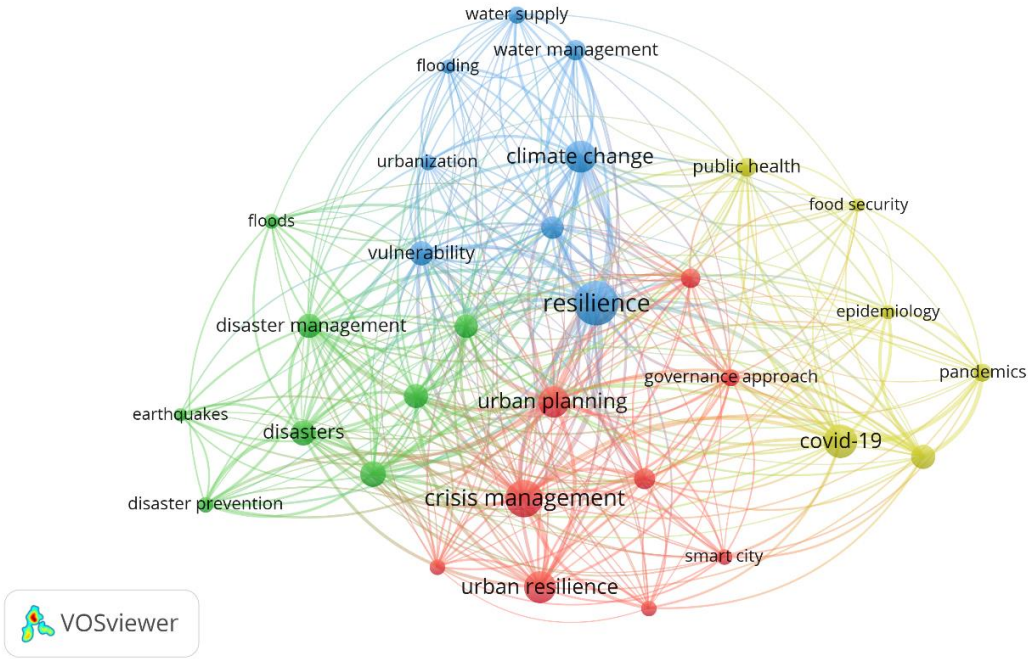

Figure 3. Network Visualization
Source: Data Analysis

The keyword co-occurrence map above visualizes the thematic structure of research in crisis management and urban resilience, based on literature from metropolitan disaster contexts. The central node is "resilience", which forms the thematic core of the field, acting as the most frequently occurring and interconnected keyword. This suggests that resilience serves as a conceptual anchor, linking multiple subfields such as climate change adaptation, urban planning, disaster risk reduction, and public health. The size of the node and density of links radiating from "resilience" indicate its interdisciplinary relevance and integration across diverse research agendas. The map is divided into several distinct color-coded clusters, each representing a group of thematically linked keywords. The blue cluster, led by terms such as climate change, urbanization, water management, and flooding, highlights the environmental and infrastructural dimensions of urban resilience. This cluster reflects the growing scholarly attention to how climate-induced hazards like flooding and water stress impact urban systems and how these can be mitigated through adaptive infrastructure and land-use planning. These issues are particularly pertinent in coastal megacities and rapidly urbanizing regions vulnerable to sea-level rise and extreme weather events.

The green cluster, which includes terms like disaster management, disasters, earthquakes, and vulnerability, represents the traditional disaster risk reduction domain. This thematic group emphasizes emergency preparedness, response mechanisms, and strategies for reducing exposure to natural hazards. It reflects the historical roots of crisis management research, grounded in managing acute shocks through institutional and technical interventions. The co-linkages with urban planning and resilience also point to a shift toward integrating risk management within broader development and planning frameworks, moving from reactive to proactive strategies. Meanwhile, the red and yellow clusters signal more recent and emerging discourses. The red cluster focuses on

urban resilience, crisis management, and smart cities, indicating a convergence of digital technology, governance innovation, and spatial planning in building adaptive capacity in cities. The yellow cluster, centered on COVID-19, pandemics, public health, and food security, reflects the post-2020 surge in research that intersects epidemiological risk with urban governance and resilience. These topics represent a new frontier in urban resilience literature, where public health crises are now considered alongside environmental disasters.

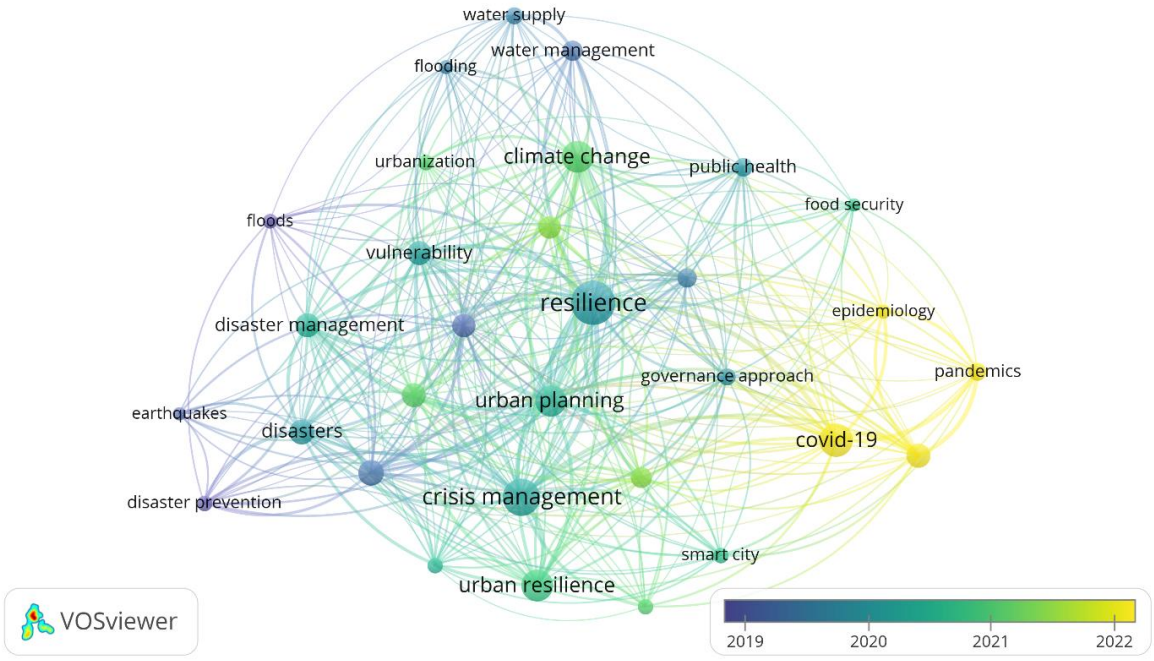

Figure 4. Overlay Visualization
Source: Data Analysis

The overlay visualization above illustrates the temporal evolution of key research themes in the field of crisis management and urban resilience, based on the average publication year of each keyword. Color gradients from blue (older terms, around 2019) to yellow (newer terms, around 2022) indicate how the focus of scholarly attention has shifted over time. Core foundational topics such as disaster management, earthquakes, disasters, and disaster prevention appear in darker blue, signifying their dominance in earlier phases of research. These traditional concerns reflect an initial emphasis on natural hazard preparedness and technical mitigation strategies in urban environments. As we move toward the green spectrum (2020–2021), themes such as climate change, urban planning, resilience, and crisis management gain prominence. These represent a transitional phase in the literature, where research began integrating broader systemic challenges like climate vulnerability and the need for adaptive urban governance. The central position and relatively large size of the resilience node in this spectrum highlight its role as a unifying and expanding concept, linking various subdomains including sustainability, governance, infrastructure planning, and risk reduction. In contrast, the yellow nodes such as COVID-19, pandemics, epidemiology, and public health indicate emerging and most recent research themes, triggered by the global pandemic. These topics signify a paradigm shift in the discourse, where crisis management and resilience are no longer confined to natural disasters but have been extended to encompass health-related systemic shocks and urban public health preparedness.

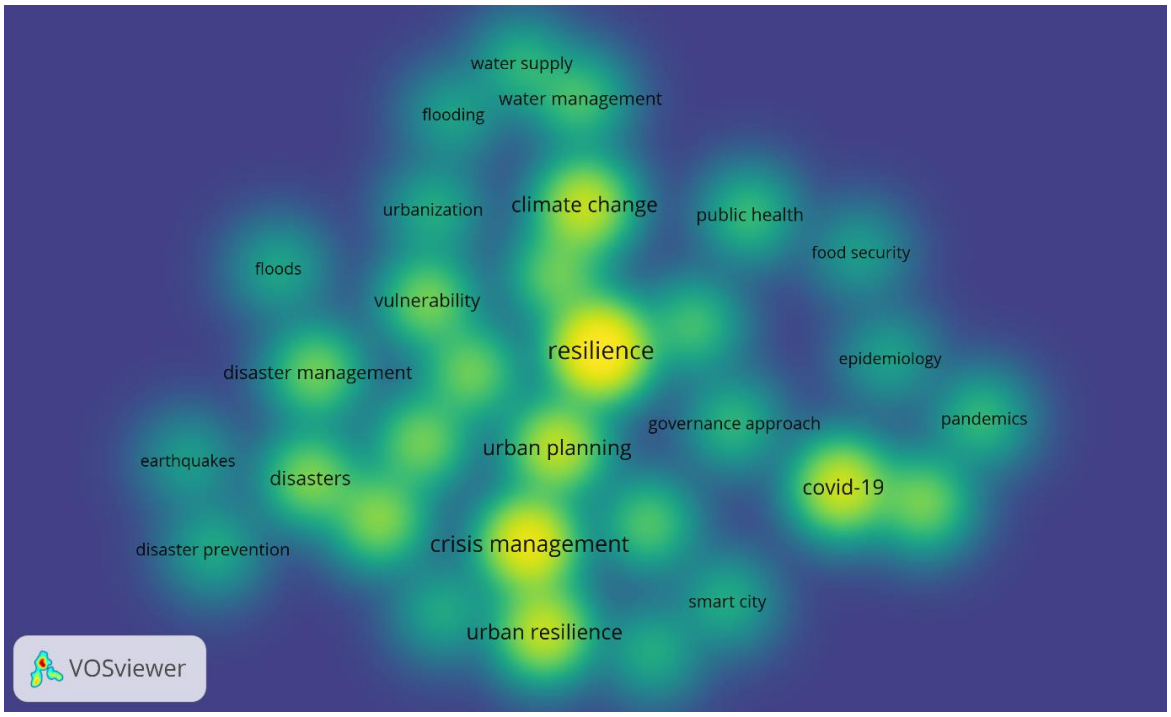

Figure 5. Density Visualization
Source: Data Analysis

The heatmap visualization above illustrates the density of keyword occurrences in scholarly publications related to crisis management and urban resilience. Brighter yellow areas represent high-frequency keywords, indicating intensive research attention. The term "resilience" stands out as the densest node, reinforcing its central role as the conceptual and thematic core of the field. Surrounding this central term, frequently co-occurring keywords such as urban planning, climate change, crisis management, and disaster management also exhibit high-density zones. This suggests that the integration of resilience into urban planning and disaster governance has been a dominant and sustained theme in the literature.

On the periphery of the heatmap, terms such as smart city, public health, governance approach, and epidemiology appear with moderate to low density, indicating emerging or more specialized research areas. Notably, COVID-19 shows a concentrated but highly visible density zone, reflecting a surge in scholarly interest in pandemic-related urban resilience post-2020. The spread of density from traditional disaster terms like earthquakes and floods to broader systemic concerns such as food security and water management illustrates the field's evolution from event-specific response strategies to multi-dimensional urban resilience frameworks.

DISCUSSION

Intellectual Structure and Influential Scholars

The co-authorship network map reveals a distinct clustering of scholars into several thematic groups. The green cluster, which includes influential names such as C.S. Holling, Carl Folke, and Elinor Ostrom, represents foundational thinkers in resilience theory and socio-ecological systems. Their work has significantly shaped how resilience is understood not merely as a reactive capability but as a system's adaptive and transformative capacity. These authors have contributed extensively to interdisciplinary frameworks, linking ecological dynamics with institutional governance—critical for understanding complex urban systems. The blue cluster, led by authors such as Serre D. and Cutter S.L., is more grounded in urban vulnerability assessment and quantitative resilience metrics. Their contributions emphasize hazard exposure, spatial vulnerability, and resilience indicators, forming a methodological base for assessing metropolitan preparedness. In contrast, the red cluster,

with scholars such as Wang J., Sharifi A., and Liu Y., shows a more recent shift toward technologically driven resilience, including smart cities, digital disaster modeling, and data-centric urban planning. These diverse but overlapping intellectual clusters point to the field's maturity and its rich interdisciplinarity.

Global Knowledge Production and Collaboration Patterns

The country co-authorship map highlights strong research contributions and collaborations among countries such as the United States, United Kingdom, China, Italy, and Australia. These nations occupy central positions in the network, indicating both high productivity and extensive international cooperation. The United States and United Kingdom, in particular, dominate not only in publication volume but also in cross-border partnerships, suggesting their leadership in setting global research agendas on urban resilience. Emerging participation from countries like Iran, Malaysia, India, and Brazil also points to a growing geographical diversification of research efforts. These countries often face acute urban challenges such as rapid urbanization, flooding, air pollution, or fragile health systems. As such, their increasing involvement signals a promising trend in context-specific and localized resilience research, which is crucial for addressing the distinct disaster risks faced by Global South cities.

Thematic Trends and Knowledge Clusters

The keyword co-occurrence map presents a rich and interconnected structure of dominant themes. At its core is the term "resilience", which links almost all thematic branches. The blue cluster focuses on climate-oriented terms such as climate change, urbanization, water supply, and flooding. This cluster reflects increasing concerns about the effects of climate-induced hazards on urban systems. It resonates with the literature on climate urbanism, where cities are not just sites of risk but also laboratories for adaptive solutions. The green cluster, containing terms like disaster management, vulnerability, and earthquakes, represents the traditional emergency response discourse. Research in this cluster typically explores the physical and social vulnerabilities of cities and suggests technical and institutional responses to sudden-onset hazards. However, this discourse is increasingly being integrated with resilience thinking, as evidenced by the close proximity of these terms to urban planning and governance. In contrast, the red and yellow clusters point to emerging and transformational research. The red cluster focuses on governance innovations, smart cities, and integrated planning. The inclusion of urban resilience and crisis management here indicates a shift from hazard-centric responses to systemic approaches that include policy, technology, and spatial design. The yellow cluster, meanwhile, is clearly driven by pandemic-related research, especially the prominence of COVID-19, public health, epidemiology, and food security. These findings reflect a reorientation of urban resilience research after 2020, where health security, social systems, and epidemiological preparedness became central to urban disaster discourse.

Temporal Shifts and Emerging Frontiers

The overlay visualization further reinforces this transition in research focus. Earlier studies (2018–2019) emphasized disaster prevention, earthquakes, and traditional risk management, which are marked in darker blue. This period reflects a dominance of hazard-response frameworks rooted in civil engineering, emergency response, and structural mitigation. By 2020, the field expanded to encompass climate change, urban planning, and resilience, showing a more holistic and preventive focus, aligned with frameworks such as the Sendai Framework for Disaster Risk Reduction (2015–2030) and New Urban Agenda. Post-2020 research, shown in bright yellow tones, is dominated by keywords such as COVID-19, pandemics, public health, and governance approach. This marks a pivotal moment in the literature, where the pandemic exposed systemic weaknesses in urban preparedness and revealed the need for multi-sectoral resilience strategies. The prominence of governance-related keywords also points to a growing recognition that resilience is not just technical but also deeply political, involving decision-making, resource allocation, and citizen trust.

Research Gaps and Future Directions

While the field is rich and evolving, several gaps remain evident. First, there is a need for more localized, data-driven studies that address resilience in the Global South. Many highly cited

works and collaborative networks are still concentrated in North America, Europe, and East Asia. Cities in Africa, Southeast Asia, and Latin America face distinct resilience challenges—ranging from informal settlements to weak institutional structures—that require context-specific research agendas. Second, the intersection between resilience and digital technology, while emerging, is still underdeveloped. Although terms like smart city and data governance are beginning to appear, their links to core resilience strategies remain thin. As urban management increasingly turns to digital twins, IoT systems, and AI-driven early warning tools, future research should explore how digital infrastructure can support adaptive capacity without exacerbating existing inequalities. Third, while public health and epidemiology have surged since COVID-19, they are still somewhat isolated from traditional urban planning and disaster management discourses. Future work must continue bridging this divide to build truly integrative frameworks of urban resilience that include health systems, transportation, energy, housing, and food security as interconnected subsystems of the urban whole.

Theoretical and Practical Implications

Theoretically, this study affirms the Resource-Based View of resilience [19], which conceptualizes urban resilience as a function of diverse assets—ecological, infrastructural, institutional, and social. The clustering of research into thematic zones—ecological risks, technological responses, and social health systems—demonstrates how resilience is understood and operationalized as a multi-scalar, multi-domain construct. It also supports complex systems theory, where urban resilience emerges from the interactions of diverse subsystems under stress. Practically, this bibliometric mapping provides a valuable roadmap for policymakers, urban planners, and researchers. By identifying the most connected keywords, influential scholars, and collaborative countries, decision-makers can better align academic evidence with practical needs. The rise of governance, equity, and health in resilience discourse suggests that urban resilience strategies must be not only risk-informed but also people-centered and inclusive. Policymakers must focus on participatory planning, real-time data integration, and cross-sectoral coordination to address the multifaceted risks of modern metropolitan environments.

CONCLUSION

This bibliometric study provides a comprehensive overview of the scholarly landscape surrounding crisis management and urban resilience, with a particular focus on disaster strategies in metropolitan cities. The findings reveal that the field has evolved significantly from traditional disaster response paradigms toward more integrated, interdisciplinary frameworks that emphasize resilience, adaptive governance, and systemic planning. Central themes such as climate change, urban planning, and vulnerability have remained dominant, while emerging topics like pandemics, public health, and smart cities reflect the dynamic and responsive nature of urban resilience scholarship, particularly in the wake of COVID-19. Geographically, the research is led by countries like the United States, United Kingdom, China, and Italy, though contributions from developing nations are gradually increasing. The intellectual structure, as mapped through co-authorship and keyword networks, underscores the field's diversity and its convergence across environmental, technological, and social dimensions. This study not only highlights existing gaps—such as limited integration of digital infrastructure and localized studies in the Global South—but also points toward future directions that require holistic, inclusive, and data-driven approaches. Ultimately, understanding the evolution and structure of this research domain is essential for guiding more effective and equitable resilience strategies in increasingly complex urban environments.

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