A Framework for Disability-Inclusive Policy During Natural Disasters: Challenges and Pathways

Abstract

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| This study aimed at examining vulnerabilities of persons with disabilities (PWDs) during natural disasters, addressing critical gaps in existing research by analyzing systemic failures in policy, practice, and data across various contexts.  The methodology integrated seven key dimensions (policy, institutional preparedness, resources, communication, infrastructure, individual readiness, and risk assessment) through a systematic review of disaster cases in Ghana, the U.S., and Australia, showcasing contrasts between high- and low-income settings and regional diversity. Reviewing 19 case studies, the research advanced the field by offering comprehensive insights that extend beyond single-theme analyses, incorporating the Social Model of Disability with Human Rights and Intersectionality frameworks, and provided applicable policy recommendations for refining Ghana's disability and disaster laws.  In conclusion, the findings indicated that PWDs face heightened disaster risks due to structural barriers rather than individual impairments, emphasizing the necessity for inclusive strategies, integrated policies, targeted training, accessible infrastructure, and dedicated funding aligned with Sustainable Development Goals (SDGs) 1, 3, 10, and 11. Through this analysis, the study serves as a roadmap for implementing global frameworks like the Sendai Framework, fostering equitable disaster resilience for PWDs. |

***Keywords:*** *Persons with Disability, Vulnerability, Natural Disasters, Disaster Risk Reduction, Inclusive Policy.*

1. Introduction

Over the past decades, natural disasters have become more ruthless, and this is largely due to climate change, environmental degradation, and aggressive urbanization. Over 200 million people are affected by disasters every year (UNDRR, 2015), but the effect is not shared equitably. Among the most disadvantaged groups are people with disabilities (PWDs) who often suffer more harm during and after disasters. Globally, with over one billion individuals living with some form of disability (WHO, 2011), the issues they face in emergencies cannot be exaggerated. The literature shows that disabled individuals are two to four times more vulnerable to injury or death from disasters than others (Malpass et al., 2019; Palenewen, 2024). This is due to their physical limitations, social and institutional barriers, including inaccessible environments and exclusion from planning policies (Hemingway & Priestley, 2006). Despite international efforts like the Sendai Framework promoting inclusion, there has been limited implementation (UNDRR, 2015). Within the United States, only a few emergency managers include disability-specific actions, and most local governments do not have plans for individuals with mobility issues (Fox et al., 2007). Communication barriers also affect deaf and hard-of-hearing people during emergencies (Engelman et al., 2013). Schools in Australia typically have emergency plans, but few of these plans take into account students with disabilities, and emergency responders receive minimal training in inclusive practices (Boon et al., 2012; Boon et al., 2014). These examples show that exclusion of PWDs from disaster planning is a widespread, structural issue.

For sub-Saharan Africa, challenges are further compounded by underdeveloped infrastructure and limited capacity. In 2015, research concluded that evacuation procedures in West Africa rarely account for disability considerations, with available shelters further being physically inaccessible. A relevant case is provided by Ghana in examining these issues. Even with legislation in place such as the Persons with Disability Act in 2006, as well as ratification of the Convention on the Rights of Persons with Disabilities in 2012, legislative progress in this direction has not been meaningfully incorporated into plans in disaster preparedness.

The Accra floods in 2015 revealed that the National Disaster Management Organization (NADMO) had no framework that was comprehensive enough to include PWDs, although these people carried a greater weight of the impact as a result of evacuation routes and shelters which weren’t accessible (Amponsah-Tawiah & Mensah, 2016). As revealed in the US and Taiwan, homes with PWDs were even less prepared when disaster struck (Bethel et al., 2011; Han et al., 2017). It was obvious that Ghana had no data grading PWDs, and this posed a serious barrier in the effective implementation of planning strategies (Owusu-Ansah & Braimah, 2013; Antwi-Agyei et al., 2021).

Substantial gaps such as; 1). uneven distribution of thematic studies (Fox et al., 2007; Boon et al., 2012); 2). limited studies in low and middle-income countries (LMICs) such as Ghana (Owusu-Ansah & Braimah, 2013); and 3). an under-examination of coaxial framework approaches (Malpass et al., 2019) remain, although there have been past works looking into disability-inclusive issues as regards disaster risk reduction (DRR). To fill such gaps, this study integrates seven core themes emphasizing LMICs in a theory of rights-based perspective. The themes are policy development, institutional preparedness, resource allocation, communication, infrastructure, individual preparedness, and risk assessment in diverse contexts.

Excluding PWDs from disaster preparation shows global and local restrictions which range from lack of resource to stigmatization, and this weakens progress on SDGs which deal with health, inequality, poverty and education. This article examines the risk of PWDs in natural disasters, with the view of addressing the gaps in policy and practice. The structural issues confronting PWDs are brought to the fore to pitch inclusivity as a resilient and equitable resource in responding to natural disasters in Ghana and beyond.

* 1. Overview of Literature

Natural disaster risks associated with PWDs are heterogeneous and complicated with entrenchments in policy gaps, institutional supervision, inequalities and infrastructural accessible challenges. Although international discussions appreciate the rights and demands of PWDs, definite implementation governing disaster risk is still sketchy. This study integrates previous researches on interrelated policy development, infrastructure, communication, preparedness, resource allocation, and risk assessment themes to establish how these gaps together expose PWDs to increased risks during disasters.

* + 1. Policy Development and the Limits of Global Frameworks

International policy environments have increasingly incorporated consideration of disability into disaster risk reduction (DRR) responses, due to heightened vulnerability of PWDs, mostly drawn from disasters like the 2004 Indian Ocean tsunami as well as the 2010 Haitian earthquake. The 2015–2030 Sendai Framework of disaster risk reduction, agreed between 187 nations, decrees the necessary inclusion of PWDs into planning as well as implementation of DRR responses (UNDRR, 2015). Nevertheless, as Wisner et al. (2004) have noted, these sorts of general, broad decrees necessarily risk sounding, are nothing more than motivational until they are capable of becoming national legislation as well as being implementational. There have been many pieces of scholarship reporting vast gaps between high-altitude rhetoric of inclusion of disability into overseas agreements, as well as poor absorption of policy across national as well as subnational levels of governments (Malpass et al., 2019; Boon et al., 2012).

Even in developed countries like the United States, with existing federal legislation like Americans with Disabilities Act (ADA), Fox et al. (2007) reported a lack of emergency managers with a set written procedures on how to cater for disability needs, in spite of mandatory compliance. Similarly, Boon et al. (2014) documented that though schools in Australia have a responsibility under the law to have emergency plans in place, few of them consider the specialized risk that children with physical or intellectual impairments would have in these plans. In contrast, low- and middle-income countries (LMICs), like Ghana, face challenges both at policy-making as well as policy-implementing levels. Ghana's Persons with Disability Act (Act 715) makes no direct references to national disaster management policies, leading to a fragmented governance framework under which disability and disaster management are addressed. These are handled as discrete issues rather than being consolidated in an integrated manner (Owusu-Ansah & Braimah, 2013). This exclusion creates ambiguities in responsibility, it weakens coordination, and PWDs are systematically exposed in situations of emergency.

* + 1. Institutional Preparedness and Systemic Exclusion

Institutional preparedness or readiness of formal systems in protecting vulnerable populations is key in reducing risk. Yet, it is revealed in numerous studies that institutions fail to plan for, or include disabled populations. In the United States, Engelman et al. (2013) found that more than half of state emergency management agencies had not provided staff training on assisting individuals with sensory or communication disabilities during disasters. These institutional inequalities often originate from the lack of consultation with disabled people's organizations (DPOs) at the planning and design phase of policy. Without participatory engagement, institutions resort to a one-size-fits-all response that promotes able-bodied norms (Hemingway & Priestley, 2006).

In education, Boon et al. (2012) reported widespread deficits in school preparedness for children with disabilities in Australia, with emergency drills that failed to include adaptive protocols for children with autism or wheelchair users. In LMICs like Ghana, institutional capacity is further undermined by underfunding, staff shortages, and limited cross-sector coordination. Antwi-Agyei et al. (2021) observe that disaster management organizations in northern Ghana rarely work together with social services, disability councils, or local NGOs, resulting in fragmented interventions that fail to address the complex needs of PWDs during floods and other crises. Institutional exclusion is thus both a source and a reflection of deeper systemic marginalization.

* + 1. Resource Allocation and the Politics of Prioritization

Integration of disability considerations in policy-making related to disaster response is necessary in order to safeguard all individuals, especially those with disabilities, in times of emergency. Inclusion of responses demands substantial investments in several sectors, such as employment of skilled staff, provision of assistive devices, enhancement of infrastructure, as well as installation of accessible communication systems. Technically, these governments and humanitarian actors underfinance disability-inclusive preparedness due to limited resources, as well as the assumptions of cost-effectiveness of these responses. Engelman et al. (2013), and Handicap International (2015), have a remarkable conclusion: advocacy for disability for disasters is consistently considered as low-priority initiative amongst other measures of low priority. This directly or otherwise, excludes PWDs from effective preparation.

In Ghana, and other low- to middle-income countries (LMICs), scarce resources have specialized harmful effects, due to the reliance of the National Disaster Management Organization (NADMO) on ‘tricking-in’ relief funds. This creates a lack of focus which safeguards PWDs during disasters, evidenced in the aftermath response of the Accra's 2015 flooding, wherein several PWDs encountered evacuation difficulties due to a lack of adequate specialized evacuation facilities as well as poorly prepared personnel (Amponsah-Tawiah & Mensah, 2016). Such lack of focus does injustice to the security and dignity of PWDs, as well as reflects societal values that insufficiently prioritize these persons, thus continuing exclusionary patterns in humanitarian response. To have community resilience when disasters strike, there is also a necessity for governments and humanitarian institutions, to place investment into inclusive planning for disasters.

* + 1. Communication Barriers and Information Exclusion

Effective communication embodies timely delivery of services and is pivotal in disaster preparation and recovery especially with PWDs. Unfortunately, risk communication initiatives have catered for PWDs poorly. Engelman et al. (2013) reports that in the United States, emergency preparedness messages communicated to the general public were bias against persons with poor vision or hearing impairments. Ghana has an undue emphasis on traditional forms of communication, including radio messages and public loudspeakers but these exclude individuals with hearing disabilities. Bridging this divide implies detail interventions of inclusivity in the traditional methods as well as in sign communication, pictograms, and community-based interpreters so that all sections of the community benefit from the vital information.

The quantity and quality of infrastructure significantly impact the disaster vulnerability of PWDs. Fox et al., (2007) reports that most emergency shelters in the US lack essential accessibility for wheelchairs, accessible restroom facilities and ramps. In addition to these, the situation is complicated by outdated construction regulations, which frustrate accessibility efforts for the Global South. In Accra, Ghana, the 2015 floods revealed inadequate accessibility in buildings thereby impeding evacuation of PWDs (Amponsah-Tawiah & Mensah, 2016).

Furthermore, Antwi-Agyei et al., (2021) opines that homes with disabled persons usually have low levels of preparedness when confronted with disasters mostly due to exclusionary factors such as lack of adequate resources and stigmatization resulting from exclusion in community-based initiatives. Meaningful planning and the allocation of resources have been thwarted by the lack of disability-disaggregated statistics (Malpass et al., 2019). To promote disaster risk reduction efficiency, these issues need to be addressed. Converse to Engelman et al. (2013), who blame exclusionary communication barriers only in U.S. contexts, this research in addition, identifies inaccessible infrastructure as well as inflexible policy structures as world drivers of exclusion. In agreement with Malpass et al. (2019), lack of disability-disaggregated statistics in this research is attributed to disaster management regime failure in Ghana with resultant policy implications.

* + 1. Parallels with Southern Asia

Persons with disabilities (PWDs) encounter exacerbated vulnerabilities during natural disasters in Southern Asia, reflecting many of the systemic challenges observed in Ghana. These vulnerabilities stem from inadequate policy implementation, inaccessible infrastructure, cultural stigma, and insufficient data, which collectively heighten risks for PWDs in disaster contexts.

* + - 1. Inconsistent Policy Implementation

Despite the establishment of legal frameworks such as India’s Rights of Persons with Disabilities Act (2016), which mandates accessibility and inclusion in public services, implementation remains inconsistent, particularly in disaster preparedness (Government of India, 2016). In Ghana, the National Disaster Management Organisation (NADMO) faces chronic underfunding and overstretch during crises, and broader weaknesses in governance and coordination among disaster agencies may further impede proactive disability-inclusive response (NADMO 2024). These gaps reflect a broader failure to translate legal mandates into actionable disaster management strategies in both regions. India's Rights of Persons with Disabilities Act (2016) is perhaps comprehensive in writing, but its application has been confined to state-level disaster preparedness, particularly in accessible evacuation schemes and shelters, a terrain extensively addressed in flood response in Bihar (Sharma et al., 2022).

* + - 1. Inaccessible Communication and Infrastructure

Inaccessible communication systems significantly increase risks for PWDs during disasters. The lack of universally designed shelters, equipped with features like wheelchair-accessible entrances, further compounds these challenges in both regions (**ICIMOD (2024)**).

* + - 1. Cultural Stigma and Social Exclusion

Cultural stigma exacerbates the marginalization of PWDs in disaster planning. In rural areas of India and Nepal, misconceptions about disability often result in social exclusion, limiting PWDs’ participation in community disaster preparedness initiatives (NFDN 2023). Similarly, in certain Ghanaian communities, traditional beliefs associating disability with spiritual causes can diminish PWDs’ visibility in public decision-making processes (Reynolds 2010). This social exclusion undermines the ability of PWDs to advocate for their needs, perpetuating their vulnerability during disasters.

* + - 1. Data Limitations in Disaster Assessments

The absence of disability-disaggregated data hinders evidence-based policymaking in both Southern Asia and Ghana. In Southern Asia, few countries systematically collect data on PWDs during disaster impact assessments, limiting the ability to tailor interventions to their needs (ESCAP, 2019). A parallel situation exists in Ghana, where disability-inclusive data systems remain underdeveloped, impeding targeted disaster response strategies (Gupta et al. 2021). This data gap restricts the formulation of policies that address the specific challenges faced by PWDs in disaster contexts.

* + - 1. Vulnerabilities

Asia's unique climate vulnerabilities, including strengthening cyclones and accelerating sea-level rise, present additional challenges that need solutions beyond the flood-based model of Ghana, particularly to vulnerable island and coastal communities, as Pertiwi et al.'s (2020) review of Indonesian disaster frameworks testifies. To effectively implement this study's model in Asian contexts, policymakers should first prioritize top-local solutions that have worked in the region, such as Indonesia's disability-inclusive village forums, which greatly increase community participation in disaster planning.

* + - 1. Conclusion

In both Southern Asia and Ghana, systemic barriers—ranging from underfunded disaster management agencies and inconsistent policy enforcement to cultural stigma and inadequate data—disproportionately marginalize PWDs during natural disasters. Addressing these shared vulnerabilities requires robust, inclusive legislation, culturally sensitive community engagement, and sustained investment in accessible infrastructure and communication systems. By prioritizing these measures, governments and stakeholders can enhance disaster resilience for PWDs, ensuring equitable protection and support.

* + 1. Theoretical Framework

This study is underpinned by the theory of Social Model of Disability (SMD) whose view is that attitude, social arrangements, as well as social obstacles, more than impairment of an individual, define disability (Oliver 2013). It is opposed to the medical model, which views impairment as an individual problem requiring a specific treatment. In favor of SMD are Human Rights-Based Approach (HRBA), Universal Design Theory (UDT), Intersectionality Theory (IT), Vulnerability Theory (VT), Capability Approach (CA), and Systems Theory (ST).

SMD recognizes barriers in society as the problem, it logically leads to the assertion that removing these barriers is a matter of rights, not charity (Berghs et al. 2019). This links to HRBA, which recognizes disabled persons as rights-holders with inherent dignity (Lawson 2016). These rights to life, safety, information, participation, and non-discrimination must be respected, protected, and fulfilled, especially during national disasters (Meekosha and Soldatic 2011). UDT deals with designed environments, and services should consider the widest range of people, without the need for adaptation or specialized design (Lid 2014). IT emphasises that multiple social identities (race, gender, class, disability, etc.) intersect to create unique experiences of discrimination and privilege, leading to compounded disadvantage or compounded resilience (Crenshaw 1991). It reveals a more complex, colorful picture rather than the simple monochrome situation (Moodley and Graham 2015). VT posits that all humans are universally and inherently vulnerable and that resilience is socially constructed (Fineman 2008). The state, therefore, has an affirmative responsibility to build resilience for all (Lid 2014). CA focuses on what people can do and be (their "capabilities" or real opportunities for valued functioning), rather than just their resources or subjective happiness (Sen 2005). To convert resources into capabilities, it recognizes that different levels of support are needed for different people (Burchardt 2004). ST views a system as a set of interconnected components that work together to form a whole (Parsons 1951). This sits well with the complex nature of PWDs (Bampi, Guilhem, and Alves 2010).

1. MethodS

Ghana, located along the Gulf of Guinea in West Africa, faces increasing vulnerability to natural hazards such as floods, droughts, bushfires, coastal erosion, and disease outbreaks. Rapid urbanization and climate change have heightened these risks, especially in densely populated cities like Accra and Tamale, affecting marginalized populations disproportionately. Although the NADMO has made strides in disaster risk governance, challenges persist, particularly regarding the inclusion of PWDs in emergency planning and response mechanisms. The 2010 Census indicates that 3% of the population have disabilities, a figure likely underreported due to stigma and poor data collection (Ghana Statistical Service, 2010). Disability-inclusive disaster preparedness remains inadequate, compounded by inaccessible infrastructure and communication barriers that elevate risks for PWDs in disaster-prone areas. This research utilized a systematic review methodology of 19 articles based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework (Moher et al., 2009) to understand how systemic gaps in policy and practice disproportionately impact PWDs during natural disasters. The findings underscore the need for targeted strategies to mitigate vulnerabilities and ensure equitable disaster response for all populations.

* 1. Research Design and Objectives

The study was guided by one central research question: What are the key gaps in policy and practice that exacerbate the vulnerability of PWDs during natural disasters? This overarching question was supplemented by three sub-questions aimed at exploring how disability-specific needs are integrated into disaster governance globally and in LMICs, identifying barriers to inclusive preparedness and response, and extracting lessons for improving disability-inclusive disaster planning, particularly in contexts like Ghana.

* 1. Inclusion and Exclusion Criteria

To ensure thematic and methodological relevance, clear inclusion and exclusion criteria were established. Studies were included if they focused on individuals with pre-existing disabilities, whether physical, sensory, or cognitive, and examined their experiences or conditions in the context of natural disasters, such as floods, earthquakes, droughts, or hurricanes. Additionally, eligible studies needed to explore one or more aspects of emergency response, infrastructure, policy development, risk communication, or institutional practices. Furthermore, only sources published in English between 2000 and 2024 were reviewed, and priority was given to peer-reviewed journals, credible institutional reports (e.g., from UNDRR, WHO, or Handicap International), and grey literature from reputable academic or humanitarian organizations. Studies were excluded if they centered solely on non-disabled populations, focused exclusively on man-made or conflict-related disasters, or lacked empirical data. Editorials, commentary pieces, and theoretical essays that did not include case evidence or systematic analysis were also omitted.

* 1. Search Strategy and Literature Identification

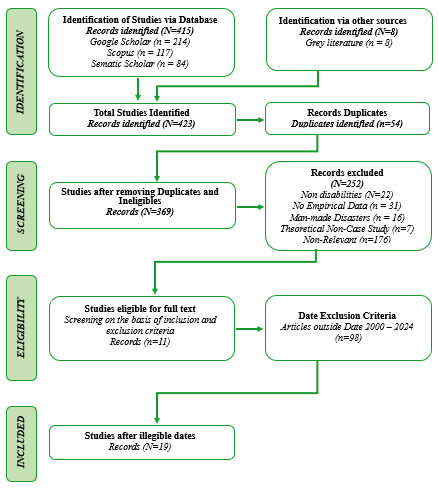
The literature search spanned three major databases; these were Semantic Scholar, Scopus, and Google Scholar. The latter was particularly useful for accessing regional and grey literature, especially documents relevant to Ghana and sub-Saharan Africa. Search terms were carefully chosen and combined using Boolean operators to maximize relevance. The search string included variations of:

*(“disability” OR “persons with disabilities”) AND (“natural disasters” OR “floods” OR “earthquakes” OR “droughts”) AND (“disaster preparedness” OR “emergency response” OR “policy” OR “risk communication” OR “infrastructure” OR “vulnerability”).*

An initial set of over 415 articles was retrieved. After the removal of duplicates and title-abstract screening, 119 full-text articles were reviewed. Of these, 19 met all criteria and were selected for in-depth analysis.

* 1. Data Extraction and Coding

Each selected article was reviewed using a standardized data extraction template, focusing on geographical context, population characteristics (e.g., disability type), disaster context, methodological approach, and findings on preparedness and vulnerability. Data was analyzed through Braun and Clarke’s (2006) thematic analysis framework, which includes six iterative steps: familiarization with data, code generation, theme identification, theme review, definition, and final write-up. The coding process was primarily inductive, informed by existing literature, and organized into seven core themes: policy development, institutional preparedness, resource allocation, communication, infrastructure, individual preparedness, and risk assessment. For methodological rigor, each study was subjected to a stringent appraisal using tools available with the Critical Appraisal Skills Program (CASP), with a focus on quality of purposes, methodological homogeneity, appropriateness of study design, as well as reporting integrity. Studies failing set quality standards were excluded in order to ensure reliability. Since the study involved using freely available secondary sources of data, no ethical approval was necessary; however, ethical considerations were observed with due citation of sources along with respectful treatment of primary sources.



**Fig. 1: PRISMA flow diagram for the review**

*Source: Authors’ Construct*

Table 1. Characteristics of Included Studies

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| --- | --- | --- | --- | --- |
| **Author(s)** | **Study Type** | **Population Focus** | **Disaster Type** | **Geographic Context** |
| Hemingway  & Priestley,  (2006) | Descriptive study | Disabled people | Hurricane, Tsunami | US (Hurricane  Katrina, Southeast Asia (Asian tsunami) |
| Fox et al. (2007) | Descriptive study, Cross-sectional survey | PWDs | No mention found | United States  (FEMA) disaster sites |
| Bethel et al.  (2011) | Cross-sectional survey | General population (PWD, poor health,  and chronic diseases) | Natural disasters | Six U.S. states |
| Boon et al.,  (2011) | Literature review | Children with disabilities | Natural disasters  (climate change) | Global, with a focus on the U.S. |
| Boon et al.,  (2012) | Descriptive study | Students with disabilities (including  Intellectual disabilities) | Weather related  Disasters (floods, fires) | Australia |
| Engelman et al. (2013) | Descriptive and Comparative study, Cross-Sectional survey. | Deaf and hard-of-hearing individuals | All-hazards emergencies  (including natural disasters) | United States (with focus on San Francisco Bay Area) |
| Boon et al.,  (2014) | Descriptive study, Cross-sectional survey | Students with disabilities | Natural disasters | Western Australia and South Australia |
| Han et al.,  (2017) | Cross-sectional survey,  Comparative study | Households with and without disabled members | Natural hazards  (earthquake, typhoon) | Taiwan |
| Malpass et al. (2019) | Integrative review | Individuals with disabilities | Natural disasters | Global (with mention of Australia) |
| Palenewen,  (2024) | Scoping review | Individuals with physical disabilities | Natural disasters | No mention found |

**Table 2. Thematic analysis on Policy Framework on PWDs during Natural Disasters**

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| --- | --- | --- | --- | --- |
| **Author(s)** | **Objectives** | **Methodology** | **Findings** | **Relevance** |
| **Theme 1: Policy Development** | | | | |
| Fox et al.  (2007) | Assess emergency preparedness policies for PWDs in the US. | Descriptive Study using Survey Data | Only 20% of counties included disability-specific protocols; 66% had no intention of adjusting plans. | Demonstrates the policy exclusion of PWDs from disaster planning frameworks. |
| Boon et al. (2012) | Assess school emergency policies for students with disabilities in Australia. | Policy Review  and Survey | Most policies lacked specific provisions for students with disabilities. | Shows the inadequacy of inclusive policy implementation in educational institutions. |
| Owusu-Ansah  & Braimah  (2013) | Examine physical accessibility in Ghana’s built environment. | Case study  and  Policy Analysis | Poorly integrated disability laws with public policy frameworks, including disaster planning. | Highlights disconnect between disability rights law and disaster governance in Ghana. |
| **Theme 2: Institutional Preparedness** | | | | |
| Engelman et al. (2013) | Investigate state-level preparedness for Deaf populations in US disasters. | Cross-Sectional Survey and Descriptive Analysis | Most agencies lacked staff training or operational plans for Deaf populations. | Exposes gaps in institutional readiness for disability-inclusive response. |
| Boon et al. (2014) | Survey Australian schools on emergency planning for disabled students. | Survey and Descriptive Statistics | Many schools lacked any provisions for students with disabilities despite general plans. | Shows systemic failure to integrate disability concerns in institutional DRR. |
| Antwi-Agyei et al. (2021) | Explore disaster management coordination in northern Ghana. | Qualitative Study with Key Informant Interviews | Found lack of coordination between NADMO and social welfare agencies. | Reveals local institutional fragmentation affecting vulnerable populations. |
| **Themes 3 and 4: Resource Allocation and Communication** | | | | |
| Boon et al. (2011) | Review communication in school disaster planning for disabled children. | Literature review | Plans lacked inclusive communication protocols for children with disabilities. | Highlights lack of inclusive communication practices in school DRR. |
| Engelman et al. (2013) | Assess resource training gaps for disability inclusion in DRR. | Survey and policy review | Over half of states reported no formal training or budget allocation for inclusion. | Highlights underinvestment in inclusive preparedness measures. |
| Engelman et al. (2013) | Study readability and accessibility of disaster materials for Deaf communities. | Content analysis and survey | Materials were often inaccessible, exceeding average literacy levels. | Demonstrates exclusionary risk communication strategies. |
| Amponsah-Tawiah & Mensah (2016) | Analyze occupational safety and emergency responses in Ghana. | Descriptive case study | PWDs affected by floods lacked access to specialized rescue services. | Illustrates neglect of disability needs in emergency resource planning. |
| **Theme 5: Infrastructure** | | | | |
| Fox et al. (2007) | Evaluate accessibility of FEMA disaster shelters for PWDs. | Descriptive field study | Many shelters lacked ramps and accessible toilets. | Shows physical infrastructure barriers faced by disabled individuals. |
| Owusu-Ansah & Braimah (2013) | Assess Ghana’s urban accessibility in context of public emergencies. | Policy and spatial analysis | Most public buildings remain inaccessible to PWDs. | Identifies critical infrastructure failings in Ghana. |
| Amponsah-Tawiah & Mensah (2016) | Document effects of Accra floods on PWDs’ access to shelter. | Descriptive field case study | PWDs could not evacuate due to inaccessible terrain and shelter design. | Provides context-specific evidence of infrastructure barriers. |
| **Theme 6: Individual Preparedness** | | | | |
| Bethel et al. (2011) | Compare emergency preparedness in medically vulnerable and general populations. | Cross-sectional survey | PWDs less likely to have emergency kits and plans. | Shows disparities in household-level preparedness. |
| Han et al. (2017) | Compare household disaster readiness in Taiwan based on disability presence. | Comparative quantitative study | Households with PWDs were less prepared across multiple indicators. | Reinforces global patterns in preparedness gaps. |
| Antwi-Agyei et al. (2021) | Study rural household resilience in northern Ghana. | Qualitative interviews | Households with disabled members lacked resources for preparedness. | Local evidence for preparedness challenges in vulnerable households. |
| **Theme 7: Risk Assessment** | | | | |
| Hemingway & Priestley (2006) | Critique social construction of disability risk in disasters. | Theoretical and conceptual review | Argue PWDs’ vulnerability is structurally produced. | Foundational work emphasizing systemic causes of exclusion. |
| UNDRR (2015) | Establish global DRR framework promoting inclusion. | Policy document and framework analysis | Acknowledges need for disaggregated data but implementation lags. | Highlights global-level policy-practice gaps in inclusive risk planning. |
| Malpass et al. (2019) | Review experiences of PWDs in disaster shelters. | Integrative literature review | Risk assessments rarely included disability-specific needs. | Exposes knowledge and planning gaps in global DRR. |

*Source: Authors’ Construct*

1. Thematic overview of included studies

This section offers an overarching summary of the studies incorporated as organized in accordance with the overarching themes that have emerged from the literature. These themes; policy formulation, institutional readiness, resource distribution, information sharing, infrastructure, individual readiness, and risk evaluation, capture the system gaps and vulnerabilities faced by PWDs during natural disasters. Each study was evaluated to demonstrate its contribution in informing the understanding of these themes, synthesizing global and local evidence for disability-inclusive disaster risk reduction (DRR). Such a systematic process allows findings to be compared across a variety of contexts, drawing out persistent patterns of exclusion and emphasizing the urgent need for inclusive practice and policy. The tabular structure ensures readability and easy identification of key gaps in current DRR frameworks.

* 1. Comparative Thematic Synthesis of Reviewed Literature

Literature examined in the present study found converging evidence in at least one theme of PWDs' disproportionate risk to natural disasters. Despite varying in contexts, disaster types, and disability groups discussed, similar dynamics of exclusion, system omission, and under-readiness were found. By grouping the discussed articles into related themes, the study untangled complementary and contrasting findings that enriched comprehension of disabled groups' institutional and structural vulnerabilities.

* + 1. Policy Development

In all contexts, the researchers highlighted that disaster policies seldom catered to disability-specific needs. Fox et al. (2007), in their research on emergency readiness in the U.S, discovered that 20% contained disability-specific procedures. This indicated a global policy deficiency even in nations with well-established frameworks of disability rights. Boon et al. (2012) made similar findings for Australia's education sector. Their examination of school-based emergency policy identified that most disaster plans did not address students with disabilities, a finding which again reflects the same gap in policy obligation and operational planning. In another similar but context-specific example, Owusu-Ansah and Braimah (2013) demonstrate how Ghana's disability law, while progressive in writing, has yet to be integrated into national disaster risk governance systems. As a result, protection measures for PWDs during emergency conditions remain fragmented and incomplete. The research identifies with a general observation: despite the existence of disability laws and universal guidelines, policy integration remains superficial. Similar findings in high-, middle-, and low-income economies suggest an international phenomenon of reconciling legislative intent with tangible disaster administration.

* + 1. Institutional and Community Preparedness

Research gives evidence of wide disparities in institutional capacity in disability-inclusive disaster preparedness globally. Emergency management officials usually lack specialized knowledge and standards to serve the PWDs, particularly the sensory-impaired (Engelman et al., 2013). Educational institutions also fail to adapt emergency plans for individuals with disabilities, maintaining generic operations that do not cater for vulnerable groups (Boon et al., 2014). In the case of Ghana, institutional errors are exacerbated by NADMO and welfare institutions' inability to coordinate, thereby creating fragmented responses that never take into consideration PWD needs (Antwi-Agyei et al., 2021). This institutional inability is nothing but the reflection of an even broader tendency where inclusion of disability is theorized but never put into practice, even where disability planning is concerned.

* + 1. Household and Individual Preparedness

Families with PWDs have not shown enough level of preparedness in the event of a disaster. By qualitative comparison, scholars have the conclusion that these families are significantly less likely to have emergency-needs supplies or evacuation planning (Bethel et al., 2011; Han et al., 2017). As rural Ghana is typical, concomitant deterrents of poverty, resource frugality, and stigmatization cause cumulating deterrents of PWD family preparedness (Antwi-Agyei et al., 2021). The results depict how structural inequity amplifies disaster vulnerability for disabled populations. Onuma et. al., (2017) opines that due to inevitable delays in government relief items reaching people, there should be higher levels of individual preparation, to ensure minimum degrees of disaster consequences.

* + 1. Resource Allocation

Inextricably bound up with institutional capacity is the question of prioritization of resources.

Engelman et al. (2013) found that more than half of U.S. emergency agencies did not have a dedicated budget or training programs to enable disability inclusion. This money neglect is part of a greater trend where disability considerations were either too costly or secondary in nature. Amponsah-Tawiah and Mensah (2016) also relay such an experience within Ghana, wherein the Accra floods response showed enormous loopholes in extending specialized rescue services to PWDs. Since resources are not allocated, inclusive planning is a pipe dream. From the observations and the findings about the correlation between financial investment and inclusive disaster response capacity, the conclusion was made in no uncertain terms that without deliberate fund allocation and capacity building, institutional goodwill is insufficient for effective inclusion.

* + 1. Communication

The other of the cross-cutting issues is the exclusion of PWDs from risk communication systems. Engelman et al. (2013) confirmed that emergency communications materials in the United States were written at levels that were well above the capabilities of the typical Deaf or hard-of-hearing individual. The absence of visual cues or simplified modes of language severely limited the availability of critical information. Similarly, Boon et al. (2011) noted that Australian school emergency procedures lacked inclusive communication strategies, thus disabled students were left vulnerable during emergencies. Both examples reiterated that until risk communication is made adaptable based on the needs of the users, it fails to play its general function. Both studies are exemplary of a larger critique of disaster communication strategies: they assume a normative audience, typically able-bodied, literate, and neurotypical. In doing so, they systematically exclude persons with sensory, intellectual, or cognitive disability, perpetuating a cycle of invisibility in disaster response planning.

* + 1. Infrastructure

Emergency infrastructure is inevitably acknowledged as an overriding challenge for an inclusive response to disasters. It is reported by Fox et al. (2007) that FEMA shelters in the US America did not typically include necessary access features like ramps or accessible toilets, a result of which risk of exclusion for individuals who have mobility disabilities is strengthened. Similarly, in the case of Ghana, Owusu-Ansah and Braimah (2013) asserted that the majority of public buildings are not accessible and noted the ongoing lack of enforcing building policies that accommodate universal design parameters. In the 2015 Accra floods, Amponsah-Tawiah and Mensah (2016) documented that PWDs frequently faced severe obstacles in seeking access to shelters, brought about by both inaccessibility of terrain and shortcomings in shelter infrastructure. These case studies in different contexts show a perpetuating system failure: emergency infrastructure is systematically planned and built without protecting PWDs, thus making physical inaccessibility an issue of mobility, and of survival for those facing disasters.

* + 1. Risk Assessment

A critical but often overlooked area of exclusion is risk assessment itself. Malpass et al. (2019) highlight that most disaster planning tools do not include disability-specific indicators, leading to blind spots in preparedness and response strategies. This exclusion at the data level results in policies that overlook the needs of entire population segments. The UNDRR (2015), through the Sendai Framework, explicitly calls for disaggregated data and inclusive assessment tools. Yet, implementation has lagged behind policy aspirations, especially in LMICs where data infrastructure is weak. Complementing these policy-level insights, Hemingway and Priestley (2006) offer a theoretical critique, arguing that vulnerability is not a consequence of disability per se, but of the ways society structures exclusion. Their work underlines that unless structural inequities are addressed at the level of assessment and planning, superficial reforms will yield limited change.

Across all themes, the literature reveals remarkable consistency in identifying structural and institutional drivers of disability vulnerability during disasters. The studies largely reinforce each other, suggesting a global pattern of policy neglect, inadequate planning, underfunding, and systemic inaccessibility. While there are differences in geographic scope and methodological approaches, the convergence of findings lends significant weight to the argument that inclusion must be deliberate, systemic, and well-resourced. This thematic synthesis underscores the urgency of rethinking disaster risk governance through a disability-inclusive lens. This is in accordance with the SDGs, which advocate for inclusive, equitable, and sustainable societies. The susceptibility of PWDs to disasters has a direct negative impact on a number of core SDGs. Integration of disability-inclusive measures in disaster risk reduction is not just a moral and legal right but also key to the achievement of global development expectations

* + - 1. SDG 1 - No Poverty:

Disasters tend to increase poverty among PWDs by eroding livelihoods, protection systems, and access to social protection. As Antwi-Agyei et al. (2021) point out, there is an extensive shortage of resources in rural Ghana households that have disabled members, leaving disaster preparedness practically impossible. Without inclusive risk management, disasters will continue entrenching already disadvantaged people in poverty.

* + - 1. SDG 3 - Good Health and Well-Being:

Disasters greatly impede the provision of health care, which is necessary for the majority of PWDs who rely on continuous medical care or assistive devices. Data from the United States and Ghana (Engelman et al., 2013; Amponsah-Tawiah & Mensah, 2016) indicate that PWDs frequently face life-threatening barriers to evacuation and health care due to inaccessible systems. Integration into disaster planning is therefore key to the preservation of health equity.

* + - 1. SDG 4 - Quality Education:

As shown by Boon et al. (2012, 2014), school emergency planning overlooks the particular requirements of students with disabilities. Disaggregation from safe learning facilities during emergencies jeopardizes the realization of lifelong learning and equal education opportunities for all, particularly in low-resource settings where adaptive infrastructure is limited.

* + - 1. SDG 10 - Reduced Inequalities:

This goal emphasizes the need to eliminate discriminatory practices and ensure equal opportunity. The reviewed literature reveals systemic exclusion of disabled populations from policy, institutional preparedness, and emergency communication systems (Fox et al., 2007; Hemingway & Priestley, 2006), reinforcing inequality before, during, and after disasters.

* + - 1. SDG 11 - Sustainable Cities and Communities:

This goal calls for inclusive urban planning and disaster resilience. However, case studies from Ghana (Owusu-Ansah & Braimah, 2013) and the U.S. (Fox et al., 2007) show that emergency infrastructure such as shelters, evacuation routes, and warning systems often remain inaccessible. Without the enforcement of all-inclusive design, cities will continue to marginalize disabled residents during crises.

* + - 1. SDG 13 - Climate Action:

As climate-induced disasters become more frequent, inclusive resilience planning is essential. The failure to integrate PWDs into climate adaptation strategies undermines the global mandate for equitable climate action. The literature underscores that current disaster risk governance rarely includes disability-specific vulnerability data, limiting both effectiveness and fairness (Malpass et al., 2019; UNDRR, 2015).

* + - 1. SDG 17 - Partnerships for the Goals:

The exclusion of DPOs from national disaster planning violates the spirit of multi-stakeholder engagement promoted under SDG 17. Antwi-Agyei et al. (2021) highlight the lack of collaboration between Ghana’s NADMO and disability councils, an institutional weakness echoed globally (Engelman et al., 2013). Stronger partnerships are needed to embed lived experience into inclusive policy reform. The failure to include PWDs in disaster planning is not simply a humanitarian lapse, it reflects a fundamental breach of the SDG commitment to "leave no one behind."

Achieving the SDGs requires mainstreaming disability inclusion across all dimensions of DRR, from policy to practice, infrastructure to communication, and local action to global advocacy. The lessons are clear: without policy coherence, institutional accountability, financial investment, inclusive communication, accessible infrastructure, targeted household interventions, and inclusive data practices, the cycle of exclusion will persist, placing lives at risk in every future disaster. This study advances beyond descriptive critiques (e.g., Hemingway & Priestley, 2006) by offering a multi-scalar framework for inclusion, aligning with SDGs 1, 3, and 11. Where prior work identified institutional neglect (Boon et al., 2014), our recommendations, such as mandatory DPO consultation and universal design enforcement, provide pathways for systemic change.

* 1. Synthesis with Evidence

The literature indicates a significant and disproportionate vulnerability of PWDs during natural disasters, driven by systemic neglect and under-preparedness. Studies emphasize the insufficient inclusion of disability-specific needs in disaster policies, with Fox et al. (2007) finding that only 20% of emergency preparedness plans in the U.S. incorporated such protocols. Similar results emerged in education, where Boon et al. (2012) noted that most Australian school disaster plans failed to accommodate students with disabilities. Additionally, Owusu-Ansah and Braimah (2013) further stressed that there is insufficient integration of disability legislation in Ghana with disaster risk governance, reflecting one of several universal challenges in balancing policy goals with operational strategies of disaster management.

Studies have shown severe gaps in preparedness among institutions and at the community level, with emergency agencies commonly being poorly trained to serve PWDs (Engelman et al., 2013). Evidence has shown that households with persons who have disabilities have lower emergency preparedness levels, as Bethel et al. (2011) and Han et al. (2017) have shown in reporting emergency store shortages and evacuation plans. In rural Ghana, Antwi-Agyei et al. (2021) have identified poverty levels and social stigma as magnifiers of preparedness issues. These gaps serve as indicators of current disaster risk management strategies being ineffective in accommodating PWDs, highlighting a dire need for disability-inclusive practice along with resource allocation aimed at bolstering community resilience.

1. Conclusion and Recommendations

The 19 articles employed for the review and the restriction to the English language as a criterion limits the outcomes of this review, since an expansion of the inclusion criteria may have further enriched the outcomes. Notwithstanding, this review has demonstrated the following:

Systematic Marginalization of PWDs in Disasters

* PWDs remain among the most systematically marginalized populations during natural disasters.
* Their marginalization is not due to impairments alone, but stems from a structural inequality issue.
* Evidence from global, national, and local levels (including Ghana) shows vulnerability is constructed through intersecting failures in disaster risk governance, which include inadequate policy integration, weak institutional preparedness, underfunding, exclusionary communication practices, inaccessible infrastructure, poor household preparedness, lack of disability-disaggregated data in risk assessments.
* DRR frameworks, including those underpinned by international treaties and national laws, have not fully operationalized inclusive responses for PWDs.

Disconnect Between Commitments and Practice

* Despite the shift toward inclusive DRR rhetoric, a disconnect remains between policy and implementation. Examples from the US, Australia, and Ghana depict that policies often remain broad and unenforceable, and that concrete, disability-specific mechanisms are absent. Lack of institutional capacity, training, and chronic underinvestment in inclusive tools and technologies are contributory factors.
* These are deep-rooted political and societal norms that deprioritize disability.
* Without a fundamental shift in worldview, disability management will remain discriminatory.
* PWDs will continue to bear a disproportionate burden in environmental crises.

Proposed Solution: Multi-Scalar Disability-Inclusive DRR

* A cross-disciplinary, multi-level approach is required to address existing gaps.
* National governments must integrate disability rights into DRR legislation and planning, and move beyond superficial alignment to enforceable mandates.
* Mandatory standards should span the entire disaster management cycle of planning, response, recovery, and rebuilding.
* For Ghana, this includes integrating the Persons with Disability Act into NADMO’s operations, and ensuring PWDs participate as beneficiaries, co-planners, and active respondents at the district planning level..

Institutional Accountability and Investment

* Institutions must be both empowered and held accountable for inclusion.
* Preparedness should be mandatory and institutionalized.
* Governments and donors should allocate specific budgets for assistive technologies, accessible communication tools, inclusion-centered emergency drills.

Inclusive Communication as Core DRR Practice

* Communication must be inclusive at every stage of disaster planning.
* Risk messages should be conveyed using visual media, auditory formats, tactile methods, simple and plain language.
* Effective communication requires collaboration among Disabled People’s Organizations (DPOs), linguists, educators, and health professionals.
* Content must be cognitively accessible, and culturally relevant.

Accessible Physical and Digital Infrastructure

* Disaster response infrastructure must incorporate accessibility by design.
* All new buildings should adhere to universal design standards.
* Existing structures must undergo retrofitting for accessibility.
* Emergency corridors and shelters must be usable by people with mobility limitations, and people with sensory impairments.
* Infrastructure upgrades should be guided by legal mandates on universal design.

Household-Level and Community Preparedness

* PWDs and their households must improve disaster preparedness through ongoing awareness campaigns, provision of affordable preparedness kits, disability-inclusive community training.
* Caregiver support is essential and should include social protection systems, and emergency response training for the caregivers.

Disability-Disaggregated Data for Risk Assessment

* Risk analysis and disaster warnings must include disability-disaggregated data so as to monitor needs, evaluate responses, and strategically plan for PWDs.
* Governments and research bodies must develop inclusive data infrastructures, and ensure that PWDs are counted and represented in all DRR assessments.

1. COMPETING INTERESTS DISCLAIMER:

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

**Disclaimer (Artificial intelligence)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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