Review Article

doi: 10.31674/mjn.2025.v16isupp2.017

MJN

Mobile Applications and Community Disaster Preparedness: Insights from a Scoping Review

Iwan Permana*, Rosliana Dewi, Johan Budhiana

Department of Nursing, Sekolah Tinggi Ilmu Kesehatan Sukabumi, Jawa Barat 43122, Indonesia

**Corresponding Author's Email: permana.iwan@gmail.com*

ABSTRACT

Background: Mobile applications have emerged as innovative solutions for enhancing community resilience during emergencies. However, their widespread adoption faces challenges, including usability limitations, accessibility barriers, and integration issues within existing disaster management systems. **Objective:** This scoping review systematically investigated the role of mobile applications in strengthening community disaster preparedness. **Methods:** The study employed the Arksey and O'Malley framework for scoping reviews. A comprehensive literature search was conducted across multiple databases, including PubMed, Google Scholar, Scopus, and Web of Science, covering publications from 2012 to 2024. Eligible studies included peer-reviewed articles focusing on mobile applications designed for disaster preparedness, excluding non-peer-reviewed sources and those lacking a community focus. Data extraction utilised a standardised form, and quality assessment was performed using the Mixed Methods Appraisal Tool (MMAT). **Results:** The review included 16 studies from an initial pool of 256 records. The findings highlighted that mobile applications often feature real-time notifications, educational modules, and tools for emergency coordination. Applications targeting specific demographics, such as older adults, demonstrated improved readiness outcomes but underscored the importance of addressing diverse user needs. **Conclusion:** Mobile applications are pivotal in enhancing community disaster preparedness and resilience, offering a range of functionalities that can significantly contribute to readiness. Future research should focus on validating these applications in real-world settings and examining their effects on both individual and community-level preparedness outcomes.

Keywords: Disaster Preparedness; Mobile Applications; Scoping Review; Usability

INTRODUCTION

Disaster preparedness plays a vital role in reducing the adverse effects of natural and human-induced disasters on communities. With the rising frequency and intensity of disasters driven by climate change, population growth, and urbanisation, the need for effective disaster preparedness strategies has become increasingly urgent (Meyer *et al*., 2025). Traditional methods such as community training and information dissemination are now being supplemented by technological innovations, particularly mobile applications. These applications have proven to be valuable tools for improving disaster preparedness by offering real-time alerts, comprehensive disaster management information, and platforms for communication and coordination (Ezeonu *et al*., 2024; Kangana *et al*., 2024).

Research has extensively examined the role of mobile applications in increasing awareness and enhancing disaster response efficiency (Navarro de Corcuera *et al.*, 2022). These applications support critical functions such as early warning systems, evacuation planning, and post-disaster recovery efforts (Rivas *et al*., 2024). For instance, Sukhwani and Shaw (2020) highlighted the effectiveness of mobile apps in delivering hazard-specific information and helping users create personalised emergency plans.

Received: December 26, 2024 Received in revised form: April 21, 2025 Accepted: April 30, 2025

Shafapourtehrany *et al*., (2023) further demonstrated the advantages of integrating geospatial technologies into mobile apps, enabling better tracking of disaster-affected populations and improving coordination of relief efforts.

Several studies underscore the importance of mobile applications in building disaster resilience. Kangana *et al*., (2024) reviewed disaster management apps, emphasizing their role in real-time risk communication and strengthening community resilience. Similarly, Ezeonu *et al.* (2024) showed that mobile applications could bridge the gap in traditional disaster management approaches by providing marginalised and resource-poor communities with access to vital disaster-related information. User-friendly apps like Disaster Alert and FEMA have also been recognised for enabling even technologically inexperienced individuals to access critical information during emergencies (Meyer *et al.*, 2025). Additionally, disaster preparedness apps have been found effective in educating communities and promoting intentional behavior changes in high-risk areas, such as hurricane-prone regions (Susmini *et al*., 2023).

` However, despite their advantages, barriers such as limited digital literacy, accessibility challenges, and low user engagement hinder the widespread adoption of disaster preparedness apps (Ahmed *et al*., 2025; Chandran & Vipin, 2024). An analysis of 45 disaster support apps and over 28,000 user reviews identified 13 critical features aligned with the four stages of the disaster life cycle. The findings revealed that while these apps hold significant potential, technical issues such as login difficulties, network instability, and configuration problems negatively impact user experience and safety (Syukron *et al*., 2024).

Moreover, the effectiveness of these applications across diverse community settings remains ambiguous. Current studies are fragmented, often focusing on technical aspects of app development rather than user-centred outcomes such as usability, accessibility, and cultural relevance (Cicek & Kantarci, 2023). Research on their long-term impact on community preparedness is also limited, with little attention given to their integration into broader disaster management frameworks (Bania, Iatrellis & Samaras, 2023). This highlights the need for a comprehensive review to systematically assess existing evidence on mobile applications' role in disaster preparedness and identify research gaps, particularly regarding their applicability in low-resource settings and among vulnerable populations.

This study aimed to address these gaps through a scoping review aimed at exploring the role of mobile applications in enhancing community disaster preparedness. The specific objectives are: 1) to analyze the features and functionalities of mobile applications designed for disaster preparedness. 2) to evaluate the usability, accessibility, and effectiveness of these applications in diverse community settings. 3) to identify challenges and opportunities for integrating mobile applications into existing disaster management frameworks. 4) to provide evidence-based recommendations for optimising the use of mobile technology in disaster preparedness.

METHODOLOGY

Study Design

This scoping review was conducted in accordance with the framework established by Arksey and O'malley, 2005) and later refined by Levac, Colquhoun and O'Brien (2010). The primary objective of this review was to systematically examine the role of mobile applications in improving community disaster preparedness by identifying, analysing, and synthesising relevant research findings. To ensure a thorough and transparent process, the review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews (PRISMA-ScR) guidelines (Tricco *et al*., 2018), providing a structured approach to reporting and analysis.

Search Strategies

A thorough literature search was conducted across PubMed, Google Scholar, Scopus, and Web of Science

databases to identify peer-reviewed articles published between January 2012 and December 2024. The search strategy utilised a combination of keywords and Boolean operators, including "Mobile Applications" or "Mobile Apps" and "Disaster Preparedness" or "Community Disaster Management" and "Usability" or "Effectiveness". To ensure comprehensive coverage, additional relevant studies were identified by manually reviewing the reference lists of the included articles. This multi-faceted approach aimed to capture all pertinent research on the topic.

Inclusion and Exclusion Criteria

The inclusion criteria for this study comprised: (1) articles published in English, (2) research focusing on mobile applications specifically designed for enhancing community disaster preparedness, (3) studies evaluating aspects such as features, usability, accessibility, or the effectiveness of mobile applications in disaster-related contexts, and (4) publications sourced from peer-reviewed journals. Conversely, the exclusion criteria encompassed (1) non-peer-reviewed sources, including reports, conference proceedings, and editorial articles; (2) studies that exclusively addressed individual disaster preparedness without a broader community focus; and (3) articles where mobile applications were not a central component of the research.

Data Extraction

Data extraction for the review was conducted using a standardised form specifically designed for this purpose. The extracted data encompassed key details such as the names of the study authors, the year of publication, the study design, research objectives, features of the mobile applications, the outcomes evaluated (including usability, accessibility, and effectiveness), and the primary findings. To ensure accuracy and reliability, two reviewers independently performed the data extraction. Any disagreements or discrepancies encountered during this process were addressed and resolved through mutual discussion or, when necessary, by seeking input from a third reviewer.

Quality Assessment

The quality of the studies included in this review was evaluated using the 2018 version of the Mixed Methods Appraisal Tool (MMAT). This assessment instrument is specifically designed to appraise qualitative, quantitative, and mixed-methods research, focusing on methodological rigour and relevance to the research objectives. Each study was categorised as having low, moderate, or high quality based on the criteria outlined in the tool. Any discrepancies or disagreements during the assessment process were resolved through a consensus-building discussion among the reviewers to ensure consistency and reliability in the evaluation.

Data Analysis

A narrative synthesis method was utilised to summarise the extracted data comprehensively. Thematic analysis was conducted to identify core themes, which included mobile application features, usability, accessibility, effectiveness, challenges, and their integration within disaster management frameworks. Additionally, descriptive statistics were employed to analyse trends in publication years, study contexts, and the various types of disasters covered, providing quantitative insights into the research landscape.

RESULTS

Searching Results

The PRISMA flowchart outlines the systematic selection process for studies in a review. From 256 records initially identified through database searches, duplicates were removed, leaving 217 for screening. After title and abstract review, 198 records were screened, and 126 were excluded for not meeting inclusion criteria. Of 72 full-text articles assessed for eligibility, 56 were excluded for specific reasons. Ultimately, 16 studies were included in the qualitative synthesis, ensuring a transparent and rigorous review process (Figure 1).

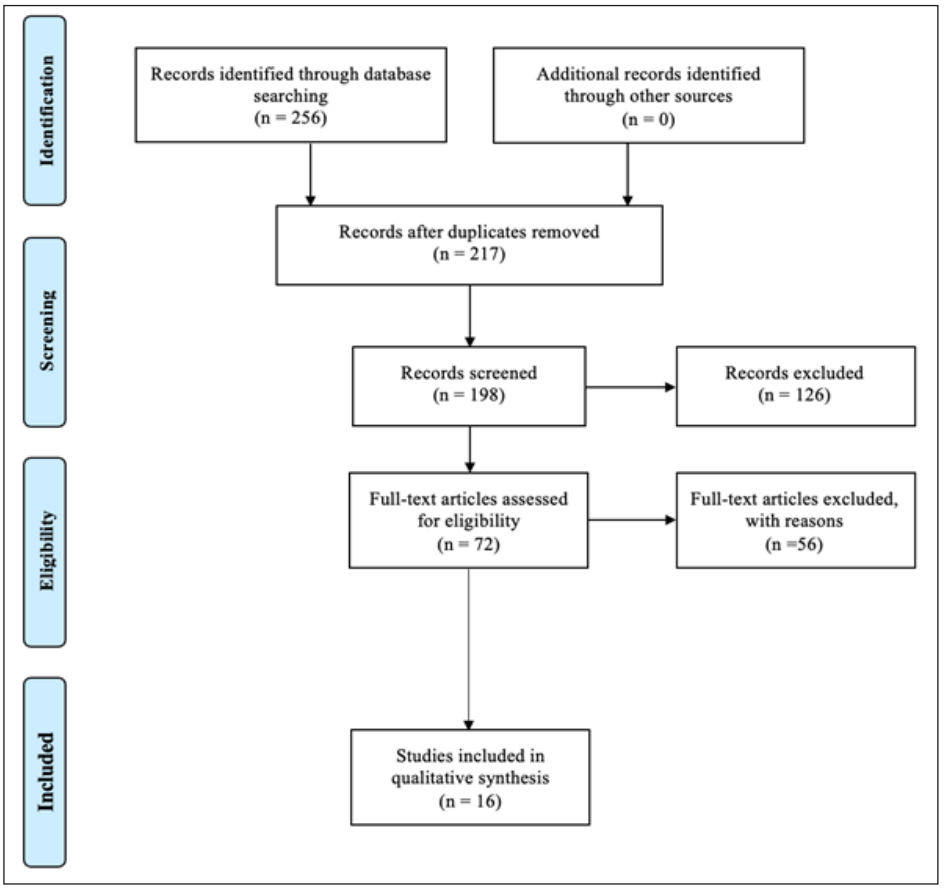

Figure 1: PRISMA Flow Chart

Quality of Study

The quality appraisal of studies on mobile applications and digital solutions for disaster preparedness and emergency response reveals a wide spectrum of methodological approaches, strengths, and limitations. High-quality studies, such as those by Kuula *et al*. (2013) and Johnson et al. (2023), showcased rigorous methodologies and comprehensive insights, contributing significantly to the field. Similarly, Aiello et al. (2023) demonstrated robust methods for earthquake early warning systems but highlighted the challenges of infrastructure dependency. Moderate-quality studies, including those by Fazeli *et al*. (2024), offered valuable contributions but were often constrained by factors such as the absence of usability testing or limited participant diversity.

Low-quality studies, such as those by Nilsson and Stølen (2011) and Nurse *et al.* (2012), primarily focused on conceptual frameworks or preliminary evaluations, lacking empirical validation and generalisability. Studies addressing specific user groups, such as Yuwono *et al*. (2019) on elderly preparedness and Nourozi et al. (2016) on risk mitigation, highlighted the importance of targeted interventions with varying methodological rigour. Furthermore, research on user interface (UI) and user experience (UX) designs, such as those by Kwee-Meier, Wiessmann and Mertens (2017) and Estuar et al. (2014), emphasised advancements in usability while exposing gaps in real-world application testing.

Overall, while high-quality studies provide a solid foundation for advancing disaster preparedness through digital solutions, many studies reveal recurring limitations, including small sample sizes, limited diversity, and the absence of real-world testing. Future research should prioritise methodological rigour, scalability, and practical implementation to enhance the reliability and impact of digital tools in disaster preparedness and emergency response.

Main Finding

Features and Functionalities of Mobile Applications for Disaster Preparedness

Studies investigating mobile applications for disaster preparedness have highlighted a wide array of features and functionalities designed to enhance individual and community readiness. Core functionalities include educational modules, self-assessment tools, real-time notifications, emergency response coordination mechanisms, and the visualisation of critical information. For instance, Fazeli *et al*. (2024) examined a mobile application providing earthquake preparedness education and self-assessment tools, demonstrating its ability to improve preparedness at both individual and community levels. Similarly, Xu *et al*. (2020) evaluated the PRESTo system, which delivers early warnings for earthquakes, effectively alerting residents to imminent seismic events. Other applications, such as the one studied by Kuula *et al*. (2013), focused on emergency alerting and command coordination, showcasing improved collaboration between Finnish police and civilians during emergencies. Furthermore, Bachmann *et al*. (2015) reviewed various preparedness applications, emphasizing their role in bolstering emergency response capabilities across different contexts.

Usability, Accessibility, and Effectiveness in Diverse Community Settings

The usability and accessibility of disaster preparedness applications have emerged as pivotal factors determining their effectiveness in diverse community settings. Research by Nurse *et al*. (2012) and Sarshar, Nunavath and Radianti (2015) underscored the importance of usability evaluations in identifying design shortcomings and providing actionable recommendations for enhancement. For example, Nurse et al. reviewed the Secure Situation Awareness System and highlighted areas requiring improvement to optimise usability. Applications designed for specific demographic groups have also shown promising outcomes. Nourozi *et al*. (2016) reported significant gains in earthquake preparedness among elderly users following educational interventions delivered via mobile applications. Similarly, Ida *et al*. (2022) explored the use of digital media tools for disaster communication, demonstrating their effectiveness among earthquake-affected populations in East Java, Indonesia. These findings underscore the potential of targeted, accessible solutions to enhance preparedness across diverse user groups.

Challenges and Opportunities for Integration into Disaster Management Frameworks

Integrating mobile applications into disaster management frameworks presents both challenges and opportunities. Nilsson and Stølen (2011) proposed conceptual models emphasizing generic user interface designs adaptable to various emergency scenarios. Similarly, Karl, Rother and Nestler (2015) identified critical features for crisis-related applications, such as user-friendly interfaces and robust communication tools, which are essential for successful integration into larger disaster management systems. However, challenges persist, including usability limitations and the need to validate app effectiveness in real-world settings. Estuar *et al*., 2014, highlighted these issues in their study of a crowdsourcing disaster management application, which underwent rigorous UI/UX validation to enhance its capabilities. Addressing these challenges is vital to realising the full potential of mobile applications in disaster preparedness and response.

Evidence Based Recommendations for Optimization

To maximise the effectiveness of mobile technology in disaster preparedness, several evidence-based recommendations have been proposed. First, incorporating user-centreddesign principles can mitigate usability challenges, as suggested by Bandi *et al.*, 2018. Second, tailoring educational content to specific demographics, as demonstrated by Nourozi *et al*. (2016), can enhance user engagement and preparedness outcomes. Third, leveraging smartphone-based systems for real-time data collection and alert dissemination, such as the approach used by Aiello *et al*. (2023) to estimate earthquake parameters, has proven effective. Lastly, developing interoperable applications aligned with existing disaster management frameworks, as proposed by Nilsson and Stølen (2011), ensures seamless integration and improved coordination during emergencies. These strategies collectively underscore the transformative potential of mobile applications in advancing disaster preparedness and resilience.

Table 2: Characteristics of Included Studies

Authors and Year	Country	Study Design	Sample	Instrument/ Tools	Name of Application	Content of Application	Main Findings
Kolathayar *et al*. (2019)	India	Development Study	Not applicable	Earthquake preparedness survey	Not specified	Educational content on earthquake preparedness, self-assessment tools	Improved individual and community preparedness levels
Sarshar, Nunavath & Radianti, (2015)	Not specified	Usability Evaluation	Not specified	Usability testing	GDACSmobile, SmartRescue	Emergency alerts, rescue coordination features	Identified critical usability issues and provided design recommendations
Nurse *et al*. (2012)	Not specified	Usability Evaluation	Not specified	Usability testing framework	Secure Situation Awareness System	Real-time situation awareness for emergencies	System usability moderately effective; improvement areas identified
Kwee-Meier, Wiessmann & Mertens, (2017)	Not specified	Usability and Interface Design Study	Not specified	Interface usability testing	Not applicable	Integrated visualization of critical information	Enhanced usability of interfaces for safety-critical operations
Kuula *et al*. (2013)	Finland	Preliminary Testing Study	Finnish police and civilians	Smartphone-based system testing	Not specified	Emergency alerting and command functionalities	Effective in improving response coordination
Estuar *et al*. (2014)	Not specified	Validation Study	Not specified	UI/UX evaluation tools	Crowdsourcing Disaster Management Application	Features for disaster reporting and response coordination	UI/UX design validated for enhancing disaster management
Ida *et al*. (2022)	Indonesia	Case Study	Individuals affected by East Java earthquakes	Digital media tools	Not specified	Communication during disasters using digital platforms	Effective use of diverse digital media for disaster response
Paul, Bee & Budimir, (2021)	Not specified	Predictive Study	Participants in controlled social experiments	Social dilemma frameworks	Not applicable	Decision-making factors in disaster preparedness	Individual decision-making impacts community resilience in disasters
Aiello *et al*. (2023	Turkey-Syria, USA	Modeling Study	Smartphone-generated earthquake data	Earthquake parameter estimation algorithms	Not specified	Analysis of earthquake triggers for early warnings	Smartphone triggers effectively estimate earthquake parameters
Nilsson & Stølen (2011)	Norway	Review/Conceptual Framework	Not applicable	UI analysis tools	Not applicable	Proposed generic UI functionalities for emergencies	Conceptual UI model for emergency response systems
Xu *et al*. (2020)	China	Case Study	Data from region-specific early warning system	PRESTo system	PRESTo	Earthquake early warning notifications	PRESTo effectively alerted residents of imminent earthquakes
Karl, Rother & Nestler (2015)	Germany	Conceptual Framework	Not applicable	Crisis-related app examples	Not specified	Assistance in emergency preparedness and response	Identified essential features of crisis-related apps
Yuwono *et al*. (2019)	Indonesia	Mobile App Development	Not specified	App development frameworks	Not specified	Earthquake risk management strategies	Mobile app proposed to mitigate risks effectively
Nourozi *et al*. (2016)	Iran	Intervention Study	Elderly individuals	Preparedness questionnaires	Not specified	Educational interventions on earthquake preparedness	Significant improvement in elderly preparedness levels
Bachmann *et al*. (2015)	USA	Descriptive Study	General population	App analysis tools	Various preparedness apps	Emergency response features	Apps demonstrated improved preparedness and response
Bandi *et al*. (2018)	Not specified	Usability Testing	Emergency management stakeholders	Usability metrics	Not specified	User interface design for emergency disaster management	Key design requirements for improving UI usability identified

DISCUSSION

The findings of this study highlight the critical role mobile applications play in enhancing disaster preparedness and resilience at individual, community, and systemic levels. By incorporating educational modules, real-time alerts, emergency coordination tools, and content tailored for diverse demographic groups, these applications demonstrate their versatile functionalities. These outcomes align with prior studies that underscore the significance of mobile technologies in disaster management (Paul, Bee & Budimir, 2021; Xu *et al.*, 2020). For instance, Wang *et al.* (2020) demonstrated the effectiveness of mobile applications in delivering timely information and improving emergency response times, while they emphasised the value of tailored educational features in boosting preparedness among vulnerable populations.

This study contributes to the existing literature by addressing usability and accessibility challenges associated with disaster preparedness applications. Previous research has highlighted the importance of user-centred design in fostering application engagement and effectiveness (Prasad *et al*., 2023). Unlike earlier studies that predominantly explored technical functionalities, this research focuses on overcoming barriers to usability and accessibility. For example, Grinko, Kaufhold and Reuter (2019) identified design limitations as significant obstacles to app adoption in resource-constrained settings, a concern echoed in the present findings. Moreover, the emphasis on integrating mobile applications within broader disaster management frameworks resonates with Pandey, Rani and Kundu (2025), who highlighted the necessity of seamless coordination between digital tools and existing emergency systems.

Nurses, as frontline healthcare professionals, play a pivotal role in leveraging these digital tools to enhance public preparedness through education, triage, and psychosocial support during disasters. Mobile applications can also be integrated into nursing disaster training curricula to improve competencies in emergency response, risk communication, and psychological first aid (Rivas *et al.*, 2024). The findings suggest that healthcare providers, particularly nurses, and disaster management agencies should adopt user-centred design principles to enhance application engagement and usability (Tan, 2020). Additionally, customised interventions tailored to specific demographic groups—such as older adults, children, or people with chronic illnesses—can optimise preparedness outcomes, especially among high-risk populations (Mehmood *et al*., 2023). Policymakers are encouraged to incorporate these applications into national disaster preparedness strategies while also involving nursing associations in the planning and implementation stages to ensure clinical relevance, scalability, and long-term sustainability in managing disaster risks effectively (Shukla *et al.*, 2024).

Limitation

This scoping review explores the role of mobile applications in community disaster preparedness. However, it has limitations, such as relying on English-language publications and omitting practical insights from grey literature and non-peer-reviewed sources. The review also overlooks the interconnectedness between individual and community-level strategies, narrowing the scope of findings. The Mixed Methods Appraisal Tool's heterogeneity in methodologies and outcomes also posed challenges in comparing findings across studies. The short timeframe for database searches may have excluded ongoing or recently published research. Future research should include studies in multiple languages, grey literature, and practical applications from diverse sources, and investigate the interplay between individual and community disaster preparedness through mobile applications.

CONCLUSION

The findings highlight the significant role mobile applications play in enhancing disaster preparedness and resilience at individual, community, and systemic levels. These applications offer diverse functionalities, including educational modules, real-time alerts, emergency coordination tools, and tailored content for specific demographic groups. Usability and accessibility remain critical factors influencing their effectiveness, with research underscoring the importance of user-centred design to address potential shortcomings and optimise engagement. Despite their potential, challenges such as usability limitations and integration with broader disaster management frameworks persist, necessitating further refinement and

validation in real-world settings. Future studies should focus on improving the user experience through iterative design processes, tailoring features to meet the needs of diverse populations, and ensuring seamless integration with existing disaster management systems. Additionally, leveraging real-time data and interoperable technologies can enhance communication and response capabilities during emergencies. Continued advancements in mobile applications for disaster preparedness hold the promise of fostering more resilient communities equipped to navigate and mitigate the impacts of disasters effectively.

Conflict of Interest

The authors have no conflicts of interest to declare.

ACKNOWLEDGEMENT

The authors are thankful to the institutional authority for completion of the work.

REFERENCES

Ahmed, M. M., Oweidat, M., Okesanya, O. J., Alaswad, M., Abdelbar, S. M. M., Gill, P., & Alsabri, M. (2025). Barriers to Pediatric emergency care in low-resource settings: A narrative review. *Sage Open Pediatrics, 12*, https://doi.org/10.1177/30502225251336861 .

Aiello, L., Argiento, R., Finazzi, F., & Paci, L. (2023). Survival modelling of smartphone trigger data for earthquake parameter estimation in early warning. With applications to 2023 Turkish-Syrian and 2019 Ridgecrest events. ArXiv Preprint, *Cornell University*. https://doi.org/10.48550/arXiv.2303.00806

Arksey, H., & O'malley, L. (2005). Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology, 8*(1), 19–32. https://doi.org/10.1080/1364557032000119616

Bachmann, D. J., Jamison, N. K., Martin, A., Delgado, J., & Kman, N. E. (2015). Emergency preparedness and disaster response: there's an app for that. *Prehospital and Disaster Medicine, 30*(5), 486–490. https://doi/10.1017/S1049023X15005099

Bandi, A., Fellah, A., Bondalapati, H., & Corson, M. (2018). Mobile usability testing: Gathering evidence for designing user interfaces for emergency disaster management systems. *Proceedings of ISCA 28th International Conference on Software Engineering and Data Engineering, 38*. Retrieved from: https://www.nwmissouri.edu/csis/pdf/vitae/bandi/Mobile%20Usability%20Testing%20Gathering%20Evidence%20for%20Designing%20User.pdf. Accessed on 15th July, 2024

Bania, A., Iatrellis, O., & Samaras, N. (2023). Information communication technologies (ICTs) and disaster risk management (DRM): systematic literature review. *Conference on Sustainable Urban Mobility*, 1779–1794. https://doi.org/10.1007/978-3-031-23721-8_137

Chandran, I., & Vipin, K. (2024). Multi-UAV networks for disaster monitoring: challenges and opportunities from a network perspective. *Drone Systems and Applications, 12*, 1–28. https://doi.org/10.1139/dsa-2023-0079

Cicek, D., & Kantarci, B. (2023). Use of mobile crowdsensing in disaster management: A systematic review, challenges, and open issues. *Sensors, 23*(3), 1699. https://doi.org/10.3390/s23031699

Estuar, M. R. J., De Leon, M., Santos, M. D., Ilagan, J. O., & May, B. A. (2014). Validating UI through UX in the context of a mobile-web crowdsourcing disaster management application. *2014 International Conference on IT Convergence and Security (ICITCS)*, 1–4. https://doi.org/10.1109/ICITCS.2014.7021823

Ezeonu, N. A., Hertelendy, A. J., Adu, M. K., Kung, J. Y., Itanyi, I. U., Dias, R. da L., Agyapong, B., Hertelendy, P., Ohanyido, F., & Agyapong, V. I. O. (2024). Mobile apps to support mental health response in natural disasters: Scoping review. *Journal of Medical Internet Research, 26*. https://doi.org/10.2196/49929

Fazeli, S., Haghani, M., Mojtahedi, M., & Rashidi, T. H. (2024). The role of individual preparedness and behavioural training in natural hazards: A scoping review. *International Journal of Disaster Risk Reduction, 105*. https://doi.org/10.1016/j.ijdrr.2024.104379

Grinko, M., Kaufhold, M.-A., & Reuter, C. (2019). Adoption, use and diffusion of crisis apps in Germany: A representative survey. In Proceedings of Mensch und Computer 2019 (263–274). https://doi.org/10.1145/3340764.3340782

Ida, R., Widiyantoro, S., Gunawan, E., Sunarti, E., Marliyani, G. I., & Saud, M. (2022). The use of digital media and modes of communication of affected people: A case study of earthquakes in East Java, Indonesia. *Journal of Disaster Research, 17(*6), 1037–1047. https://doi.org/10.20965/jdr.2022.p1037

Johnson, P. M., Baroud, H., Brady, C. E., & Abkowitz, M. (2023). Who contributes to disaster preparedness? Predicting decision making in social dilemmas pertaining to community resilience. *Risk Analysis, 43*(12), 2659–2670. https://doi.org/10.1111/risa.14116

Kangana, N., Kankanamge, N., De Silva, C., Goonetilleke, A., Mahamood, R., & Ranasinghe, D. (2024). Bridging community engagement and technological innovation for creating smart and resilient cities: A systematic literature review. *Smart Cities, 7*(6), 3823–3852. https://doi.org/10.3390/smartcities7060147

Karl, I., Rother, K., & Nestler, S. (2015). Crisis-related apps: Assistance for critical and emergency situations. *International Journal of Information Systems for Crisis Response and Management (IJISCRAM), 7*(2), 19–35. https://doi.org/10.4018/IJISCRAM.2015040102

Kolathayar, S., Karan Kumar, V., Rohith, V.R., Priyatham, K., Nikil, S., Anupa, S.A. (2019). Development of mobile application to assess and enhance earthquake preparedness level of individuals and community in India. In: Fatahi, B., Mwanza, A., Chang, D. (eds) Sustainable design and construction for geomaterials and geostructures. GeoChina 2018. Sustainable Civil Infrastructures. *Springer, Cham*. https://doi.org/10.1007/978-3-319-95753-1_16

Kuula, J., Kettunen, P., Auvinen, V., Viitanen, S., Kauppinen, O., & Korhonen, T. (2013). Smartphones as an alerting, command and control system for the preparedness groups and civilians: Results of preliminary tests with the finnish police. *ISCRAM*, 42–51. Retrieved from: https://idl.iscram.org/files/kuula/2013/666_Kuula_etal2013.pdf. Accessed on 15th July, 2024

Kwee-Meier, S. T., Wiessmann, M., & Mertens, A. (2017). Integrated information visualization and usability of user interfaces for safety-critical contexts. *International Conference on Engineering Psychology and Cognitive Ergonomics*, 71–85. https://doi.org/10.1007/978-3-319-58475-1_6

Levac, D., Colquhoun, H., & O'Brien, K. K. (2010). Scoping studies: Advancing the methodology. *Implementation Science, 5*, 69. https://doi.org/10.1186/1748-5908-5-69

Mehmood, A., Barnett, D. J., Kang, B.-A., Chhipa, U.-A., Asad, N., Afzal, B., & Razzak, J. A. (2023). Enhancing a willingness to respond to disasters and public health emergencies among health care workers, using mHealth intervention: A multidisciplinary approach. *Disaster Medicine and Public Health Preparedness, 17*. https://doi.org/10.1017/dmp.2023.129

Meyer, M. A., Yu, S., Semien, J., Van Zandt, S., & Burke, S. (2025). Planning for disaster recovery: planner perspectives and experiences. *Journal of the American Planning Association, 91*(2), 239–255. https://doi.org/10.1080/01944363.2024.2367031

Navarro de Corcuera, L., Barbero-Barrera, M. D. M., Campos Hidalgo, A., & Recio Martínez, J. (2022). Assessment of the adequacy of mobile applications for disaster reduction. Environment, Development and Sustainability, 1–27. https://doi.org/10.1007/s10668-021-01697-2

Nilsson, E. G., & Stølen, K. (2011). Generic functionality in user interfaces for emergency response. *Proceedings of the 23rd Australian Computer-Human Interaction Conference*, 233–242. https://doi.org/10.1145/2071536.2071574

Nourozi, K., Saeli, E., Khankeh, H., Kavari, S. H., Rezasoltani, P., & Fathi, B. (2016). The effect of risk reduction intervention on earthquake disaster preparedness of the elderly people. *Health in Emergencies & Disasters Quarterly, 1*(2), 89-96. Retrieved from: http://hdq.uswr.ac.ir/article-1-68-fa.html.Accessed on 18th July, 2024.

Nurse, J. R. C., Creese, S., Goldsmith, M., Craddock, R., & Jones, G. (2012). *An initial usability evaluation of the secure situation awareness system*. Retrieved from: https://kar.kent.ac.uk/67531/. Accessed on 24th July, 2024

Pandey, N., Rani, P., & Kundu, S. (2025). An intelligent disaster management system: integrating technology for effective response and recovery. *2025 3rd International Conference on Intelligent Systems, Advanced Computing and Communication (ISACC),* 1107–1112. https://doi.org/10.1109/ISACC65211.2025.10969224.

Paul, J. D., Bee, E., & Budimir, M. (2021). Mobile phone technologies for disaster risk reduction. *Climate Risk Management, 32*. https://doi.org/10.1016/j.crm.2021.100296

Prasad, A., Gasco-Hernandez, M., Gil-Garcia, J. R., & Yuan, Q. (2023). Human-centric design in applications for emergency preparedness and response in rural communities: The case of the e! app. *Proceedings of the 24th Annual International Conference on Digital Government Research*, 380–387. https://doi.org/10.1145/3598469. 3598512

Rivas, L.Y.C., Domínguez, E.L., Velázquez, Y.H., Isidro, S.D., Nieto, M.A.M., De La Calleja, J. (2024). Intelligent mobile distributed management systems for emergencies such as earthquakes or fires: A systematic literature review. In: Mejía, J., Muñoz, M., Rocha, A., Hernández Pérez, Y., Avila-George, H. (eds) New perspectives in software engineering. studies in computational intelligence, vol 1135. Springer, Cham. https://doi.org/10.1007/978-3-031-50590-4_21

Sarshar, P., Nunavath, V., & Radianti, J. (2015). On the usability of smartphone apps in emergencies: An HCI analysis of GDACSmobile and SmartRescue apps. *Human-Computer Interaction: Interaction Technologies: 17th International Conference, HCI International 2015, Los Angeles, CA, USA, August 2-7, 2015, Proceedings, Part II 17*, 765–774. https://doi.org/10.1007/978-3-319-20916-6_70

Shafapourtehrany, M., Batur, M., Shabani, F., Pradhan, B., Kalantar, B., & Özener, H. (2023). A comprehensive review of geospatial technology applications in earthquake preparedness, emergency management, and damage assessment. Remote Sensing, 15(7). https://doi.org/10.3390/rs15071939

Shukla, M., Amberson, T., Heagele, T., McNeill, C., Adams, L., Ndayishimiye, K., & Castner, J. (2024). Tailoring household disaster preparedness interventions to reduce health disparities: Nursing implications from machine learning importance features from the 2018–2020 FEMA national household survey. *International Journal of Environmental Research and Public Health, 21*(5). https://doi.org/10.3390/ijerph21050521

Sukhwani, V., & Shaw, R. (2020). Operationalizing crowdsourcing through mobile applications for disaster management in India. *Progress in Disaster Science, 5*. https://doi.org/10.1016/j.pdisas.2019.100052

Susmini, S., Feri, J., Wijaya, S., Wibowo, W. D. A., Arifin, H., & Lee, B.-O. (2023). The effects of a disaster preparedness app on community knowledge and intentional behavior in hurricane risk areas. *Disaster Medicine and Public Health Preparedness, 17*. https://doi.org/10.1017/dmp.2022.46

Syukron, M., Madugalla, A., Shahin, M., & Grundy, J. (2024). A comprehensive study of disaster support mobile apps. *ArXiv Preprint, Cornell University*. https://doi.org/10.48550/arXiv.2407.08145

Tan, M. L. (2020). *Usability of disaster apps: understanding the perspectives of the public as end-users: a*

dissertation presented in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Emergency Management at Massey University, Wellington, New. Massey University. Retrieved from: http://hdl.handle.net/10179/15393. Accessed on 18th July, 2024

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., & Weeks, L. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Annals of Internal Medicine, 169*(7), 467–473. https://doi.org/10.7326/M18-0850

Wang, Y., Li, J., Zhao, X., Feng, G., & Luo, X. (2020). Using mobile phone data for emergency management: a systematic literature review. *Information Systems Frontiers, 22*, 1539–1559. https://doi.org/10.1007/s10796-020-10057-w

Xu, W., An, X., Li, E., Wang, C., & Zhao, L. (2020). Earthquake early warning system in Liaoning, China based on PRESTo. *Earthquake Science, 33*(5–6), 281–292. https://doi.org/10.29382/eqs-2020-0281-01

Yuwono, A., Chrysler, A., Puteri, T., Warnars, H. L. H. S., Adnandi, M. A., & Maulana, I. (2019). Mobile application development to mitigate the risk of earthquake. *2019 IEEE International Conference on Engineering, Technology and Education (TALE)*, 1–5. https://doi.org/10.1109/TALE48000.2019.9225888.