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No One Left Behind: Accessible Emergency Communication and Social Sustainability in the European Union

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ABSTRACT:
Accessible emergency communication is essential for inclusive and socially sustainable crisis response in the European Union. While emergency number 112 is intended to serve everyone, access remains uneven, particularly for people with disabilities and others facing communication barriers in emergency situations. This paper explores accessible emergency communication as a core public service capability rather than a technical add-on. It asks how accessibility contributes to social sustainability and inclusive crisis resilience across the EU. The analysis is grounded in public administration and crisis governance perspectives, where equity, trust, and institutional responsibility are central concerns. The study uses a qualitative, policy-oriented approach. A PRISMA-informed synthesis of academic research, EU policy documents, and institutional reports is conducted. The analysis identifies four interconnected dimensions: accessible communication, public service governance, crisis resilience, and disability inclusion. The findings show that accessibility is often addressed reactively and inconsistently, limiting the social sustainability of emergency systems. The paper argues that treating accessibility as a structural governance responsibility is essential to ensure that no one is left behind when emergencies occur.

Keywords: emergency communication accessibility; social sustainability; disability inclusion; public services; inclusive resilience

1. Introduction

Social sustainability is a central dimension of sustainable development. It refers to the capacity of societies to ensure inclusion, equity, and well-being for all people over time. Access to essential public services plays a key role in this process, particularly for groups exposed to structural vulnerability. When access is unequal, social risks tend to increase, and trust in public institutions can be weakened (Tierney, 2012; Hansson et al., 2020).

Emergency communication systems are a crucial part of social infrastructure. In crises, disasters, or acute health emergencies, timely communication with public authorities can be decisive. Research on crisis and disaster governance shows that resilience and institutional legitimacy depend not only on response capacity but also on whether systems function equitably under pressure (Boin, Hart & Sundelius, 2016; Nohrstedt et al., 2018).

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From this perspective, accessibility is not a secondary or technical issue, but a structural condition for inclusive and sustainable governance (Renn, 2008; van Asselt and Renn, 2011).

People with disabilities are especially affected by shortcomings in emergency communication. In emergencies, they face higher risks and barriers related to hearing, speech, cognition, or interaction with digital systems, which can block effective communication and delay assistance, with serious consequences (Hansson et al., 2020; Jesus et al., 2021). These challenges may be invisible in everyday life but become critical under stress. Digitalisation has transformed emergency communication across Europe, improving efficiency and coordination but not always through inclusive design. Differences in digital skills, access to assistive technologies, and socio-environmental conditions shape how people interact with emergency services (Mitchell et al., 2022; Holliman et al., 2023). When systems are built around standardised users, exclusion can become structural rather than exceptional (Pescaroli & Alexander, 2018).

Within the European Union, the single emergency number 112 is intended to guarantee universal access to emergency services. This principle is reflected in the European policy framework, including the European Accessibility Act, which establishes the obligation to ensure equivalent access to emergency communications for persons with disabilities (European Parliament and Council of the European Union, 2019). However, despite these legal commitments, implementation remains uneven across Member States.

Recent European Commission reports show progress in digitalisation and system coordination but also highlight ongoing fragmentation in accessible communication channels within national emergency systems (European Commission, 2024). Consequently, the level of accessibility available to users often depends on national context rather than shared European standards. From a social sustainability perspective, these gaps have long-term implications. Social sustainability relies not only on the existence of public services but also on their capacity to adapt to diverse needs and evolving risks. Exclusionary system designs can turn temporary crises into lasting structural vulnerabilities, especially for persons with disabilities, who already face heightened risks during emergencies (Renn, 2008; van Asselt & Renn, 2011; Pescaroli & Alexander, 2018).

Against this background, this paper addresses the following research question: How does accessible emergency communication contribute to social sustainability and inclusive crisis resilience in the European Union?

The paper has four aims. First, it positions accessible emergency communication as a core pillar of social sustainability, beyond mere compliance or technical concerns. Second, it evaluates accessibility in European emergency communication through EU policy documents and implementation reports. Third, it analyzes how differing accessibility practices shape inclusive crisis resilience across Member States, with a focus on persons with disabilities. Fourth, it proposes policy and governance measures to embed accessibility as a long-term sustainability goal in emergency communication. By framing accessibility as public infrastructure that advances equity, public health, and institutional legitimacy, the paper informs debates on sustainable development, crisis governance, and inclusive public services. Ensuring no one is left behind in crises is both a moral duty and a requirement for socially sustainable societies.

2. Literature Review

Research on crisis governance shows that public administrations are judged not only on response capacity but also on how they govern under pressure. Work on transboundary crises shows that modern emergencies often cross organisational and jurisdictional boundaries, demanding coordination across institutional, sectoral and territorial levels (Ansell, Boin & Keller, 2010). In such settings, failures are rarely purely technical; they stem from institutional fragmentation and unclear responsibility. Later studies note that crises can develop gradually. Boin, Ekengren & Rhinard's (2020) concept of creeping crises describes risks that grow over time and remain insufficiently addressed until they escalate. This is pertinent for accessibility in public services, where long-standing gaps may remain hidden until an emergency exposes them. Public administration research also stresses legitimacy. Christensen, Laegreid & Rykkja (2016) argue that crisis management capacity must be balanced with democratic accountability and public trust. During COVID-19, high-performing governments combined strong coordination with transparent, inclusive communication (Christensen & Laegreid, 2020). Classic crisis research identifies learning and adaptation as core governance functions: Farazmand (2007) and Comfort (2007) show that crises reveal institutional blind spots, especially in communication and coordination. Recent comparative work confirms that crisis governance can unintentionally harm vulnerable groups when inclusivity is not built into decision-making (Janssen et al., 2025). Procedurally, Vasickova (2019) argues that crisis management should integrate prevention, response and recovery, rather than treat them as separate phases.

Across the literature, persons with disabilities face structural barriers in accessing public and emergency services, not only in physical access but also in communication formats, information processing, and system design (Walji et al., 2021; Carmichael et al., 2023). In emergencies, these barriers can delay or prevent assistance. Lived-experience studies show how this exclusion occurs: Armstrong-Wood et al. (2023) find that many digital and communication systems assume motor, sensory, or cognitive abilities that some users lack, so systems designed for efficiency can become inaccessible when reliability is most critical. Disability-related vulnerability is intensified by broader social and health inequalities. Holliman et al. (2023) show how disability intersects with race, health, and socio-economic status to produce unequal crisis outcomes. Evidence from low- and middle-income countries confirms that emergencies magnify existing disparities for persons with disabilities, especially where institutional support is weak (Rohwerder et al., 2022). Research on humanitarian and health crises echoes these findings: Lee et al. (2023) and Aav (2025) show how communication barriers affect displaced and refugee populations, many with disability-related vulnerabilities. At policy level, Eurofound (2023) shows that unequal access to services during large-scale crises has long-term consequences for integration, trust, and well-being.

Digitalisation has reshaped public and emergency communication. Digital tools can enhance speed, coordination, and information sharing but also create new exclusions. Access to technology does not guarantee effective use, especially in stressful, time-critical situations. Empirical research shows wide variation in users' digital capability in emergencies. Andersen et al. (2025) find that patients' interaction with digital systems

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depends on age, education, health, and disability, aligning with broader evidence that marginalised groups face structural barriers to meaningful digital participation (Choudhary & Bansal, 2022). The concept of digitainability links digital competence to social sustainability, with Sa et al. (2021) arguing that digital transformation must be inclusive to support long-term resilience. From this perspective, media and digital literacy are essential for accessing modern public services. Lacourt (2024) notes that digital literacy is especially crucial in high-risk situations, where misinformation or poor interface design can heighten vulnerability. New technologies in emergency response, such as integrated platforms and sensor-based systems, increase the complexity of digital emergency infrastructures (Damasevicius et al., 2023; Wolf et al., 2022). These systems can improve accessibility but require careful governance to avoid reinforcing inequalities.

At EU level, emergency communication accessibility rests on a comprehensive legal and policy framework. The European Electronic Communications Code and related measures require equivalent access to emergency services for all users, but implementation is difficult. European Commission reports show gradual progress in digitalisation and coordination, yet persistent disparities in accessible communication channels across Member States (European Commission, 2020; 2022; 2024), driven by technical and institutional differences in governance, resources, and priorities. Civil society organisations highlight a gap between legal commitments and lived experience. Joint statements and monitoring reports point to ongoing barriers for persons with hearing and speech disabilities, especially for real-time text, relay services, and alternative communication modes (EENA & EDF, 2025; European Union of the Deaf, 2025). OECD (2023) finds that inclusive emergency communication closely depends on broader governance capacity and social policy coordination.

This study advances research on emergency call accessibility in Europe. Earlier work examined accessibility through technological, operational, and managerial lenses. Studies on location technologies and alternative access channels show measurable gains in emergency response but also persistent governance and implementation gaps (Bokor et al., 2025a; 2025b). Recent research treats accessibility as a strategic crisis-management capability linked to preparedness and institutional performance (Bokor, Certan & Nen, 2026). Bibliometric analyses indicate growing international interest in emergency communication, digitalisation, and inclusion, but relative neglect of social sustainability (Bokor et al., 2026). Building on this, the paper applies a social sustainability lens to examine accessible emergency communication as a public infrastructure capability rather than a purely technical or compliance issue.

Technology is vital for improving emergency communication accessibility but not sufficient. Research on AI-supported systems, integrated platforms, and digital emergency infrastructures shows strong potential for better communication and coordination (Damasevicius et al., 2023; Wolf et al., 2022). However, without inclusive governance, training, and user-centred design, these tools can reproduce or worsen inequalities. Technology must therefore be treated as one element within a broader social sustainability framework. Accessibility outcomes depend on how tools are embedded in governance, organisational practices, and policy priorities. Figure 1 illustrates this by linking key dimensions from the literature: governance, vulnerability, digital capability, and institutional resilience.

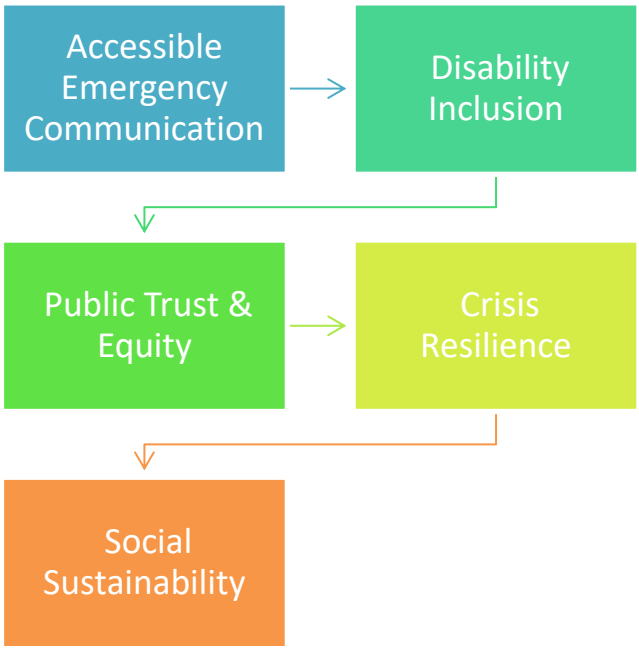

Figure 1. Key dimensions shaping social sustainability in emergency communication systems.

Source: Authors' conceptualisation based on the reviewed literature.

Figure 1 summarises the literature, showing how these dimensions interact to shape social sustainability in emergency communication systems and affect inclusive crisis resilience.

3. Methods

This study adopts a qualitative, policy-oriented design that integrates a PRISMA-informed literature review with conceptual and documentary analysis. The exploratory and interpretive approach is consistent with the aim of examining how accessible emergency communication contributes to social sustainability and inclusive crisis resilience in the European Union. Rather than being used as a framework for quantitative meta-analysis, PRISMA was applied to support transparent and structured reporting within an interdisciplinary and conceptually oriented review (Page et al., 2021). The methodological design reflects the objective of producing a theoretically grounded and policy-relevant contribution. In line with Whetten's (1989) perspective on theoretical contribution, the study emphasises conceptual clarification and the integration of existing knowledge rather than hypothesis testing or statistical measurement.

3.1 Literature Identification and Data Sources

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Academic literature was identified through structured searches of Scopus and Web of Science Core Collection, selected because of their comprehensive coverage of peer-reviewed research in public administration, sustainability, crisis and risk governance, emergency management, public health, and disability studies. The literature search was conducted between December 2025 and March 2026, following the principles of the PRISMA 2020 Statement, which was adopted to enhance the transparency and reproducibility of the review process (Page et al., 2021).

Searches were performed within the title, abstract, and keyword fields (Scopus) and the Topic field (Web of Science), using combinations of keywords related to the objectives of the study. The search strategy was structured around three principal conceptual domains: (i) emergency communication and emergency services; (ii) accessibility and disability inclusion; and (iii) governance, resilience, and social sustainability. Representative search terms included *"emergency communication"*, *"emergency services"*, *"emergency response"*, *"112"*, *accessib**, *disab**, *inclus**, *"social sustainability"*, *governance*, *resilience*, and *"crisis management"*. Searches were limited to English-language peer-reviewed journal articles and review articles to ensure consistency in the identification and interpretation of relevant literature. Database-specific Boolean search strategies were adapted to the syntax requirements of each database while maintaining equivalent search concepts. The complete search strategies, including the Boolean search queries and database filters applied in Scopus and Web of Science, are provided in Appendix A.

In addition to peer-reviewed publications, European Union legislation, policy documents, institutional reports, and implementation assessments were retrieved from official European Union repositories and institutional websites. These documents were included because the study examines not only the conceptual foundations of accessible emergency communication but also its regulatory framework, governance arrangements, and practical implementation across the European Union. Consequently, official reports and policy evaluations provided essential contextual evidence that could not be obtained exclusively from academic publications. International standards relating to risk management and organisational resilience were also consulted to ensure conceptual consistency with established governance frameworks (ISO, 2018; Eurostat, 2022; European Commission, 2024).

As this study was conducted as a qualitative, PRISMA-informed review intended to synthesise conceptual and policy evidence rather than a formal systematic review with meta-analysis, no prospective review protocol was registered.

3.2. PRISMA-Informed Screening and Selection Process

The identification and selection of sources followed a PRISMA-informed screening process, guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement (Page et al., 2021). Although PRISMA is commonly associated with quantitative reviews, it was applied here as a reporting and transparency tool to support clarity in the selection and exclusion of qualitative, conceptual, and policy-orientated sources.

After the initial database searches, duplicate records were removed. Titles and abstracts were then screened to assess relevance to the study's focus on accessible emergency communication, public service governance, disability inclusion, crisis resilience,

and social sustainability. Publications addressing emergency services without meaningful engagement with accessibility, inclusion, or governance dimensions were excluded at this stage.

Full-text screening was subsequently conducted to define the final corpus of literature. Sources were included if they contributed conceptually or empirically to at least one of the following areas: (a) accessibility in emergency or public service communication; (b) crisis governance and institutional resilience; (c) disability inclusion in emergency, health, or public service systems; or (d) social sustainability in public service provision.

The screening and selection process was conducted collaboratively by the authors through successive stages of title, abstract, and full-text review. Records that did not meet the predefined inclusion criteria were excluded at each stage. Where the relevance of a publication was uncertain, the authors discussed its eligibility until a consensus was reached. Given the qualitative and conceptually oriented nature of the review, no formal methodological quality appraisal tool was applied. Instead, sources were assessed according to their relevance to the research objectives, conceptual contribution, methodological credibility, and policy significance. This approach is consistent with qualitative evidence synthesis, where conceptual richness and relevance are prioritised over methodological scoring.

The overall identification, screening, and selection process is illustrated in Figure 2 using a PRISMA 2020-compliant flow diagram (Page et al., 2021). The diagram was generated using PRISMA2020, an R package and Shiny application designed to support transparent reporting of review processes (Haddaway et al., 2022).

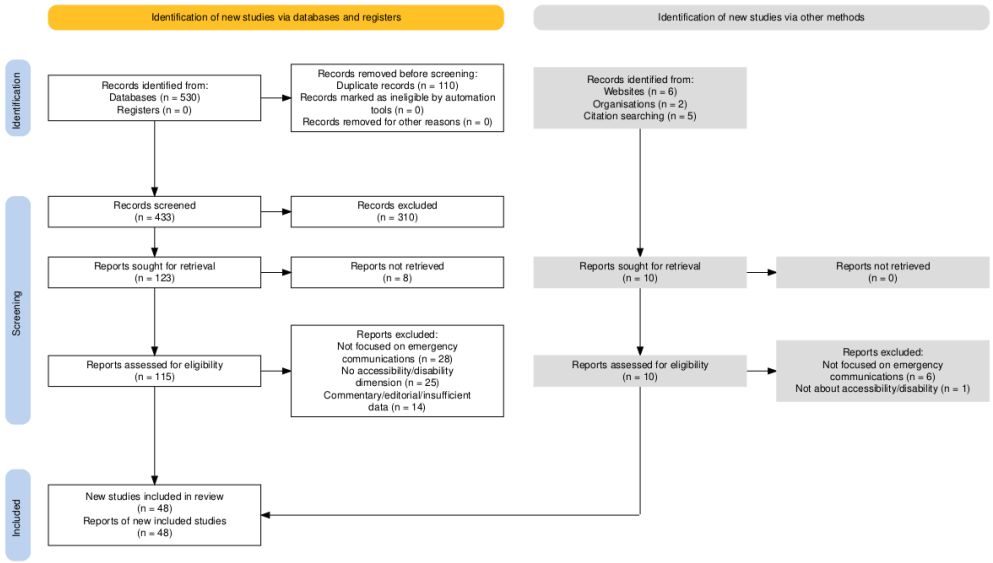

Figure 2. PRISMA 2020 flow diagram illustrating the literature identification, screening, and selection process.

Source: PRISMA 2020 guidelines (Page et al., 2021). Diagram generated using PRISMA2020, an R package and Shiny app (Haddaway et al., 2022).

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Following full-text screening, 48 sources met the inclusion criteria and constituted the final corpus for thematic synthesis.

3.3. Analytical Approach

The selected literature was analysed using **thematic synthesis**, a method suited to integrating qualitative evidence across interdisciplinary academic literature, policy documents, and institutional reports. Following the screening process, the included sources were subjected to repeated reading and comparative analysis to identify recurring concepts, governance patterns, institutional practices, and accessibility challenges related to emergency communication, disability inclusion, crisis resilience, and social sustainability.

The analysis was conducted collaboratively by the four authors. Emerging concepts were compared across the included sources and iteratively grouped into broader analytical categories through discussion and consensus. Coding was performed inductively, allowing themes to emerge from literature rather than being imposed through a predefined analytical framework. Rather than quantifying the frequency of individual themes, the analysis sought to identify shared governance challenges, policy trajectories, and conceptual relationships across the European Union. This interpretive approach is consistent with the objectives of a qualitative, PRISMA-informed review, which emphasises conceptual integration and policy relevance rather than statistical aggregation or country-level comparison.

The thematic synthesis resulted in four interrelated analytical dimensions that guided the organisation and interpretation of the findings: *accessible emergency communication, public service governance, crisis resilience, and disability inclusion. Table 1* summarises these analytical dimensions together with the representative concepts identified in the reviewed literature and their role in the analysis. These dimensions are consistent with the conceptual framework presented in *Figure 1*, which synthesises the theoretical relationships identified in the literature review.

Table 1. Analytical framework used for the thematic synthesis

Analytical dimension	Representative concepts identified in the literature	Role in the analysis
Accessible emergency communication	Universal access, accessible communication channels, emergency communication technologies, accessibility standards, inclusive emergency services	Examined how emergency communication systems accommodate diverse user needs and accessibility requirements.
Public service governance	Institutional coordination, accountability, policy implementation, regulatory compliance, multi-level governance	Analysed the governance mechanisms supporting the implementation of accessible emergency communication.
Crisis resilience	Emergency preparedness, organisational resilience, adaptive capacity, continuity of services, crisis management	Examined how accessibility contributes to resilient emergency communication systems during crises.
Disability inclusion	Equal access, reasonable accommodation, participation, digital inclusion, rights-based approaches	Analysed the integration of disability inclusion within emergency communication policies and governance practices.

Source: Authors' thematic synthesis based on the reviewed literature.

3.4. Tools, Transparency, and Ethical Considerations

Writing support tools such as Writefull and Grammarly were used only for spelling, grammar, and stylistic refinement and did not affect analytical decisions, source selection, or interpretation of findings. The study uses only secondary data and publicly available sources, including academic publications, policy documents, and institutional reports. No personal data were collected, and no human participants were involved; therefore, formal ethical approval was not required. As a qualitative, PRISMA-informed review, the study does not seek exhaustive coverage but prioritises conceptual relevance, policy significance, and methodological transparency. Future research could build on this work through empirical user-centred studies, comparative national case analyses, or quantitative approaches.

4. Results

The thematic synthesis of the 48 sources included through the PRISMA-informed review identified four interrelated analytical dimensions shaping social sustainability in European Union emergency communication systems. Although the included studies differed in disciplinary perspective, methodology, and publication type, consistent patterns emerged across the evidence. These recurring analytical dimensions illustrate how accessibility is operationalised, governed, and experienced within emergency communication systems. Table 2 summarises the four analytical dimensions together with the representative evidence supporting each theme.

Table 2. Overview of key result dimensions and representative evidence (PRISMA-informed synthesis)

Result dimension	Focus of evidence	Representative sources*
Accessible emergency communication	Functional accessibility, communication barriers, alternative channels, digital capability	Armstrong-Wood et al. (2023); Andersen et al. (2025); Carmichael et al. (2023); European Commission (2024)
Public service governance	Institutional responsibility, coordination, implementation gaps, legitimacy	Boin et al. (2016); Christensen et al. (2016); Nohrstedt et al. (2018); European Commission (2022)
Crisis resilience	Adaptive capacity, communication under stress, cascading and compound risks	Comfort (2007); Helbing (2013); Pescaroli & Alexander (2018)
Disability inclusion	Structural vulnerability, equity, inclusive design, disproportionate impacts	Mitchell et al. (2022); Jesus et al. (2021); Holliman et al. (2023); NEMA (2024)

Note: Representative sources are illustrative. The synthesis draws on all included studies identified through the PRISMA-informed selection process (n = 48). Source: Authors' synthesis based on a PRISMA-informed review of the literature (Page et al., 2021).

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4.1. Accessible Emergency Communication as a Foundational Condition

The first and most prominent result concerns accessible emergency communication as a foundational condition for equitable emergency response. Across the reviewed sources, accessibility is closely linked to the ability of individuals to initiate and sustain contact with emergency services, particularly in situations characterised by stress, urgency, and uncertainty.

Communication barriers related to hearing, speech, cognition, mobility, and digital interaction repeatedly emerge as limiting factors, even in systems formally designed to be universal. Empirical studies show that differences in digital capability and system usability continue to affect real-world access, especially for persons with disabilities (Armstrong-Wood et al., 2023; Andersen et al., 2025). At the European level, monitoring reports confirm that the implementation of accessibility requirements remains uneven across Member States, weakening the universality principle of the emergency number 112 (European Commission, 2024).

Overall, the thematic synthesis identified accessible emergency communication as the foundational dimension underpinning all other analytical themes. Across the reviewed sources, accessibility was consistently presented not merely as a technical communication function but as a prerequisite for equitable access to emergency services, institutional responsiveness, and socially sustainable crisis management**.**

4.2. Public Service Governance and Institutional Responsibility

A second key result relates to public service governance and institutional responsibility. The synthesis indicates that accessibility outcomes in emergency communication systems are strongly shaped by governance arrangements, including regulatory clarity, institutional coordination, and accountability mechanisms.

Research on crisis governance highlights that fragmented responsibility often leads to partial or inconsistent implementation of accessibility measures. Effective emergency communication systems require not only technical capacity but also governance legitimacy, particularly under conditions of pressure (Boin et al., 2016; Christensen et al., 2016). European Commission monitoring documents similarly identify gaps between legal accessibility obligations and operational practice, suggesting that accessibility is not yet fully embedded in routine governance processes (European Commission, 2022).

The synthesis further indicates that governance-related challenges were reported across diverse institutional contexts, suggesting that accessibility depends not only on technological capability but also on clear accountability structures, inter-organisational coordination, and sustained policy implementation. These recurring governance characteristics emerged consistently throughout the reviewed literature and policy documents.

Table 3. Illustrative evidence of accessibility implementation across selected EU Member States

Member State	Illustrative implementation evidence	Source
Finland	Implementation of Real-Time Text and accessible emergency communication channels	European Commission (2024)

Member State	Illustrative implementation evidence	Source
Netherlands	Multiple functionally equivalent communication channels supporting accessibility	European Commission (2024)
Romania	Partial implementation with continuing accessibility gaps	European Commission (2024); EENA & EDF (2025)
Bulgaria	Limited implementation of equivalent communication services	European Commission (2024)

Source: Authors' synthesis based on European Commission (2024) and EENA & EDF (2025).

These examples illustrate that accessibility implementation varies across Member States, supporting the finding that governance capacity and institutional commitment remain important determinants of socially sustainable emergency communication.

4.3. Crisis Resilience and Adaptive Capacity

The third result dimension concerns crisis resilience. The reviewed literature consistently links accessible communication to the capacity of emergency systems to operate effectively under conditions of high demand, uncertainty, and cascading risk.

Studies on interconnected and compound risks show that communication failures can amplify the effects of crises across systems and population groups (Helbing, 2013; Pescaroli & Alexander, 2018). These findings underline that resilience depends not only on technical robustness but also on inclusive and adaptive communication practices that can accommodate diverse needs under stress.

Across the included evidence, resilience emerged as an adaptive governance capability rather than solely an operational outcome. The synthesis suggests that emergency communication systems become more resilient when accessibility is embedded within preparedness, organisational learning, and inclusive response planning.

4.4. Disability Inclusion as a Cross-Cutting Dimension

Disability inclusion emerged as a cross-cutting dimension intersecting all other result areas. Across the included sources, persons with disabilities are shown to face disproportionate risks during emergencies when communication systems are not designed with diverse needs in mind.

Empirical studies demonstrate that exclusion from emergency communication reinforces broader social and health inequalities (Mitchell et al., 2022; Holliman et al., 2023). International guidance further emphasises that disability-inclusive emergency management is a core component of equitable and socially sustainable crisis response (NEMA, 2024).

The thematic synthesis identified disability inclusion as a cross-cutting analytical dimension that influenced all other themes. Rather than representing a separate policy objective, inclusion consistently emerged as a condition affecting communication accessibility, governance effectiveness, and the resilience of emergency communication systems.

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4.5. Synthesis of Results: Linking Accessibility and Social Sustainability

Taken together, the results indicate that social sustainability in emergency communication systems emerges from the interaction between accessible communication, governance responsibility, crisis resilience, and disability inclusion. Improvements in one dimension alone are insufficient to ensure sustainable outcomes.

This interaction is conceptualised in Figure 1, while Table 1 summarises how evidence from the included sources contributes to each result dimension. Where coordination between these dimensions is weak, accessibility remains fragmented, and the social sustainability of emergency communication systems is undermined.

The synthesis suggests that accessible emergency communication contributes to social sustainability by reducing exclusion, strengthening equitable access to public services, enhancing institutional legitimacy, and improving crisis resilience. These outcomes emerge through the interaction of accessible communication, governance capacity, disability inclusion, and adaptive response mechanisms. Accessibility therefore functions not only as a technical feature of emergency systems but also as a governance capability that supports socially sustainable crisis management.

Taken together, these four analytical dimensions did not emerge as independent themes but as mutually reinforcing components of a broader governance framework. The thematic synthesis demonstrated that accessible emergency communication contributes to social sustainability only when communication accessibility, governance arrangements, crisis resilience, and disability inclusion operate in an integrated manner. This relationship was consistently identified across academic literature, policy documents, and institutional reports despite differences in disciplinary focus and methodological approach.

5. Discussion

The findings of this study confirm that accessibility in emergency communication cannot be understood as a narrow technical feature. Instead, it functions as a structural condition for social sustainability and inclusive crisis governance. Interpreting the results through a governance and sustainability lens highlights how accessibility shapes not only individual outcomes but also institutional resilience and public trust.

From a risk governance perspective, the results align with Renn's (2008) argument that effective risk management depends on the ability of institutions to anticipate diversity, uncertainty, and unequal exposure. Emergency communication systems that rely primarily on standardised, voice-based interaction implicitly assume a homogeneous user population. This assumption becomes problematic in crises, where functional diversity and stress conditions are most pronounced. In such contexts, accessibility gaps translate directly into unequal risk distribution. While this interpretation is consistent with Renn's (2008) risk governance framework, the present synthesis extends it by demonstrating that communication accessibility functions as a practical governance mechanism through which unequal risk exposure is either reduced or reinforced. Rather than representing only a technical communication issue, accessibility emerges as a determinant of equitable crisis governance.

The findings also resonate with the literature on collaborative and adaptive crisis governance. Nohrstedt et al. (2018) emphasise that crisis management capacity is shaped

by coordination, learning, and inclusiveness across institutional boundaries. The variation in accessibility maturity identified across European Commission implementation reports and supporting institutional evidence suggests that accessibility has not yet been fully embedded as a shared governance responsibility across Member States. Where coordination between regulators, emergency services, and social policy actors is weak, accessibility remains fragmented and reactive rather than systematic. This finding also expands the collaborative governance literature by suggesting that institutional coordination alone is insufficient to ensure equitable emergency response. The reviewed evidence indicates that coordination must be accompanied by accessible communication practices if governance arrangements are to support social sustainability effectively.

Recent governance research further underlines the importance of legitimacy during crises. Christensen and Laegreid (2020) show that public confidence depends not only on effective decision-making but also on perceptions of fairness and inclusion. The results of this study suggest that inaccessible emergency communication can undermine this legitimacy by excluding certain population groups from timely assistance. In this sense, accessibility contributes directly to the democratic quality of crisis governance, not only to operational efficiency. The present synthesis therefore broadens existing governance research by positioning accessibility as an institutional legitimacy issue rather than solely a service delivery characteristic. This perspective reinforces the view that equitable communication is fundamental to maintaining public trust during emergencies.

Disability inclusion emerges in the discussion as a central interpretive lens rather than a marginal concern. Hansson et al. (2020) conceptualise communication-related vulnerability as a critical but often overlooked risk factor in disasters. The present findings extend this insight by showing how communication-related vulnerability becomes institutionalised when accessibility is treated as optional or supplementary. This reinforces the idea that vulnerability is not inherent to individuals but is produced through system design choices. This interpretation shifts the analytical focus from individual impairment towards institutional responsibility, reinforcing a social model of disability within emergency communication governance. Consequently, accessibility should be understood as an organisational responsibility rather than an individual adaptation challenge.

The interaction between accessibility and crisis dynamics also reflects insights from the literature on cascading and compound risks. Pescaroli & Alexander (2018) argue that small failures can propagate across systems, amplifying the overall impact. The thematic synthesis suggests that inaccessible emergency communication constitutes a critical governance vulnerability capable of initiating cascading consequences across emergency response systems. When certain users cannot access emergency services, delays and misunderstandings may cascade into wider response challenges, affecting not only individuals but also the system's performance.

Importantly, the discussion situates these findings within the evolving research field on emergency communication systems. The synthesis also reveals an important tension within existing literature. While digitalisation is widely presented as a means of improving emergency communication efficiency and accessibility, several reviewed studies indicate that technological innovation may unintentionally reinforce exclusion when accessibility considerations are incorporated only after system implementation. This suggests that digital transformation alone cannot guarantee socially sustainable emergency

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communication. Instead, technological innovation must be accompanied by governance reforms, inclusive design principles, and continuous institutional commitment to accessibility. Recent work conceptualising emergency call accessibility as a strategic capability highlights that accessibility supports preparedness, adaptability, and institutional learning (Bokor, Certan, & Nen, 2026). The present study reinforces this view by showing that accessibility contributes to social sustainability precisely because it strengthens long-term system resilience rather than short-term compliance. Unlike previous studies that primarily conceptualise accessibility as an operational capability, the present study demonstrates that accessibility also functions as a governance capability supporting long-term social sustainability and institutional resilience.

Bibliometric evidence further suggests that while research on emergency communication has expanded rapidly in recent decades, social sustainability and accessibility remain under-represented as core analytical dimensions (Bokor et al., 2026). By integrating governance theory, disability inclusion, and sustainability perspectives, this study addresses this gap by positioning social sustainability as a central analytical perspective through which emergency communication accessibility can be interpreted.

Overall, this study contributes to the emerging literature by conceptualising accessible emergency communication as a public infrastructure capability embedded within governance systems rather than as an isolated technological feature or legal compliance requirement. By integrating perspectives from crisis governance, disability studies, and social sustainability, the study provides a unified analytical framework demonstrating that accessibility simultaneously strengthens institutional legitimacy, equitable service provision, crisis resilience, and long-term social sustainability. This broader perspective extends previous research by positioning accessibility as a strategic governance responsibility, essential for inclusive emergency communication systems.

6. Implications and further research

This study examines how accessible emergency communication supports social sustainability and inclusive crisis resilience in the European Union. Using a PRISMA-informed review of academic and policy literature, it argues that accessibility is not a minor technical issue but a structural condition shaping equity, institutional legitimacy, and long-term resilience. From a social sustainability perspective, emergency communication systems embody decisions about who can access public services and on what terms. When accessibility is fragmented, these systems can deepen existing vulnerabilities rather than mitigate them, conflicting with inclusion- and fairness-based understandings of social sustainability (Tierney, 2012).

The findings have several policy implications. Accessibility should be a core governance objective in emergency communication, not just a compliance obligation. Recent European Commission reports note progress in digitalisation and coordination but also persistent disparities in accessible communication across Member States (European Commission, 2024). Addressing these gaps requires clearer institutional responsibility and stronger integration of accessibility into routine emergency governance. Civil society organisations continue to report gaps between legal commitments and lived experience, especially for persons with hearing and speech disabilities, highlighting the need for

functionally equivalent, multi-channel access based on user-centred design and sustained organisational investment (EENA and EDF, 2025).

The findings are particularly relevant to several Sustainable Development Goals. Accessible emergency communication contributes to SDG 3 (Good Health and Well-Being) by facilitating timely access to emergency assistance, SDG 10 (Reduced Inequalities) by reducing barriers faced by persons with disabilities, SDG 11 (Sustainable Cities and Communities) through more inclusive emergency preparedness, and SDG 16 (Peace, Justice and Strong Institutions) by strengthening equitable access to public services and institutional trust.

The findings also suggest the need for measurable governance indicators to monitor progress in accessible emergency communication across the European Union. Such indicators could include the availability of functionally equivalent emergency communication channels, compliance with the accessibility requirements established by the European Electronic Communications Code and the European Accessibility Act, response performance for accessible emergency communications, user satisfaction among people with disabilities, and the regular completion of accessibility audits within national emergency systems. Monitoring these indicators would enable policymakers and emergency service authorities to evaluate implementation progress, identify governance gaps, and strengthen the social sustainability and long-term resilience of emergency communication systems across the European Union.

Accessibility must also be integrated into wider crisis and humanitarian responses. Large-scale and cross-border emergencies reveal the consequences of inaccessible communication, as seen in refugee contexts where communication barriers delay protection and assistance (UNHCR, 2024). This study is limited by its qualitative, PRISMA-informed design and reliance on secondary sources, which constrain insight into real-time user experiences. Future research should therefore emphasise user-centred empirical studies, comparative national analyses, and longitudinal approaches to understand how governance arrangements and technological change shape accessibility outcomes. Overall, accessible emergency communication should be recognised as a public infrastructure capability underpinning social sustainability and inclusive crisis resilience. Treating accessibility as optional risks leaving some groups unprotected when public support is most needed.

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References

Al-Dahash, H., Thayaparan, M., & Kulatunga, U. (2016). Understanding the terminologies: disaster, crisis and emergency. In: Proceedings of the 32nd Annual ARCOM Conference. Manchester, UK, pp. 1191-1200.

Aav, K. (2025). Communication-related vulnerability of war refugees. Risk, Hazards & Crisis in Public Policy, 16(3). https://doi.org/10.1002/rhc3.70032

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Andersen, L. B., Larsen, J. J., Marsaa, K., Rosenmai, G., Seemann, H. B., & Schmidt, T. (2025). Quantitative evaluation of patients' digital capability evaluated in an emergency department setting: a cross-sectional study. Emergency Medicine Journal, 42(12), 785-790. https://doi.org/10.1136/emermed-2024-213999

Ansell, C., Boin, A., & Keller, A. (2010). Managing transboundary crises: Identifying the building blocks of an effective response system. Journal of Contingencies and Crisis Management, 18(4), 195-207. https://doi.org/10.1111/j.1468-5973.2010.00620.x

Armstrong-Wood, R., Messiou, C., Kite, A., Joyce, E., Panousis, S., Campbell, H., Lauriau, A., Manning, J., & Carlson, T. (2023). Smartphone accessibility: Understanding the lived experience of users with cervical spinal cord injuries. Disability and Rehabilitation: Assistive Technology, 19(4), 1434-1445.

Boin, A., Hart, P., & Sundelius, B. (2016). The Politics of Crisis Management: Public Leadership under Pressure (2nd ed.). Cambridge: Cambridge University Press. https://doi.org/10.1017/9781316339756

Boin, A., Ekengren, M., & Rhinard, M. (2020). Hiding in plain sight: Conceptualizing the creeping crisis. Risk, Hazards & Crisis in Public Policy, 11(2), 116-138. https://doi.org/10.1002/rhc3.12193

Bokor, E.-C., Certan, C. D., & Nen, M. (2026). *Emergency call accessibility as a strategic capability for crisis management in the EU*. *International Journal of Emergency Services*, 1–15. https://doi.org/10.1108/IJES-09-2025-0050

Bokor, E.-C., Stanila, M.V., Baranescu, M., & Nen, M. (2026). From telephones to AI: A seventy-year bibliometric analysis of emergency call system research. Technium Social Sciences Journal, 79, 256-267. https://doi.org/10.47577/tssj.v79i1.13428

Bokor, E., Botis, H.R., Cretescu, A.S., Nen, M., & Certan, C.D. (2025a). Improving emergency call accessibility via location technologies in Romania. International Journal of Engineering and Management Sciences, 10(4), 19-36. https://doi.org/10.21791/ijems.2025.16

Bokor, E., Sava, A., Botis, H.R., & Nen, M. (2025b). Managing accessibility in Romania's 112 emergency call service. Proceedings of the International Conference on Business Excellence, 19(1), 5061-5075. https://doi.org/10.2478/picbe-2025-0388

Carmichael, J., Kalagher, K., Reznek, M., & Modi, P. (2023). Improving accessibility in the emergency department for patients with disabilities: A qualitative study. Western Journal of Emergency Medicine, 24(3). https://doi.org/10.5811/westjem.58406

Choudhary, H., & Bansal, N. (2022). Barriers affecting the effectiveness of digital literacy training programs for marginalised populations: A systematic literature review. Journal of Technical Education and Training, 14(1), 110-127.

Christensen, T., & Laegreid, P. (2020). Balancing Governance Capacity and Legitimacy: How the Norwegian Government Handled the COVID-19 Crisis as a High Performer. Public Administration Review, 80, 774-779. https://doi.org/10.1111/puar.13241

Comfort, L.K. (2007). Crisis management in hindsight: Cognition, communication, coordination, and control. Public Administration Review, 67(S1), 189-197. https://doi.org/10.1111/j.1540-6210.2007.00827.x

Damasevicius, R., Bacanin, N., & Misra, S. (2023). From sensors to safety: Internet of Emergency Services (IoES) for emergency response and disaster management. Journal of Sensor and Actuator Networks, 12(3), 41. https://doi.org/10.3390/jsan12030041

EENA & EDF (2025). Open letter on improving accessibility in emergency communications. European Emergency Number Association and European Disability Forum. Available at: https://www.edf-feph.org/publications/open-letter-on-improving-accessibility-in-emergency-communications/

Eurofound (2023). Social impact of migration: Addressing the challenges of Ukrainian refugee inflows in the EU. Luxembourg: Publications Office of the European Union.

European Commission (2020). The European Electronic Communications Code and the accessibility of emergency communications. Brussels: European Commission.

European Commission (2022). Report from the Commission to the European Parliament and the Council on the effectiveness of the implementation of the single European emergency number "112" (COM(2022) 724 final). Brussels: European Commission.

European Commission (2024). Report on the implementation of the European accessibility provisions in emergency communications (COM(2024) 623 final). Brussels: European Commission.

European Parliament and Council of the European Union (2018). Directive (EU) 2018/1972 establishing the European Electronic Communications Code. Official Journal of the European Union, L321, 36-214.

European Parliament and Council of the European Union (2019). Directive (EU) 2019/882 on the accessibility requirements for products and services (European Accessibility Act). Official Journal of the European Union, L151, 70-115.

European Union of the Deaf (2025). Report on the implementation of the European Accessibility Act (EAA). Brussels: EUD. Available at: https://eud.eu/wp-contf/uploads/2025/06/D2.4-Report-on-the-implementation-of-the-European-Accessibility-Act.pdf

Eurostat (2022). Persons reporting basic activity difficulty by sex, age, level of difficulty, type of basic action and risk of poverty threshold. Available at: https://ec.europa.eu/eurostat

Farazmand, A. (2007). Learning from the Katrina crisis: A global and international perspective with implications for public administration. Public Administration Review, 67(S1), 149-159. https://doi.org/10.1111/j.1540-6210.2007.00824.x

Haddaway, N.R., Page, M.J., Pritchard, C.C., & McGuinness, L.A. (2022). PRISMA2020: An R package and Shiny app for producing PRISMA 2020-compliant flow diagrams. Campbell Systematic Reviews, 18, e1230. https://doi.org/10.1002/cl2.1230

Hansson, S., Orru, K., Siibak, A., Back, A., Kruger, M., Gabel, F., & Morsut, C. (2020). Communication-related vulnerability to disasters: A heuristic framework. International Journal of Disaster Risk Reduction, 51, 101931. https://doi.org/10.1016/j.ijdrr.2020.101931

Helbing, D. (2013). Globally networked risks and how to respond. Nature, 497, 51-59. https://doi.org/10.1038/nature12047

Holliman, A., Stransky, M., Dieujuste, N., & Morris, M. (2023). Disability doesn't discriminate: Health inequities at the intersection of race and disability. Frontiers in Rehabilitation Sciences, 4, 1075775. https://doi.org/10.3389/fresc.2023.1075775

International Organization for Standardization (ISO) (2018). ISO 31000: Risk management - Guidelines. Geneva: ISO.

Janssen, C., Kover, I., Boersma, F.K., Boland, M., Kyratsis, Y., & Cremers, A.L. (2025). Every choice comes with a consequence: Exploring unintended consequences of COVID-19 crisis governance in long-term care facilities. Risk, Hazards & Crisis in Public Policy, 16(3), e70031. https://doi.org/10.1002/rhc3.70031

Jesus, T.S., Bhattacharjya, S., Papadimitriou, C., Bogdanova, Y., Bentley, J., Arango-Lasprilla, J.C., Kamalakannan, S., & Hoenig, H. (2021). Lockdown-related disparities experienced by people with disabilities during the first wave of the COVID-19 pandemic: Scoping review with thematic analysis. International Journal of Environmental Research and Public Health, 18(12), 6178. https://doi.org/10.3390/ijerph18126178

Lacourt, G. (2024). IRIS Special: Media literacy and the empowerment of users. Strasbourg: European Audiovisual Observatory.

Lee, A., Khaw, F., Lindman, A.E., & Juszczyk, G. (2023). Ukraine refugee crisis: Evolving needs and challenges. Public Health, 217, 41-45. https://doi.org/10.1016/j.puhe.2023.01.016

Mitchell, R., Ryder, T., Matar, K., Lystad, R., Clay-Williams, R., & Braithwaite, J. (2022). An overview of systematic reviews to determine the impact of socio-environmental factors on health outcomes of people with disabilities. Health & Social Care in the Community, 30(4), 1254-1274. https://doi.org/10.1111/hsc.13665

NEMA (2024). Disability Inclusive Emergency Management Toolkit: Principles and Practical Action Guide. Australian Government, National Emergency Management Agency.

Nohrstedt, D., Bynander, F., Parker, C., & 't Hart, P. (2018). Managing crises collaboratively: Prospects and problems - A systematic literature review. Perspectives on Public Management and Governance, 1, 257-271. https://doi.org/10.1093/ppmgov/gvx018

OECD (2023). Policy responses to the Ukrainian refugee crisis. Paris: OECD Publishing.

Page, M.J., McKenzie, J.E., Bossuyt, P.M., et al. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ, 372, n71. https://doi.org/10.1136/bmj.n71

Pescaroli, G., & Alexander, D. (2018). Understanding compound, interconnected, interacting, and cascading risks: A holistic framework. Risk Analysis, 38(11), 2245-2257. https://doi.org/10.1111/risa.13128

Renn, O. (2008). Risk governance: Coping with uncertainty in a complex world. London: Earthscan. https://doi.org/10.4324/9781849772440

Rohwerder, B., Wong, S., Pokharel, S., Khadka, D., Poudyal, N., Prasai, S., Wicks, N., & Morrison, J. (2022). Describing adolescents with disabilities' experiences of COVID-19 and other humanitarian

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emergencies in low- and middle-income countries: A scoping review. Global Health Action, 15(1), 2107350. https://doi.org/10.1080/16549716.2022.2107350
Sa, M.J., Santos, A.I., Serpa, S., & Ferreira, C.M. (2021). Digitainability - Digital competences post-COVID-19 for a sustainable society. Sustainability, 13(17), 9564. https://doi.org/10.3390/su13179564
Tierney, K. (2012). Disaster governance: Social, political, and economic dimensions. Annual Review of Environment and Resources, 37, 341-363. https://doi.org/10.1146/annurev-environ-020911-095618
UNHCR (2024). Ukraine refugee situation: Operational data portal. Geneva: United Nations High Commissioner for Refugees.
van Asselt, M.B.A., & Renn, O. (2011). Risk governance. Journal of Risk Research, 14(4), 431-449. https://doi.org/10.1080/13669877.2011.553730
Vasickova, V. (2019). Crisis management process: A literature review and a conceptual integration. Acta Oeconomica Pragensia, 27(3-4), 61-77.
Walji, S., Carroll, J., & Haber, C. (2021). Experiences of patients with a disability in receiving primary health care. Canadian Family Physician, 67(7), 517-524. https://doi.org/10.46747/cfp.6707517
Whetten, D.A. (1989). What constitutes a theoretical contribution? Academy of Management Review, 14(4), 490-495. https://doi.org/10.5465/amr.1989.4308371
Wolf, K.K., Dawson, R., Mills, J.P., Blythe, P., & Morley, J. (2022). Towards a digital twin for supporting multi-agency incident management in a smart city. Scientific Reports, 12, 20178. https://doi.org/10.1038/s41598-022-20178-8

Appendix

Appendix A. Database Search Strategies

The literature search was conducted between *December 2025 and March 2026* using *Scopus* and *Web of Science Core Collection*. Searches were limited to *English-language* peer-reviewed journal articles and review articles. Database-specific search syntax was adapted to the requirements of each database while maintaining equivalent search concepts across both platforms.

Component	**Description**
Databases	Scopus; Web of Science Core Collection
Search period	December 2025–March 2026
Search language	English
Search fields	Title, Abstract, Keywords (Scopus); Topic (Web of Science)
Document types	Peer-reviewed journal articles and review articles
Additional sources	European Commission, EUR-Lex, Eurostat, EDF, EENA, ISO
Review approach	Qualitative, PRISMA-informed review
Protocol registration	No prospective review protocol was registered

A1. Scopus Search Strategy

Database: Scopus

Search fields: Title, Abstract, Keywords (TITLE-ABS-KEY)

```
TITLE-ABS-KEY(
(
"emergency communication"
OR "emergency services"
```

OR "emergency response"
OR "emergency medical services"
OR "public safety answering point*"
OR "112"
)
AND
(
accessib*
OR disab*
OR inclus*
OR "universal design"
)
AND
(
governance
OR resilience
OR "social sustainability"
OR "crisis management"
OR "public service"
)
)

Filters applied:

- Language: English
- Document type: Peer-reviewed journal articles and review articles
- Search fields: Title, Abstract, Keywords
- Search period: December 2025–March 2026

A2. Web of Science Core Collection Search Strategy

Database:Web of Science Core Collection
Search field: Topic (TS)

TS=(
(
"emergency communication"
OR "emergency services"
OR "emergency response"
OR "emergency medical services"
OR "public safety answering point*"
OR "112"
)
AND
(
accessib*
OR disab*
OR inclus*
OR "universal design"
)
AND
(
governance

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OR resilience
OR "social sustainability"
OR "crisis management"
OR "public service"
)
)

Filters applied:

- Language: English
- Document type: Peer-reviewed journal articles and review articles
- Search field: Topic
- Search period: December 2025–March 2026

A3. Additional Documentary Sources

To complement the peer-reviewed literature, official documentary sources were retrieved from authoritative European and international institutions, including:

- European Commission
- EUR-Lex
- Eurostat
- European Disability Forum (EDF)
- European Emergency Number Association (EENA)
- International Organization for Standardization (ISO)

These documents were included because the study examines not only the conceptual foundations of accessible emergency communication but also its regulatory framework, governance arrangements, and implementation across the European Union. Official legislation, policy documents, implementation reports, and international standards therefore provided essential contextual evidence that could not be obtained solely from academic publications.