



Article

Disaster Preparedness, Capabilities, and Support Needs: The Lived Experience Perspectives of People with Disability

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Abstract: People with disability face heightened vulnerability during disasters due to functional limitations and inadequate support. This study explores disaster preparedness, capabilities, and support needs among Australians with disability. A cross-sectional survey was conducted, aligned with the Person-Centred Emergency Preparedness (P-CEP) framework: a co-designed and tested framework that helps people with disability assess their capabilities, identify their needs, communicate with others, and plan for different emergency scenarios. Data collection involved self-administered online surveys and interviewer-administered telephone surveys through convenience sampling. Descriptive statistics and regression modelling were employed for data analysis. Of the 138 respondents, most were female (68.1%) and aged 60–69 (23.9%). While 60.3% had emergency plans, motivators included enhancing survival chances (36.7%) and past disaster experiences (22.7%). Barriers included uncertainty about preparation (22.0%) and difficulty obtaining information (11.3%). Those perceiving bushfire risk were more likely to have a plan ($p = 0.004$), while individuals living alone were less likely ($p = 0.019$). Common preparedness actions included safely storing important documents (57.5%), but fewer had backup plans for support workers (9.2%) or home generators (9.7%). Respondents with disaster experience highlighted diverse support needs, encompassing health, emotional well-being, and practical assistance. Inclusive disaster risk reduction should involve individuals with disability in assessing their capabilities and support requirements. This study underscores the necessity of tailored emergency preparedness measures to safeguard the well-being of this demographic.

Keywords: disability; disaster planning; vulnerable populations; emergency preparedness; support needs



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1. Introduction

People with disability are more likely to experience adverse consequences of disasters compared to the wider population [1–3]. They find it challenging to respond quickly and effectively during disasters because of their functional limitations (e.g., motor, sensory, cognitive limitations), lack of evacuation support, and the poor accessibility of emergency shelters [4,5].

In the aftermath of disasters, the existing health problems of people with disability may be aggravated by a lack of supplies and utilities, physical and mental stress, loss of permanent housing and possessions, and disruption of their routine access to healthcare and social supports [1,3,6–9]. Consequently, the long-term effects of a disaster on people with disability include a higher risk of emotional trauma, financial hardship, and decreased standards of living [10,11].

These negative impacts may be avoided or alleviated through appropriate emergency preparedness, such as stockpiling household supplies and medications, developing an evacuation plan, and engaging in emergency preparedness programs [12,13]. Yet, despite the importance of being prepared, studies report that people with disability do not feel confident to prepare [14] and are less likely to engage in preparedness actions due to the interaction of various individual and social factors [6,12,15]. Currently, people with disability have fewer choices and opportunities to access and use risk information and preparedness resources [16,17]. Emergency planning places high demands on those who rely on others to assure their safety and well-being [18,19].

Article 11 of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) specifically requires nations to take all necessary measures to protect the safety of persons with disability in situations of risk, including disasters triggered by natural hazards [20]. With one in six Australians living with disability [21], and an ever-increasing number and intensity of disasters in Australia [22,23], there is an urgent need to increase the resilience of people with disability to disasters through pre-planning and preparedness. This imperative aligns with the principles of shared responsibility embedded in Australia's disaster risk reduction policy frameworks, which advocate for individuals to contribute to disaster risk reduction within their capabilities [24]. Specifically, individuals need to learn about their risks, take responsibility for their own safety through personal emergency and household preparedness planning, and act on advice from government and emergency services [16].

Notwithstanding the individual capability of people with disability to prepare, achieving equitable access on par with everyone else in society may require the provision of extra supports before, during, and after a disaster event [17]. A significant challenge to fulfilling rights and protections for a heterogeneous group of people with disability is understanding (a) what those extra supports are, and (b) how they should be resourced, organized, and delivered [17]. Inclusive disaster risk reduction should be informed by the experiences of people with disability who must be at the centre of identifying what they can do for themselves and what they need support for before, during, and after disasters. This study provides a voice for individuals with disability to share what they can do for themselves and what they need support for in the context of Australian disasters.

This paper reports on findings from a cross-sectional survey that examined the self-reported emergency preparedness, capabilities, and support needs of people with disability in emergencies, and sought their advice about emergency preparedness actions that other people with disability, the government, and emergency services can take to increase safety and well-being outcomes for people with disability when disasters strike. This study was approved by the University Human Ethics Committee (Project: 2020/591).

2. Materials and Methods

2.1. Questionnaire Design

We employed the survey design approach outlined in Crawford et al., 2023 [25], adopting four parts based on the Person-Centred Emergency Preparedness (P-CEP) process steps. The Australian P-CEP, developed collaboratively and field-tested with input from people with disability, disability services, and the emergency services sector [17], employs a function-based approach. It serves as both a process tool and framework, guiding individuals through a capability-focused self-assessment of preparedness actions tailored to their unique support needs in eight areas. They include communication, transportation, management of health, personal support, assistive technology, living situation, assistance animals, and social connectedness [17]. This approach facilitates the identification of unmet needs that heighten disaster risk and encourages communication with various stakeholders to mobilize pre-planning for necessary supports during emergencies [26]. As an all-hazards tool, P-CEP prompts contingency planning for two scenarios: shelter-in-place and evacuation to a place of safety.

Within the P-CEP context, “preparedness” is defined as proactive planning and actions taken by individuals to enhance their response and recovery capabilities in emergency situations. “Capabilities” refers to the interaction between the abilities, skills and confidence individuals possess to deal with different hazard events based on the available resources, opportunities, and preferences. The term “support” encompasses various forms of assistance individuals may require to prepare for, respond to, and recover from emergency situations, including practical assistance, emotional support, and accessibility aids.

The initial segment of the survey focused on collecting data related to respondents’ health conditions, self-perceived health, dwelling type, tenure, and sociodemographic characteristics such as gender, household income, and education. The second part delved into perceived disaster risk, communication media used for obtaining disaster information, and the preparedness actions undertaken by the respondents. To alleviate the burden on survey participants, 18 preparedness action items were divided into two sets, randomly assigned to respondents, each requiring comparable effort to undertake the actions. The Cronbach alpha was 0.68 for the first set of preparedness actions and 0.87 for the second set, indicating good internal consistency. Part three of the survey presented two scenarios related to sheltering in place and evacuation, focusing on respondents’ capabilities and support needs. They were asked about their self-sufficiency, preparation activities, and the type of support they would require from others to manage these scenarios. The final survey question invited respondents to share their experiences managing any actual disasters and provide advice they considered helpful to other people with disabilities and emergency services.

2.2. Recruitment and Data Collection

The selection criteria are persons who self-identified as a person with a disability, or a person with any long-term physical or mental health conditions. The survey was piloted with 25 people with disability who provided feedback on the language and acceptability of the survey questions. Following the pilot test, minor wording changes were made to the survey questions and all pilot surveys were included in the final analysis. The survey questionnaire can be found in the Supplementary Material.

The survey was conducted across Australia between 1 October 2020 and 31 March 2021, employing a convenience sampling strategy to recruit Australian adults with disability. Respondents were recruited through a wide range of channels, including social media platforms, and direct email distribution by ten organisations of people with disability and their member networks. Despite this non-probability sampling method leading to lower generalizability of the study results, this recruitment method was well-suited to secure respondents in a population who were readily accessible. In addition to providing a self-administered survey via a web-based instrument, respondents were given the option to complete the survey via telephone, which was administered by three trained interviewers.

2.3. Data Analysis

Responses from both self-administered and telephone-administered surveys were treated in the same way. All quantitative analyses were conducted using STATA SE 14. The pattern of missing data appeared to be “missing at random” (MAR) and was imputed using the regression imputation method. Emergency preparedness scores were calculated based on the level of completion of each preparedness action. One point was assigned to the action if the respondent indicated “Yes”, 0.5 point if “Partially”, and 0 point if “No”. An overall emergency preparedness score for each respondent was calculated as the total points divided by the number of items answered. Items that did not apply to the respondents identified by answers “not applicable” were excluded from this calculation. These scores were used as a proxy measure to determine the level of emergency preparedness. Respondents’ postcodes were used to identify the Index of Relative Socio-Economic Advantage and Disadvantage (SEIFA), which was derived from attributes such as income, educational attainment, employment rate, and type of occupation in the area.

Data collected online and via telephone were analysed using the same methods. Descriptive statistical analyses were applied to explore frequencies, percentages, mean/median values, standard error of the mean, and standard deviations. Regression analyses were conducted to examine the relationships between explanatory variables and outcome variables. The explanatory variables were impairment type, functioning limitation, self-reported health, perceived emergency risk, and various socio-demographic characteristics as listed in Table 1. The outcome variables were emergency preparedness score and having an emergency plan.

Table 1. General characteristics of survey respondents.

		Survey Respondents <i>n</i> (%)	Australian Population with Disability * (%)	Australian Population with no Disability * (%)
Sex	Female	94 (68.1)	(52.3)	(51.7)
Age group	18–30	18 (13.0)	(10.6)	(28.4)
	30–39	19 (13.8)	(7.0)	(20.4)
	40–49	31 (22.5)	(10.0)	(17.6)
	50–59	27 (19.6)	(14.9)	(15.2)
	60–69	33 (23.9)	(20.0)	(11.0)
	70–79	9 (6.5)	(20.3)	(5.7)
	80+	1 (0.7)	(17.2)	(1.8)
Long term impairment †	Loss of sight	21 (15.2)	(6.2)	-
	Loss of hearing	19 (13.8)	(26.3)	-
	Speech difficulties	10 (7.3)	(5.0)	-
	Breathing difficulties	26 (18.8)	(10.4)	-
	Chronic/recurring pain/discomfort	69 (50.0)	(36.1)	-
	Blackouts/seizures/loss of consciousness	11 (8.0)	(5.2)	-
	Learning/understanding difficulties	22 (15.9)	(13.0)	-
	Incomplete use of arms/fingers	32 (23.2)	(9.5)	-
	Difficulty gripping/holding things	37 (26.8)	(22.0)	-
	Incomplete use of feet/legs	47 (34.1)	(14.7)	-
	Nervous/emotional condition	48 (34.8)	(14.6)	-
	Restriction in physical activities/work	77 (55.8)	(41.2)	-
	Disfigurement/deformity	2 (1.5)	(4.8)	-
	Mental illness	33 (23.9)	(9.4)	-
	Memory problems or periods of confusion	36 (26.1)	(10.3)	-
Social or behavioural difficulties	25 (18.1)	(9.2)	-	
Do you have difficulty seeing, even if wearing glasses?	No—no difficulty	77 (56.2)		
	Yes—some difficulty	44 (32.1)		
	Yes—a lot of difficulty	11 (8.0)		
	Cannot do at all	5 (3.7)		

Table 1. Cont.

		Survey Respondents <i>n</i> (%)	Australian Population with Disability * (%)	Australian Population with no Disability * (%)
Do you have difficulty hearing, even if using a hearing aid?	No—no difficulty	99 (72.3)		
	Yes—some difficulty	29 (21.2)		
	Yes—a lot of difficulty	7 (5.1)		
	Cannot do at all	2 (1.5)		
Do you have difficulty walking or climbing steps?	No—no difficulty	31 (22.5)		
	Yes—some difficulty	48 (34.8)		
	Yes—a lot of difficulty	39 (28.3)		
	Cannot do at all	20 (14.5)		
Do you have difficulty remembering or concentrating?	No—no difficulty	49 (36.0)		
	Yes—some difficulty	68 (50.0)		
	Yes—a lot of difficulty	17 (12.5)		
	Cannot do at all	2 (1.5)		
Do you have difficulty with self-care such as washing all over or dressing?	No—no difficulty	75 (54.4)		
	Yes—some difficulty	42 (30.4)		
	Yes—a lot of difficulty	15 (10.9)		
	Cannot do at all	6 (4.4)		
Do you have difficulty communicating, (for example understanding or being understood by others)?	No—no difficulty	86 (62.3)		
	Yes—some difficulty	40 (62.3)		
	Yes—a lot of difficulty	11 (8.0)		
	Cannot do at all	1 (0.7)		
Self-rated health	1	17 (12.3)		
	2	32 (23.2)		
	3	56 (40.6)		
	4	30 (21.7)		
	5	3 (2.17)		
Absolutely could NOT live without certain aid(s)/assistive device/equipment for three days	Yes	99 (71.7)		
Need electricity to operate aforementioned aid/device/equipment?	Yes	46 (46.5)		
Having a paid support worker	Yes	47 (34.3)		
Having an informal carer	Yes	67 (48.6)		
Having an assistance animal?	Yes	13 (9.5)		

Table 1. Cont.

		Survey Respondents <i>n</i> (%)	Australian Population with Disability * (%)	Australian Population with no Disability * (%)
Type of dwelling	A free-standing separate house	98 (72.6)	(77.4)	(78.9)
	A semi-detached house	11 (8.2)	(11.2)	(10.9)
	A low-rise unit with no lift	10 (7.4)	(4.5)	(5.5)
	A medium/high rise unit with a lift	9 (6.7)	(1.8)	(3.5)
	Other	7 (5.2)	(0.3)	(0.3)
Housing	Owned by you or someone in this household	89 (64.5)		
	Rented as a public housing Tenant	10 (7.3)		
	Rented as a private rental tenant	36 (26.1)		
	Occupied without payment of rent	3 (2.2)		
Living with †	Alone	42 (30.4)		
	Spouse/partner	50 (36.2)		
	Family	37 (26.8)		
	Support/care worker	6 (4.4)		
	Friend(s) or housemate(s)	10 (7.3)		
	Other	5 (3.6)		
State	Australian Capital Territory	6 (4.4)	(1.8)	(1.6)
	New South Wales	79 (57.3)	(30.8)	(32.6)
	Northen Territory	1 (0.7)	(0.5)	(0.8)
	Queensland	13 (9.4)	(21.5)	(19.3)
	South Australia	2 (1.5)	(7.6)	(6.9)
	Tasmania	3 (2.2)	(3.2)	(1.9)
	Victoria	33 (23.9)	(25.1)	(26.7)
	Western Australia	1 (0.7)	(9.4)	(10.3)
Australian Statistical Geography Standard	Major city	74 (54.4)	(66.4)	(75.4)
	Inner regional	45 (33.1)	(23.8)	(16.1)
	Outer regional	16 (11.8)	(8.9)	(7.6)
	Remote	1 (0.7)	(0.9)	(0.9)
Socio-Economic Indexes for Australia	1–2	18 (13.0)	(27.8)	(15.5)
	3–4	32 (23.2)	(21.2)	(19.1)
	5–6	25 (18.1)	(19.0)	(20.9)
	7–8	18 (21.0)	(17.4)	(21.3)
	9–10	43 (31.2)	(14.7)	(23.2)
Education	Postgraduate Degree	34 (24.6)	(2.9)	(7.2)
	Bachelor's Degree	25 (18.1)	(10.0)	(21.3)
	Advanced or Graduate Diploma	27 (19.6)	(11.1)	(12.9)
	Certificate	28 (20.3)	(20.2)	(18.2)
	Year 12 or 11	16 (11.6)	(14.1)	(21.6)
	Year 10 or below	6 (4.4)	(33.3)	(15.3)
	Unknown	2 (1.5)	(3.7)	(3.5)

Table 1. Cont.

		Survey Respondents <i>n</i> (%)	Australian Population with Disability * (%)	Australian Population with no Disability * (%)
Employment	Yes	52 (37.7)	(28.5)	(73.1)
Annual household income	≤\$20,000	22 (16.9)		
	\$20,001–\$50,000	40 (30.8)		
	\$50,001–\$80,000	25 (19.2)		
	\$80,001–\$120,000	15 (11.5)		
	≥\$120,001	12 (9.2)		
National Disability Insurance Scheme participant	Yes	57 (41.3)	(10.0) **	
Disability Support Pensioner	Yes	57 (41.3)	(3.7) ***	
My Aged Care package	Yes	3 (2.2)		

Note: † Multiple responses were allowed. * Source: ABS 2018 SDAC [21]. ** Source: Australian Institute of Health and Welfare [27]. *** Source: National Disability Insurance Agency [28]. The shaded columns are comparison data.

The associations between the explanatory variables and outcome variables were first assessed using univariate regression analyses. Variables that emerged as significant ($p < 0.30$) were then evaluated in a multivariate regression model. The final model was derived using backwards stepwise selection techniques requiring a 0.05 level of significance. All the multivariate regression models generated coefficients (β) and 95% confident intervals (CIs) that measured the independent relation of each explanatory variable to the outcome variable, adjusting for confounding by the model covariates.

Qualitative analysis of the free text data was conducted by the second, third, and fourth authors using a reflexive thematic analytic approach to explore respondents' insights regarding: (a) capabilities and actions reported in relation to the shelter-in-place and evacuation scenarios presented in the questionnaire (see supplementary material); (b) actual experience of disaster, and (c) advice that offered a practical guide to preparedness actions for people with disability and advice to emergency personnel. Reflexive thematic analysis offered flexibility in exploring the data and comparing perspectives among respondents. Emerging findings were discussed on four occasions between three authors (MV, TC, IY) to make our own perceptions and interpretations explicit as we worked together to interpret the data. For example, we noticed that respondents with actual experience of disaster (e.g., evacuating from bushfire or sheltering in place during the COVID-19 pandemic) were able to specify their support needs in great detail. In contrast, respondents who did not have lived experience of disaster identified a narrower range of support needs. Our discussions caused us to further examine the codes of people who reported they would not cope in an emergency. It would have been easy to overlook these respondents who were fewer in number. By returning to the coding, we recognized consistency among these respondents who reported high support needs. We took care to report similarities and differences across respondents.

3. Results

3.1. Participant Characteristics

One hundred thirty-eight Australians with disability completed the survey. The majority of respondents (94.9%) completed the survey online, while a smaller number (5.1%) participated via telephone. The high prevalence of online survey completion is likely due to our recruitment efforts being conducted through electronic platforms, such as social media and email invitations. Most survey respondents were female (68.1%), aged between

60 and 69 years old (23.9%), from New South Wales (57.3%), with a bachelor's degree or above (42.8%), earned an annual household income between AUD 20,000–AUD 50,000 (31.2%), and were participants of the National Disability Insurance Scheme (41.3%) (see Table 1). The most reported impairment was a restriction in physical activities (55.8%), followed by chronic pain (50.0%), nervous/emotional condition (34.8%), and incomplete use of feet/legs (34.1%). Nearly a third (32.6%) of the respondents reported five or more impairments (Figure 1). Just over three quarters (77.5%) experienced difficulty walking, 64.0% in remembering or concentrating, 45.7% in self-caring, 43.8% in seeing, 37.7% in communicating, and 27.7% in hearing. The majority (71.7%) reported that they could not live without their aids/equipment for three days; 46.5% needed electricity to power essential aids/equipment. Almost half (48.6%) had an informal carer, 34.3% had a paid support worker, and 9.5% had an assistance animal.

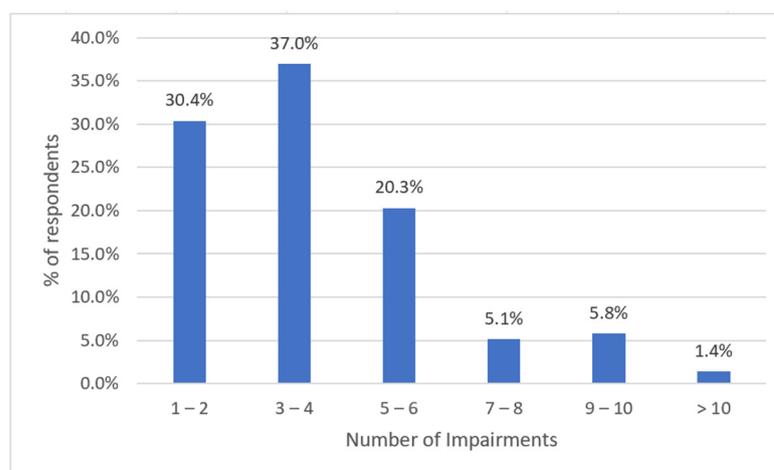


Figure 1. Number of impairments that had lasted, or are likely to last, for 6 months or longer.

Only 37.7% of the respondents were currently employed full-time or part-time, approximately half of the employment rate of Australian adults without disability (73.1%). Approximately 13.0% of respondents were from areas of the lowest socioeconomic status (SEIFA 1 or 2), 7.4% were living in a low-rise unit with no lift, with 7.3% of respondents as public housing tenants. Approximately 36.2% were living with their spouse/partner, while 30.4% were living alone. As for self-reported health, most respondents (40.6%) were at the mid-point on a five-point scale (Table 1). Table 1 also compares the socio-demographic characteristics of the general Australian population and the population with disabilities. Our sample was consistent with the Australian population with disabilities in terms of dwelling type, however, it is overrepresented by women, people in the labour force, and those with higher educational attainment.

3.2. Preparedness, Capabilities, and Support Needs

The survey explored the respondents' preparedness, capabilities, and support needs in relation to disasters.

3.2.1. Preparedness

Well over a half of respondents (60.3%) reported that they had an emergency plan that could guide them through the emergency events. Through two multi-select multiple choice questions, respondents reported what motivated or discouraged them from making an emergency plan. The top three motivators for planning were: "By making an emergency plan, I am improving my chances of surviving during an emergency" (36.7%), "Disasters I have experienced make me think about getting an emergency plan" (22.7%), and "I am confident that I can actually do something to help myself" (20%).

The most common reasons for not having an emergency plan were “I am not sure how to prepare for an emergency” (22.0%), “getting information about what to do in an emergency is too hard” (11.3%), and “I just bury my head in the sand and hope nothing happens” (8.0%). Our multivariate regression analysis revealed that having an emergency plan was positively associated with “perceived bushfire risk within the next five years” ($\beta = 1.292$, $p = 0.004$) but negatively associated with “living alone” ($\beta = -1.019$, $p = 0.019$).

The level of emergency preparedness was assessed by asking whether respondents (or their household members) had taken any of the listed actions to prepare for an emergency associated with a disaster (Table 2). Safely storing important documents (e.g., will, power of attorney, passport, banking information, etc.) (57.5%) and working out how to obtain timely emergency information and warnings (55.4%) were the most frequently occurring preparedness actions. Some of the least undertaken actions were making a backup plan for support workers (9.2%) and having a home generator (9.7%). The level of emergency preparedness was negatively associated with self-reported mental illness ($\beta = -25.279$, $p < 0.001$) and positively associated with perceived bushfire risk ($\beta = 14.579$, $p = 0.004$), holding other variables constant.

Table 2. Percentage of actions taken to prepared for an emergency in the past one year.

Set A (n = 67)	
Keeping an updated emergency contact list	33.3%
Keeping extra prescription medications and copies of prescriptions in a waterproof container	37.9%
Developing an evacuation plan for where to go if you decide to leave and how to get there	25.8%
Arranging a family meeting place or reconnection plan	18.8%
Stocking your house with emergency supplies such as 3-day supply of food and drinking water, a first aid kit, a flashlight, a battery-powered radio, extra batteries, personal hygiene items, food for pet or assistance animal, etc.	46.3%
Getting and reviewing property, vehicle and/or life insurance policies	50.0%
Making a backup plan for support workers/personal assistants and essential suppliers/agencies	9.2%
Working out how to get timely emergency information and warnings	55.4%
Getting a home generator or solar panel	9.7%
Set B (n = 71)	
Writing down your medical information, such as identification, medications, food and drug allergies, health records, etc.	49.3%
Safely storing important documents (e.g., will, power of attorney, passport, banking information, etc)	57.5%
Making arrangements for short-notice/emergency replacement care	13.9%
Reducing home/property damage by either keeping gutter and downpipes clear of leaf and litter, trimming trees and cutting back overhanging branches, clearing an area around the house, keeping the roof in good condition, installing and maintaining a smoke alarm, etc.	54.2%
Putting together an easy-to-carry go-bag with critical items, such as mobile phone, medications, flashlight, extra cash, spare clothing, food and water, blankets, etc.	32.9%
Speaking with family and/or personal assistant about what to do during an emergency situation	45.1%
Knowing the manual operations for your medical equipment or assistive technology	22.5%
Participating in an evacuation drill in the past 12 months	14.1%
Maintaining at least a quarter tank of petrol in your vehicle at all times	47.9%

3.2.2. Capabilities

The hazards people with disability felt most and least capable of dealing with are presented in Figure 2. Among the hazard events considered, heatwave (34.1%) and pandemic (31.1%) emerged as the events that most respondents felt confident in their ability to deal with. On the other hand, bushfire (32.6%) and housefire (31.9%) were the events that respondents felt least confident in handling.

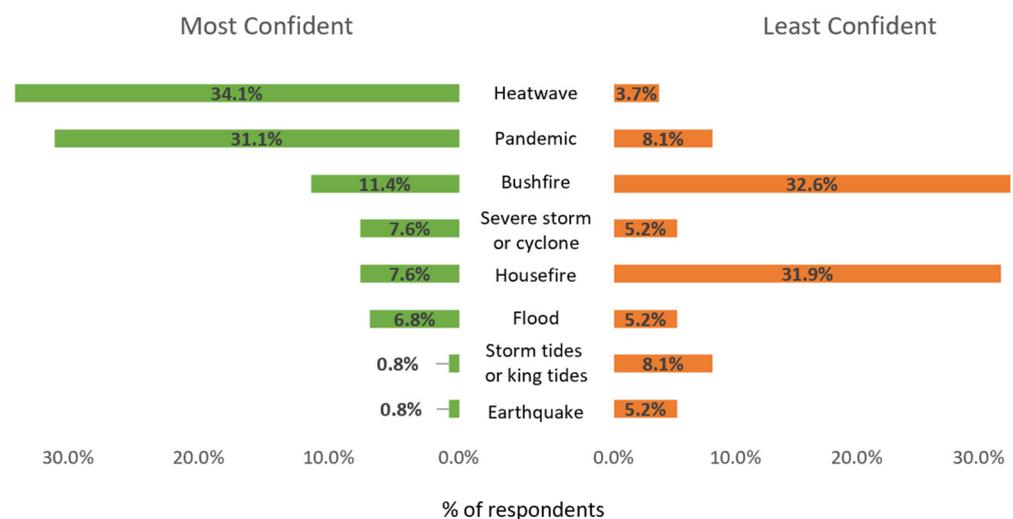


Figure 2. Confidence in dealing with various hazard events.

The confidence in managing the reported hazard event can be attributed to three primary factors: the ability to deal with the emotions that arise during the event (43.5%), previous experience in handling the event (40.6%), and the presence of supportive family or carers during the event (35.5%). The lack of confidence in dealing with the reported hazard event can be attributed to several factors, including the perceived inability to keep oneself safe during the event (48.6%), lack of personal experience in dealing with this type of event (44.9%), and having nowhere accessible to go during such an event (38.4%).

With regard to capabilities accessing information on how to prepare for and respond to emergency risks, the most quoted sources were fire services (62.0%), State Emergency Services (54.7%), and government agencies such as the Bureau of Meteorology (36.7%). Smartphone or tablet applications such as Fires Near Me (56.7%), radio stations such as ABC Emergency (55.3%), and local council or emergency services websites (55.3%) were the most common channels used to obtain timely emergency information or disaster warnings.

3.2.3. Support Needs

Survey respondents reported that they would expect to rely mostly on household members (59.3%), fire services (58.1%), and the State Emergency Service (52.2%) in the first 72 h following an emergency; but rely least on faith communities (6.8%), neighbours (14.9%), and support workers (20.6%).

The support needs reported via the open-ended questions differed between the shelter-in-place and evacuation scenarios. For those with actual experience of disaster, there was greater specificity about a diverse range of support needs. Experiences of disaster included bushfire (most common), the COVID-19 pandemic, flood, cyclone, power outage, storm, and house or yard fires.

Respondents with actual experience of disaster reported on a broad range of specific support needs and their management during the event. The diversity of support needs included: (a) the need for *personal support from people, equipment, and medications* to manage their healthcare and daily living tasks; (b) *emotional and welfare support* (e.g., checking in) to manage their well-being; and (c) *practical support* such as information, transportation, communication, and heavy lifting in order to take effective action in response to the disaster. Among respondents with experience of managing during a disaster, reported capabilities reflected a high degree of preparedness planning for disability-specific support needs in emergencies (e.g., “tailor your plan to your disability”, “prepare for different emergency risks”; “build a support team around you”; “practice your plan”; “ask for help”).

Responses to the shelter-in-place scenario revealed similar findings to participants’ actual experiences of sheltering in place, likely due experience of the COVID-19 pandemic. Beyond having access to food, water, and a power source, respondents identified a broad

range of disability-specific support needs and articulated what they required to manage those needs while sheltering in place. Respondents offered specific details about: (a) *managing their health needs* (e.g., temperature regulation, pressure sore management, fatigue, anaphylaxis risks, breathing); (b) *accessing services* for themselves or to maintain their equipment (medical, life support, communication, assistive technology); and (c) *managing their emotions* (e.g., staying connected, keeping occupied or distracted with activities).

In contrast, the evacuation scenario showed a narrower range of identified support needs. These survey responses grouped into two key areas: (a) *access to transportation* for themselves and/or their equipment; and (b) *accessible accommodation*. Beyond expressing their need for shelter, food and water, respondents' main concerns included how they would manage their *sensory or communication needs* (e.g., seeing or hearing; managing in noisy or crowded environments) and how they would receive *personal supports* if they had to evacuate. Anticipated actions they would take focused on calling on family, friends, or housemates for assistance. Limited information was shared concerning what they would be able to do for themselves in an evacuation.

Importantly, a small group of respondents with reported high support needs identified that they would *"not manage at all"* in either the evacuation or shelter-in-place scenarios. Their concerns related to not knowing what they would do, needing support with everything (e.g., requiring *"total support in all areas of life"*), and struggling to manage basic activities of daily living without power (e.g., eating, drinking, toileting, hearing, moving around, communicating). In the shelter-in-place scenario, three respondents reported that they would need electricity or a generator for life support (e.g., breathing). In the evacuation scenario, one respondent stated, *"This would result in either my death or hospitalisation which would negatively impact on my health as hospitals are not equipped to care for quadriplegics"*.

3.3. Advice to People with Disability and Emergency Services

Advice was provided by survey respondents and interviewees about emergency preparedness actions that people with disability should take, and how government and emergency services can better support people with disability to prepare for and respond to emergencies.

3.3.1. Advice to Other People with Disability

Proactive strategies used in disasters by people with disability were reflected in the advice that was shared with others. These strategies included reaching out to family, friends, or support workers, accessing emergency advice and updates, and leaving early. Participants advised on having a *stay/go kit* ready, *activating and sticking to their emergency plans*, *remaining calm*, and *seeking emotional support*.

Participants advised the importance of planning ahead to develop a step-by-step approach to preparedness that is tailored to individual circumstances and disability. For example:

"Develop a step-by-step approach & consider risk management."

"Have an emergency plan that has considered all situations that may arise."

"Honestly assess your limits & frame your emergency response plans with these front of mind."

Tailoring an emergency response requires consideration of one's strengths/capabilities and vulnerabilities. For example:

"Seek support, recognize your strengths."

"Think ahead as we are not as able to respond compared to able-bodied person."

"To have a system that suits their disability."

"There's not really any 'one size fits all' advice in this kind of context because a lot of the plan will depend on your specific needs and your local area's environmental factors. If

you need advice about how to address disability-specific needs, ask other people with the same disability."

"Be honest about limitations and ask for help if needed."

Building and preparing a support team for different emergencies through engagement with emergency services, and then practicing the plan was also advised. For example:

"Make contact with local emergency services to talk about your needs and options."

"Contact your local organisation for some quality time with your community engagement officer to help make a plan and let them know you will need assistance if the proverbial happens."

"Build a support team with whom you have trust and confidence."

Other advice included researching online for risk and preparedness information and evacuation routes. For example:

"Go online and look for disaster preparedness."

"Use disaster management websites to find tool kits and templates to help you prepare."

"Get info from a credible source—e.g., Emergency Services, Council, Police or Weather Bureau—don't rely on rumours or stuff on social media."

"Use trusted, official sources (including emergency agencies, existing building emergency plans) to read up on how to respond to various likely emergencies."

Other advice that reflected experience included the importance of asking for help, being aware of and heeding warnings, and advocating for others.

3.3.2. Advice to Government and Emergency Services

The advice provided by people with disability for government and emergency services focused on accessibility and appropriateness of evacuation centres that go beyond ramp access. They called on government and emergency services to listen to the needs of people with disability that may need more than physical assistance. They advised that being person-centred, and implementing universal design principles would enable evacuation centres to be more accessible for people with diverse needs. For example:

"Listen to people with disabilities about their daily experiences to learn where policy can translate into tangible, supportive actions during disasters. My major issue in 2011 was inaccessible evacuation centers."

"Use Universal Design principles. Ask those who have a disability. They can tell you."

"Listen to the person with a disability, they know their disability and what their needs are. Make sure refuge areas are fully accessible, not just a ramp, but shower and toilet, high hospital bed with lift, other high beds not just mattress on floor or stretcher, vitamiser for soft foods, very quiet area for those who cannot tolerate lots of noise and busy environments, forms in braille, Auslan interpreters, oxygen cylinders for those that need it."

Respondents also discussed strategies that would assist with knowing who needs information or support and how provide it (e.g., welfare checks, or a list of accessible accommodation that may be vacant for emergency accommodation during or after the disaster). For example:

"Emergency managers and council staff need to know where people with disabilities are, especially in rural areas. Communicate information and updates of any assistance available. Set up a support network for people in this situation to help us better help ourselves."

"A suggestion would be to have a record/database of people in all areas of Australia who are at high risk, so they can be assisted in an emergency. Especially people who are wheelchair bound, bed bound, the elderly and the severely disabled."

“To have a database of people who are disabled and to arrange for someone to visit people long before disaster strikes and put a safety plan in place.”

4. Discussion

This study took place amid the backdrop of a global pandemic and following Australia’s catastrophic bushfires in 2019–2020, which directly affected 14.4% of the adult population, or about 2.9 million Australians [29]. Additionally, data collection coincided with severe flooding in northern New South Wales and southeast Queensland. Findings from this study can be instrumental in shaping more inclusive disaster risk reduction strategies, enabling individuals with disability to take responsibility for their own preparedness, and informing development of emergency management plans that address the unique support needs of this demographic.

The impact of the COVID-19 pandemic may have influenced people’s preparedness behaviour. In comparison to findings from a cross-sectional survey study conducted by McLennan et al. in Australia before the COVID-19 pandemic [18], our survey revealed a significantly higher percentage of respondents who reported having an emergency plan (60%)—with 30% of respondents with disability and 36% of respondents without disability reporting having an emergency plan in the study by McLennan et al. Moreover, 46% of our respondents claimed that they had stocked their house with emergency supplies, while only 23% of respondents with disability and 25% of respondents without disability did so in McLennan et al.’s study. Both studies indicated similar percentages of respondents taking other preparedness actions, such as preparing their home or property for emergency events (54% in our study, 57% in the study by McLennan et al. for respondents with disability, and 62% for respondents without disability). Additionally, both studies reported comparable percentages of respondents participating in emergency drills (14% in our study, 10% in McLennan et al.’s study for respondents with disability, and 12% for respondents without disability). It is important to note the variations in participant recruitment methods, participant number and composition, and the wording of survey questions between the two studies.

Our survey findings reveal a complex interplay between emergency planning and various influencing factors. Specifically, our multivariate regression analysis uncovered a positive association between having an emergency plan and the perceived bushfire risk within the next five years. Similarly, we find a positive association between the level of emergency preparedness and the same perceived bushfire risk within the next five years. Several plausible explanations underpin these observed associations. Those who perceive an elevated risk of bushfires may reside in hazard-prone areas, where they are exposed to public awareness campaigns, media coverage, and community initiatives focused on bushfire preparedness. Moreover, some respondents may have personally experienced or witnessed the devastating impact of bushfires in their region, motivating them to proactively develop emergency plans and take preparedness actions. This finding aligns with the studies of Becker et al. (2013) [30], Calgaro and Dominey-Howes (2013) [16], and Ng (2022) [31], which suggest that risk perception significantly predicts disaster preparedness behaviour.

Conversely, our analysis revealed a negative association between having an emergency plan and living alone. Individuals living alone often lack immediate sources of support and assistance, hindering their ability to engage in emergency planning. Furthermore, the absence of dependents in the household, such as young children, may contribute to a reduced sense of urgency regarding preparedness—a finding supported by previous research that demonstrates a positive correlation between the presence of children in a household and disaster preparedness [32].

Survey participants, particularly those who have experienced disasters, offered valuable insights into addressing the issue of a lack of planning among people with disability. Effective emergency planning begins with a comprehensive understanding of individuals’ needs, strengths, and limitations in both everyday life and emergency situations. This assessment should encompass various aspects, including social connectedness, transportation,

assistive technology, health management, personal support, communication, assistance animals, and living arrangements—reflecting the eight elements of the P-CEP [17]. Based on the outcomes of P-CEP self-assessment, individuals can then customise their emergency plans to align with their unique circumstances and requirements.

Furthermore, the insights provided by survey respondents extend to identifying additional support measures that may be necessary to facilitate effective emergency planning. This support can take the form of emotional assistance, empowering individuals to actively participate in planning for their safety, or instrumental support, involving practical aid, such as helping individuals assemble a support team, practice their emergency plans, and access essential resources and information.

Comprehensive support is especially crucial for individuals with high support needs. Although they represent a smaller segment of the disability population, these individuals rely significantly on extensive assistance and specialised care in their daily lives, and their needs become even more pronounced during emergency situations. Therefore, their emergency planning must prioritise the continuity of essential support services, including provisions for backup care providers, accessible transportation, access to power, and a steady supply of medical resources.

People with mental illness may also require additional support to prepare. Our quantitative analysis reveals a negative association between mental illness and engagement in preparedness actions. Previous studies suggest that several factors may explain this association [33,34]. Individuals with mental illness may experience conditions such as anxiety, depression, or post-traumatic stress disorder, which can lead to feelings of hopelessness, apathy, or an inability to focus on tasks, including preparing for emergencies. Stigma surrounding mental illness can result in social isolation, limiting access to information, resources, or peer support networks that could otherwise facilitate their preparedness efforts.

To address this gap, further research is needed to explore the potential support roles of peer advocates and mental health service providers. Peer advocates, individuals with lived experience of mental illness who have received training to support others, can play a pivotal role in helping their peers prepare for emergencies. These advocates can offer valuable insights, empathetic understanding, and guidance tailored to the mental health needs of those they support. Similarly, mental health service providers, including counsellors, therapists, and clinicians, are well-positioned to contribute to the preparedness of their clients. These professionals can incorporate discussions on emergency preparedness into their treatment plans, recognising the role that preparedness plays in overall mental health and well-being.

Effective emergency preparedness for people with disability is a shared responsibility that involves individuals, their formal and informal support network, as well as government agencies. Regardless of the level of actual preparedness, survey respondents recognised the significance of personal responsibility in preparedness and provided practical advice to their peers, such as taking the initiative to create personalised emergency plans that address their specific support needs, strengths, and limitations, regularly reviewing and updating these plans, staying informed about potential risks and hazards specific to one's location, maintaining a supply of essential items, including medications and assistive technology, actively participating in training and drills, and staying connected with support networks, neighbours, and emergency management agencies.

Informal support networks, comprising family, friends, and neighbours, also play a vital role in the preparedness of people with disability. They should be aware of the specific needs and preferences of individuals with disability within their circle, establish clear lines of communication and develop systems for checking in on them during emergencies. Participating in training programs that teach basic caregiving skills and emergency response procedures and collaborating with local disability organisations and formal service providers to access resources, information, and support networks are essential steps.

The Australian government has taken steps to improve disaster preparedness among people with disability and their service providers. Updates to the National Disability

Insurance Scheme (NDIS) Quality and Safeguarding Standards of Practice now require disability service providers to engage in emergency and disaster management planning with the individuals they support [35]. Service providers are well-informed about the functional needs of their clients, positioning them to facilitate emergency preparedness tailored to the specific support needs of their clients. Collaborative efforts with other service providers, disability organisations, and local authorities are encouraged to coordinate resources and services throughout all phases of emergencies.

Local authorities and emergency management agencies play crucial roles in ensuring inclusive emergency preparedness. Actively engaging with the local disability community is vital to building trust and establishing partnerships that enhance preparedness and responsiveness. The importance of engaging directly with vulnerable populations in emergency planning is highlighted by a recommendation from the 2009 Victorian Bushfires Royal Commission [36], which advocates for the development and maintenance of a list of vulnerable persons in the community. Echoing this recommendation, one of our survey respondents called for the creation of a database identifying at-risk individuals, such as those who are wheelchair-bound, bed-bound, elderly, or severely disabled, to ensure targeted assistance during emergencies. However, ongoing debate persists regarding the effectiveness of such interventions. Advocates argue that a disability register can facilitate the provision of tailored advice and information to vulnerable populations and help emergency services to locate them during evacuations and post-disaster recovery [36]. On the other hand, sceptics contend that maintaining such a register poses challenges in terms of resource allocation, potentially diverting attention and resources from critical aspects of disaster management [37,38]. Additionally, concerns about privacy and the potential for stigmatization and discrimination against individuals listed in the database are raised [37,38]. Perhaps one of the most concerning drawbacks is that the implementation of such a register may foster a false sense of security and unrealistic expectations among participants. This could lead to the belief that emergency services agencies will promptly attend to their needs during an emergency, potentially resulting in a decreased sense of personal responsibility in preparing for disasters [37,38].

The survey respondents emphasized the importance of acquiring accurate and timely information from trusted sources. Equally important is ensuring that these resources are accessible, easy to comprehend, and actionable. However, we acknowledge that the majority of our respondents had above-average levels of education, and the survey itself required a relatively high cognitive capacity to complete. Consequently, there is a notable absence of perspectives from individuals who may require different approaches to access information. Future studies should aim to diversify the participant pool by including individuals with disability from various socioeconomic backgrounds, education levels, and geographical locations. Greater attention should be given to individuals who have cognitive, language, and literacy support needs and investigate how to best support this population in emergency preparedness.

In addition to the high proportion of respondents with above-average levels of education, our survey respondents also comprised a high proportion of female respondents, and respondents from higher social-economic areas compared to the national average among Australians with disability. While the survey's findings may have limitations in generalizability due to the specific demographic characteristics of the sample, rigorous efforts were invested in the survey's construction and question formulation to ensure validity and reliability. This survey comprehensively covers factors highly relevant to the intended constructs: disaster preparedness, capabilities, and support needs among people with disability, signifying robust content validity. Furthermore, construct validity is upheld as these constructs align seamlessly with the established P-CEP framework, co-designed and field-tested with people with disability, disability service providers, and the emergency service sector, and underpinned by Sen's capability theory [17]. Pilot results and feedback from respondents demonstrated that the survey questions were clear and relevant to study population, indicating good face validity. The internal consistency among

each set of preparedness actions was affirmed by optimal scores in the Cronbach alpha test (0.68 and 0.87).

5. Conclusions

This study makes a significant contribution to the understanding of emergency preparedness for individuals with disability. The implications of this study extend to policy and practice in disability-inclusive disaster risk reduction. Governments and emergency services must prioritise the development of comprehensive support strategies that cater to the diverse range of needs exhibited by people with disability. These strategies should encompass various aspects, including healthcare, emotional well-being, risk communication and practical support, such as assessable accommodation and transportation needed in the face of disasters.

Inclusive disaster risk reduction should be informed by the lived experiences of individuals with disability themselves. They must be at the forefront of identifying their capabilities and support needs before, during, and after disasters. This study provides a valuable voice to people with disability, allowing them to express what they can do independently and where they require external support in the context of Australian disasters. By listening to the voices of individuals with disability and implementing inclusive policies and practices, governments, emergency personnel, and service providers can better fulfill their obligations to protect and support all members of society during times of crisis.

While this study provides insights into the emergency preparedness of individuals with disability in a high-income, well-resourced context, it is crucial to acknowledge potential disparities in less well-resourced settings and examine how these lessons can be adapted to ensure inclusivity and support for individuals facing diverse socioeconomic challenges.

Supplementary Materials: The emergency preparedness survey of people with disability can be found at: https://collaborating4inclusion.org/wp-content/uploads/2023/03/SurvPWD_questionnaire_JC_v01_logo.pdf (accessed on 1 August 2020).

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