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M E D I C I N E J O U R N A L

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RESEARCH PAPER

Evaluation of hospital preparedness for disasters: a bibliometric analysis

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ABSTRACT

INTRODUCTION: This bibliometric analysis focuses on hospital preparedness for disasters research perspective & evaluation method especially in range of COVID pandemic era. The research presents a comprehensive analysis of research articles spanning 2019 to 2023, a total of articles from Scopus database 2.571, after filtered with inclusion criteria there are 145 articles selected.

MATERIAL AND METHODS: The methodology employed in this article is Bibliometric Analysis utilizing Scopus Analytics & VOSViewer, trends in publication output, geographical distribution, prominent authors, and subject areas were explored.

RESULTS: The dataset highlighted fluctuations in yearly publications between 18 and 40 articles per year, with peaks in 2021 with 40 articles in total. The United States led in contributions with 45 articles, followed by diverse global engagement from countries like Iran (20), Australia (9), and South Korea (9). The keyword 'Nursing' dominates the research field with 101 documents followed by 'Medicine' with 74 documents related to hospital disaster preparedness strategies and focusing on exploring human factors and community readiness for patient care during post-disaster conditions. VOSViewer analysis unveiled thematic clusters emphasizing COVID-19, hospital emergency service, healthcare personnel, and disaster nursing, elucidating interconnectedness within healthcare research. Notably, keywords like 'disaster planning,' 'disaster preparedness,' and 'disaster management' emerged as pivotal in assessing hospital readiness during disasters.

CONCLUSIONS: This study underscores the necessity of evaluating hospital preparedness for disasters, emphasizing multidisciplinary approaches and key thematic clusters, providing foundational insights for enhancing disaster management strategies in healthcare settings.

KEYWORDS: bibliometrics; COVID-19; disasters; health facilities; hospitals

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INTRODUCTION

Government Regulation Number 21 of 2008 on Disaster Management defines a disaster as a series of events that threaten society and can be caused by natural, non-natural, and human factors without warning [1]. These disasters result in various impacts including loss of life, environmental damage, property loss, and psychological issues. Over 2.6 billion individuals worldwide have been affected by natural disasters in the last decade, with serious impacts such as injuries and damages [2, 3]. Indonesia, with approximately 87% of its territory vulnerable to natural disasters, frequently experiences various types of disasters like floods, cyclones, and landslides [4, 5]. The year 2020 recorded 2.939 disaster events, causing over 6.4 million people to be displaced, 370 fatalities, and significant damage to thousands of facilities [4].

Hospitals play a crucial role in addressing various types of disasters, particularly in providing healthcare services to affected populations. They are expected to operate during and after disasters. When hospitals fail to function in disasters and emergencies, whether due to structural or functional issues, they cannot promptly cater to victims' needs during the most critical periods [6, 7]. The early hours of crises triggered by natural disasters are critical for victim safety and minimizing fatal impacts. The limited timeframe necessitates swift and effective emergency actions to locate and rescue the injured while preventing or containing additional hazards. However, both objective and subjective factors often hinder timely and efficient emergency responses. These constraints are frequently associated with powerful and rapid hazardous events like earthquakes, storms, or floods, disrupting the implementation of emergency management plans [8, 9]. Incidents involving mass casualties and disaster scenarios pose significant challenges to medical facilities such as hospitals, necessitating adequate preparedness measures. The evaluation of medical facility readiness can be conducted using multiple dimensions or aspects assessments. A comprehensive analysis involves structural, functional, and organizational factors, encompassing infrastructure facilities, technical facilities, safety standards, workflow organization, connections with external facilities, human resource management, crisis planning, and communication strategies [10–13].

Evaluation of hospital preparedness for disasters is an important component of improving disaster preparedness. There are several approaches and tools available for evaluating hospital disaster preparedness. One approach is a multi-criteria decision-making approach, which involves evaluating the readiness of hospitals and proposing a ranking of them based on measurable elements and standards [14]. Another approach is to use a hospital disaster risk management evaluation model, which can embed standards and measurable elements to measure a hospital's preparedness in disasters [15]. There are also assessment

tools available, such as the Hospital Disaster Preparedness Self-Assessment Tool, which can assist hospitals in revising and updating existing disaster plans or in the development of new plans [16]. Additionally, models are being developed for the evaluation of hospital disaster resilience, which include variables such as hospital safety, emergency services, surge capacity, command, disaster plan, logistics, staff ability, and more [16]. These tools and approaches can help hospitals assess their preparedness for disasters and identify areas needing improvements.

This study employs Scopus Advanced Search using the keywords “hospital,” “disasters,” and “preparedness” yielding 145 articles spanning from 2019 to 2023. Subsequently, these articles will undergo Bibliometric Analysis using the VOSviewer application to identify relevant keywords. Thereafter, VOSviewer will be utilized for clustering, a method for grouping objects based on similarities or differences [17]. The clustering criteria are based on keywords relevant to this research focus, namely “Evaluation of Hospital Preparedness for Disasters”.

MATERIAL AND METHODS

The methodology employed in this article is Bibliometric Analysis. Bibliometric Analysis is a term used to refer to a specific research methodology and development aimed at gathering and evaluating relevant studies on a particular topic focus. The objective of Bibliometric Analysis is to identify, assess, evaluate, and interpret all available studies within the field of interest, with specific research questions [18]. This Bibliometric Analysis also aims to provide characterization, and an overview of research trends, methods, and coverage fields investigated within the study of digital literature databases over a specific period [19, 20].

In this study, the advanced search feature of the Scopus database was utilized to meticulously curate relevant scholarly articles. The search for articles on the database has been done on 20th March 2024. The search strategy incorporated specific keywords and filters including "hospital", "disaster", and "preparedness" within the title, abstract, and keywords (TITLE-ABS-KEY), ensuring the inclusion of articles pertinent to the research focus. Moreover, articles published between 2018 and 2024 were targeted (PUBYEAR), limiting the scope to recent developments in the field. Restriction to journal articles (DOCTYPE "ar") and indexed sources (SRCTYPE "j") upheld the standard of scientific rigor. Further refinement involved selecting articles from subject areas such as Nursing (SUBJAREA "NURS"), Health (SUBJAREA "HEAL"), or multiple disciplines (SUBJAREA "MULT"). Language criteria (LANGUAGE "English") were imposed to ensure linguistic consistency, while only articles in the final stage of publication (PUBSTAGE "final") were considered, reflecting the culmination of rigorous peer review. This comprehensive approach aimed to compile a robust dataset of high-quality scholarly literature essential for research analysis.

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TITLE-ABS-KEY ( hospital AND disaster AND preparedness ) AND PUBYEAR > 2018 AND PUBYEAR < 2024 AND ( LIMIT-TO ( SRCTYPE , "j" ) ) AND ( LIMIT-TO ( DOCTYPE , "ar" ) ) AND ( LIMIT-TO ( SUBJAREA , "NURS" ) OR LIMIT-TO ( SUBJAREA , "HEAL" ) OR LIMIT-TO ( SUBJAREA , "MULT" ) ) AND ( LIMIT-TO ( LANGUAGE , "English" ) ) AND ( LIMIT-TO ( PUBSTAGE , "final" ) )
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For ease of understanding, the process and workings of a Bibliometric Analysis can be outlined with PRISMA as seen in Figure 1.

The stages of the Bibliometric Analysis above require the assistance of applications to streamline the process. The applications used are Scopus Advanced Search and VOSviewer. Both applications are commonly used for bibliographic analysis. Scopus advanced search is designed to illustrate citation metrics using metadata obtained from Scopus' internal indexing institution with concrete data. The Scopus advanced search website enables searches based on authors, publication names, titles, and keywords, and can map the year range of articles along with citation counts. Meanwhile, VOSviewer is utilized to visualize bibliographies or datasets containing bibliographic fields such as titles, authors, journal names, and so forth. In the academic realm, VOSviewer is employed for bibliometric analysis, identifying research gaps in specific topics, finding the most widely used references in particular fields, and more [17, 21].

The Hospital Disaster Preparedness analyzed in this article comes from the Scopus database metadata. The author takes article metadata from Scopus with certain keywords along with inclusions and exclusions. The stages in the data collection process which are then analyzed in VOSviewer are carried out in several stages consisting of: First stage. At this stage the author carries out several processes, namely 1). Downloading journal article metadata with the keyword "Hospital Disaster Preparedness" using Scopus advanced search 2). Data is stored in RIS format. 3). RIS data is analyzed using the VOSviewer application to get visuals. 4). The results of the analysis with VOSviewer are written in this article.

In the second stage, the authors conducted several processes: 1). downloading metadata and journal articles using Scopus Advanced Search, 2). storing the acquired data in RIS format, 3). performing narrative analysis within the Mendeley reference program, focusing on the folder labeled Hospital Disaster Preparedness, 4). analyzing the data obtained in RIS format from Scopus Advanced Search using VOSviewer to generate visual data, and 5). presenting the outcomes of this analysis in this article.

Stage three. In this stage, the authors analyzed the author's network contributing to the study of Hospital Disaster Preparedness between 2019 and 2023. The analysis results were visualized in graphical form, depicting the map and emerging themes categorized within the output of the VOSviewer program. This visualization encompassed aspects such as 1) The varying thickness of connecting lines and circles, reflecting the magnitude of the VOSviewer analysis results. 2) Several numerical values were divided into links, representing networks, by calculating link strength (measured through full or fractional counting) and the frequency of occurrence. Moreover, this paper encompassed several types of analyses, including a) Citation analysis, visualizing the documents under observation, and connecting those documents that cite the same articles. This analysis reveals citation relationships among documents. b) Bibliographic coupling, visualizing, and creating networks of articles based on shared references. This analysis indicates the proximity of studies among documents. c) Co-authorship analysis, examining collaborations among authors. This analysis visualizes outcomes based on author names and their affiliated organizations. The output from VOSviewer resulted in three visual displays: network, overlay, and density visualization.

RESULTS

Based on the Scopus advanced search using the keywords “hospital,” “disasters,” and “preparedness”, 145 articles were retrieved spanning from 2019 to 2023. There appears to be an increasing trend in research articles focused on the Evaluation of Hospital Preparedness for Disasters. However, there was a decline in the number of studies in the year 2020. After obtaining the metadata from Scopus, the data was saved in the RIS file format. This RIS format was subsequently utilized and analyzed using the VOSviewer application. The result from the analysis is discussed in this section.

Result analysis based on Scopus analytics

The dataset showcases the distribution of scholarly documents across different countries or territories, summing up to a total of 145 documents (Fig. 2). The United States leads the list with the highest document count, contributing 45 documents, signifying a substantial presence in this field of study or research. Following behind are Iran, Australia, and South Korea, each contributing 20, 9, and 9 documents, respectively, suggesting a diverse geographical representation in scholarly output. Additionally, countries like China and Ethiopia show moderate contributions with 8 documents each. Meanwhile, Saudi Arabia and Sweden present a smaller yet noticeable presence with 7 documents each, and Indonesia presents 4 documents on this research topic. The remaining documents, until reaching a total of 145, are attributed to several other countries or territories not explicitly listed, indicating a global engagement in research activities within the context of this dataset. This distribution sheds light on the varying degrees of research output across different nations, showcasing their participation and contributions to this field of Hospital Preparedness for Disasters study.

Search using the keywords “hospital,” “disasters,” and “preparedness”. The dataset provided illustrates the publication output across five consecutive years in Figure 3, from 2019 to 2023. The data reveals fluctuations in the number of articles released annually within this timeframe illustrated by a bold blue line, but the trendline shown by the blue dashed line shows an uptrend year by year. In 2019, there were 18 articles published, followed by a notable increase to 22 articles in 2020 and 40 articles in 2021 as a peak (Fig. 3). Subsequently, the publication count dropped to 33 in 2023. However, the following year, 2023, experienced constant numbers in publications with 31 articles. This dataset offers insights into the varying levels of research output, potentially indicating shifts in research focus, productivity, or interest within the field under study during these specific years. Analyzing such trends might unveil patterns or periods of intensified academic activity.

The research output showcased an increasing trend in publications addressing the evaluation of hospital preparedness for disasters, indicating a growing interest and concern in this critical area. Despite a slight decline in research output observed in 2020, likely influenced by the onset of the COVID-19 pandemic, subsequent years witnessed a resurgence in publications, highlighting the resilience and adaptability of the research community in addressing emergent challenges.

Two authors, namely Khankeh, H.R., and Abbasabadi-Arab from Iran, each have three documents attributed to their names, as shown in Figure 4A. This indicates a substantial presence and contribution within the field of “hospital,” “disasters,” and “preparedness.” Additionally, Arcos González, P. from Spain, Hart, A. & Ciottone, G.R. from the United States, Dadkhah, B. from India, and others have two documents each associated with their

authorship, also illustrated in Figure 4a. This suggests a moderate but noteworthy level of involvement in the publications related to the aforementioned keywords.

An analysis of the affiliations of the authors using Scopus data shows that Chung-Ang University has the most publications related to the topic, with five documents (Figure 4B). Iran University of Medical Sciences also has five publications. Other universities with a significant number of publications (four documents each) are Harvard Medical School, Icahn School of Medicine at Mount Sinai, Beth Israel Deaconess Medical Center, and the University of Social Welfare and Rehabilitation Sciences. These data indicate that these affiliations are actively producing publications related to the topic keywords “hospital,” “disasters,” and “preparedness.”

Result analysis based on VOSviewer

The results from the VOSViewer analysis reveal four main clusters grouping closely related keywords or topics within the domain of health research and hospital disaster preparedness. The cluster item group can be seen in Table 1. The first cluster highlights topics related to Disaster Preparedness and pandemics, encompassing terms such as COVID-19, pandemic, and epidemiology, along with healthcare-related aspects in hospitals. Meanwhile, the second cluster shows a strong association between Disaster Preparedness and Emergency Response Training in Healthcare, including terms like disaster planning, and disaster management, and their association with nurses in multicenter studies. The third cluster focuses on Emergency Management and Healthcare Services in Response to Disasters, featuring terms such as emergency preparedness, practice guideline, simulation training, and mass disaster, mental health, patient care, focusing on the management of healthcare services during disaster conditions. The fourth cluster, Disaster Response and Management in Nursing and Healthcare Settings contains words like clinical competence and disaster nursing related to the keywords earthquake and natural disaster. This cluster highlights the importance of health workforce competence when facing disaster conditions such as earthquakes or other natural disasters. This cluster analysis demonstrates robust thematic interconnections between pandemic-related topics. “Healthcare System and Pandemic Preparedness” intersects with “Emergency Management and Healthcare Services in Response to Disasters” to address comprehensive healthcare strategies for managing pandemics and emergencies due to natural disasters.

Figure 5 depicts the visualization outcomes utilizing VOSViewer subsequent to the author's execution of keyword inclusion (sorting keywords relevant to the Evaluation of Hospital Preparedness for Disasters) and exclusion (filtering out data irrelevant to the Evaluation of Hospital Preparedness for Disasters). The resulting visualization has mapped keyword clusters into four distinct groups, denoted by red, green, blue, and yellow colors.

The VOSViewer analysis reveals the relationship between Cluster 1, represented by the red color, and Cluster 2, depicted in green. The correlation observed is pertinent to the subject investigated in the Bibliometric Analysis, namely the Evaluation of Hospital Preparedness for Disasters. The items ‘Nursing’, ‘Pharmacist’, and ‘Manager’ are associated with Workforce or as representatives of medical personnel and are linked to disaster preparedness. The human factor as a mitigator in disaster preparedness emerges as a rational finding. Additionally, the presence of ‘disaster planning’ associated with ‘disaster’ and ‘Hospital’ signifies the connection between research focusing on disaster planning and studies

involving diverse fields related to hospital emergency health service. Within the navy-blue cluster 3, the item 'Hospital emergency service' and cluster 4 (yellow) with the item 'Organization and management' is a focal point in this Bibliometric analysis.

In Figure 6, it is evident that certain words or topics are depicted prominently and boldly colored, signifying their dominance in discussing themes or past research related to the Evaluation of Hospital Preparedness for Disasters. The standout topics include (1) Disaster Preparedness, (2) Disaster, (3) Disaster Planning, (4) Hospital, (5) Pandemics and Covid-19. Figure 7, describes the frequently occurring keywords between 2020 and 2022, analyzing research data using VOSViewer.

DISCUSSION

Result analysis based on Scopus analytics

Griebe et al. [22] from the United States show a perspective that disaster is not only caused by natural factors but also by human activity that could cause catastrophes, the uniqueness of this research lies in the development and execution of a "person with a weapon" exercise specifically tailored to the hospital pharmacy department, representing an innovative step in strengthening hospital preparedness for disasters, including terrorism threats. Another research at a midwestern suburban hospital in the United States by Shostrand et al. [23], knowledge deficits in disaster preparedness among hospital-based nurses and healthcare professionals can be enhanced by experiential learning programs. There is a significant improvement in disaster preparedness familiarity on the subject after experiential learning intervention.

Focus research on hospital disaster preparedness also focused topic in Iran, Abbasabadi-Arab et al. [24], demonstrate a significant increase in the Hospital Safety Index (HSI) in Iranian hospitals in 2020 (60.84%) compared to 2014 (42%), albeit still moderate. Utilizing the Farsi Hospital Safety Index (FHSI) checklist and a cross-sectional approach involving 604 hospitals, it unveils solutions to fortify hospital safety and preparedness through enhancements in structural, non-structural, and functional safety, alongside managerial skills. The study in Ardabil Province, Iran, found that only a few hospitals were well-prepared, while most showed moderate readiness levels. Identified areas for improvement include triage, human resource management, and post-disaster recovery. This emphasizes the need for comprehensive planning and clear instructions to bolster hospital readiness for unforeseen accidents, thus contributing to disaster management discussions in healthcare settings [24].

Research topic related to hospital disaster preparedness during the COVID-19 outbreak in China has been done by Hou et al. [25]. This research highlights deficiencies that were identified in multidisciplinary collaboration and efforts to promptly diagnose and treat critically ill patients with fever. These findings underscore the importance of comprehensive preparedness strategies and highlight the need for improved collaboration and rapid response protocols in emergency departments during public health emergencies. The study by Sarı et al. [26] examines the demographic characteristics, clinical outcomes, and injuries of earthquake victims admitted to the emergency department within the first week following an earthquake in Diyarbakir, Turkey. Most victims sought emergency services within three days of the disaster, with a notable percentage transferred from other affected cities. Although the

majority of victims were admitted as survivors, a significant proportion were found deceased under rubble. Extremity injuries were prevalent among survivors, with varying treatment needs observed across age groups. These findings underscore the importance of understanding such characteristics and outcomes to inform disaster response strategies of earthquake patients related to preparedness, response, and recovery policies for future disasters.

Meanwhile, there are four research found in Indonesia about hospital disaster preparedness. Research in Indonesia on disaster preparedness encompasses various aspects, ranging from understanding emergency preparedness information among emergency and intensive care nurses to exploring nurses' perceptions of disaster preparedness competencies, evaluating the level of disaster preparedness assessment among emergency nurses, and analyzing the relationship between nurses' perceptions of hospital facility support and disaster preparedness. Findings indicate that factors such as education, disaster simulation experience, awareness of hospital disaster plans, and hospital infrastructure support influence nurses' perceptions and preparedness in facing disasters. In this context, emphasis on understanding, competency, assessment, and hospital infrastructure support constitutes the primary focus of disaster preparedness research in Indonesia [27–30].

The Scopus analysis outcome (Figure 4) presents the distribution of documents categorized by the number of publications by authors and institutions. A Scopus analysis using the keywords “hospital,” “disaster,” and “preparedness” reveals interesting trends. Nursing dominates the field with 101 documents, reflecting their critical role in disaster response. Medicine follows closely (74 documents), likely focusing on broader hospital preparedness strategies. Other healthcare professions (38 documents) and social sciences (25 documents) contribute significantly, exploring human factors and community readiness alongside patient care. Emerging fields like engineering (12 documents) and multidisciplinary research (12 documents) point towards a growing focus on hospital infrastructure and collaborative approaches. Overall, the data suggests a strong emphasis on patient care but highlights the need for a more multidisciplinary approach encompassing social impact, mental health support, and infrastructure resilience. Exploring trends and specific research topics within each field can offer further insights to strengthen hospital preparedness across all relevant areas. This distribution delineates the diverse array of subjects investigated within the analyzed literature about the Evaluation of Hospital Preparedness for Disasters, portraying the spectrum of academic disciplines encapsulated within this dataset.

In conclusion, the dataset reflects a global engagement in research activities related to hospital preparedness for disasters, with significant contributions from various countries and territories. The analysis highlights the importance of continuous evaluation and improvement of disaster preparedness strategies to enhance healthcare system resilience. Furthermore, the findings underscore the critical role of healthcare professionals, particularly nurses, in disaster response and patient care. By leveraging insights from this comprehensive analysis, policymakers, and healthcare stakeholders can develop more effective strategies to mitigate the impact of disasters on public health and ensure the readiness of healthcare systems to respond to future challenges.

Result analysis based on VOSviewer

Cluster 1 emphasized the importance of healthcare system resilience and pandemic preparedness, underscoring the need for comprehensive strategies to manage pandemics and emergencies. The most related article representing cluster 1 is Hou et al. [25], who conducted a study on hospital disaster preparedness during the COVID-19 outbreak in China, which revealed shortcomings in multidisciplinary cooperation and the swift diagnosis and treatment of severely ill patients with fever. These results emphasize the necessity of comprehensive readiness plans and stress the importance of enhanced collaboration and quick-response protocols in emergency departments during public health crises.

Cluster 2 focused on disaster preparedness and emergency response training in healthcare, highlighting the critical role of training programs in enhancing healthcare professionals' preparedness and response capabilities. Most of the studies related to cluster 2 represented by four studies conducted in Indonesia have examined hospital disaster preparedness. They cover various aspects, including understanding emergency preparedness among nurses, evaluating disaster preparedness competencies, assessing emergency nurses' readiness, and exploring the relationship between nurses' perceptions and hospital infrastructure support. These studies highlight the significance of education, disaster simulation experience, awareness of hospital disaster plans, and hospital infrastructure support in shaping nurses' preparedness for disasters. Overall, disaster preparedness research in Indonesia emphasizes enhancing understanding, competency, assessment, and infrastructure support [27–30].

Cluster 3 highlighted emergency management and healthcare services in response to disasters, emphasizing the importance of effective emergency preparedness, practice guidelines, and simulation training in managing healthcare services during crises. There are three studies highlight the necessity of disaster preparedness in healthcare systems related to cluster 3, as demonstrated by the development of simulation models to evaluate emergency plans during floods [31], the identification of varying levels of disaster core competencies among Turkish nurses [32], and the call for improved disaster training programs to address competency gaps among nurses [9].

Cluster 4 underscored the significance of disaster response and management in nursing and healthcare settings, emphasizing the role of clinical competence, workforce readiness, and organizational management in mitigating the impacts of disasters. Research by Lin et al. [33] investigates factors associated with readiness for disaster response among Taiwanese hospital nurses, revealing that length of nursing work, higher education level, working in intensive care units or emergency rooms, and previous disaster training are positively associated with nurses' readiness for disaster responses. These findings underscore the importance of considering these determinants in recruiting nurses for disaster response assistance and designing tailored disaster training programs for nurses in the future. Bahrani-fard et al. [34] suggest the need for practical measures such as crisis management courses, establishment of a crisis management team, resource estimation, structural changes, human resource provision, equipment maintenance, timely triage, and hospital retrofitting to enhance preparedness. Jamaili et al. [35] state that nurses with their technical skills and practical knowledge can provide the highest level of disaster care appropriate to adverse conditions to improve the health of those affected.

The concept of Hospital Preparedness for Disasters is notably characterized by the term “nurse”, and serves as the primary subject in disaster preparedness [36]. This term holds significant influence over the discussed topics, resulting in its frequent usage by researchers in creating published articles, aligning with the subsequent research focus. Concerning ‘education,’ ‘hospital emergency service,’ and ‘clinical competence’ serve as complementary topics that align with the theme, mutually reinforcing the dominant concept, and vice versa.

One of the reviewed studies mentioned that through an anonymous survey involving 134 healthcare providers, their self-assessment indicated a better perception regarding personal readiness compared to their workplace readiness in facing disaster events. This evaluation serves as a valuable tool to identify and rectify potential gaps and weaknesses in the functioning and management of hospitals during mass incidents [37]. The keywords ‘risk management’ and ‘evaluation’ were identified to appear in the research titled Developing a Hospital Disaster Risk Management Evaluation Model [15]. The keyword ‘evacuation’ appears in the research titled Evacuation from healthcare facilities in Poland: Legal preparedness and preparation [38].

Based on Figure 7, in the year 2020, the data indicates that “organization and management” emerged as a prominent keyword, suggesting that research on hospital disaster preparedness focused on organizational and management variables during that time [34, 39]. In contrast, in 2021, the keywords were more varied and centered around “disaster planning.” Subsequently, in the following year, the focus shifted towards the topic of “disaster preparedness” [40, 41]. Publications in 2022 predominantly focused on keywords related to “COVID-19”. This indicates a positive trend, reflecting a concern for evaluating hospital readiness for disasters, including pandemics, in the upcoming future [42–44].

The analysis also revealed temporal shifts in research focus, with keywords such as “organization and management” dominating in 2020, followed by a transition to “disaster planning” in 2021, and a subsequent emphasis on “disaster preparedness” in 2022. This temporal evolution reflects the dynamic nature of disaster research and the need for continuous adaptation and response to emerging threats and challenges.

The analysis of journal articles from 2019 to 2023 reveals significant advancements in hospital disaster preparedness research, driven by increased publications following the COVID-19 pandemic. This period highlights four main thematic clusters: healthcare system resilience, training programs, emergency management, and disaster response in nursing and healthcare settings. The VOSViewer analysis further illuminates these themes, showing strong interconnections and temporal trends. The clustering of keywords underscores the multifaceted nature of disaster preparedness, from pandemic response to emergency management and workforce competence. These visualizations emphasize the importance of comprehensive strategies, effective training programs, and the need for continuous adaptation to emerging threats.

Key findings underscore the critical role of integrating organizational management, strategic planning, and community resilience into disaster preparedness frameworks. Studies by Firissa et al. [45] and Chisholm et al. [46] highlight the necessity of robust disaster plans, regular training, and effective communication networks. Aminizadeh et al. [47] also emphasize the need for standardized instruments with reliable psychometric properties for assessing hospital preparedness in biological events.

Geographically, the United States leads in publication volume, with significant contributions from Iran, Australia, South Korea, China, and Ethiopia, reflecting diverse approaches and challenges in disaster preparedness. Institutions such as Chung-Ang University and Iran University of Medical Sciences have notably contributed to developing measurement tools and evaluation policies.

Regarding subject areas, nursing dominates with a focus on medical personnel preparedness and training, while medicine addresses broader hospital strategies. Other healthcare professions and social sciences also contribute significantly, covering mental readiness and psychosocial support.

Future research should focus on integrating various healthcare professionals into disaster preparedness training, conducting longitudinal studies on training effectiveness, and developing adaptable frameworks for different settings. Exploring technological innovations and preparing for climate-related disasters is crucial for enhancing hospital preparedness. Effective communication, regular restocking of supplies, and community engagement are essential components that require ongoing evaluation to ensure a resilient healthcare system.

Acknowledging the study's limitations is essential, as it relies solely on data from the Scopus database. Future studies should incorporate data from additional databases to provide a more comprehensive understanding of hospital disaster preparedness and enrich the research perspectives in this critical area.

CONSLUSIONS

The research indicates a growing interest in evaluating hospital preparedness for disasters, with a resurgence in publications following the initial impact of the COVID-19 pandemic. Four main thematic clusters emerged, emphasizing healthcare system resilience, training programs, emergency management, and disaster response in nursing and healthcare settings. Temporal shifts in research focus were observed, reflecting the dynamic nature of disaster research. The findings underscore the critical importance of comprehensive strategies to manage pandemics and emergencies, enhance preparedness through training programs, and improve emergency management practices. By leveraging insights from this analysis, researchers and policymakers can enhance healthcare system resilience and effectively respond to disasters to safeguard public health.

Article information and declarations

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Conflict of interest

The authors declare no conflicts of interest.

Author contributions

Conceptualization — IS, MU; data curation — IS; formal analysis — IS, MU; methodology — IS, MU; project administration — IS; writing, original draft — IS; writing, review & editing — IS, MU.

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Figure 1. The steps of searching and selecting articles

Identification	Step 1	Records were identified using the search database of Scopus (n = 2.517)
Assessment of Eligibility	Step 2	Publication dates from 2019 until 2023 (n = 934)
Inclusion and Exclusion	Step 3	Inclusion Criteria Eligible records were assessed based on the area of Nursing, Health Professions, multidisciplinary (n = 189)

Step 4

Records were identified using document type "Article", publication stage "final", journal language "English"
(n = 145)

Selection

Final

Records are selected (n = 145)

Figure 2. Documents by country

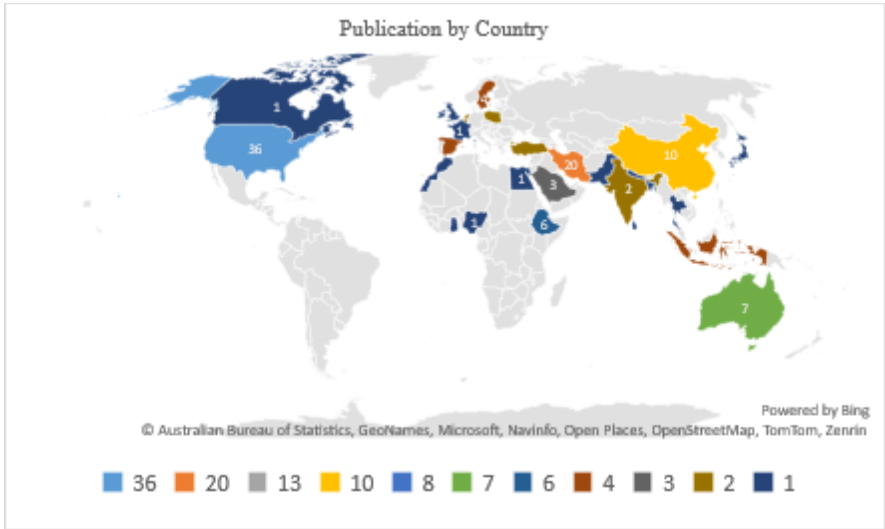


Figure 3. Documents by year

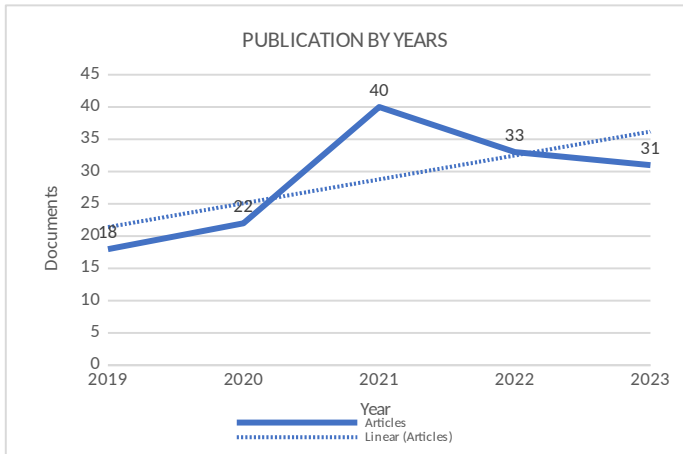


Figure 4. Result analysis based on Scopus analytics: A — by author, B — by affiliation

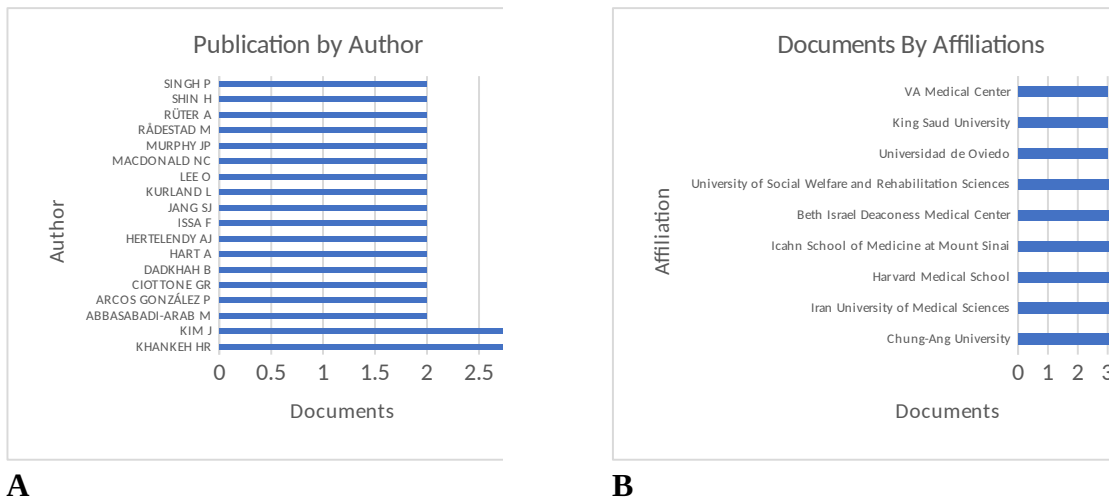
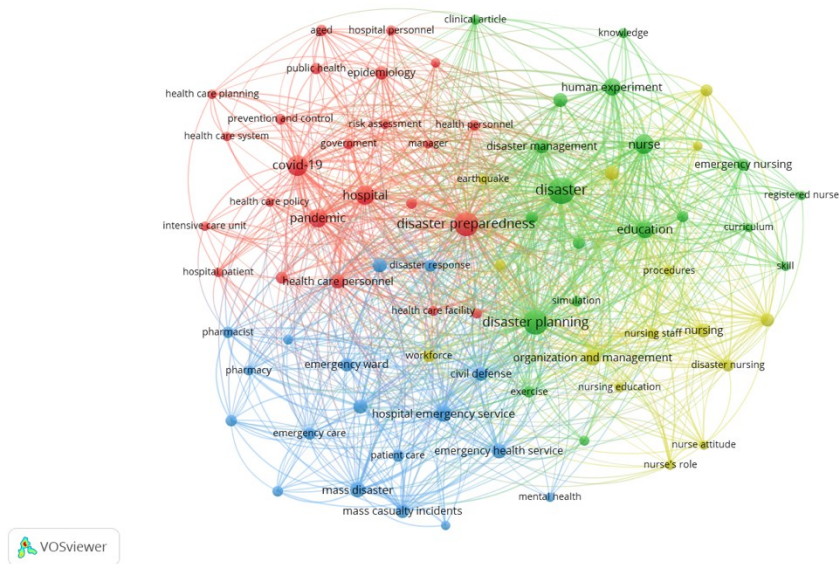


Figure 5. Network visualization on hospital disaster preparedness using VOSViewer



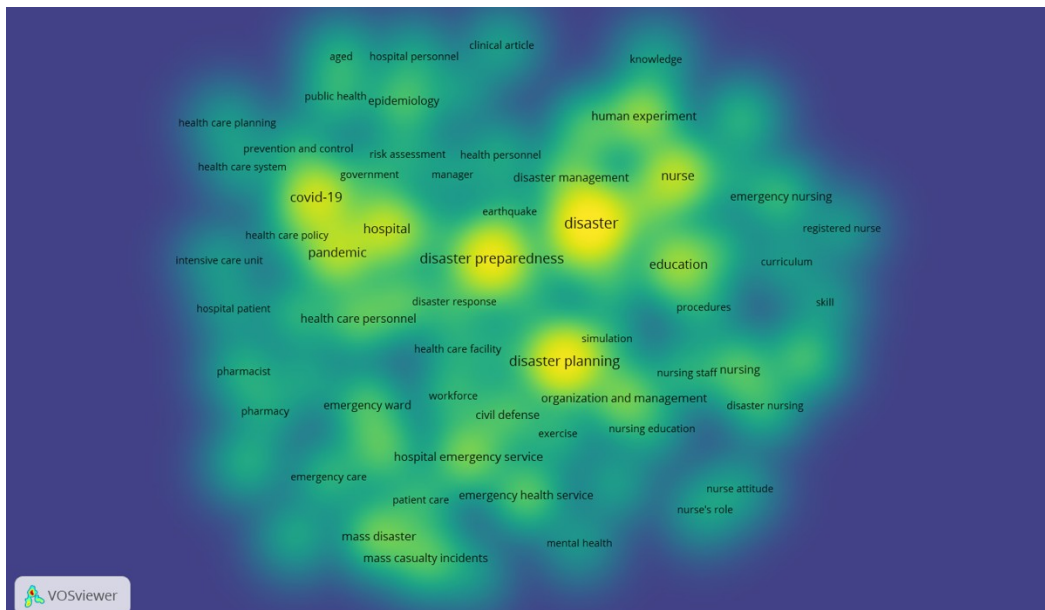


Figure 7. Overlay visualization on hospital disaster preparedness using VOSViewer

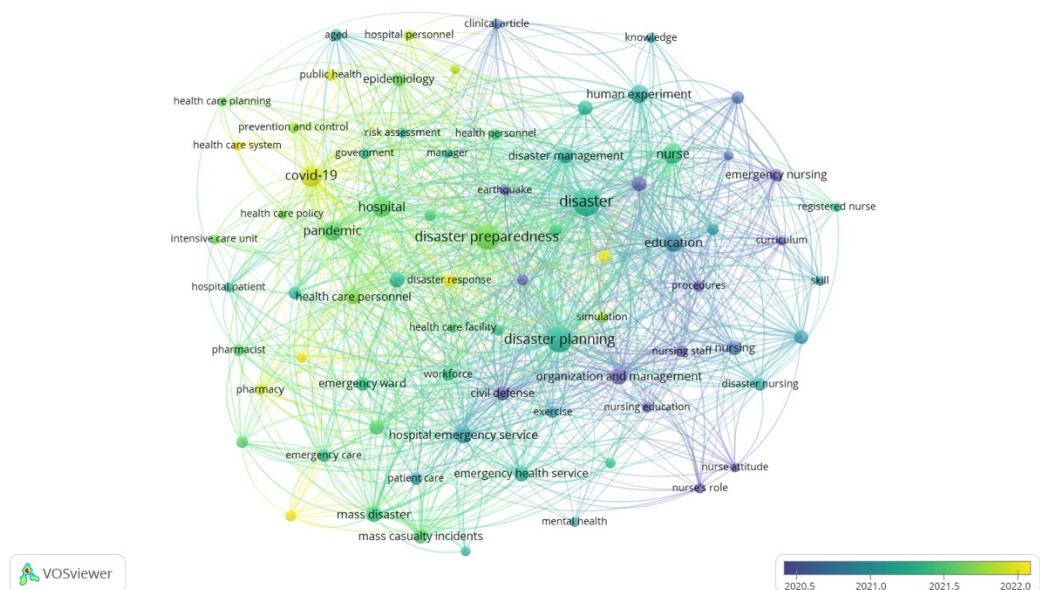


Table 1. Cluster item group

Cluster	Items	Total	Percentage
Cluster 1 "Healthcare System and Pandemic Preparedness"	aged, covid-19, disaster preparedness, epidemic, epidemiology, follow-up, government, health care facility, health care personnel, health care planning, health care policy, health care system, health personnel, hospital, hospital	24	31.57%

	patient, hospital personnel, intensive care unit, leadership, manager, pandemic, prevention and control, public health, risk assessment, surge capacity.		
Cluster 2 “Disaster Preparedness and Emergency Response Training in Healthcare”	awareness, clinical article, curriculum, disaster, disaster management, disaster medicine, disaster planning, education, emergency medical services, emergency nursing, exercise, human experiment, knowledge, nurse, preparedness, public hospital, registered nurse, simulation, skill.	19	25.00%
Cluster 3 “Emergency Management and Healthcare Services in Response to Disasters”	civil defense, disaster response, emergency, emergency care, emergency health service, emergency medicine, emergency preparedness, emergency ward, hospital emergency service, hospital pharmacy, mass casualty incidents, mass disaster, mental health, patient care, pharmacist, pharmacy, practice guideline, simulation training.	18	23.68%
Cluster 4 “Disaster Response and Management in Nursing and Healthcare Settings”	clinical competence, disaster nursing, earthquake, emergency department, health personnel attitude, natural disaster, nurse attitude, nurse's role, nursing, nursing education, nursing staff, organization and management, procedures, psychology, workforce.	15	19.75%