An Analysis of Cultural Responsiveness, Inclusivity, and Accessibility in Crisis mHealth Apps

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ABSTRACT

Mobile health (mHealth) apps increasingly support crisis response and management, yet their effectiveness across diverse populations remains underexamined. Older adults, people with disabilities, and low-resource communities often face linguistic, technological, and design barriers that limit their ability to benefit fully from crisis-focused mHealth tools. During crises, such barriers risk amplifying existing digital inequities and restricting access to critical health information. This study systematically evaluates crisis-focused mHealth apps in terms of cultural responsiveness, inclusivity, and accessibility. Findings reveal recurring design gaps and inform the Equitable Digital Crisis Infrastructure (EDCI) Framework, which reconceptualizes digital resilience as a function of both operational capacity and inclusiveness, and offers actionable design recommendations to strengthen equitable crisis response.

Keywords

mHealth, crisis, cultural responsiveness, inclusivity, accessibility.

INTRODUCTION

Natural and human-made disasters present severe challenges to healthcare provision, as damage to infrastructure, power outages, water shortages, road destruction, and communication interruptions can hinder timely and appropriate care to those in need (Salam et al., 2023). These disruptions expose the limitations of traditional emergency preparedness and response systems, and highlight the need for more resilient and adaptive response strategies.

Digital technologies, particularly mobile apps, have become integral to crisis response (Tan et al., 2017). They facilitate rapid information dissemination, resource tracking, and coordination among crisis responders and affected populations (Cawley & McEntire, 2024). In healthcare contexts, mobile health (mHealth) apps can mitigate geographic and infrastructural constraints, enhancing the resilience and continuity of healthcare services in crisis settings. Through real-time monitoring, virtual consultations, and data-driven decision support, these technologies can improve access and coordination of care during emergencies (Roncero et al., 2020).

Despite the rapid proliferation of crisis-focused mHealth tools, ensuring their accessibility and effectiveness across diverse populations remains a challenge (Zakerabasali et al., 2021). Linguistic diversity, cultural norms, limited health literacy, and technological barriers can restrict meaningful user engagement with these tools (Bitomsky et al., 2025). Addressing these contextual factors is critical to designing digital interventions that are accessible, inclusive, and equitable for all communities during crises.

This study systematically evaluates crisis mHealth apps to assess their cultural responsiveness, accessibility, and inclusivity. We address two research questions:

1. To what extent do current crisis mHealth apps accommodate linguistic, cultural, and accessibility needs?

2. What structural design gaps exist that may limit the effectiveness of crisis mHealth apps for diverse populations?

Drawing on these findings, we inductively develop the *Equitable Digital Crisis Infrastructure (EDCI) Framework*, which reconceptualizes digital resilience as a function of both operational capacity and inclusiveness. Identifying and addressing barriers to the adoption of crisis mHealth apps is critical to preventing digital exclusion and ensuring equitable access in times of crisis.

This study contributes to crisis informatics and digital health research in three ways. First, it provides a systematic evaluation of crisis-focused mHealth apps through the combined lenses of cultural responsiveness, inclusivity, and accessibility, dimensions that are often examined in isolation. Second, it identifies recurring structural design limitations that constrain equitable use across diverse populations. Third, it introduces the EDCI Framework, which integrates these dimensions into a unified perspective on digital crisis resilience. This contribution is relevant in contemporary crisis contexts, including public health emergencies (e.g., pandemics), climate-related disasters (e.g., wildfires and floods), and geopolitical disruptions, which highlight the need for accessible and culturally responsive mHealth apps. Such tools can help maintain continuity of care, deliver timely health information, and support vulnerable populations particularly when traditional health systems are disrupted.

LITERATURE REVIEW

mHealth apps hold substantial potential for supporting crisis response and management. However, their effectiveness depends not only on technical functionality but also on their ability to serve diverse populations equitably. Cultural responsiveness, inclusivity, and accessibility are key determinants of the effectiveness and overall impact of crisis mHealth apps.

Cultural Responsiveness in Crisis mHealth Apps

Cultural responsiveness in mHealth refers to the design and implementation of digital health tools that are sensitive to the cultural, linguistic, and social contexts of diverse user populations (Nittas et al., 2025). It emphasizes the design of interfaces and content that align with users' cultural values, beliefs, and communication practices to improve the effectiveness and engagement of these tools (Naderbagi et al., 2025). Frameworks such as Hofstede's cultural dimensions, provide a theoretical foundation for understanding how cultural norms shape people's health behaviors and interactions with technology (Jan et al., 2024). For example, a diabetes management app, designed using cultural competence models, may incorporate culturally specific meal-planning features based on users' dietary traditions or suggest healthier adaptations of traditional foods. More recent approaches highlight the importance of continuous cultural humility and iterative co-design processes that center community voices, ensuring interventions remain relevant and contextually appropriate (Goff et al., 2024).

Practical implementation of cultural responsiveness extends well beyond language translation (Harrison et al., 2020) to include culturally relevant idioms, metaphors, and examples that resonate with target audiences (Kreuter & McClure, 2004). Understanding help-seeking norms is important because in some cultures, individuals may prefer family support or community leaders over direct professional consultation during crisis (Lin et al., 1982). Other cultural factors, including family dynamics and religious or spiritual practices, strongly influence how people interpret health information and respond to digital guidance during crises (World Health Organization, 2020). Without such adaptation, crisis apps risk alienating diverse users and limiting their potential to support effective action in crisis.

Despite broad recognition of the importance of cultural adaptation, empirical evidence on its implementation and effectiveness in crisis mHealth remains limited (Nittas et al., 2025). Culturally humble approaches that actively engage diverse participants, experts, and stakeholders can generate critical insights to inform the development, implementation, and evaluation of digital health interventions (Naderbagi et al., 2025). However, involving target users in cultural adaptation is often challenging due to resource constraints, time limitations, and the complexity of coordinating stakeholders across disciplines, frequently resulting in minimal or superficial adaptations (Naderbagi et al., 2025). Rigorous evaluations of the cultural responsiveness of mHealth apps are limited, underscoring a pressing need for systematic research in this domain (Hilty et al., 2021).

Inclusivity and Accessibility in Crisis mHealth Apps

While cultural responsiveness focuses on alignment with cultural contexts, inclusivity and accessibility emphasize the intentional integration of features such as simplified language, visual supports, adjustable settings, and intuitive navigation into the core design of crisis mHealth apps to ensure that users, regardless of literacy, cognitive ability, disability, or background, can access, understand, and confidently use these tools (Moreno et al., 2025).

Inclusivity ensures that diverse groups are actively involved in the design and implementation of mHealth apps, whereas accessibility emphasizes removing barriers that limit their use. International standards such as the Web Content Accessibility Guidelines (WCAG) specify technical design criteria to ensure digital tools are perceivable, operable, understandable, and robust for people with visual, auditory, motor, cognitive, and neurological disabilities. Legal frameworks such as the Americans with Disabilities Act (ADA) require organizations to meet these accessibility standards. In digital healthcare, adherence to WCAG helps ensure that apps and websites are usable by all patients, including those who rely on screen readers, voice commands, or alternative text formats. Universal design principles, including compatibility with assistive technologies, adjustable text sizes, high-contrast interfaces, clear navigation, and voice guidance aim to make products usable by the widest possible range of users without requiring individual adaptation thus supporting accessibility for users with visual, hearing, cognitive, or motor impairments. Yet, in domains such as mental health apps, accessibility research reveals widespread lack of responsiveness to system-level accessibility features such as screen readers and captions, and when such features exist, implementation is often inconsistent (Bunyi et al., 2021). Many digital health apps fail to report or adhere to accessibility principles and omit disability-related considerations altogether (Watson et al., 2025), reflecting broader challenges in designing inclusive digital health tools and indicates a gap between recommended guidelines and development practices (Watson et al., 2025).

Beyond disability-specific issues, technical barriers also limit access to crisis mHealth (Veinot et al., 2018). Many crisis apps require modern smartphones with up-to-date operating systems, excluding users with older or lower-cost devices (Hampton et al., 2024). Reliable internet connectivity, essential for real-time alerts and data updates, is often unavailable or unstable in rural and low-resource settings further restricting use (Graves et al., 2021)). Digital literacy (the ability to navigate app interfaces and understand digital content) also varies widely, with individuals unfamiliar with mobile technology facing challenges even when apps are otherwise well-designed (Paige et al., 2018). Demographic factors compound these technical challenges. Older adults may struggle with small text and complex navigation (Arcury et al., 2020), children require age-appropriate interfaces, and people in isolated locations face persistent connectivity constraints (Wildenbos et al., 2018). Socioeconomic status further influences access to devices and digital skills, as data costs and device ownership can prevent lower-income individuals from using mHealth apps, reinforcing existing inequities (Hengst et al., 2023). These disparities have become more pronounced in the post-pandemic period (Badr et al., 2024), resulting in the systematic exclusion of vulnerable populations including older adults, people with disabilities, low-income communities, and rural residents, from the benefits of crisis-oriented mHealth apps (Yang et al., 2025).

Design considerations around data security and privacy are also critical to inclusivity, as widespread adoption of mHealth depends on users' confidence in how their data are handled (Alzghaibi, 2025). For instance, a recent breach of New Zealand's widely used "Manage My Health" (MMH) portal compromised personal health data from approximately 126,000 patients, followed by a ransom demand for the stolen information (Health New Zealand, 2026). Such incidents can erode users trust and discourage adoption, particularly among populations already hesitant to engage with formal healthcare systems, thereby reinforcing existing digital inequalities. From a design perspective, this issue can be addressed by treating privacy, security, and trust as core usability requirements rather than solely backend concerns. This involves applying privacy-by-design principles, minimizing unnecessary data collection, and ensuring that consent processes are clear, transparent, and easy to understand. Collectively, these strategies may enhance user adoption and engagement, as trust is not solely a technical construct but a fundamental dimension of the user experience. However, implementing these approaches requires a culturally responsive lens to address the digital divide in at-risk communities and to ensure that diverse populations can engage with new, digitally enabled models of care (Lokmic-Tomkins et al., 2023).

Study Contribution

Current mHealth app development often operates with limited regulatory oversight and lacks robust evidence-bases and meaningful input from healthcare professionals (Voth et al., 2022). Despite advances in usability, persistent gaps in patient accessibility and clinician engagement highlight the need for human-centered design (Stan et al., 2025). The combined consideration of cultural responsiveness, inclusivity, and accessibility remains underexplored in digital health interventions, and crisis-oriented mHealth apps represent an even less examined subset, making confident claims about their accessibility difficult to substantiate. Consequently, systematic evaluation of mHealth apps is essential to ensure alignment with user needs, particularly in high-stakes emergency settings where equitable access is critical.

This work-in-progress addresses these gaps by evaluating crisis mHealth apps through the combined lenses of cultural responsiveness, inclusivity, and accessibility. It identifies structural design limitations that affect uptake and engagement, and introduces the EDCI Framework to guide the development of more inclusive and accessible mHealth solutions for crisis response.

METHODS

To address our research questions, we conducted a systematic search for crisis-related mHealth apps across the two dominant mobile app marketplaces, Google Play and the Apple App Store, between December 2025 and February 2026 using the keywords "emergency", “disaster”, "crisis" and "mHealth". To ensure comprehensive coverage and capture emerging or less visible apps, we supplemented these searches using artificial intelligence (AI) tools, including Microsoft Copilot, ChatGPT, Perplexity, and Gemini. The AI tools were used to support discovery and cross-checking of relevant apps rather than to autonomously generate or replace systematic search results.

Two authors first conducted parallel, independent searches across all platforms and AI tools. All authors then met to compare results, resolve discrepancies through discussion, and reach consensus on a final set of 99 apps for initial consideration.

We then screened each app for relevance to the study objectives. We excluded apps that (1) provided general health information without a crisis focus, or (2) addressed emergency preparedness or response without a clear connection to health-related crisis support. This yielded 19 apps for analysis (see Table 1).

From these 19, we selected the seven most frequently downloaded apps for in-depth evaluation. This included two apps exceeding 1 million downloads, two exceeding 500,000 downloads, and three exceeding 100,000 downloads. For these seven apps, we analyzed negative user feedback, focusing on 1-star ratings, to identify recurring design gaps and usability concerns reported by app users.

FINDINGS

We categorized the 19 apps into four groups based on primary functionality: emergency alert apps (6 apps), medical guidance apps (5 apps), mental health support apps (5 apps), and personal health record apps (3 apps). A detailed description of each category and the apps within them is provided in Table 1.

Our analysis revealed clear patterns in both purpose and temporal orientation. Most apps prioritized physical health, providing guidance for first aid, cardiac emergencies, and injury management. Examples include *PulsePoint Respond*, *MySOS, iFirstAid, First Aid: American Red Cross, EchoSOS, Stop the Bleed, Disaster Nursing, HazAdapt Emergency Safety App*, and GoodSAM Responder. In contrast, a smaller subset of apps, such as, *SAMHSA Disaster Behavioral Health*, *PFA*, *PTSD Coach*, *PTSD Family Coach*, and *Help Kids Cope*, focused on psychological and emotional recovery after crises.

Apps also varied in their emphasis on immediate response versus long-term recovery. Apps such as *PulsePoint Respond, MySOS, iFirstAid, First Aid: American Red Cross, EchoSOS, ICE Medical Standard, Stop the Bleed, ShowMe for Emergencies, HazAdapt Emergency Safety App, WIS Emergency, Medical ID, Disaster Nursing, GoodSAM Responder*, and *ICE-In Case of Emergency* prioritize immediate, real-time interventions during active crises. By contrast*, SAMHSA Disaster Behavioral Health, PFA, PTSD Coach, PTSD Family Coach*, and *Help Kids Cope* focused on long-term recovery support, offering coping strategies, behavioral health resources, and sustained psychological support following crises.

The remainder of this section is organized into two subsections: first, the cultural responsiveness, inclusivity, and accessibility features identified in the apps, and second, the design gaps that limit effectiveness for diverse populations.

Cultural Responsiveness, Inclusivity, and Accessibility Features

Cultural Responsiveness

Support for Multiple Languages: 74% of apps (n = 14) primarily supported English, with only a few offering additional languages such as Spanish, French, German, Italian, or Japanese. Where multilingual options existed, they were often limited in scope. The lack of linguistic diversity suggests that many apps may not adequately support non-English-speaking populations during crises.

Inclusivity

Population-Specific Design: 26% of apps (n = 5) demonstrated population-specific design. *Help Kids Cope* and *PTSD Family Coach* targeted children and families, while *PTSD Coach* addressed the needs of veterans experiencing posttraumatic stress disorder. Apps like *WIS Emergency* and *Show Me for Emergencies* were purposely built to support users with disabilities.

Table 1. Types of Crisis mHealth Apps

Category	App Name	Brief Description
Emergency alert apps connect users to emergency services to alert trained responders	PulsePoint Respond	Allows users to request CPR assistance from nearby trained responders.
	MySOS	Connects users with nearby blood donors during emergencies and allows users to register as donors.
	EchoSOS	Connects users with the right emergency service, shows the correct emergency number, shares location via GPS, and provides vital medical information during critical situations.
	GoodSAM Responder	Used by ambulance services to alert nearby trained off-duty paramedics, nurses, doctors, police and fire staff to cardiac emergencies.
	WIS Emergency call app def	Enables deaf, hard-of-hearing, and speech-impaired users to report emergencies using sign language.
	Show Me for Emergencies	Aids communication between public health emergency workers and people with difficulty hearing, speaking, or understanding instructions by using icons during an emergency.
Medical guidance apps provide instructions for health-related emergencies	iFirstAid	Provides instructions for effectively managing minor and major emergencies.
	First Aid: American Red Cross	Offers expert guidance with videos, quizzes, and step-by-step instructions for everyday emergencies.
	Stop the Bleed	Teaches life-saving techniques to control severe bleeding.
	HazAdapt: Emergency Safety App	Provides offline, expert guidance for before, during, and after emergencies.
	Disaster Nursing	Provides the need-to-know information for emergency situations for field, hospital, or classroom settings.
Mental health support apps focus on psychological well-being, offering resources for crisis-related anxiety or trauma.	SAMHSA Disaster Behavioral Health	Supports behavioral health professionals with evidenced based tools and resources on mental health and substance use in the aftermath of disasters.
	Psychological First Aid (PFA)	Assists responders in providing psychological first aid to survivors.
	PTSD Coach	Supports Veterans and military service members who (may) have Posttraumatic Stress Disorder.
	PTSD Family Coach	Offers guidance to family members of individuals with posttraumatic stress disorder on self-care, relationships, and accessing right treatment.
	Help Kids Cope	Helps parents discuss disasters with children.
Personal health record apps store user's medical information for facilitating care during emergencies.	ICE - In Case of Emergency	Stores emergency contacts and essential medical information for immediate access in an unfortunate accident.
	ICE Medical Standard	Allows storing essential medical information that provides first responders quick access to vital health details during emergencies.
	Medical ID	Allows creating medical profiles with allergies, blood type, medical contacts, that are accessible from lock screen. Ensures first responders have quick access to vital details in case of emergency.

Usability for Non-Medical Professionals: 21% of apps (n = 4), i.e., *First Aid: American Red Cross*, *Stop the Bleed*, *iFirstAid*, and *HazAdapt* provided instructions for managing health emergencies that could be followed by users without any formal medical training. These features enhance usability for the general public during emergencies.

Platform and Device Availability: Most apps were available across platforms, with 95% (n = 18) available on Google Play, 84% (n = 16) on the Apple App Store, and 79% (n = 15) on both platforms (see Figure 1). Device compatibility extended across Android smartphones (94%, n = 18), iPhones (84%, n = 16), iPads (68%, n = 13), Android tablets (42%, n = 8), with limited support for Chromebooks (5%, n = 1) and Apple Watches (5%, n = 1) (see Figure 1). This broad availability supports inclusivity across diverse user groups and device preferences.

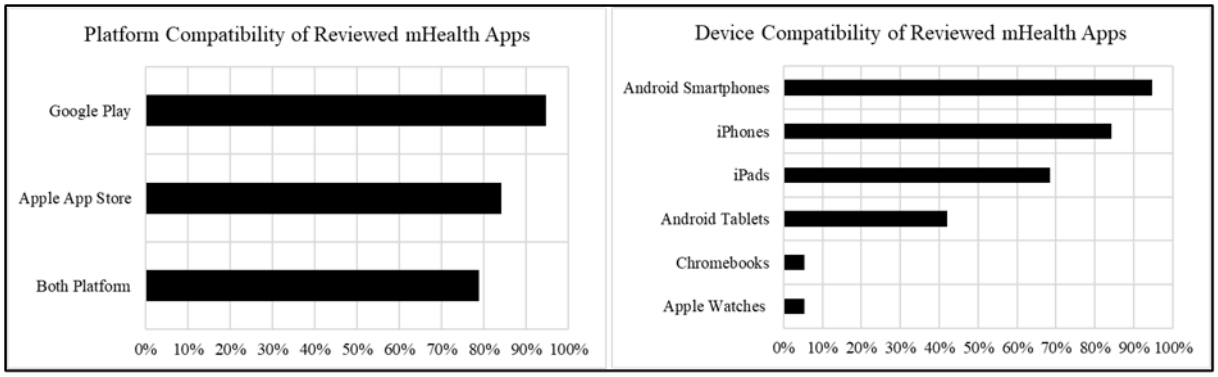

Figure 1. Platform (left) and Device (right) compatibility of reviewed mHealth applications.

Accessibility

Figure 2 summarizes how crisis mHealth apps addressed users with visual and auditory accessibility, assistive technology compatibility, and offline functionality.

Visual Accessibility: 21% of apps (n = 4), namely *PulsePoint Respond*, *PTSD Coach*, *PTSD Family Coach*, and *PFA* incorporated visual accessibility features such as larger text, high contrast, and color differentiation.

Auditory Accessibility: 16% of apps (n = 3) included auditory accessibility features, such as captions (e.g., *PFA, PTSD Coach*, and *PTSD Family Coach*). Additionally, *WIS Emergency* supported communication through sign language and text, enhancing accessibility for users with hearing impairments.

Assistive Technology Compatibility: 21% of apps (n = 4), namely *PulsePoint Respond*, *PTSD Coach*, *PTSD Family Coach*, and *PFA,* demonstrated compatibility with screen readers (e.g., VoiceOver).

Offline Functionality: Only one app in our dataset (*HazAdapt),* offered preparedness guidance that could be accessed without internet connectivity, highlighting a critical limitation in network-disrupted disaster contexts.

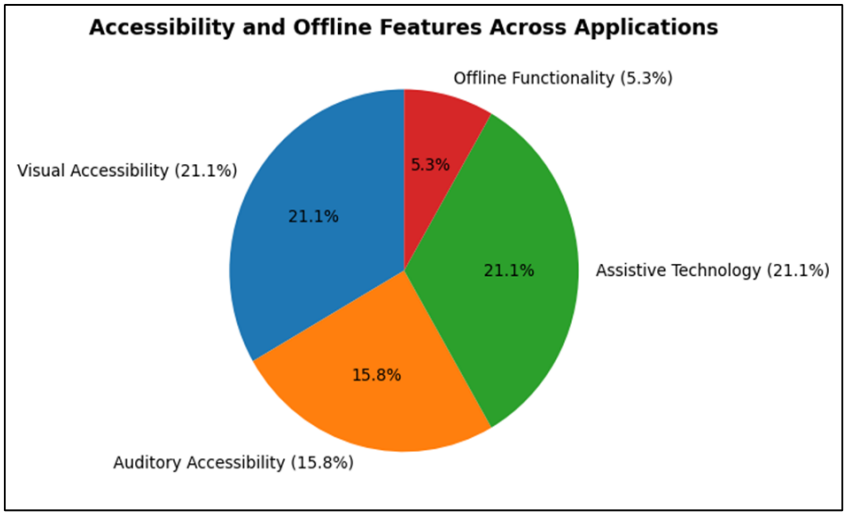

Figure 2. Accessibility and Offline Features Across Applications

Design Gaps Limiting the Effectiveness of Crisis mHealth Apps for Diverse Populations

Cultural and Inclusivity Challenges

Broader inclusivity challenges were evident in cultural and demographic design choices. A majority of apps (74%, n = 14) were predominantly English-only, limiting accessibility for non-English-speaking populations during crises. Additionally, 16% of apps (n = 3), including *PFA*, *SAMHSA Disaster Behavioral Health*, and *Disaster Nursing* targeted healthcare professionals, limiting usability for the general population during emergencies. Moreover, one (5%) app, *ICE Medical Standard* was available only on the Apple app store and three apps (16%), namely *MySOS*, *Medical ID*, and *ICE – In Case of Emergency* were available only on Google Play. Such device exclusivity may reduce accessibility in regions where other operating systems are more prevalent. These gaps highlight systemic challenges in ensuring equitable reach across diverse populations.

Accessibility Challenges

Findings show that accessibility features were limited across the reviewed apps. Only a few apps addressed communication, sensory, or cognitive impairments, and existing accessibility features were inconsistently implemented and poorly documented, making it difficult for users with disabilities to assess usability prior to an emergency. Apps like *Disaster Nursing* and *Medical ID* used dense text, small fonts, low-contrast, and unclear icons, limiting usability for older adults and users with visual impairments. Auditory accessibility was minimal, and cognitive accessibility was constrained by professional terminology, complex navigation, and redundant onboarding, increasing cognitive load during high-stress situations. Simplified text, adaptive screens, and other inclusive design elements were rare, leaving vulnerable populations at a disadvantage during high-stress crisis situations.

Technical and Socioeconomic Challenges

The majority of apps relied on internet connectivity, real-time data, GPS, or integration with local services, limiting functionality when network infrastructure was compromised. App sizes and storage requirements posed additional barriers in low-bandwidth environments. Regional differences in local emergency service integration created inconsistent user experiences across locations. Socioeconomic factors, including paywalled features and professional-focused design, further restricted access, amplifying inequities in critical health support during emergencies.

These gaps reveal systemic limitations in current crisis mHealth apps and highlight the need for a framework that integrates operational effectiveness with inclusiveness. In the next section, we introduce the EDCI Framework, which builds directly on these findings to guide inclusive, culturally responsive, and accessible crisis mHealth design.

DISCUSSION

Our analysis of crisis mHealth apps revealed that while functional capabilities such as alerts, medical guidance, mental health support, and personal health record management are generally well developed, cultural responsiveness, accessibility, and inclusivity remain systematically underprioritized.

Theoretical Contributions

From Performance-Centric to Equity-Centric Evaluation

ISCRAM research has traditionally assessed digital crisis systems through efficiency, coordination, and adoption metrics. This study reframes the fundamental evaluative question from: "*Does the system work?*" to "*For whom does the system work under crisis conditions?*", thus integrating cultural responsiveness, accessibility, and inclusiveness.

The Digitally Privileged User as an Embedded Design Assumption

Across the reviewed apps, limited multilingual support, inconsistent accessibility, and design choices oriented toward medically trained or tech-proficient users suggest an implicit "digitally privileged user" model embedded in crisis app design. This model assumes stable connectivity, modern devices, dominant-language proficiency, and familiarity with digital interfaces. In crisis contexts, where infrastructure may be disrupted and vulnerable

populations disproportionately affected, such assumptions can inadvertently amplify existing inequalities, connecting crisis informatics to broader sociotechnical and digital divide concerns.

Practical Design Recommendations

The findings carry several implications for public agencies, developers, and platform providers. Public agencies and emergency management authorities should mandate multilingual support and accessibility compliance for crisis mHealth apps. Offline functionality should also be treated as a critical capability in disaster-prone regions where network infrastructure may be compromised.

Developers should embed inclusive and assistive design principles from the earliest stages of app development rather than retrofitting them after release. Participatory co-design approaches with vulnerable populations can surface implicit assumptions about users and ensure that apps better meet diverse needs (Moreno et al., 2025; Donkin et al., 2024; Lokmic-Tomkins et al., 2023). Device and operating system compatibility should be broadened to reduce exclusion based on hardware constraints.

Platform providers can promote equitable access by clearly indicating accessibility and inclusiveness features for crisis-related apps within their marketplaces. Curated crisis app collections could prioritize apps that meet equity-focused design standards, guiding users towards tools that are both functional and inclusive.

Toward the Equitable Digital Crisis Infrastructure (EDCI) Framework

Building on the findings of this study, we propose the EDCI Framework, which reconceptualizes digital resilience as a function of both operational capacity and inclusiveness. It consists of four interrelated constructs:

Functional Capacity: This refers to the technical capabilities of a crisis mHealth app, including features such as emergency alerts, medical guidance, mental health support, and personal health data access. It represents what the system is capable of doing under ideal conditions. As observed in our analysis, many apps demonstrate relatively strong functional capacity. However, functional capacity reflects potential capability rather than realized societal impact.

Access Enablers: These refers to socio-technical conditions and design features that determine whether users can actually access and use system functionality under crisis conditions. While functional capacity reflects *what is available*, access enablers determine *who can effectively use it*. Based on our findings, these include cultural responsiveness (e.g., multilingual support), inclusivity (e.g., design for diverse populations, usability for non-medical professionals, and platform and device compatibility), and accessibility features (e.g., visual, auditory, assistive-technology integration, and offline capability). Access enablers act as structural mediators that translate functional capability into usable capacity across diverse contexts, particularly when crises disrupt infrastructure and amplify existing inequalities.

Equitable Reach: This refers to the extent to which diverse population groups across language, age, ability, expertise, and technological resources can effectively access and use crisis app's functionality. Apps with limited access enablers may achieve high functional capacity while remaining socially selective, benefiting only subsets of the population (Guo et al., 2013).

Digital Crisis Resilience: This refers to the app's ability to sustain effective support for heterogeneous populations under conditions of stress and disruption. Within this framework, resilience is an emergent outcome that depends on equitable reach so that all users, regardless of language, ability, or technological access, can effectively benefit from the system during crises.

The EDCI Framework (see Figure 3) implies following key theoretical claims:

- High functional capacity without strong access enablers limits equitable reach.
- Access enablers amplify or attenuate the societal impact of functional capacity (Guo et al., 2013).
- Equitable reach is a necessary condition for achieving digital crisis resilience.
- Digital crisis resilience emerges only when diverse populations can effectively access functionality.

This framework reframes crisis preparedness, emphasizing that preparedness requires alignment between what apps can do and who can meaningfully access what they do. Without such alignment, digital infrastructures risk reorganizing vulnerability rather than mitigating it.

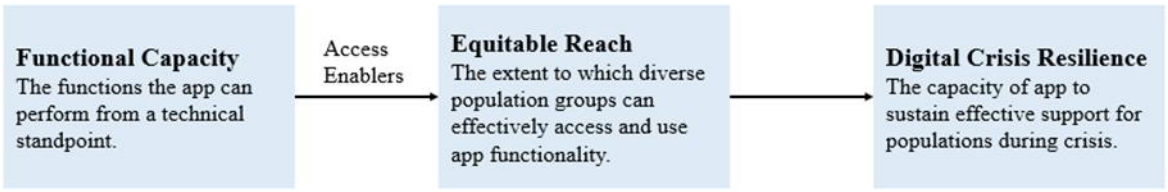

Figure 3. The Equitable Digital Crisis Infrastructure

Limitations and Future Research

This work-in-progress study has some limitations. First, the analysis relies on publicly available app descriptions, which reflect developers' communicated priorities rather than verified feature performance. While these descriptions are analytically meaningful as they signal how developers publicly frame crisis support and what dimensions they choose to emphasize, they may not fully represent actual usability or functionality in practice. Second, the selected keyword set used to identify applications may have constrained the scope of the sample, potentially excluding relevant apps that use alternative terminology or are categorized differently within app marketplaces. As a result, the dataset may not fully capture the breadth of crisis-oriented mHealth tools currently available. Third, the EDCI Framework is currently in its early stages of development and requires further validation.

In future phases of this study, we plan to:

- Conduct a Delphi study to establish consensus on the key dimensions of the EDCI framework.
- Validate and refine the EDCI Framework through empirical studies involving practitioners and end users.
- Conduct user testing of crisis mHealth apps with diverse populations, including individuals with disabilities, non-native language speakers, and users in resource-limited environments.

CONCLUSION

Our analysis of crisis-focused mHealth apps shows that while most apps are functionally robust, covering alerts, medical guidance, mental health support, and personal health records, they often lack cultural responsiveness, accessibility, and inclusiveness, thereby favoring digitally privileged users. The EDCI Framework demonstrates that functional capacity alone does not guarantee resilience; access enablers like multilingual support, assistive features, offline functionality, and broad device compatibility are essential for achieving equitable reach. Without integrating inclusiveness into core design, digital systems risk reinforcing existing vulnerabilities rather than alleviating them. True crisis resilience requires technologies that effectively serve all populations under stress and disruption.

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