

SYSTEMATIC REVIEW

Hospital Disaster Preparedness Assessment Tools: A Comparative Systematic Review of Types, Applications, and Global Use

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ABSTRACT

Introduction: Hospital disaster preparedness is essential to ensure the resilience and functionality of healthcare services during emergencies. Numerous assessment tools have been developed to evaluate hospital readiness, but these tools vary significantly in their structure, application, and regional use. This systematic review aimed to identify and compare hospital disaster preparedness assessment tools with respect to their types, applications, and global use.

Methods: A literature search was conducted across PubMed, Scopus, and Web of Science using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. The search strategy was developed using relevant keywords and Boolean operators, including terms such as “hospital disaster preparedness,” “assessment tool,” “checklist,” “evaluation framework,” and “emergency preparedness.” Inclusion criteria were limited to English-language full-text articles published within the last five years that discussed hospital disaster preparedness tools and their applications across different countries. **Results:** Twenty-eight studies met the inclusion criteria. Various tools were identified, including standardised checklists, frameworks, and indices, most of which addressed all-hazards preparedness, while others focused on specific threats such as infectious disease outbreaks or mass casualty events. Tools were found to be used or developed across a range of countries, including several low- and middle-income nations, reflecting growing global interest in improving hospital disaster readiness. **Conclusion:** The review underscores the need for further validation and potential standardisation of tools to enhance cross-setting applicability and inform policy development. Notably, many locally adapted, or hazard-specific tools lack validation, underscoring the need for robust standardised frameworks that remain adaptable to different healthcare settings.

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INTRODUCTION

Disaster is a rapid natural or artificial event affecting social, economic, and health well-being of the community, often requiring external support. Natural disasters killed nearly 700,000 people with disabled over 1.2 million, and annual cost close to 2.3 trillion dollars globally [1]. Disaster preparedness involves proactive measures and planning by governments, communities, and organisations to reduce these impacts. Healthcare facilities are particularly vulnerable, as seen during the COVID-19 pandemic, where disruptions led to significant health and economic crises, underscoring the

need to strengthen hospital readiness for both natural and biological emergencies [2].

Hospitals are an essential resource for the country, delivering emergency care and preserving lives in emergencies. In addition to their life-saving function, they possess considerable social and political symbolism that enhances community security, well-being, and economic development [3]. Hospital personnel are the primary responders and makes them vulnerable during emergencies. Hospitals must accommodate the increased patient influx during emergencies and are essential for sustaining disasters. Their failure may lead to catastrophic loss of life, diminished public morale, and compromised political stability [4]. Moreover, hospitals contain built-in hazards including chemical, biological, radiological, and nuclear substances associated with their specialised services. Consequently, hospitals must

implement effective strategies, tools, and processes to ensure disaster preparedness and fulfil their role as healthcare service providers during emergencies [5].

World Health Organisation (WHO) has long promoted "Safer Hospitals" programmes to prevent hospital failures during emergencies. This has led to global, regional, and national policy obligations, as well as provision of technical advice and support to Member States and partner organisations [6]. Numerous studies indicate insufficient preparedness in hospitals, particularly in regions susceptible to disasters [7]. Unprepared hospitals may arise from ambiguity regarding roles and responsibilities, ineffective communication, inadequate planning, insufficient training, and exclusion from community disaster mitigation initiatives [8]. Therefore, a standardised tool/index/protocol is vital for evaluating hospital preparedness, determining risk factors and gaps, regulating progress, as well as directing actions to maintain hospital functionality at times of disasters. Numerous hospital preparedness evaluation tools such as Hospital Safety Index and hospital emergency response checklist have been developed and are complemented with WHO Toolkit, are currently utilised globally [6]. However, the majority are specific to regions, adhering to local bodies and hospital systems. Variations in funding allocations, disaster types, and their frequencies across regions contribute to discrepancies and highlight the necessity for a reliable, valid, and standardised preparedness tool or kit. A scarcity of studies exists that examine the comparative assessment of hospital disaster preparedness tools [9]. Evidence on hospital disaster preparedness tools remains fragmented across countries, healthcare settings, and hazard types, limiting their validation on a global scale. To date, no recent systematic review has synthesised and compared these tools, leaving a gap in understanding their scope, application, and effectiveness.

This study aims at conducting a systematic review of identifying, comparing, and analysing various hospital preparedness tools regarding their types, applications, hazard coverage, and global usage. The results of this study provide comprehensive insights into the use of various hospital disaster preparedness assessment tools and may assist in the development of standardised assessment tools in the future.

METHODOLOGY

This systematic review was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. This review aimed to identify the various assessment tools utilised for evaluating hospital disaster preparedness worldwide as well as their application across diverse countries and hazard contexts.

Search Strategy

The search strategy aimed to identify relevant research articles from various scholarly databases, including PubMed, Scopus, Web of Science, and Google Scholar, utilising a systematic approach. Keywords including "hospital," "disaster preparedness," "emergency preparedness," "assessment tools," "checklist," and "framework" were utilised in the search process. The search was optimised through the use of Boolean operators: "AND" was utilised to integrate terms, while "OR" was employed to expand the search parameters.

Eligibility Criteria and Study Selection

This review applied well-defined inclusion and exclusion criteria to ensure the relevance and quality of selected studies.

Inclusion Criteria

This review encompassed studies that identified or described assessment tools utilised for evaluating hospital disaster preparedness. Eligible studies reported the application, use, or implementation of these tools in hospital settings across various countries or regions. Only English-language peer-reviewed journal articles were included in the analysis. The publication date range was limited to 1 June 2015 to 1 June 2025 to focus on the most recent decade of studies, including the latest tools and practices in hospital disaster preparedness.

Exclusion Criteria

Studies were excluded if they emphasised on non-hospital settings, including community preparedness, primary care, or educational institutions. Articles lacking assessment tools or those addressing preparedness without a structured evaluation framework or tool were excluded from assessment. Publications in languages other than English and articles lacking full-text availability were excluded.

The titles and abstracts obtained from the initial search were screened for relevance. Full-text articles were obtained for additional assessment. Eligibility was assessed by two independent reviewers according to the established inclusion and exclusion criteria, maintaining consistency. Any disagreements between reviewers during study selection and data extraction were resolved through discussion until consensus was reached.

Quality Assessment

The methodological quality of the included studies was evaluated using the Joanna Briggs Institute (JBI) Critical Appraisal Checklists. Given the predominance of cross-sectional designs, the JBI Checklist for Analytical Cross-Sectional Studies was applied to most studies along with JBI checklist for quasi-experimental studies for two studies. Two reviewers independently performed the appraisal, and any disagreements were resolved through discussion until consensus was reached. Studies were retained as relevant to the review objectives after

quality assessment. A detailed summary of the appraisal outcomes is provided as supplementary data and available upon request.

RESULTS

Study Selection

A total of 862 records were retrieved from three databases (PubMed = 273, Scopus = 263, Web of Science = 326). After removal of duplicates and title/abstract screening, 72 articles were eligible for full-text review. Of these, 28 studies met the inclusion criteria and were included in the final analysis. The study selection process is summarised in the PRISMA 2020 flow chart (Fig. 1).

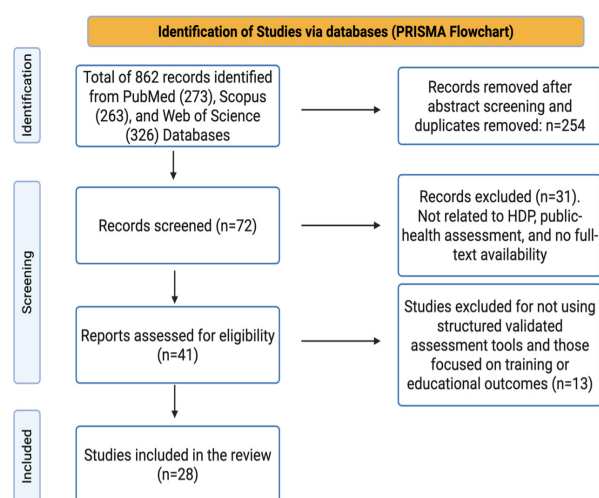


Fig. 1: PRISMA flowchart of the study

Study Characteristics

This systematic review included 28 studies from 17 countries: Saudi Arabia [10–16], Iran [17–21], Netherlands [22, 23], Ethiopia [24, 25], Pakistan [26], Norway [27], Germany [28], Palestine [29], Jordan [30], Sweden [31], Lebanon [32], Belgium [33], Indonesia [34], Yemen [35], USA [36], Italy [37], and UAE [38]. The studies exhibited wide geographical distribution, with the majority coming from Asia (n=18), particularly from the Middle East region (n=15). Most employed a cross-sectional design, with only one retrospective descriptive study [36] and one qualitative case study [33]. All studies assessed disaster preparedness in hospital settings for various types of hazards. The assessed hazards varied significantly, encompassing general disaster preparedness and specific domains, including chemical, biological, radiological, and nuclear (CBRN) events, biological threats, and natural disasters such as flooding.

Hospital Preparedness Assessment Tools

The assessment tools utilised included mainly of structured surveys, checklists, or frameworks, which were either standardised or developed locally. Across the 28 studies, ten distinct tools or frameworks were reported. WHO-aligned instruments were predominant, used in 16 studies (57%), with the WHO Hospital Emergency

Response Checklist being the most frequent (n=9, 32%). Additional WHO tools included the Hospital Safety Index (HSI; n=3), the National Health Sector Emergency Preparedness and Response Tool (n=2), and the Hospital Disaster Preparedness (HDP) self-assessment tool (n=2). In contrast, locally developed or adapted tools were used in 12 studies (43%), including the Threat Identification and Emergency Response (TIER) assessment tool for CBRN preparedness [28] and Hazard Vulnerability Analysis (HVA) frameworks [38]. Additional tools, such as the Health Disaster Preparedness Evaluation (HDEP) tool [32] and the WHO Health Emergency and Disaster Risk Management (EDRM) framework [33], were utilised in a single study. Overall, the studies indicate a predominance of WHO-aligned tools alongside the development of locally specific instruments that address context-relevant preparedness needs. The distribution of HDP tools is presented in Fig. 2.

Preparedness Tools Distribution Across Countries

The study's data indicated that the majority of studies were from in Asia and the Middle East. In high-income countries, including Sweden [31], Germany [28], Belgium [33], and the Netherlands [22, 23], structured frameworks such as WHO checklists or locally validated survey instruments were utilised more frequently and often adapted to align with national standards. Conversely, low- and middle-income countries (LMICs) like Pakistan [26], Ethiopia [24, 25], and Yemen [35] generally utilised more straightforward tools, including WHO-provided checklists or self-created questionnaires, which indicate practicality and limitations in resources. Saudi Arabia and Iran featured prominently, with various studies utilising WHO tools, HDP self-assessment tools, and hybrid survey methodologies, indicating a systematic and developing national emergency preparedness strategy [10–21]. This global usage pattern highlights the adaptability of specific tools and the ongoing necessity for adaptive assessment tools.

Hazard Types Assessed

Seventeen studies utilised tools that evaluate an all-hazards approach, measuring overall hospital preparedness for a wide array of emergencies without concentrating on a specific type [11, 13, 15–17, 19–22, 25, 29, 32, 34–38]. This aligns with global best practices, especially those supported by the WHO and associated organisations. Additionally, hazard-specific studies were identified: CBRN preparedness, encompassing biological, nuclear, and radiological hazards, was evaluated in five studies [10, 12, 23, 26, 28]; mass casualty incidents (MCI) were examined in four studies [18, 24, 27, 31]; and biological threats, including COVID-19, were addressed in two studies [30, 33]. Furthermore, a study examined natural hazards, with a specific emphasis on flooding [14]. The extensive application of all-hazards frameworks underscores the focus on holistic preparedness, whereas hazard-specific assessments illustrate the necessity of

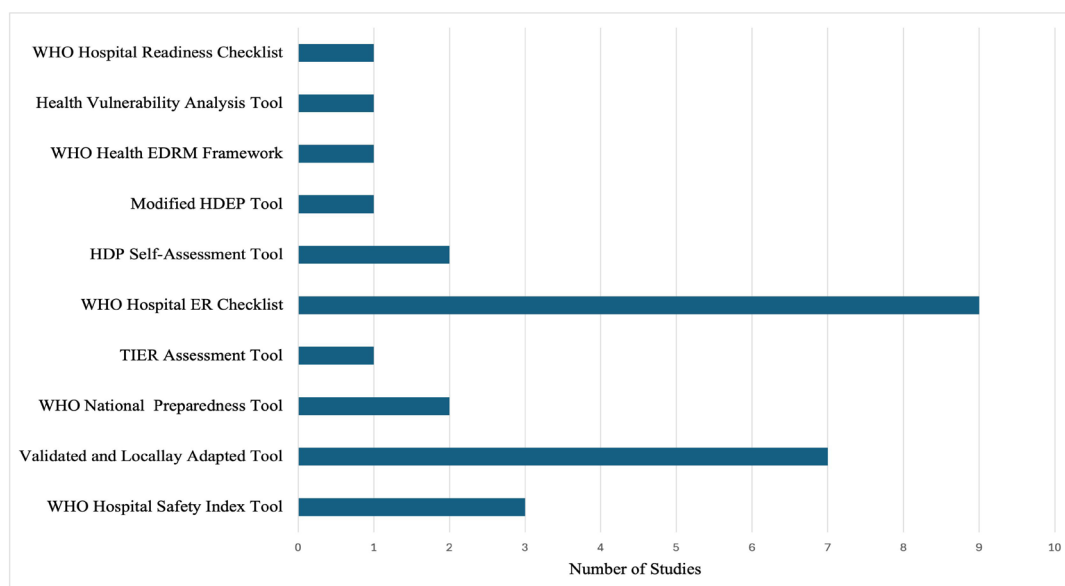


Fig. 2: Distribution of Hospital Disaster Preparedness (HDP) Tools

specialised evaluation tools, particularly in regions susceptible to disaster categories. **Table 1** summarised the characteristics and findings of the included studies of hospital disaster preparedness assessment tools based on of types, applications, and global use.

Quality Assessment Results

Of the 26 studies assessed using the JBI Cross-Sectional Checklist (8 questions), a high degree of rigor was consistently demonstrated in core methodological steps. All 26 studies (100%) had clear inclusion criteria, described their subjects and setting in detail, used objective and standard criteria for measurement of the condition, measured outcomes validly and reliably, and used appropriate statistical analysis. The primary weakness was in managing confounding factors: 9 studies (34.6%) reported neither identifying nor employing strategies to deal with confounding factors. Only 11 studies (42.3%) successfully identified confounding factors and employed strategies to address them.

For the 2 studies assessed using the JBI Quasi-Experimental Checklist (9 questions), both studies clearly established the cause and effect, had multiple pre- and post-measurements, measured outcomes reliably and consistently, and used appropriate statistical analysis (a total of 8/9 positive scores for one study and 7/9 for the other). However, both studies (100%) lacked a control group, and one study had an unclear determination on whether participants in the comparison groups were similar.

DISCUSSION

Hospitals are pivotal in preserving patient lives during disasters, significantly contributing to disaster mitigation [2]. The preservation of health is a significant concern. In times of disaster, the health system encounters a swift escalation in service demands. Numerous hospitals

and health facilities have been documented as failing during disasters and mass casualty events, despite their essential role in life preservation [39]. Effective preparedness during disasters can conserve resources, reduce economic costs, and protect human lives within a community [40]. To avert hospital failures during emergencies, the WHO advocates for "safer hospitals," which fosters community policy commitments and provides support and guidance to member or partner organisations. Various tools tailored for hospital disaster management have been suggested to effectively reduce health and resource damage. This study systematically reviews the distribution of various types of assessment tools across different countries and their hazard coverage.

WHO Tools

Our study revealed a notable trend in the predominant utilisation of the WHO-recommended hospital preparedness tools among the included studies ($n=16$), with particular emphasis on the WHO Hospital Emergency Response Checklist ($n=9$). This demonstrates the practicality, ease of adaptation, and global acceptance of the standardised and validated WHO tools for assessing hospital preparedness [37]. In accordance to the previous studies suggesting that the established WHO checklists offer a thorough and adaptable framework for hospitals to assess essential functional capacities and determine preparedness inadequacies systematically. Furthermore, these frameworks are designed to equip and strengthen emergency risk mitigation abilities of healthcare systems by adopting a multi-hazard approach suited for all-hazards [41]. The widespread application across various health systems in different countries indicates its role in comparing between the international preparedness levels as well as response measures. Nonetheless, dependency on a single tool may overlook local contextual variables, highlighting the necessity for complementary, setting-specific assessments checklists

Table 1: Characteristics and findings of the included studies of hospital disaster preparedness assessment tools

Reference	Country	Tool/Framework	Study Design	Hazard Type	Study Findings
Al-Shammari et al. [10]	Saudi Arabia	WHO National Health Sector Emergency Preparedness and Response Tool	Cross-sectional study	Biological hazards	Study highlights need for enhancing awareness, education, and preparedness within healthcare facilities.
Alhamaid et al. [11]	Saudi Arabia	Modified EPIQ questionnaire	Cross-sectional study	General Disaster Preparedness	Disaster preparedness among Saudi Arabian ED personnel highlighted variations in knowledge, attitudes, and practices, underscoring the need for ongoing education.
Shubayr et al. [12]	Saudi Arabia	Self-Structured Questionnaire	Cross-sectional study	Nuclear and radiological hazards	Nurses had poor knowledge among regarding responses to radiation emergencies.
Alruwaili et al. [13]	Saudi Arabia	WHO National Health Sector Emergency Preparedness and Response Tool and WHO Hospital Emergency Response Checklist	Cross-sectional study	General Disaster Preparedness	Study identified 3-factor structure as key predictors of hospital disaster preparedness.
Al-Wathinani et al. [14]	Saudi Arabia	Validated Adapted Tool	Cross-sectional study	Flooding	Respondents were confident in their hospital's flood response (73.2%), willing to report to work (89%).
AlHarastani et al. [15]	Saudi Arabia	HDP Self-Assessment Tool	Cross-sectional study	General Disaster Preparedness	Participants' knowledge, practice and overall disaster preparedness was satisfactory.
Khan et al. [16]	Saudi Arabia	WHO Hospital Emergency Response Checklist	Cross-sectional study	General Disaster Preparedness	The Ministry of Health hospitals in Madinah province showed an insufficient level of disaster preparedness.
Rahimi et al. [17]	Iran	WHO Hospital Emergency Response Checklist	Cross-sectional study	General Disaster Preparedness	Study reported high level of awareness among nursing managers and strong level of hospital preparedness.
Yari et al. [18]	Iran	Validated assessment tool for road traffic accidents-mass casualties (RTA-MC)	Cross-sectional study	Mass casualties	Hospitals in the Kurdistan region showed favourable preparedness levels, with preparedness linked to hospital profile.
Beyramijam et al. [19]	Iran	WHO Hospital Emergency Response Checklist	Cross-sectional study	General Disaster Preparedness	Most hospitals had moderate preparedness level.
Beyramijam et al. [20]	Iran	Iranian HDP Self-Assessment Tool	Pre- and post-intervention study	General Disaster Preparedness	Introduction of educational programme and national disaster preparedness plan improved the HDP score of a hospital.
Janati et al. [21]	Iran	WHO Hospital Emergency Response Checklist	Cross-sectional study	General Disaster Preparedness	Emergency preparedness response rate of hospitals in Tabriz Province was inadequate (54.26%).
Blanchette et al. [22]	Netherlands	WHO Hospital Emergency Response Checklist	Cross-sectional study	General Disaster Preparedness	Hospital preparedness of Dutch hospitals was not satisfactory.
Mortelmans et al. [23]	Netherlands	Developed and validated Local assessment tool	Cross-sectional study	CBRN preparedness	There is a serious lack of hospital preparedness for CBRN incidents.
Getu et al. [24]	Ethiopia	WHO Hospital Emergency Response Checklist	Cross-sectional study	Mass casualty incidents (MCI)	Hospital preparedness level was insufficient for MCIs.
Ayenew et al. [25]	Ethiopia	WHO Hospital Safety Index	Cross-sectional study	General Emergency Preparedness	Overall hospital disaster preparedness in the East Gojjam zone was inadequate and low.
Sughra et al. [26]	Pakistan	WHO Hospital Safety Index Tool	Cross-sectional study	CBRN emergencies	Both hospitals had satisfactory emergency preparedness.
Ugelvik et al. [27]	Norway	Structured survey instrument adapted from Sweden	Cross-sectional study	Mass casualty incidents (MCI)/Major incidents (MI)	Study demonstrated regional contextualisation of disaster preparedness evaluation instruments for MCI/MI.
Hupf et al. [28]	Germany	Validated questionnaire incorporated into TIER assessment tool	Cross-sectional study	CBRN emergencies	CBRN preparedness is heterogeneous and still not satisfactory for German hospitals.
Alrayyes et al. [29]	Palestine	Self-administered structured questionnaire and observational checklist	Cross-sectional study	General Disaster Preparedness	Level-four primary health care centres in Gaza strip are not adequately prepared for emergencies.
Dahmash et al. [30]	Jordan	WHO Hospital Readiness Checklist	Cross-sectional study	COVID-19 pandemic	Hospitals' general preparedness level for the management of COVID-19 pandemic was moderate.
Suderin et al. [31]	Sweden	WHO Hospital Emergency Response Checklist	Cross-sectional study	Mass casualty incidents (MCI)	Swedish hospitals lack full all-hazard coverage with large variations between different hospitals' preparedness
Al-Hajj et al. [32]	Lebanon	Modified HDEP tool	Cross-sectional study	General Disaster Preparedness	All hospitals had disaster and emergency response plan.
He et al. [33]	Belgium	WHO Health Emergency and Disaster Risk Management (EDRM) Framework	Descriptive qualitative case study	COVID-19 pandemic	Belgium's multisectoral emergency framework facilitated coordinated COVID-19 response.
Suparni et al. [34]	Indonesia	WHO Hospital Safety Index	Cross-sectional study	General Disaster Preparedness	Public hospitals in West Java Province had limited disaster and emergency preparedness.
Naser et al. [35]	Yemen	WHO standards checklist 2011	Cross-sectional study	General Disaster Preparedness	All hospitals in South Yemen had unacceptable very low disaster preparedness level.
Der-Martirosian et al. [36]	USA	Custom assessment tool	Retrospective descriptive study	General Disaster Preparedness	More than half of Veterinary Affairs Medical Centres achieved desired preparedness level.
Ingrassia et al. [37]	Italy	WHO Hospital Emergency Response Checklist	Cross-sectional study	General Disaster Preparedness	Majority of the hospitals showed inadequate level of preparedness.
Fares et al. [38]	Dubai	Hazard Vulnerability Analysis (HVA) Tool	Cross-sectional study	General Disaster Preparedness	HVA revealed gaps in data accuracy, hazard assessment, decontamination, emergency planning, and coordination systems across public hospitals in Dubai.

CBRN: Chemical, Biological, Radio, and Nuclear; WHO: World Health Organization; EPIQ: Emergency Preparedness Information Questionnaire; HDEP: Hospital Disaster and Emergency Preparedness; COVID-19: Coronavirus Disease; HDP: Hospital Disaster Preparedness.

in addition to standardised checklists. The widespread use of WHO tools reflects their accessibility and status as an international “gold standard” for baseline preparedness, rather than their inherent quality. Many resource-limited settings favour these standardised tools due to limited funding, technical expertise, and governmental support for context-specific validation. However, relying solely on the generic WHO framework can encourage a “check-box” approach, where formal compliance may not translate into genuine resilience against local, high-frequency, low-impact hazards [42].

Geographic Distribution

Over 80% of natural disasters in the past century have taken place in the Middle East and North Africa. In 2015 alone, hydrological disasters, including flooding and landslides, constituted 63% of all recorded disasters, exceeding the frequency recorded over the past century [43]. Majority of the studies in this review originated from Asia and the Middle East, particularly Saudi Arabia and Iran highlighting an increasing need and attention towards hospital disaster preparedness policy in the region [10–21]. Similar to previous studies, a recurring pattern of using WHO approved checklists like Hospital Emergency Response checklist and Hospital Safety Index was observed. The findings indicate WHO checklists have ease of adaptability across diverse healthcare settings, besides highlighting the scarcity of locally developed country specific tools. Both high- and low-income settings had adopted WHO checklists due to their simplicity, structured domains, as well as emphasis on critical hospital functions [22, 35, 37]. Recently, a limited number of studies from Saudi Arabia and Iran have adopted modified, locally validated hazard-specific assessment tools [12, 14, 18, 20]. This trend reflects a growing interest in these countries to move beyond generic frameworks and incorporate tailored hazard-specific tools into national policies for disaster preparedness. Moreover, the findings indicate that countries initially utilise WHO tools for standardisation but, as their preparedness systems mature, they transition towards hazard-specific or locally validated checklists, with context-specific adaptations being essential to maximise relevance and accuracy [44]. In high-income countries, such as Germany, Sweden and USA, these frameworks were often tailored to national regulatory requirements [28, 31, 36], whereas in resource-limited settings, the same checklists were used in their original form [24, 26].

Hazard-Specific vs All Hazards Approach

The review found that the majority of studies utilised an all-hazards approach, aligning with international recommendations that prioritise comprehensive preparedness over a focus on individual events. This finding aligns with existing literature, wherein the WHO and other global health organisations have promoted all-hazards frameworks to enhance hospital resilience and prevent isolated preparedness efforts [45]. A subset

of studies in our review evaluated preparedness specific to hazards, particularly concerning CBRN events, mass casualty incidents, as well as infectious disease outbreaks, including COVID-19. This targeted approach reflects findings from previous studies indicating that hazard-specific evaluations are frequently prioritised in areas characterised by elevated risk profiles or recent disaster incidents, exemplified by chemical threats in Europe and infectious diseases in Asia [28]. These findings indicate that although the all-hazards model is the global standard, disaster-specific assessments are crucial for implementing an evidence-based management strategy that addresses context-relevant disasters and develops tailored preparedness strategies.

Policy Implications

A key challenge for global health policy is balancing the localisation of hospital disaster preparedness assessment tools with the need to maintain cross-national comparability afforded by WHO frameworks. To address this, national ministries in Low- and Middle-Income Countries (LMICs) need to prioritise building expertise in validation (psychometrics) and disaster tracking (epidemiology) instead of simply adopting foreign standards.

The WHO should support this shift by creating a tiered framework that keeps the international core checklist mandatory but provides clear guidance to validate custom local sub-modules, ensuring relevance without losing global comparability. Additionally, LMICs should be supported through formalised WHO guidelines outlining the minimum psychometric requirements for validating these local sub-modules, particularly regarding content validity and inter-rater reliability within their specific health context. This support should be integrated into national disaster policies by adopting a phased approach: starting with WHO standards for baseline assessment, followed by targeted investment in research to develop and validate hazard-specific tools using local risk data. This strategy would ensure a preparedness system that is both globally benchmarked and locally tailored [46].

This review identifies gaps in the implementation of hospital disaster preparedness tools, noting significant variation in their scope, structure, as well as regional adaptation. Moreover, the evidence supporting the effectiveness and validation of numerous locally developed or hazard-specific tools is limited, highlighting the necessity for standardised frameworks that are also locally relevant. The study faced limitations due to significant heterogeneity among the included studies regarding applied tools, along with hazard focus, which hindered direct comparison. The review primarily concentrated on comparing the types and global distribution of tools, rather than analysing their individual components and findings.

CONCLUSION

In conclusion, this review reveals that various hospital disaster preparedness tools are utilised, with WHO checklists being the most prevalent globally, alongside the emergence of locally adapted or hazard-specific tools in certain regions. Hospitals and policymakers should prioritise the adoption of validated, context-sensitive disaster preparedness tools that balance global standards with local needs. Future research must focus on rigorously validating both WHO frameworks and locally adapted instruments, ensuring reliability, content relevance, and practical applicability across diverse healthcare settings. WHO and national authorities should collaborate to provide guidance, technical support, and resources for the development of hazard-specific assessment modules. By fostering such coordinated efforts, health systems can strengthen hospital resilience, enhance emergency response capacity, and ensure patient safety during disasters.

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