

Review

Health impacts of climate-change related natural disasters on persons with disabilities in developing countries: A literature review



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ABSTRACT

Background: Climate change is identified as the foremost health threat in the present era, resulting in a broad range of negative health impacts on individuals, families, and communities. Marginalized populations in developing countries are particularly affected. This literature review explored the health impacts of climate change-related natural disasters on persons with pre-existing physical and mental disabilities in developing countries.

Methods: The Joanna Briggs Institute [JBI] evidence synthesis guideline was applied and results were reported following Preferred Reporting Items for Systematic Reviews and Meta-Analyses [PRISMA] guidelines. PubMed, PsycINFO, Scopus, and Embase databases were searched using terms related to 'persons with disabilities' (PWD), 'climate change', and "developing countries" and types of natural disasters considered to result from climate change. Selected articles were reviewed and thematic analysis was performed.

Findings: Fourteen articles were included of which five generalized across multiple countries and nine profiled specific developing countries including Bangladesh, China, Haiti, India, Nepal, Philippines, South Africa, Tuvalu, and Uganda. Five key themes were identified: [i] impact on PWD physical health, [ii] impact on PWD mental health, [iii] resilience and coping strategies of PWD in disasters, [iv] PWD involvement in inclusive disaster planning, and [v] climate-change related natural disasters on PWD in developing countries as a human rights issue.

Interpretation: This review underscores the lack of literature related to negative health impacts of climate change-related natural disasters on persons with pre-existing physical and mental disabilities in developing countries. Additional research is required to better understand these impacts as well as contributing social and economic factors and facilitative coping and resilience strategies in climate-related natural disasters. Addressing these gaps can inform development of effective, disability-inclusive disaster management practices which contribute to more equitable climate-change related health and rights-based outcomes for PWD in developing countries.

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1. Introduction

The World Health Organization (WHO) has identified climate change as the single largest health threat today and estimates that climate change will result in an additional 250,000 deaths annually between 2030 and 2050 [1]. The health effects of climate change have been described at the individual, family, and community

levels [2]. Vulnerable populations including persons with disabilities (PWD) in developing countries are among those most adversely affected, experiencing severe health impacts and limited opportunities to implement coping and resilience strategies. PWD are at high risk for both negative physical and mental health impacts due to climate change [3]. Developing countries are more severely impacted than developed countries [4–6].

An estimated 16 % of the global population lives with a disability, and 80 % of these people live in developing countries [7]. Developing countries are those historically assigned to the World Bank low and middle income classification groups. Besides having smaller economies, developing countries generally have a lower average standard

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of living, less functional governments, weaker health systems and human rights protections, lower literacy rates, and lower life expectancies than developed countries [8,9]. Disability refers to a state wherein the body or mind experiences impairments, resulting in challenges in performing specific tasks and engaging with the world. WHO identifies three dimensions of disability: first, impairments affecting body structure, function, or mental capacity, which include examples such as limb loss, vision impairment, or memory decline; second, activity limitations including difficulty in tasks such as seeing, hearing, walking, and problem-solving, and; lastly, participation restrictions in routine engagement activities such as work, social interaction, recreation, and healthcare and preventive service access [10].

PWD are a disenfranchised minority in many countries and often face significant challenges in daily living due to their medical conditions, which can be complicated further by the external environment. Serious climate change-related threats to the health of PWD include water-related illness, heat illness, mental health effects, injuries, and deaths [11–14]. The effects of heat and cold waves, extreme temperatures, wildfires, and natural disasters, including floods, cyclones, and landslides, on human health are more prevalent in PWD, especially those in developing countries. PWD suffer disproportionately higher rates of morbidity and mortality in natural and man-made disasters resulting from climate change [14]. They are also more prone to worsening of pre-existing health vulnerabilities, especially given the increasing frequency and intensity of global disasters [15]. Besides harm to physical health, negative life events due to extreme weather events related to climate change can cause unhealthy stress, grief, depression, and mental illness. Climate change weather events also result in increased disruption of medical care for PWD compared to the general population and a higher prevalence of negative economic and social risk factors including unemployment and poverty.

Despite the high vulnerability of PWD to extreme weather events, their views and lived experiences are often not included in development of climate change disaster management policies [14,16]. The negative impacts of climate change on PWD, especially in developing countries, are consequently less thoroughly documented in the literature compared to those of other vulnerable populations [17]. This literature review seeks to address the need for a greater understanding of negative climate change-related natural disaster impacts on the health of PWD in developing countries with the intention of helping to reduce these impacts.

2. Methods

2.1. Search strategy

Search eligibility criteria were informed by the Joanna Briggs Institute (JBI) evidence synthesis guideline [18]. The review concept was defined as the 'intersection of climate change and health', the population as 'individuals with disabilities, and the review context as 'developing countries'. Multiple databases were searched including PubMed, PsycINFO, Scopus, and Embase, 2005 to 2023 inclusive, to more comprehensively identify the available, limited literature on PWD and climate change. Additional studies were identified by hand-searching article reference lists.

PubMed search terms for PWD and climate change (Box 1) were applied to all database searches and the term "developing countries" was searched for country-specific inclusion (supplementary material Table 1 for each database search term). Primary keyword terms "persons with disabilities", "climate change", and "developing countries" were used as were types of natural disasters considered to result from climate change. MeSH terms, truncation, double quotes, and similar terms were employed to help ensure the inclusion of all available pertinent studies.

Box 1 PubMed search terms

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((Disabled Person*[mh] OR rehabilitation*[mh] OR Spinal Cord Injuries[mh] OR "People with Disabil*" or "PWD"[all] OR "Person with Disabil*" [all] OR Physically Disabl*[all] OR "Physically Challenged"[all] OR "Person with special needs"[all] OR Disability-Adjusted Life Years[mh] OR "Disease related disabilit*" [all] OR "Trauma related disabilit*" [all] OR "health impact"[all] OR "Quality of Life"[mh] OR "health effect*" [all] OR "health consequenc*" [all] OR "physical health"[all] OR "mental health"[mh]) AND (Climate Change*[mh] OR Natural Disaster*[mh] OR Cyclonic Storm*[mh] OR Flood*[mh] OR Heatwave*[all] OR Hurricanes[mh] OR Cyclones[mh] OR Drought*[mh] OR Wildfire*[mh] OR Sea Level Rise[mh] OR "landslid*" [all] OR "Weather variation"[all] OR "climate variabil*" [all] OR "climatic variati-on" [all] OR Intersection of climate change [all] OR interchange of climate change [all]))
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2.2. Article selection process

Article selection comprised four phases: identification, screening, eligibility, and inclusion. Potential articles were identified through database searches (see detailed literature search strategy in Supplementary Materials). Identified article titles and abstracts were screened for inclusion criteria. A full-text review of qualifying screened articles was performed for eligibility and non-qualifying articles were excluded. Included articles were required to be: related to persons with pre-existing physical and/or mental disabilities impacted by climate change-related extreme weather events; from developing countries; published between 2005 and 2023, and; published in the English language. Fig. 1 diagrams the flow for article selection.

2.3. Data extraction and management

The Joanna Briggs Institute Framework was adopted to ensure methodological strength and evidence management for this review [19]. In terms of the data extraction process, three authors (M.R.I., A.T., and T.U.) independently conducted title/abstract and full-text screening using an online research platform (Rayyan; <https://rayyan.ai/reviews/>). Four authors (M.R.I., A.T., M.T.I., and T.U.) then independently extracted data meeting inclusion criteria into a Google sheet; data were exported to primary documents for further analysis. The PRISMA extension for the scoping review framework (PRISMA-ScR) was used to determine the review methodology (see PRISMA-ScR Checklist in Supplementary Material) [20]. No critical appraisal was done for this review. Mendeley reference management software was used. Thematic analysis of the selected articles was performed by joint author consultation (M.R.I., A.T., M.T.I., and T.U.).

3. Results

3.1. Article characteristics, key findings, and recommendations

The database search retrieved 406 articles. After the removal of duplicates, of the 402 articles remaining for title and abstract screening, 360 were excluded for not meeting inclusion criteria. Forty-two articles were eligible for full-text review and 14 met the inclusion criterion. Based on methodological description, article studies comprised reviews ($n = 5$), cross-sectional studies ($n = 5$), a case report ($n = 1$), a series of case reports ($n = 1$), a qualitative study ($n = 1$), and a needs assessment ($n = 1$). Five articles generalized data from multiple

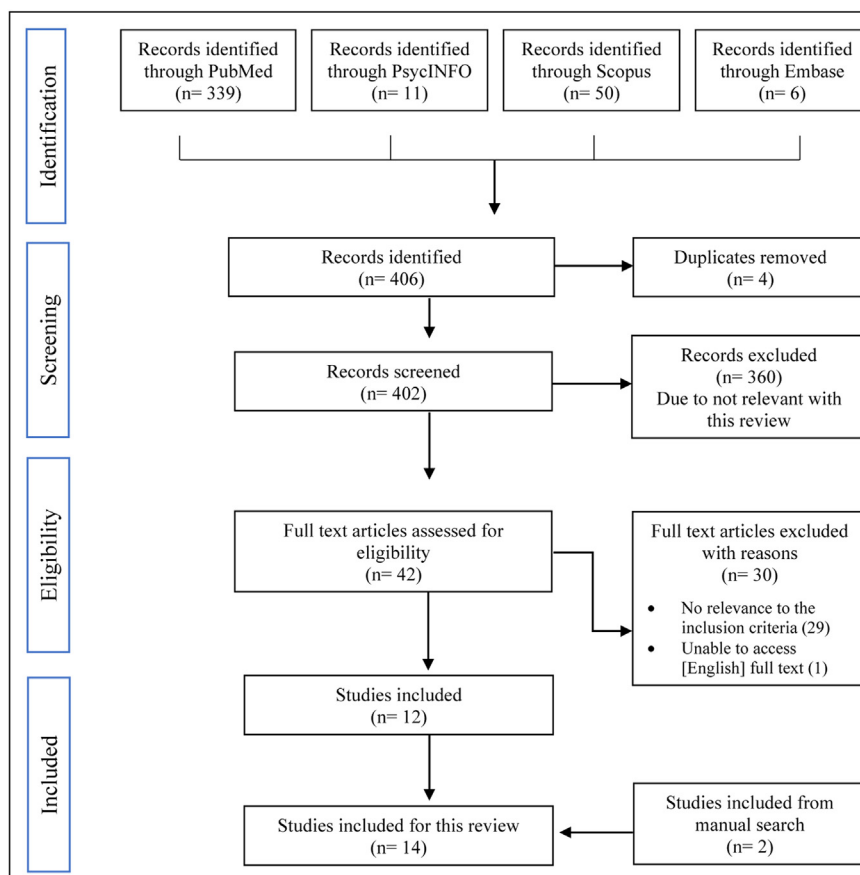


Fig. 1. Flow diagram for impact of climate-related natural disasters on physical or mental health of persons with disabilities in developing countries.

developing countries and nine articles profiled specific countries including Bangladesh, China, Haiti, India, Nepal, Philippines, South Africa, Tuvalu, and Uganda. Included studies evaluated persons with pre-existing physical and mental disabilities who were impacted by climate-related disasters. Articles spanned from 2005 to 2023 and were published in the English language. [See Table 3]. Table 4 highlights article key findings and recommendations.

3.2. Thematic analysis

Analysis of the included papers revealed five key themes related to the impacts of climate-change related natural disasters on PWD in developing countries: [i] impact on PWD physical health, [ii] impact on PWD mental health, [iii] resilience and coping strategies of PWD in disasters, [iv] PWD involvement in inclusive disaster planning, and [v] climate-change related natural disasters on PWD in developing countries as a human rights issue.

4. Discussion

4.1. Impacts of climate-change related natural disasters on the physical health of PWD in developing countries

Most articles address impacts on the physical health of PWD, persons with mobility impairments primarily, in climate change related disasters. These persons may be unable to quickly evade a crisis threat or be left behind during a hurried evacuation [21–27]. Sensory disabilities including hearing impairment, visual impairment, deafness and deaf-blindness were highlighted in a study mapping the susceptibility of PWD to landslides in eastern Uganda [21]. These persons with sensory disabilities were lowly prioritized in rescue and

recovery efforts given the assumption their survivability was poor and therefore did not merit limited available emergency resources [22]. Persons with SCI suffering motor and sensory disabilities, including mobility impairment and temperature dysregulation, respectively, were the focus of a cross-sectional study addressing the educational needs of rehabilitation professionals regarding disaster management and SCI [28]. The landmark WHO World Report on Disability indicated that persons with intellectual disabilities in Costa Rica suffer disproportionate risks in disasters and are often excluded from relief services due to lack of self-advocacy [29].

4.2. Impacts of climate-change related natural disasters on the mental health of PWD in developing countries

The literature reports that PWD experience mood changes, specifically heightened anxiety and depression, that lead to greater morbidity due to extreme weather events driven by climate change [28,30,31]. Beyond the immediate mental stresses of surviving an acute event which can involve evacuation and relocation, lack of critical resources such as clean water and food can contribute to feelings of powerlessness, fear, and depression among PWD. Healthcare service disruption may compromise PWD medical conditions in the short term and compound mental health symptoms over time [28,31]. Altered daily routines and personal support networks can also exacerbate existing mental health conditions [22]. Decreased community participation due to a climate-related disaster increases vulnerability, reduces resilience, and degrades the quality of life of affected PWD, their caregivers and their families. Children with disabilities are particularly vulnerable in disasters [25,26]. Separation of children from caregivers in disasters can cause PTSD and depression, for example [25]. Mental health sequelae for PWD due to climate-

Table 3
General characteristics of included articles.

#	Author(s) and Year	Country	Journal name	Article title	Article type (study design)	Study population	Sample size	Study Period
1	Alexander et al., 2019	Multi-countries	Spinal Cord Series and Cases	A bellwether for climate change and disability: educational needs of rehabilitation professionals regarding disaster management and spinal cord injuries	Research (cross-sectional survey)	Rehabilitation professionals	125 people	2019
2	Mann et al., 2021	Multi-countries	Current Psychiatry Reports	Children and Adolescents with Disabilities and Exposure to Disasters, Terrorism, and the COVID-19 Pandemic: a Scoping Review	Scoping review	Not mentioned	67 studies	2015–2017
3	Peek & Stough, 2010	Multi-countries	Child Development	Children with disabilities in the context of disaster: A social vulnerability perspective	Critical review	Not mentioned	Not mentioned	2010
4	Levy & Patz, 2015	Multi-countries	Annals of Global Health	Climate Change, Human Rights, and Social Justice	Review	Not mentioned	Not mentioned	2014
5	Elisala et al., 2020	Tuvalu	PLoS ONE	Exploring persons with disabilities' preparedness, perceptions, and experiences of disasters in Tuvalu	Research (qualitative; grounded theory)	PWDs above age 21	24 people	2020
6	Ssenoga et al., 2022	Uganda	Journal of Disaster Risk Studies	Mapping the susceptibility of persons with disabilities to landslides in a highland landscape of Bushika Sub County, Mount Elgon, Eastern Uganda	Research (cross-sectional survey)	PWDs above age 18	463 people	Not mentioned
7	Kisira et al., 2023	Uganda	Environmental Hazards	Persons with disabilities and resilience: coping with environmental hazards case of landslides in Mount Elgon region, Uganda	Research (cross-sectional survey)	PWDs above age 18	463 people	Not mentioned
8	Benigno et al., 2015	Philippines	Western Pacific surveillance and response journal: WPSAR	Responding to the health and rehabilitation needs of people with disabilities post-Haiyan.	Needs assessment	PWDs and acutely traumatic injured	2998 people	2013–2014
9	Pan, 2016	China	Environmental Research	Study on mobility-disadvantage group' risk perception and coping behaviors of abrupt geological hazards in coastal rural area of China.	Research (cross-sectional survey)	Mobility-disadvantaged	47 people	2014–2015
10	Khine & Langkuisen, 2023	South Africa	International journal of environmental research and public health	The Implications of Climate Change on Health among Vulnerable Populations in South Africa: A Systematic Review.	Systematic review	Not mentioned	24 studies	2014–22
11	Hiranandani, 2015	India	Strategic Disaster Risk Management in Asia	Where is disability in disaster management in India?	Review (book chapter extract)	Not mentioned	Not mentioned	2000–2010
12	Stough, 2015	Costa Rica	Journal of Policy and Practice in Intellectual Disabilities	World Report on Disability, Intellectual Disabilities, and Disaster Preparedness: Costa Rica as a Case Example	Report case study	Not mentioned	Not mentioned	Not mentioned
13	Engelman et al., 2022	Multi-countries	Health Affairs	Global Disability Justice In Climate Disasters: Mobilizing People with Disabilities As Change Agents	Case studies	Persons with disabilities	Not mentioned	Not mentioned
14	Ahmed et al., 2020	Bangladesh	Climate and Development	Effect of extreme weather events on injury, disability, and death in Bangladesh	Research (cross-sectional survey)	Not mentioned	667,740 people	2009–2014

change related natural disasters underscore the critical need for mental health support for this at-risk population.

4.3. Coping strategies of PWD in climate-change related natural disasters in developing countries

Disaster resilience may be understood to mean the capacity of individuals, communities, public and private organizations, and countries to adapt to the shocks and stresses associated with natural hazards and is determined by the degree to which these entities are capable of organizing themselves to learn from past disasters and reduce their risks to future ones [32]. Within the field of disaster management, the concept of resilience can be viewed as the ability of individuals and the community to limit the effects of disasters and includes elements of effect mitigation, adaptation, and coping [32,33].

Coping strategies are generally understood to mean actions taken by PWD, caregivers and communities during and

immediately before and after a disaster to reduce its adverse effects. Establishment of effective coping strategies for PWD in disasters in developing countries is challenged by their impairments and social circumstances [31]. Early electronic disaster warning and alert systems are considered to be a critical pre-disaster coping strategy [24,31]. Employment of organized community self-help groups to include early disaster warning groups is viewed as an effective coping strategy [21]. Effective coping by PWD, especially those living alone, requires access to technical support including mobile phones and the internet for accessing crisis information and emergency assistance. Effective coping also requires access to sufficient basic emergency supplies including water, food, and shelter; lack of these essential items contributes to poor health outcomes in disasters [23]. Access to personal medical assistive devices such as eyeglasses, hearing aids, and wheelchairs during a disaster can facilitate early warning and timely evacuation [21].

Table 4
Key findings and recommendations of included papers.

#	Author(s) and Year	Article title	Type of climate change events	Type of disability	Key findings and recommendations
1	Alexander et al., 2019	A bellweather for climate change and disability: educational needs of rehabilitation professionals regarding disaster management and spinal cord injuries	Extreme weather disasters	Physical and sensory related to spinal cord injury	Rehabilitation professionals acknowledge significant negative impacts of climate change-related disasters on persons with SCI Disability and climate change are human rights issues Perform comprehensive education of rehabilitation professionals on disaster management and SCI Conduct research on climate change and SCI
2	Mann et al., 2021	Children and Adolescents with Disabilities and Exposure to Disasters, Terrorism, and the COVID-19 Pandemic: a Scoping Review	Disaster, Terrorism and COVID19	Physical (mobility), sensory, intellectual, and psychological	Children with disabilities and their families have increased vulnerability in disasters due to societal discrimination and challenges related to trauma, various medical conditions, mobility, sensory perception, executive functioning, language, intellectual abilities, and adaptive behavior Conduct research to enhance disaster preparedness, communication in disasters, and trauma-informed treatments of COVID-19 pandemic impacts
3	Peek & Stough, 2010	Children with disabilities in the context of disaster: A social vulnerability perspective	Natural disasters, hurricanes, floods	Physical and psychological	Children with disabilities are particularly vulnerable in disasters Separation of children from caregivers in disasters can cause trauma mental health symptoms resembling PTSD and depression Lack of accessible post-disaster housing, healthcare, and academic accommodations can impede impacted childrens' community integration Establish a robust research framework investigate vulnerabilities, risks, and resiliency factors of children with disabilities in disaster contexts, integrating disability as a key aspect of short- and long-term impact assessments and intervention strategies
4	Levy & Patz, 2015	Climate Change, Human Rights, and Social Justice	Heat waves, extreme weather events, air pollution, sea level rise	Not mentioned	Climate change-related extreme weather events disproportionately affect low-income countries and poor people in high-income countries, threatening economic, social, cultural, and civil rights including a standard of living adequate for health and well-being National governments should promote and protect human rights to advance social justice in the face of climate change through disaster adaptation and mitigation measures
5	Elisala et al., 2020	Exploring PWDs preparedness, perceptions, and experiences of disasters in Tuvalu	Cyclone, Surged storms, Drought	Physical, sensory (blindness)	PWD experience barriers in preparing for disasters, compounding negative impacts of these extreme weather events Include PWDs more fully in disaster management processes
6	Ssenoga et al., 2022	Mapping the susceptibility of persons with disabilities to landslides in a highland landscape of Bushika Sub County, Mount Elgon, Eastern Uganda	Landslides	Physical, sensory (blindness, deafness),	Most PWDs in the study area live in high-risk landslide zones Blind and deaf-blind individuals were perceived as those most affected by landslides Though highly susceptible to landslide hazards, PWDs are lowly prioritized in rescue and recovery efforts Establish inclusive landslide management programs including disaster response training and relocation/resettlement assistance to mitigate vulnerability and enhance disaster resilience of PWDs, especially in high-risk areas
7	Kisira et al., 2023	Persons with disabilities and resilience: coping with environmental hazards case of landslides in Mount Elgon region, Uganda	Landslides	Physical, sensory, intellectual, and mental	PWDs face many challenges in coping with environmental hazards and developed resilience enhancement activities including self-help groups, income-generating activities, livelihood adaptation, and help-seeking from external agencies PWDs should be more included in disaster management processes Solicit additional assistance and support from government authorities including more inclusive disaster services
8	Benigno et al., 2015	Responding to the health and rehabilitation needs of people with disabilities post-Haiyan	Typhoon Haiyan	Pre-existing disabilities and those acute traumatic injuries (primarily affecting musculoskeletal system involving mobility)	Available pre-disaster PWD data would strengthen disaster response efforts Post-disaster rehabilitation services decrease the burden of disease and improve the quality of life of impacted PWDs Include PWDs in initial post-disaster health assessments to effectively meet their specific disability and rehabilitation needs

(continued)

Table 4 (Continued)

#	Author(s) and Year	Article title	Type of climate change events	Type of disability	Key findings and recommendations
9	Pan, 2016	Study on mobility-disadvantage group' risk perception and coping behaviors of abrupt geological hazards in coastal rural area of China	Typhoons, torrential rain, debris floods, rock avalanches, landslides, mud-rock flows, and strong winds, intense rainfall, earthquake shaking, water level change, storm waves or rapid stream erosion	Not mentioned	Mobility-disadvantaged groups have low awareness and knowledge of disaster prevention and mitigation strategies Implement public disaster education initiatives to dispel PWD misconceptions about disasters and to communicate appropriate coping and resilience strategies Establish mobility-disadvantaged group databases to inform development of appropriate disaster risk management and recovery strategies
10	Khine & Langkulsen, 2023	The Implications of Climate Change on Health among Vulnerable Populations in South Africa: A Systematic Review	Storms, flooding, and droughts	Various functional domains including walking, seeing, hearing, remembering, concentrating, communicating, social interaction, and self-care	Climate change related extreme weather events have a negative impact on vulnerable populations including PWDs Establish a comprehensive national health monitoring and surveillance program to include stronger disaster early warning systems Establish a disaster finance coordination mechanism Generally strengthen health systems and infrastructure
11	Hiranandani, 2015	Where is disability in disaster management in India?	Not mentioned	Not mentioned	Mismanagement of previous disasters highlights the importance of institutional learning from them Historically, marginalized populations including PWDs have not actively participated in disaster management processes Include marginalized populations including PWDs more fully in disaster management processes
12	Stough, 2015	World Report on Disability, Intellectual Disabilities, and Disaster Preparedness: Costa Rica as a Case Example	Floods, droughts, earthquakes, storms, and variability in temperature and precipitation patterns	Intellectual	Persons with intellectual disabilities suffer disproportionate risks in disasters and are often excluded from relief services Implement specialized communication strategies to help persons with intellectual disabilities access event information and services
13	Engelman et al., 2022	Global Disability Justice In Climate Disasters: Mobilizing People With Disabilities As Change Agents	Bushfires, floods, heatwaves, storms, and food- and waterborne diseases	Physical	PWDs in resource-poor nations face economic and social marginalization exacerbated by climate change-related disasters Include PWDs more fully in disaster management policy and processes
14	Ahmed et al., 2020	Effect of extreme weather events on injury, disability, and death in Bangladesh	Drought, flood, waterlogging, cyclone, tornado, storm/tidal surge, thunderstorm, river/coastal erosion, landslides, and hailstorm	Not mentioned	Socio-economic factors including age, education level, asset quintiles, urban residency, and physical disabilities contribute significantly to the substantial burden of disaster-related injuries, disabilities, and fatalities in Bangladesh

4.4. Resilience strategies of PWD in climate-change related natural disasters in developing countries

Regarding post-disaster health outcomes for PWD, telemedicine has proved an effective resilience strategy. This health delivery technology has been employed globally to provide immediate and long-care for persons with SCI [28]. Resilience for PWD in disasters in developing countries is often achieved through a community model whereby the community as a whole is engaged on behalf of PWD [22,25]. Community health workers and government officials play key roles in disaster preparedness, for example, by educating PWD about disasters and training them on how to respond during these public health emergencies [21,30]. Individuals with cognitive disabilities may require specialized alerts given inability to perceive disaster severity and risks [26,29]. Public disaster education initiatives are needed to dispel PWD misconceptions about disasters and to communicate appropriate coping and resilience strategies [29]. Rehabilitation clinicians and other medical service providers are also called upon to help prepare their PWD clients for weather emergencies [34]. Alexander et al. advocate for the training of rehabilitation professionals on disaster management and SCI specifically [28]. The critical need for proactive disaster preparedness measures for children with disabilities as well as the need for robust post-disaster support and services for this especially vulnerable population has been highlighted [25,26]. "Building Back Better", a recognized concept

which incorporates the themes of risk reduction, local recovery systems, and policy implementation to strengthen community infrastructure following disasters, has been embraced as a general strategy to enhance the resilience of PWD following natural disasters [35].

4.5. Role for PWD involvement in inclusive disaster planning

The literature strongly affirms the importance of inclusive disaster planning wherein PWD actively participate in disaster management processes, thereby considering and addressing the needs of PWD in disasters, including through disability-oriented strategies [22,24,29,36,37]. PWD are among marginalized populations now highlighted in inclusive disaster planning in India in contrast with their historic lack of inclusion [37]. PWD perception and experience of environmental barriers negatively impacting disaster planning on the disaster-prone eastern Pacific island state of Tuvalu, beset with cyclones, sea-level surges with flooding, and droughts, has prompted demand for fuller engagement of PWD in disaster planning processes [24]. Inclusive management programs focused on disaster response training and relocation/resettlement assistance have been called for in Uganda to mitigate vulnerability and enhance resilience of PWD in high-risk landslide areas [22]. In India, a specially trained rescue team using sign language and other inclusive communication tools to communicate effectively with PWD during rescue efforts has been

proposed [37]. Benigno et al. advocate for the availability of pre-disaster data on PWD and the inclusion of PWD in initial post-disaster health assessments to effectively meet their post-disaster rehabilitation need [36]. Given persons with intellectual disabilities notably suffer disproportionate risks in disasters and are often excluded from relief services, the need for use of specialized communication strategies to aid these persons in accessing event information and services has been recognized [29]. Inclusive disaster planning clearly and convincingly invokes the 'nothing about us without us' call of the disability rights movement to climate justice [38].

4.6. Climate-change related natural disasters on PWD in developing countries as a human rights issue

The literature presents climate-change related natural disasters on PWD in developing countries as a human rights issue [15,23,28,30,39,40]. Levy and Katz conclude that climate change-related extreme weather events disproportionately affect low-income countries, threatening economic, social, cultural, and civil rights, including a standard of living adequate for health and well-being [39]. This disproportionate effect is due in part to disparities in demographic characteristics and socioeconomic factors including age, gender, ethnicity, social acceptance, residency location, gender, income, and physical disabilities [30,31]; poverty is the most significant factor [31]. Disadvantaged groups, including PWD, will continue to be disproportionately impacted by climate change as these disparities limit access to existing disaster coping and resilience strategies, increasing vulnerability of PWD to disasters and challenging individual and community recovery in developing countries. Moreover, the increasing variety, frequency, and intensity of climate change-related disasters compound PWD risk for negative disaster impacts as vulnerabilities, including health conditions, are exacerbated [15]. PWD will predictably continue to experience an increasingly negative health impact globally if exposure to mounting adverse weather events is not mitigated [41]. Governments are entreated to promote and protect human rights to advance social justice in the face of climate change through effective disaster management measures [39]. 'Building resilience of persons with disabilities and reducing their exposure to and impact from climate-related hazards and other shocks and disasters' is in fact a disability-specific focus of the United Nations 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (notably Goal 3 – Good Health and Well-Being, and Goal 13 – Climate Action) - which provide a framework to guide local communities, countries and the international community toward the achievement of disability-inclusive development in order to 'leave no one behind' [40,42,43].

5. Future research

The low number of articles and limited findings resulted by this review suggest a research gap in the physical and mental health impacts of climate-change related disasters on PWD in developing countries. Use of a broader review data synthesis methodology such as a systematic or scoping review as well as changes in the search strategy as indicated in the limitations section would yield additional results. Conversely, more specific characterization of the demographic and physical characteristics of affected PWD populations could be made in a more focused review. Also, the additional themes of this review including resilience and coping strategies of PWD in disasters, PWD involvement in inclusive disaster planning, and climate-change related natural disasters on PWD in developing countries as a human rights issue could be further investigated. For example, a review identifying national disability-inclusive disaster coping and resilience programs could be performed and developed into a database to inform global disaster management. Future research of the specific intersectional impacts of social factors on

PWD vulnerability and resilience can significantly inform design and development of more effective physical and mental health services in disasters. Regarding mental health impacts of climate change-related natural disasters, research and conduct of highly relevant, contextualized (to include social and economic factors) climate change and health vulnerability and adaptation assessments in order to inform effective disaster management mental health policy and practice should be continued [44]. Such research should also include the role of family members and caregivers on PWD risk as well as disaster impacts on these carer groups. Qualitative investigation of the disaster experiences of specific individuals, including first-hand accounts, can also add valuable perspective and insight. Finally, topics for future research can include those specifically called for by articles in this review including enhanced disaster preparedness and communications [23].

6. Limitations

A more comprehensive synthetic review methodology such as a systematic or scoping review would yield additional results, permitting more substantial discussion of the topic and identification of research gaps. More results along with targeted recommendations could also have been achieved by further specifying searches to include: additional specific types of climate-related natural disasters; specific disability types; more specific geographical terms to capture additional relevant studies from developing regions within developed countries; and non-English papers. More rigorous hand-searching would also have yielded additional papers including qualitative first-hand survivor perspectives. This literature review emphasizes acute health impacts of disasters on PWD and does not address the chronic health effects of longer-term environmental changes due to disasters such as degradation in air quality on PWD. While not a limitation of this review, it should be recognized that the extensive literature on the health impacts of earthquakes on PWD in developing countries contains extensive highly relevant findings and recommendations which can inform future research.

7. Conclusion

This literature review documents the existing literature on the negative impact of climate-change related natural disasters on the physical and mental health of PWD in developing countries. It also elaborates on related themes in the literature including resilience and coping strategies of PWD in disasters, PWD involvement in inclusive disaster planning, and climate-change related natural disasters on PWD in developing countries as a human rights issue. Review findings reveal related gaps in the literature, indicating the need for significant additional future research to further advance understanding of negative climate change-related natural disaster impacts on the health and lives of PWD. This enhanced awareness can inform development of effective disability-inclusive disaster management programs, resulting in achievement of more equitable climate change-related health and function outcomes for PWD in developing countries.

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Declaration of competing interest

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CRediT authorship contribution statement

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.joclim.2024.100332.

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