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Essential Competencies of Public Health Professionals in Disaster Management: A Scoping Review

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ABSTRACT

Purpose: This scoping review aimed to systematically identify core competencies for public health professionals in disaster management.
Research Method: We analyzed 22 studies (2002-2024) from PubMed/MEDLINE, Scopus, and Web of Science using Arksey and O'Malley's scoping review framework. Included studies addressed competencies for disaster preparedness, response, and recovery.
Results and Discussion: The review identified seven critical competency domains: disaster preparedness and risk reduction, leadership and crisis management, communication and digital tool utilization, psychosocial support, community engagement with cultural competency, inter-agency coordination, and post-disaster recovery systems. Leadership and community-centered approaches were universally essential, while technological competencies, such as GIS and proficiency in social media, represented emerging needs. Significant gaps were noted in climate-related disaster frameworks and standardized global training protocols.
Implications: Findings underscore the urgent need to validate competencies in field settings, integrate climate science into training programs, and develop standardized frameworks for resource-limited regions. These directly inform public health curriculum development and policy initiatives aimed at enhancing workforce preparedness for evolving disaster scenarios, including climate-related emergencies and pandemics.

Keywords: core competencies; disaster management; emergency preparedness; public health professionals; workforce development.

Introduction

Strengthening the capacity of public health professionals remains essential for reducing the adverse health impacts of disasters worldwide. Disasters, whether natural or artificial, can severely disrupt public health systems, leading to significant morbidity, mortality, and long-term socioeconomic consequences for affected communities (Akpan-Idiok & Akpan-Idiok, 2010). The findings of Hamer *et al.,* indicate that effective disaster preparedness, as demonstrated in Senegal, is a critical component of global health capacity building, involving collaboration among key stakeholders in the public health and government sectors during disaster scenarios (Hamer *et al.,* 2017). Over the past few decades, substantial advancements have been made in disaster management, particularly in the domains of

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preparedness, response, and recovery, through the integration of technology (Pu *et al.,* 2025). However, these developments have also highlighted persistent vulnerabilities, especially in low-resource settings where public health infrastructures are often insufficient to address large-scale crises (Haroon & Thaver, 2022). In these contexts, public health professionals play a pivotal role by coordinating emergency responses, managing scarce healthcare resources, and disseminating vital public health information to the population (Mugo Moses H, 2024). The increasing frequency of global disasters, exacerbated by climate change and urbanization, emphasizes the importance of disaster preparedness and response strategies. Public health professionals, who are integral to these efforts, must be equipped with comprehensive competencies that extend beyond technical expertise to include effective interpersonal coordination and leadership during crises (Saxena *et al.,* 2022). However, despite the recognized importance of these competencies, systematic reviews highlight persistent gaps in standardized competency frameworks, with most existing literature predominantly focused on healthcare sectors and nursing roles, thus leaving public health professionals underrepresented in disaster management discussions (Ripoll Gallardo *et al.,* 2015). This gap is concerning, as studies continue to show notable deficiencies in disaster management knowledge among professionals. For instance, healthcare professionals in Lebanon demonstrated moderate knowledge of disaster preparedness; however, they still faced significant knowledge gaps in effectively managing such events (Skaff *et al.,* 2024). Similarly, healthcare professionals in the UAE demonstrated positive attitudes, yet their knowledge and readiness to respond to disasters were inconsistent, highlighting the need for more targeted education (Shanableh *et al.,* 2023). Recent studies have highlighted the growing recognition of specific competencies necessary for effective disaster management, encompassing emergency and disaster management, eHealth/digitalization, and community-based disaster resilience (Gruzieva *et al.,* 2024). These findings reinforce the argument that disaster management frameworks need to evolve and integrate these emerging competencies, including leadership, digital health, and community engagement, to ensure that public health professionals are adequately prepared to manage the complexities of modern disaster scenarios with ultimate aim to build resilience (Khan *et al.,* 2018; Morales-Torres *et al.,* 2023).

This study aims to identify the core competencies required of public health professionals in disaster management. These professionals play a critical role, particularly in community-level disaster management, where the primary focus is on prevention, preparedness, and resource management (Vukovic *et al.,* 2014). Public health professionals require competencies in areas such as epidemiology, risk communication, leadership, and community engagement (Brînzac *et al.,* 2025). Unlike nursing and medical professionals, whose roles are often more clinical, the competencies for public health professionals are designed to ensure large-scale, community-based interventions during disasters and other public health emergencies. While nursing and medical professions have well-documented disaster management frameworks, public health competencies have received limited attention. The core competencies for disaster nursing, which include communication, safety protocols, and knowledge of the Incident Command System, are vital for nurses; however, they do not fully address the unique challenges that public health professionals face at the community level (Thobaity, 2016). Medical professionals in India, despite possessing some knowledge of disaster preparedness, often lack sufficient training to effectively handle large-scale disasters, underscoring the need for improved preparedness frameworks (Tiwari *et al.,* 2019). These findings underscore the need for a specialized framework that focuses on the role of public health professionals in community-level disaster management and response. Research also highlights the need for public health students to be

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adequately prepared for disaster management, suggesting that current curricula fail to provide comprehensive disaster preparedness training (Markenson *et al.,* 2013). For instance, Yemeni healthcare workers lacked sufficient knowledge of disaster preparedness, underscoring the importance of integrating disaster education into public health curricula, especially in resource-limited settings (Naser, 2018).

While several studies have explored disaster management frameworks and the competencies required by healthcare professionals, a distinct gap remains in the literature regarding the competencies necessary for public health professionals. Much of the existing literature primarily focuses on nursing and medical professions, with limited attention to public health perspectives. While frameworks for nursing competencies in disaster preparedness emphasize clinical response skills, public health professionals are tasked with managing broader disaster preparedness plans and public health interventions at the community level (Thobaity, 2016). Furthermore, public health professionals often face knowledge gaps in disaster preparedness, which hinders their ability to respond effectively during crises (Al-Ziftawi *et al.,* 2021; Shanableh *et al.,* 2023). These studies suggest that public health training programs must be enhanced to focus more on community-based disaster management strategies. There is also a lack of standardized competency frameworks that address the specific needs of public health professionals, where public health systems are often overwhelmed by the scale of disasters (Harris *et al.,* 2024). This research is important due to the increasing frequency and severity of worldwide disasters, necessitating a more rigorous and uniform approach to public health disaster management (Banholzer *et al.,* 2014). In the absence of explicit competency frameworks, public health systems face inefficiencies and disjointed responses in emergencies, worsening health disparities, especially in at-risk areas

This study aims to conduct a scoping review of the existing literature on the core competencies required of public health professionals for disaster management. The originality of this study lies in its compilation of disaster management competencies specifically designed for public health practitioners, setting it apart from other studies that primarily emphasize clinical duties, such as those in nursing and the medical professions. The use of a scoping review approach can also offer a broad exploration of the competencies required for disaster management. Specifically, we will address the following research questions: What core competencies are cited in the literature as essential for public health professionals to manage disasters effectively? Map the key findings related to the development of disaster competency for public health and identify key themes. The study's strength lies in its scoping review approach, which provides a comprehensive exploration of the competencies required across all stages of disaster management, from preparedness to recovery. By synthesizing existing research, this study aims to provide a clearer understanding of the key competencies required for effective disaster management and identify areas where further research is necessary.

Literature Review and Hypothesis Development

Disaster Management Competency

Competency is a multifaceted construct that encompasses both explicit knowledge and skills, as well as implicit social roles, traits, self-concept, and motivation, making it essential across various professional contexts (Hein, 2010). Complementing this, the importance of precise definitions to achieve a culture of competence that meets professional practice demands is emphasized, affirming that competencies encompass a wide range of knowledge, skills, and attitudes essential for task completion

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(Hatcher *et al.,* 2013). Additionally, competency frameworks should include attributes and skills beyond knowledge, as educational approaches must align with professional competencies, focusing on practical outcomes that foster both explicit skills and implicit competencies contributing to a professional identity (Govaerts, 2008)

Disaster management, also known as emergency management, is the coordinated process of preparing for, mitigating, responding to, recovering from, and building resilience from emergencies and disasters to protect communities and reduce vulnerability to hazards (Adel Elkbuli *et al.,* 2021). As stated in the regulations of Indonesia, disaster management activities consist of stages related to prevention, preparedness, mitigation, response, and rehabilitation (Undang-Undang Republik Indonesia Nomor 24 Tahun 2007 Tentang Penanggulangan Bencana, 2007). The importance of specific competencies in disaster management is underscored by studies conducted in healthcare settings, which reveal that hospital staff who received targeted training in disaster response showed better preparedness. For instance, in Saudi Arabia's Eastern Province, most hospital staff confirmed that they had received disaster response training, which is directly linked to higher levels of preparedness (AlDulijand *et al.,* 2023). Moreover, the health workforce in Poland, who had received disaster-related training, including triage and psychological care, reported significantly better self-assessment of their preparedness, highlighting the importance of specialized training in crisis management (Goniewicz *et al.,* 2021). This is consistent with the recognition that the explicit dimension of disaster management competencies includes emergency response protocols, hazard mitigation strategies, and recovery planning, operationalized across prevention, preparedness, response, and rehabilitation phases. Competency within the domain of disaster management constitutes a complex integration of explicit knowledge and technical skills alongside implicit cognitive and behavioral attributes. The explicit dimension encompasses specialized capabilities in emergency response protocols, hazard mitigation strategies, and recovery planning, as operationalized across prevention, preparedness, response, and rehabilitation phases.

The Role of Public Health Professionals in Disaster Management

One recurring theme in disaster management literature is the central role of public health professionals in mitigating the effects of disasters, both natural and artificial (Mugo Moses H, 2024). Public health professionals are responsible for coordinating disaster preparedness, response, and recovery at the community level, with a focus on prevention, health system management, and effective public health communication. As disaster events become more frequent and intense due to climate change, the demand for competent public health professionals is growing (Harris *et al.,* 2024). Previous studies have demonstrated that public health workers are crucial for managing community health during disasters; however, disaster preparedness education remains limited for this group. For example, healthcare professionals in the UAE were generally willing to engage in disaster management; however, their knowledge and readiness for an effective response varied widely, highlighting the need for targeted disaster preparedness education for public health professionals (Shanableh *et al.,* 2023). Similarly, the importance of incorporating disaster preparedness into public health education was emphasized, with the suggestion that curricula should better equip students for real-world disaster management (Markenson *et al.,* 2013). A study in Africa developed a set of core competencies for the health workforce in public health disaster risk management (DRM), identifying 14 competencies grouped into six thematic areas: operational effectiveness, effective leadership, preparedness and risk

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reduction, emergency response, and post-disaster health system recovery (Olu *et al.,* 2018a). These competencies provide a comprehensive framework for strengthening public health disaster risk management (DRM) education in Africa. However, their global applicability remains uncertain. These demonstrate that the lack of a standardized framework for public health competencies in disaster management is a critical issue that needs to be addressed. The findings from others study also highlighted that community-based organizations (CBOs) working in partnership with public health departments, particularly in the most impacted areas, must possess the competencies required to provide essential services, such as case management, medical care, community liaison, and support for long-term recovery efforts (Acosta *et al.,* 2018). This highlights the crucial role of public health professionals in disaster management and underscores the growing need for enhanced disaster preparedness education.

Diverging Perspectives on Competencies for Healthcare Professionals

There are various perspectives on what constitutes the core competencies for disaster management, particularly among public health professionals. Many studies focus on the competencies of nursing and medical professionals, which primarily address clinical responses during disasters, such as triage, first aid, and emergency care (Balut *et al.,* 2022; Rn *et al.,* 2010; Thobaity, 2016). However, the competencies required of public health professionals extend beyond clinical response and encompass community-level leadership, epidemiology, risk communication, and public health policy. For instance, key competencies for disaster nursing, focusing on practical skills such as patient triage and emergency medical care during disasters, were identified (Thobaity, 2016). These competencies are crucial, but public health professionals have a broader role that includes community-based prevention and coordinating disaster response efforts. Medical professionals often have moderate knowledge of disaster preparedness but lack training in large-scale public health response, highlighting a significant gap (Tiwari *et al.,* 2019). This gap highlights the need for comprehensive competency frameworks specifically designed for public health professionals.

Gaps in Public Health Competencies for Disaster Management

The gap in competencies for public health professionals becomes clearer when we examine studies that directly address disaster preparedness education. Many Yemeni healthcare workers had limited knowledge of disaster preparedness, with training that was often inadequate to handle real-world emergencies effectively (Naser, 2018). This study supports the assertion that the absence of disaster preparedness training for public health practitioners, particularly in resource-constrained environments, markedly impairs their capacity to address extensive health emergencies during catastrophes. (Al-Ziftawi *et al.,* 2021). Furthermore, the Council on Education for Public Health has emphasized the urgent need to integrate disaster preparedness into public health curricula, ensuring that professionals are equipped with the competencies necessary to address the evolving challenges posed by disasters (Harris *et al.,* 2024). These findings support the central argument of our study: public health professionals need a distinct set of competencies that are not currently addressed by existing disaster management frameworks.

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The Need for Public Health Education in Disaster Management

The existing research has demonstrated that while nursing and medical professionals have well-defined competencies for disaster management, the public health sector is often overlooked. Public health professionals, who focus on community-wide health interventions during crises, require a unique set of skills that differ from those of clinical responders. Our research aims to contribute to the field by offering a comprehensive framework for public health competencies in disaster management. By focusing on the community-based approach required for effective disaster management, this study will contribute to the growing body of literature on public health preparedness and disaster response. Furthermore, the findings underscore the need for more specialized education for public health practitioners, particularly in resource-constrained settings. (Shanableh *et al.,* 2023; Tiwari *et al.,* 2019). By proposing core competencies for public health professionals, this study will provide practical recommendations for enhancing disaster preparedness by integrating disaster management into public health curricula. This contribution will help address the knowledge gap and provide a solid foundation for training programs and policy development in the field of public health disaster management.

Research Method

We conducted a scoping review to examine the existing literature on the core competencies that public health professionals need to manage disasters effectively. We adopted Arksey and O'Malley's five-stage framework for scoping reviews (Arksey & O'Malley, 2005), which has been further developed by the Joanna Briggs Institute and the PRISMA-ScR guidelines (Peters *et al.,* 2015; Tricco *et al.,* 2018). A scoping review approach was chosen to capture the breadth and variety of evidence on this topic

Identifying the Research Question

Following Arksey and O'Malley's first stage, we formulated the central question to guide our review:

1. What core competencies are cited in the literature as essential for public health professionals to manage disasters effectively?
2. Map the key findings related to the development of disaster competency for public health and identify key themes in this field.

Identifying Relevant Studies

Search Strategy and Data Sources: We conducted a systematic search across PubMed/MEDLINE, Scopus, and Web of Science from January 2025. Our search strategy is described in Table A1 in the Appendix.

Study Selection

All search results were exported to Zotero and de-duplicated. Authors screened the titles and abstracts to select potentially eligible items. Furthermore, a full-text review was conducted for the shortlisted articles.

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Inclusion Criteria

1. Focus on Competencies: Articles or documents explicitly discussing competencies, skills, or training approaches for public health professionals in the context of disaster management.
2. Study Types: Primary research (quantitative, qualitative, or mixed methods), reviews (systematic, scoping, narrative), policy documents, and organizational frameworks.
3. Language and Date: Published in English from 2000 onward, reflecting more recent frameworks of disaster preparedness and response.

Exclusion Criteria

1. Materials focus solely on clinical interventions without reference to public health professional competencies.
2. Opinion pieces, letters, editorials, or conference abstracts without sufficiently detailed competencies or recommendations.

The search and selection process was documented through a PRISMA flow diagram. (Badger *et al.*, 2000) To maintain transparency.

Data Charting

Two authors developed a standardized data extraction form in Microsoft Excel, following Arksey and O'Malley's fourth stage— "charting the data". The form captured:

1. Study Characteristics: Author(s), year, geographic context.
2. Competency Domains

The authors independently charted the data, then reconciled discrepancies through discussion and consensus checks.

Collating, Summarizing, and Reporting Results

Following Arksey and O'Malley's fifth stage, we synthesized the extracted data in two main steps:

1. Descriptive Summary
   - Frequencies of specific competency domains cited across the literature.
   - Geographic or contextual variations in recommended competencies
2. Thematic Analysis
   - Grouping competencies into broader domains
   - Identifying cross-cutting themes and gaps

We present our findings in narrative form, supported by tables that summarize the core competencies.

Results and Discussion

Analysis Result

The systematic database search yielded 527 identified records. After removing duplicates, the literature search yielded a total of 309 articles for screening. Following the screening process, 272 articles were retrieved for full-text eligibility screening based on the predefined exclusion criteria. Of those, 22

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articles met the inclusion criteria and were finally included in the review. The summary of the study selection process is illustrated in Figure 1, which presents the PRISMA flowchart.

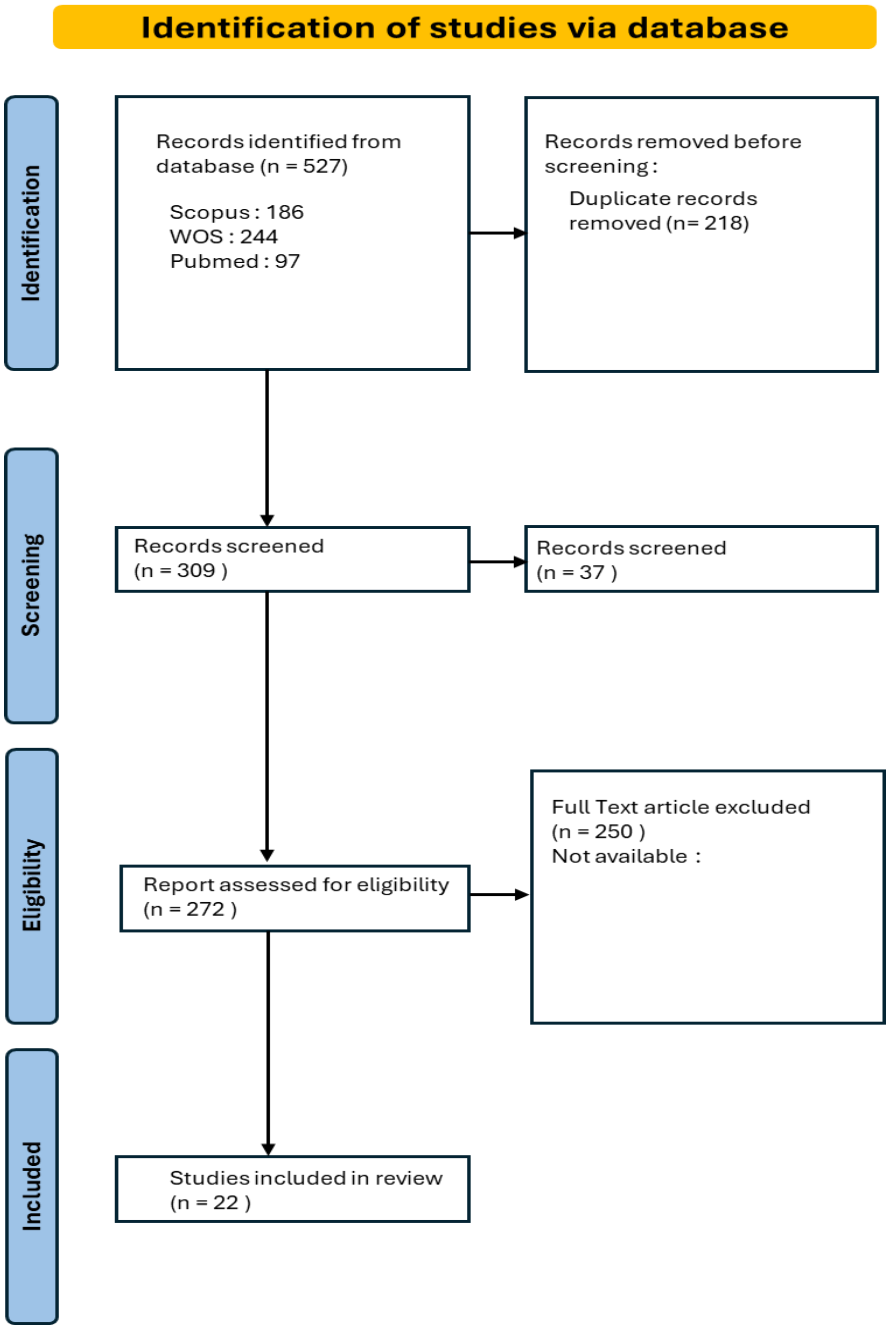

Figure 1. Flowchart of the screening process

General Characteristics of Included Studies

The studies reviewed in this scoping review were published between 2002 and 2024, with the majority published between 2010 and 2020 (54.55%), reflecting a growing interest in enhancing public health workforce capabilities in disaster preparedness and response. Studies published before 2010 accounted for 27.27%, while the remaining 18.18% of studies were published after 2020. Regarding

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region distribution, United States contributed the highest number of studies (68.18%, n=15), indicating a strong emphasis on public health workforce readiness and disaster management training within the U.S. Europe contributed 13.64% (n=3), Africa represented 4.55% (n=1), and North America accounted for 13.64% (n=3) of the studies.

Table 1. General Characteristics of Included Studies

General Characteristics	Number	%
Year of Publication		
Before 2010	6	27.27
2010–2020	12	54.55
After 2020	4	18.18
Region Distribution		
United States	15	68.18
Europe	3	13.64
Africa	1	4.55
North America	3	13.64

Competency Domains

Based on the 22 studies reviewed, the core competencies for public health professionals involved in disaster management were categorized into specific competency domains. These competencies are essential for managing various phases of disaster response, including preparedness, response, and recovery. Key findings by area of expertise are presented in Table A2 of the Appendix.

Narrative Summary of the Studies

A thematic analysis was conducted to synthesize key findings, resulting in the identification of several central competencies necessary for public health workers at all stages of disaster management: preparedness, response, and recovery.

Disaster Preparedness and Risk Reduction Competencies

Several studies emphasized the importance of disaster preparedness and risk reduction competencies for public health professionals. Olu *et al.,* (2018) identified six core competency areas, including preparedness and risk reduction, as fundamental to effective disaster risk management. This theme aligns with the need for health professionals to anticipate potential hazards and implement strategies to mitigate risks before a disaster occurs. Similarly, Perreault-Carranza *et al.,* (2024) highlighted emergency preparedness as a critical area for managing climate change and extreme weather events, where health professionals must understand climate science, health consequences, and risk communication. Furthermore, Ablah *et al.,* (2013) highlighted competencies specifically in disaster preparedness, with a focus on planning, communication, and leadership as essential for mid-level public health workers to carry out their roles effectively before a disaster occurs.

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Leadership and Management Competencies

Leadership emerged as a vital competency across several studies, with a focus on the role of public health professionals in managing both the immediate response and long-term recovery phases. Gebbie & Merrill (2002) and Tao *et al.,* (2018) emphasized leadership in emergencies, which includes decision-making, triage, and communication skills. In Barnett *et al.,* (2005), although the focus was on educational gaming, the study also highlighted the importance of leadership readiness among public health professionals, particularly in bioterrorism preparedness and emergency response scenarios. The role of leadership was not about traditional management but about contributing expertise and guidance at all levels of the disaster response process. Langan *et al.,* (2017) further supported this by highlighting the importance of disaster nursing leadership, emphasizing that effective leadership is essential for managing teams and making critical decisions under pressure.

Communication and Information Management Competencies

Effective communication is a central competency in disaster management. Savoia *et al.,* (2017) identified communication and information management as essential competencies, particularly in the coordination between public health, healthcare, and community organizations. Ulvi *et al.,* (2019) also emphasized the importance of social media as a critical tool for communication during disasters, underscoring that public health professionals must be proficient in using digital platforms to communicate effectively with the public. Rebmann *et al.,* (2008) stressed the importance of consistent risk communication and hospital surge capacity in managing infectious disease outbreaks during disasters. The study noted that communication tools, such as the Incident Command System (ICS), were key to ensuring effective collaboration and information exchange among agencies.

Psychosocial Support and Mental Health Competencies

Addressing the mental health needs of disaster survivors and responders was another prominent theme. Rebmann *et al.,* (2008) and Cristal *et al.,* (2019) highlighted the importance of psychosocial support, emphasizing the need for psychological first aid and mental health interventions for those affected by disasters. This competency is crucial for helping individuals cope with the trauma and stress associated with disasters, both during and after the event. Nicholls *et al.,* (2017) also emphasized psychosocial support as a key competency, highlighting the role of community health workers (CHWs) in providing mental health support to disaster survivors, particularly within vulnerable communities.

Community Engagement and Cultural Competency

Several studies pointed out the importance of community engagement and cultural competency in disaster management. Dickmann *et al.,* (2018) emphasized the need for public health professionals to engage with the community by understanding local contexts, facilitating community ownership, and adapting strategies to meet the needs of different populations. Barnett *et al.,* (2005) also touched upon the theme of community engagement through educational gaming, where public health professionals practiced community dynamics and leadership in simulated disaster scenarios. Morales-Torres *et al.,* (2023) further emphasized the importance of community health promotion in enhancing disaster resilience, particularly in vulnerable communities, by promoting culturally sensitive health practices and ensuring inclusive public health strategies.

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Collaboration and Inter-Agency Coordination

The need for cross-sector collaboration and inter-agency coordination was another core competency highlighted in several studies. Savoia *et al.,* (2017) and Hoard and Tosatto (2005) emphasized the importance of establishing partnerships among public health, healthcare, and community organizations. Effective disaster response requires coordinated efforts to share resources, align strategies, and ensure a timely and efficient response to disasters. Khorram-Manesh *et al.,* (2015) and McCoy *et al.,* (2014) emphasized the importance of inter-agency communication, noting that command, control, and communication systems are essential for efficient disaster management. In particular, the Incident Command System (ICS), as mentioned in Rebmann *et al.,* (2008), is crucial for ensuring that agencies work together seamlessly during crises.

Disaster Recovery and Post-Emergency Health System Recovery

The post-emergency recovery phase was highlighted in the studies by Olu *et al.,* (2018) and Perreault-Carranza *et al.,* (2024). The ability to manage the post-disaster health system recovery involves ensuring the restoration of healthcare services, coordinating long-term recovery efforts, and addressing the mental health and psychosocial needs of both survivors and responders. Public health professionals must ensure that the health system recovers to pre-disaster conditions, while also addressing new challenges arising from the disaster. Horney *et al.,* (2013) emphasized the importance of disaster assessment and surveillance, with particular focus on data collection and analysis to inform the recovery process. The integration of technology, such as GIS and GPS, in disaster recovery efforts was also highlighted as a key competency.

Discussion

This scoping review synthesized the core competencies required by public health professionals for effective disaster management, identifying essential skills necessary across all phases of disaster response, from preparedness to recovery. Based on the thematic analysis of 22 key studies, several key competencies have emerged as critical for public health professionals, which include disaster preparedness and risk reduction, leadership and management, communication and information management, psychosocial support and mental health, community engagement and cultural competency, collaboration and inter-agency coordination, and disaster recovery and post-emergency health system recovery. These competencies are pivotal in enhancing the public health workforce's readiness to respond to and manage disasters effectively, as well as ensure the long-term recovery of affected communities.

The study's results contribute to the broader discussion of disaster preparedness by emphasizing the multifaceted roles that public health professionals play in disaster management. The identification of disaster preparedness and risk reduction competencies across multiple studies reaffirms that proactive measures, such as preparedness planning and risk communication, are crucial in mitigating the impact of disasters. (Ablah *et al.,* 2013; Olu *et al.,* 2018b). These findings are consistent with the disaster management literature, which emphasizes the importance of risk reduction and early preparedness in minimizing the loss of life and resources during emergencies. (Asih *et al.,* 2023; Hargono *et al.,* 2023).

Leadership and management also emerged as central competencies across several studies, highlighting that leadership, particularly in decision-making and triage, is critical for guiding disaster

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responses. (Gebbie & Merrill, 2002; Langan *et al.,* 2017). These studies emphasize that leadership in disaster management is not merely about top-down command but involves the ability to coordinate, collaborate, and motivate teams under intense pressure. The focus on leadership readiness through educational gaming further supports the idea that leadership skills can be developed in both formal and informal settings, thereby strengthening organizational capacity during emergencies. (Barnett *et al.,* 2005).

Effective communication and information management were found across multiple studies. (Savoia *et al.,* 2017; Ulvi *et al.,* 2019). The ability to convey critical information quickly is essential for maintaining public safety and ensuring that all stakeholders, from local communities to international aid organizations, are aligned in their efforts. The increasing importance of social media platforms in managing disaster communication reflects a paradigm shift in how public health professionals must now engage with the public in real-time, offering both updates and responses to inquiries. (Ulvi *et al.,* 2019).

The need for psychosocial support and mental health interventions highlights the growing recognition that disasters have profound emotional and psychological impacts on both survivors and responders. The ability to provide psychological first aid and mental health support during and after a disaster is a crucial competency that can help mitigate the long-term effects of trauma and stress, thereby enhancing community resilience (Cristal *et al.,* 2019; Rebmann *et al.,* 2008).

In terms of community engagement and cultural competency, studies underscore the importance of understanding local contexts and adapting public health interventions to the cultural norms and needs of the affected population (Dickmann *et al.,* 2018; Morales-Torres *et al.,* 2023). Community Health Workers (CHWs) play a pivotal role in strengthening disaster resilience by fostering trust within communities, enabling effective communication, and leading local recovery efforts (Nicholls *et al.,* 2017). These findings align with the broader literature, which emphasizes the importance of community ownership and empowerment as part of building social capital in disaster management (Aldrich & Meyer, 2015; Shaw, 2012).

The importance of collaboration and inter-agency coordination was underscored in studies, which emphasized the necessity for public health professionals to coordinate with a wide array of agencies, from healthcare providers to emergency responders, during disasters. (McCoy *et al.,* 2014; Savoia *et al.,* 2017). The use of systems like the Incident Command System (ICS) is essential for ensuring effective multi-sectoral coordination, enabling a unified approach to disaster management. (Rebmann *et al.,* 2008).

Finally, disaster recovery and post-emergency health system recovery competencies were found to be crucial for ensuring that public health systems can resume normal operations after a disaster. Effective recovery requires comprehensive planning, including the restoration of the health system and strengthened surveillance. Additionally, integrating geospatial technologies such as Geographic Information Systems (GIS) and Global Positioning Systems (GPS) enhances logistical coordination, enabling efficient resource allocation and sustainable community reconstruction. (Horney *et al.,* 2013; Olu *et al.,* 2018b)

This review also highlights several gaps in current literature. For instance, while the reviewed studies emphasize the importance of these core competencies, few frameworks specifically address the integration of climate-related disaster management competencies. (Perreault-Carranza *et al.,* 2024). There is a clear need for tailored training programs that equip public health professionals with the skills necessary to respond to climate-related emergencies, which are becoming increasingly prevalent.

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Furthermore, the lack of standardized competency frameworks for disaster management across different countries and settings suggests that efforts to harmonize training programs and certification processes are necessary to ensure a consistent and high level of preparedness globally.

While this review has identified several essential competencies, the study's limitations must be acknowledged. The reliance on published literature and existing competency models means that some critical insights, particularly those from field-based experiences, may not have been captured. Additionally, many of the identified competencies have not been rigorously evaluated in real-world disaster settings, raising questions about their practical applicability and effectiveness (Tao *et al.,* 2018). Future research should validate these competencies through empirical studies and assess their impact on disaster management outcomes across diverse geographic and socio-economic contexts (Tao *et al.,* 2018).

This scoping review highlights the diverse range of core competencies required for effective disaster management across the public health sector. Leadership, communication, community engagement, and collaboration emerged as central themes, reflecting their importance in ensuring both immediate and long-term responses to disasters. The findings suggest that enhanced training and professional development in these areas are essential for improving public health outcomes in disaster-prone regions. Future research should focus on addressing the gaps identified in this review, particularly about climate-related disaster management and the standardization of competency frameworks, to better equip public health professionals for the challenges of the future.

Conclusion

This scoping review systematically identified seven core competency domains essential for effective disaster management: (1) disaster preparedness and risk reduction, (2) leadership and crisis management, (3) communication and information systems, (4) psychosocial support, (5) community engagement and cultural competency, (6) inter-agency coordination, and (7) post-disaster recovery. The findings particularly highlight the growing importance of geospatial technologies (GIS/GPS) and digital communication tools, alongside traditional competencies such as emergency planning and risk assessment. These competencies must work synergistically across all phases of disaster, from pre-event preparedness to long-term recovery.

The study makes several significant contributions to public health workforce development. First, it validates the need for a blend of technical and interpersonal skills. Second, it identifies critical gaps in climate-related disaster training. Third, it emphasizes the role of community health workers in building disaster resilience. The competency framework presented can directly inform standardized training programs and certification processes, particularly in vulnerable regions facing an increasing number of climate-related disasters.

Two significant limitations emerged: the predominance of theoretical over field-tested competencies and database restrictions that potentially exclude practical insights. Future efforts should prioritize competency validation in diverse disaster scenarios and establish global standards for disaster preparedness and response. These steps will ensure that public health professionals can effectively respond to both current emergencies and emerging threats, such as pandemics and climate crises.

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Appendix

Table A1. Search Strategy

Database	Search
Pubmed	(("public health workforce"[MeSH Terms] OR "public health professionals"[All Fields] OR "health officers"[All Fields] OR "community health workers"[All Fields] OR "public health staff"[All Fields] OR "public health practitioners"[All Fields])) AND (("competencies"[All Fields] OR "skills"[All Fields] OR "skillset"[All Fields] OR "knowledge"[All Fields] OR "training"[All Fields] OR "capacity building"[All Fields] OR "competence"[All Fields] OR "professional development"[All Fields] OR "educational needs"[All Fields])) AND ("disaster management"[All Fields] OR "emergency preparedness"[MeSH Terms] OR "disaster response"[All Fields] OR "extreme weather"[All Fields] OR "natural disasters"[MeSH Terms] OR "humanitarian emergencies"[All Fields] OR "disaster planning"[All Fields] OR "crisis management"[All Fields])
Scopus	("public health workforce" OR "public health professionals" OR "health officers" OR "community health workers" OR "public health staff" OR "public health practitioners") AND ("disaster management" OR "emergency preparedness" OR "disaster response" OR "extreme weather" OR "natural disasters" OR "humanitarian emergencies" OR "crisis management") AND (competency* OR skill* OR knowledge OR training OR "capacity building" OR "professional development" OR "educational needs")
WoS	("public health workforce" OR "public health professionals" OR "health officers" OR "community health workers" OR "public health staff" OR "public health practitioners") AND ("competency*" OR "skill*" OR "knowledge" OR

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Database	Search
	"training" OR "capacity building" OR "professional development" OR "educational needs") AND ("disaster management" OR "emergency preparedness" OR "disaster response" OR "extreme weather" OR "natural disasters" OR "humanitarian emergencies" OR "disaster planning" OR "crisis management")

Table A2. Key Findings According to Competency Domains

Author(s)	Theme	Key Findings
(Olu *et al.,* 2018b)	Disaster Risk Management (DRM)	Six key competency areas identified: (1) Introduction to DRM, (2) Operational Effectiveness, (3) Effective Leadership, (4) Preparedness and Risk Reduction, (5) Emergency Response, (6) Post-Emergency Health System Recovery.
(Langan *et al.,* 2017)	Health Workforce Education for Disaster Readiness	Emphasized competency-driven education programs with a focus on psychosocial support, incident management, and disaster nursing leadership to enhance the response capabilities of public health professionals.
(Perreault-Carranza *et al.,* 2024)	Climate Change and Extreme Weather Events	Core competencies for managing climate change and disasters encompass fundamental climate science, health consequences, transformative actions, emergency preparedness, risk communication, mental health impacts, environmental hazards, disease management, and considerations for health equity.
(Cristal *et al.,* 2019)	Simulation-based Exercises in Emergency Management	Key competencies identified include decision-making under uncertainty, critical thinking, problem-solving in dynamic scenarios, and adaptability to change. Advanced curricula to integrate essential skills such as hazard assessment,

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Author(s)	Theme	Key Findings
		psychological first-aid, risk communication, and incident management into progressively complex simulation scenarios to prepare learners for real-world disaster response and recovery challenges
(Rebmann *et al.*, 2008)	Infectious Disease and Disaster Response	Essential competencies include surveillance for identifying uncommon disease threats, consistent risk communication, and hospital surge capacity. Emphasis is placed on infection control in community shelters and psychological first aid to address the mental health needs of victims, responders, and their families. The need to improve interagency communication through tools such as the Incident Command System (ICS) was also emphasized.
(Savoia *et al.*, 2017)	Public Health System Readiness	Key competencies include the ability to build partnerships across public health, healthcare, and community organizations, as well as flexible planning approaches and targeted strategies for vulnerable populations.
(Hoard & Tosatto, 2005)	Emergency Health Care System	Emphasizes competency in building sustainable community-based programs that can support both emergency response and routine public health activities.
(McCoy *et al.*, 2014)	Disaster Response	Identified EMS preparedness competencies, including assessment, infection control, coordination, and operational protocols for safely triaging, transporting, and reporting.
(Dickmann *et al.*, 2018)	Community-Based Health Approaches	Identified critical community disaster competencies, including: understanding local contexts, informal leadership systems, and cross-sector dynamics; facilitating

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Author(s)	Theme	Key Findings
		community engagement, collaborative problem-solving, and adapting public health strategies to local needs; valuing community ownership, empowerment, and shared responsibility throughout the preparedness, response, and recovery phases.
(Khorram-Manesh *et al.*, 2015)	Disaster Education and Management in Europe	Key competencies include command, control, and communication; hazard and vulnerability analysis; logistics; law and ethics; protection and safety; and inter-agency collaboration.
(Tao *et al.*, 2018)	Public Health Workforce Competency Development	Identified core competencies such as data management, risk assessment, public health interventions, leadership, and emergency planning, which are critical for public health emergency preparedness.
(Khan *et al.*, 2018)	Public Health Emergency Preparedness	Identified eleven essential elements foundational to public health emergency preparedness: governance and leadership, collaborative planning, strong networks, community engagement, risk analysis, surveillance and monitoring, practice and simulation, resource mobilization, workforce capacity, effective communication, and ongoing learning and evaluation.
(Horney *et al.*, 2013)	Public Health Emergency Preparedness, Community Assessment	Core competencies for public health emergency preparedness include robust data collection and analysis methods, especially the use of cluster sampling as demonstrated by CASPER applications, effective community engagement, and comprehensive disaster assessment. Furthermore, integration of technology,

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Author(s)	Theme	Key Findings
		including GIS/GPS for navigation and mapping
(Gruzieva *et al.*, 2024)	Disaster Management in Global Public Health	Core competencies for global disaster management encompass health equity, emergency response, and cross-border health cooperation, all of which are essential for addressing international disaster preparedness and response.
(Pimentel *et al.*, 2022)	One Health Knowledge and Emergency Preparedness	Identified competencies related to One Health knowledge, emphasizing the importance of collaboration between human health and veterinary health professionals during public health emergencies involving zoonotic diseases, food safety, and animal welfare.
(Ulvi *et al.*, 2019)	Use of Social Media in Disaster Response	Social media is recognized as a key tool in disaster management, and proficiency in utilizing these platforms is a crucial competency for public health professionals. Social media facilitates two-way communication during public health emergencies, enabling professionals to interact with the public, disseminate information, and respond to inquiries, making it a critical tool that disaster responders must master to enhance their effectiveness.
(Morales-Torres *et al.*, 2023)	Community Health Promotion, Disaster Resilience	Emphasized competency in health promotion and disaster resilience within vulnerable communities.
(Livet *et al.*, 2005)	Emergency Preparedness, Public Health Readiness	Identified competencies that need to be enhanced, such as public health roles in emergencies, emergency response procedures, and risk communication strategies, including skills in collaboration and coordination.

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Author(s)	Theme	Key Findings
(Barnett *et al.,* 2005)	Educational Gaming, Public Health Workforce Readiness	Educational gaming has been shown to enhance the readiness and competency of the public health workforce, particularly in scenarios related to bioterrorism preparedness and emergency response.
(Gebbie & Merrill, 2002)	Public Health Worker Competencies, Emergency Response	Developed a comprehensive competency model emphasizing leadership, triage, and communication as essential competencies for effective emergency response.
(Nicholls *et al.,* 2017)	Training Community Health Workers	Key competencies through the study are leadership, health education, disaster preparedness, response, and recovery, cultural competency, psychosocial support, and collaboration.
(Ablah *et al.,* 2013)	Public Health Preparedness and Response Competency Model	Developed a competency model for mid-level public health workers, identifying 18 essential competencies required for effective disaster management, categorizing them into domains such as leadership, communication, and disaster preparedness

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