

ABSTRACT

People with physical disabilities are highly vulnerable during natural disasters. The interaction of individual, societal and environmental factors impact on their ability to prepare, evacuate and recover from disaster events. This paper provides a review of the current body of knowledge on the lived experiences of adults with a physical disability in natural disasters. Fifty-seven articles were identified in the primary search, with seven studies selected for review. The small body of research to date indicates that natural disasters present challenges to people with physical disabilities, and have significant negative impacts on their lives. However, there are a number of factors that enhance the resilience of people with physical disabilities. The aim of this integrative review was to describe the current body of knowledge on the lived experiences of adults with a physical disability in natural disasters and to identify gaps in the literature to inform future research.

Experiences of individuals with physical disabilities in natural disasters: an integrative review

Jennifer Quail, Associate Professor Ruth Barker and Associate Professor Caryn West, James Cook University, Cairns, Queensland.

Submitted: 12 October 2017. Accepted: 24 April 2018.

Introduction

People with physical disability are two to four times more likely than the general population to die or sustain injuries during disaster events (Fujii 2012). The risk to this group is greater than the general population due to the effect of impairments (e.g. motor, sensory, cognitive-linguistic) and activity limitations (e.g. mobility and communication) on their ability to prepare, evacuate and recover from disaster events (Rooney & White 2007, World Health Organization 2013, Zakour 2015). People with physical disabilities disproportionately experience poverty, lack of social support and structural exclusion. This increases their vulnerability during disaster events (Smith & Notaro 2009).

Evacuation planning must take into account the specific needs of individuals with physical disabilities. This includes mobility assistance, accessible evacuation shelters and reliable power sources to run equipment such as power wheelchairs and communication devices. Disability inclusive disaster risk reduction (DiDRR), is a relatively new phenomenon. The *Sendai Framework for Disaster Risk Reduction 2015-2030* (UNISDR 2015) is the first international framework to include the needs of people with disabilities.

Research on DiDRR is predominantly from North America and Asia and focuses on disaster preparedness and response (Llewellyn 2016). Encouragingly, DiDRR programs are being implemented in a number of locations in Australia (University of Sydney 2015). However, there is limited research available that investigates the lived experience of people with physical disabilities in natural disasters. This literature review found no studies that explore the lived experience of people with disability within the Australian context.

Method

An integrative approach was used to review the literature on this topic as it allows for examination of the diversity of research methodologies and summarisation of common themes within existing research. A systematic search was completed using the keywords: 'vulnerable population', 'disabled persons', 'disaster victims', 'nervous system diseases', 'neurological disorder',

'stroke', 'cerebrovascular disorders', 'cerebrovascular accident', 'disaster', 'cyclonic storms', 'tropical cyclone', and 'natural disaster' in various combinations. Databases used were Ovid Medline, CINAHL, Scopus and ProQuest.

The search included grey literature and examining reference lists of the articles retrieved. The search was limited to studies written in English using adult participants. No limits on year were applied. Physical disability was defined as neuro-musculoskeletal, sensory or cognitive-linguistic conditions. The review was conducted in three stages; by title, abstract and full text. The inclusion criteria applied was as follows:

- published in English
- studies exploring the experience of people with a physical disability in a natural disaster.

Exclusion criteria included research focused only on the preparedness of people with physical disability in a disaster with no mention of an actual disaster event.

Articles were appraised using the Critical Appraisal Skills Programme (CASP) 2017 critical appraisal checklist. The review process is illustrated using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart. Figure 1 illustrates the approval process.

Results

The seven articles included in the review consisted of four qualitative, two quantitative and one mixed methods study design. Data collection methods consisted of interviews, surveys and standardised psychological tests. Physical disabilities included conditions such as spinal cord injury, cerebral palsy, multiple sclerosis, vision impairment and hearing impairment that were studied individually (Duyan & Karatas 2005, Good, Phibbs & Williamson 2016, Takahashi & Kitamura 2016) or in combination (Fox *et al.* 2010, Gerber, Norwood & Zakour 2010, Rooney & White 2007, Van Willigen *et al.* 2002). The range of natural disasters included earthquakes, hurricanes, fires, floods, tornadoes and severe storm events that occurred in Turkey, the US, New Zealand and Japan.

Data quality varied across the seven articles with some reporting potential sampling bias (Fox *et al.* 2010, Rooney & White 2007, Takahashi & Kitamura 2016) or a small sample size (Duyan & Karatas 2005). Experiences of people with physical disabilities and disability organisation staff were combined in one study (Fox *et al.* 2010), clouding the disability experience of disaster. Research design rigour was only reported by

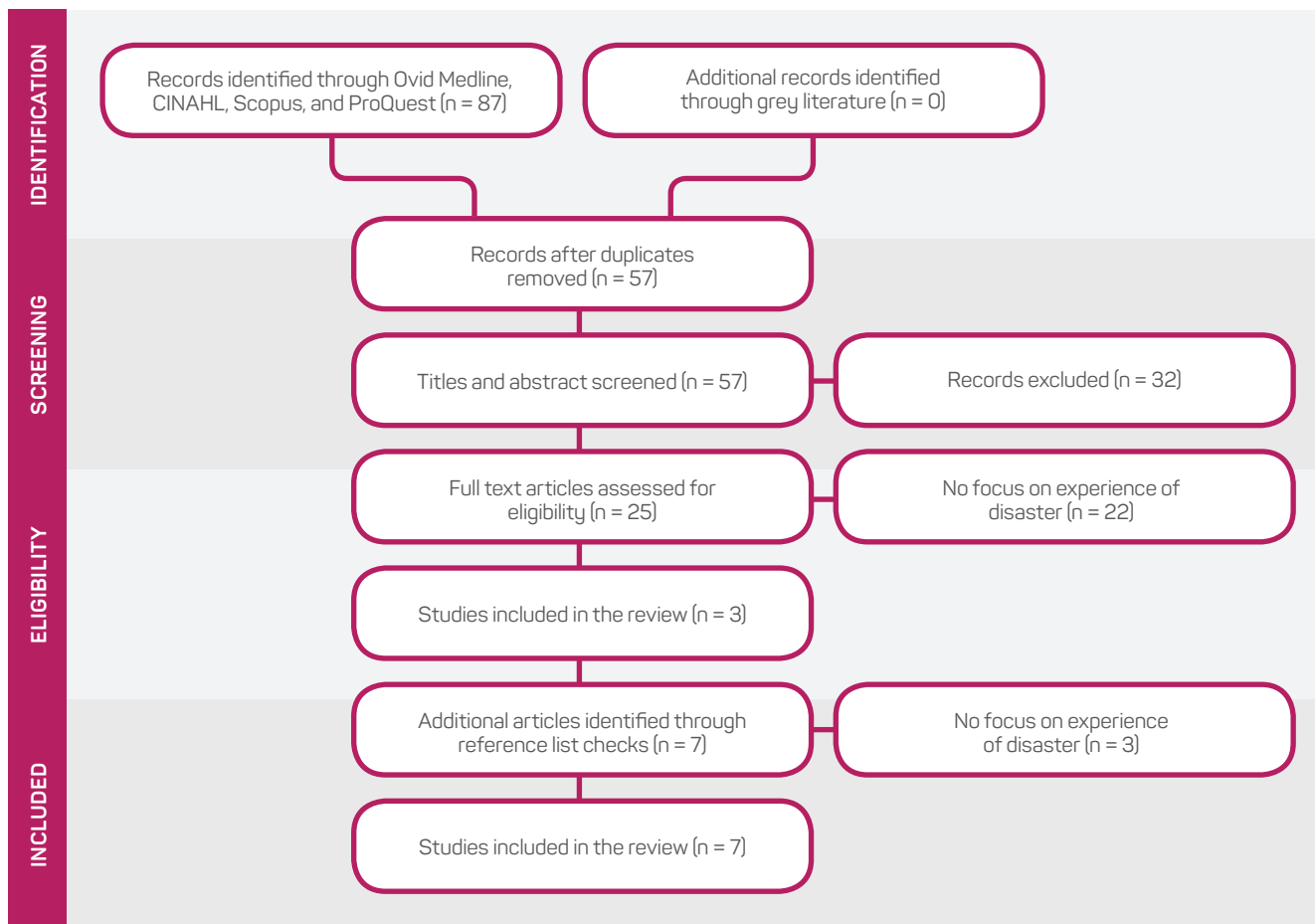


Figure 1: PRISMA flow chart for papers selected for this study.

Source: Adapted from Moher *et al.* 2009.

Fox and colleagues (2010), Rooney and White (2007) and Takahashi and Kitamura (2016). There was potential recall bias for all studies reviewed. Table 1 provides a summary of the articles used in this study.

Three overarching themes were identified across the studies in relation to the experience of people with disabilities during natural disaster events. Themes were:

- challenges faced by people with physical disabilities
- impacts of natural disasters on people with physical disabilities
- factors that enhance resilience to disaster events.

The challenges faced by people with physical disabilities in natural disasters

People with physical disabilities are less likely to evacuate from their home and wait longer to do so due to a lack of accessible transport and concerns that evacuation shelters will not accommodate their needs (Gerber, Norwood & Zakour 2010, Rooney & White 2007, Takahashi & Kitamura 2016, Van Willigen *et al.* 2002). Potential loss of independence in an evacuation shelter is particularly pertinent for those with visual impairments. These people express concerns about the safety of guide dogs, needing assistance with reading, writing, orientation and mobility in an unfamiliar environment. They also may experience difficulty accessing their support community due to changes in the physical environment from structural damage and debris (Good, Phibbs & Williamson 2016). This can cause disruption of routines and lead to isolation when medical care, the supermarket and family and friend's homes cannot be accessed (Good, Phibbs & Williamson 2016).

Lack of support to prepare, evacuate and recover from a disaster event is a recurrent theme across the literature reviewed. Absence of family support is a disadvantage and, for some, their social network may be other people with disabilities who may not be able to assist in an emergency (Fox *et al.* 2010). A lack of social support can exacerbate isolation and trauma, and recovery from an event can be slowed (Good, Phibbs & Williamson 2016). For those requiring personal carers, absence of their caregiver during a disaster event, whether sheltering in place or in an evacuation centre, presents significant challenges (Takahashi & Kitamura 2016).

A lack of communication from authorities poses a threat to people with physical disabilities during natural disasters. Disaster relief personnel need training in accessibility issues and to have a good knowledge of accessible evacuation options. Emergency announcements need to be accessible to those with vision or hearing impairment (Rooney & White 2007, Van Willigen *et al.* 2002). While radio broadcasts are regarded as the most accessible sources of information during a disaster, visually impaired people in Christchurch reported that radio broadcasts were of poor quality as misinformation was spread in the wake of the earthquake in 2011. This caused significant fear (Good, Phibbs & Williamson 2016).

The ability to manage one's own health condition is a significant challenge during and after a natural disaster (Fox *et al.* 2010, Good, Phibbs & Williamson 2016, Takahashi & Kitamura 2016). For people with cervical SCI for example, the ability to manage urinary and faecal control and pressure injuries while in an evacuation centre may be difficult. Regulating body temperature without air conditioning during a power outage or difficulty accessing medications cause significant anxiety (Takahashi & Kitamura 2016).

Impacts of natural disasters on people with physical disabilities

People with physical disabilities have reduced ability to prepare, evacuate and recover from disaster events. Experiences of decreased self-esteem, increased anxiety, emotional trauma and diminished personal safety are common (Good, Phibbs & Williamson 2016, Rooney & White 2007, Duyan & Karatas 2005). A lack of evacuation planning can result in people with physical disabilities being left behind during an evacuation, resulting in significant emotional trauma and potential loss of life (Fox *et al.* 2010, Rooney & White 2007). Additionally, property damage may prolong the recovery process and have negative effects on standards of living for people with disabilities. Studies by Van Willigen and colleagues (2002) showed that property damage was 50 per cent more likely for households with a disabled member following hurricanes in the US. The financial burden of this was almost four times that of other households. The study indicated that the consistently lower incomes of people with disabilities represents a significant barrier to recovery after disaster events.

Factors that enhance resilience to disaster events

Factors reported to enhance the resilience of people with physical disabilities to natural disaster events include disaster preparedness by individuals, communities and organisations (Fox *et al.* 2010, Gerber, Norwood & Zakour 2010, Rooney & White 2007, Takahashi & Kitamura 2016, Van Willigen *et al.* 2002). Preparedness measures include storing necessary items such as food, water, information devices, medications and essential items for a caregiver. Having an evacuation plan, pre-registration for emergency assistance, self-assessment of needs during a disaster and knowledge of a safe and accessible place to evacuate to, greatly improves preparedness. Having strong personal networks also helps with preparedness, evacuation and recovery post-disaster. This includes family, friends, disability organisations and specialised transport networks for people with a disability. For those with severe physical disability and high-care needs, having reliable caregivers during a disaster greatly reduces their vulnerability (Takahashi & Kitamura 2016).

Resilience through adaptation was also a common theme. People adapt during a disaster by doing the best they can with the resources they have available (Fox *et al.* 2010, Good, Phibbs & Williamson 2016, Takahashi & Kitamura 2016). They also learn from previous disaster

Table 1: Experiences of people with physical disabilities during natural disasters.

| Title/Author/Year | Research design | Participants | Summary of findings |
|---|--|--|--|
| Effects of the 1999 earthquake on the completely blind living in and outside Marmara, Turkey. Duyan & Karatas 2005. | Quantitative-socio-demographic features as control variables. Self-esteem and state and trait anxiety measured as dependent variables. | Convenience sample: 66 from the earthquake region and 109 from the non-earthquake region. | Self-esteem scores were lower and trait anxiety scores higher for blind persons living in the earthquake region. Results persisted when socio-demographic characteristics were controlled for. Suggests the need to enhance self-esteem, minimise material losses and strengthen social supports. |
| The psychosocial impact of Hurricane Katrina on persons with disabilities and Independent Living Centre staff living on the American Gulf Coast. Fox, White & Rooney 2010. | Qualitative semi-structured interviews. Hermeneutic data analysis. | 56 survivors of Hurricane Katrina – people with disabilities or those working with them. | Six major themes (faith, incredulousness, blaming others or oneself, family, adaptation and resiliency, and work and professional responsibility) help to explain the resilience of people with disabilities in adapting to disasters. Embracing universality of design and inclusiveness in disaster risk reduction at all government levels will improve the resilience of this vulnerable population. |
| Disasters, evacuations and persons with disabilities: an assessment of key issues facing individuals and households. Gerber, Norwood & Zakour 2010. | Mixed methods. Telephone and mail surveys. Statistical analysis of quantitative data. Coding of qualitative data. | 1162 people with disabilities and their household members evacuated due to a natural disaster. | Greater financial and other resources needed to support evacuation of people with disabilities. Greater preparedness support needed for those with hearing impairments and households with high rates of disability. Preparedness, response and recovery improved by increasing access to social networks. |
| Disoriented and immobile: the experiences of people with visual impairments during and after the Christchurch, New Zealand, 2010 and 2011 earthquakes. Good, Phibbs & Williamson 2016. | Qualitative semi-structured interviews. Thematic analysis. | 12 after the 2010-2011 earthquakes, seven original participants after catastrophic February 2011 earthquake. The Blind Foundation staff. | Themes reflected concerns (e.g. support, orientation, evacuation centres), resiliency, disbelief, recovery, the need to be with others, erosion of security and the need to move on. Older visually impaired persons have increased vulnerability. Improved disaster preparedness needed by individuals, families, communities and agencies. |
| Narrative analysis of a disaster preparedness and emergency response survey from persons with mobility impairments. Rooney & White 2007. | Qualitative online survey. Thematic analysis. | People with mobility impairment who experienced a natural or man-made disaster. | Disaster survival improved by preparedness measures, strong personal networks and help from first responders. Post-disaster challenges include clean up, emotional trauma and lack of accessibility. This population have much to contribute to disaster planning and education of disabled peers. |
| Disaster anxiety and self-assistance behaviours among persons with cervical cord injury in Japan: a qualitative study. Takahashi & Kitamura 2016. | Qualitative semi-structured interviews. Thematic analysis. | 16 Tokyo residents with cervical SCI, with an interest in disaster preparedness. | All expressed anxiety about managing their health during a disaster. Importance is placed on disaster preparedness (i.e. storing needed items, staying in a safe place, having reliable caregivers). Experience of travelling and information from peers would likely improve disaster preparedness and resilience. |
| Riding out the storm: experiences of the physically disabled during Hurricanes Bonnie, Dennis and Floyd. Van Willigen, Edwards, Edwards & Hesse 2002. | Quantitative: Phone surveys, in-depth interviews, focus groups. | 942 households (ten with a disabled person, 15 SCI association members, emergency personnel). | Households with a disabled member: lower evacuation rates, waited longer to evacuate, cited transport and lack of shelter as the barriers to evacuation, and were 50% more likely to sustain property damage. Financial burden four times that of households without a disabled member. These impacts may prolong the recovery process and have ongoing negative effects on the standard of living of households with a disabled member. |

experiences and improve personal preparedness using checklists and inventories, learning how to best access necessary information, using community networks, and coping with hardship (Fox *et al.* 2010, Good, Phibbs & Williamson 2016). Sharing disaster stories and the lessons learnt with others was identified as a positive way to cope with the experience and provide meaningful help to others (Good, Phibbs & Williamson 2016).

Social capital refers to the connections between an individual's personal networks and social resources. It is an important factor in enhancing resilience of people with disabilities (Fox *et al.* 2010). When communities adapt resources and services to help people with disabilities (e.g. community organisations providing carer support, accessible transport and accessible building design) and people with disabilities strengthen personal networks through greater participation in community organisations and activities, social capital is increased (Fox *et al.* 2010). Investing in social capital is critical to improving preparedness and increases the likelihood that people recover in a resilient fashion after a disaster. Rooney and White (2007) suggest that social capital can be enhanced by the inclusion of survivors of disaster events in disaster planning and policy development. Their valuable knowledge and experience will help to identify the needs of people with disabilities in future disaster events. The literature reviewed does not report on the level of inclusiveness of people with physical disabilities in disaster planning and response activities.

Discussion

The results of the review show there are limited studies into the disability perspective of disaster events and these studies are based on events that occurred outside of Australia.

Throughout the literature, a key finding was that people with physical disabilities face challenges during natural disasters due to individual, societal and environmental factors such as loss of independence, lack of evacuation support and difficulties managing their health conditions. These challenges negatively affect preparedness, evacuation and recovery from these events. The long-term effects of natural disasters are felt through emotional trauma and the financial burden of property damage that can prolong recovery and decrease standards of living for this vulnerable group.

Encouragingly, the literature highlights factors that enhance resilience to disaster events with a strong focus on strengthening support networks, adaptation and disaster preparedness. Participants attest to the empowerment felt as a result of educating their peers on lessons learnt from their experience. There is a call to include people with disabilities in disaster planning to take advantage of their knowledge of how to accommodate their special needs. While the *Sendai Framework for Disaster Risk Reduction 2015-2030* (UNISDR 2015) promotes active involvement of people with disabilities and their organisations in disaster

planning and policy development, there is no clear indication in the more recent literature reviewed that this level of inclusion is occurring. A greater focus on disability inclusiveness and investment in social capital within disaster-prone communities will enable greater participation in society and help to build resilience to future disasters.

Despite cyclones, floods and bushfires frequently affecting Australia, the experience of people with physical disabilities in natural disasters in this country is yet to be investigated. There is a need to examine the effects of these events on people with physical disabilities within the context of Australian communities and organisational supports. Future research should focus on the disability experience of Australian natural disasters, the level of inclusion of people with physical disabilities in disaster risk reduction activities and the development of interventions to enhance the resilience of this population. This will provide an evidence base for DiDRR policy, planning and implementation in Australia.

Limitations

Despite extensive searching, it is possible that a study on the experiences of individuals with a physical disability in natural disasters may have been omitted. Disaster research is a multidisciplinary field and studies are published in a variety of journals. Studies in languages other than English were not accessed for this review.

Conclusion

This review of the experiences of people with physical disabilities during natural disasters worldwide has revealed a number of valuable findings. It highlights the unique challenges faced by people with physical disabilities and the serious impact of natural disasters on their lives. Importantly, it also identifies factors that enhance the resilience of this population to natural disaster events. People with physical disabilities who have experienced disaster events can make a valuable contribution when included in disaster planning and response activities as well as through education of their peers. This review suggests that research to investigate the experiences of people with physical disabilities in disasters within Australia is needed to effectively inform implementation of DiDRR activities.

Acknowledgements

We gratefully acknowledge the input of study participants. This project was fully supported by the College of Healthcare Sciences at James Cook University.

References

Critical Appraisal Skills Programme 2017, *CASP Qualitative Checklist*. At: www.casp-uk.net/checklists.

Duyan V & Karatas K 2005, *Effects of the 1999 earthquake on the completely blind living in and outside Marmara, Turkey*. *International Social Work*, vol. 48, pp. 609-619.

Fox MH, White GW, Rooney C & Cahill A 2010, *The psychosocial impact of Hurricane Katrina on persons with disabilities and Independent Living Center staff living on the American Gulf Coast*. *Rehabilitation Psychology*, vol. 55, pp. 231-240.

Fujii K 2012, *Towards disability inclusive and responsive disasters and emergency response and management through promoting accessibility. Building inclusive society and development through promoting ICT accessibility: emerging issues and trends*. Japan.

Gerber BJ, Norwood F & Zakour M 2010, *Disasters, evacuations and persons with disabilities: an assessment of key issues facing individuals and households*. National Institute on Disability, Rehabilitation and Research.

Good GA, Phibbs S & Williamson K 2016, *Disoriented and immobile: the experiences of people with visual impairments during and after the Christchurch, New Zealand, 2010 and 2011 earthquakes*. *Journal of Visual Impairment and Blindness (Online)*, vol. 110, p. 425.

Llewellyn G 2016, *Disability and disaster risk reduction / emergency preparedness. Scoping review*. Sydney: University of Sydney, New South Wales. At: <https://sydney.edu.au/health-sciences/cdrp/projects/DIDP-Scope-nov16.pdf>.

Moher D, Liberati A, Tetzlaff J, Altman DG, Altman D, Antes G, Atkins D, Barbour V, Barrowman N, Berlin JA, Clark J, Clarke M, Cook D, D'amico R, Deeks JJ, Devereaux PJ, Dickersin K, Egger M, Ernst E, Gotzsche PC, Grimshaw J, Guyatt G, Higgins J, Ioannidis JPA, Kleijnen J, Lang T, Magrini N, McNamee D, Moja L, Mulrow C, Napoli M, Oxman A, Pham B, Rennie D, Sampson M, Schulz KF, Shekelle PG, Tovey D, Tugwell P & Group P 2009, Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of Internal Medicine*, vol. 151, pp. 264-269.

Rooney C & White G 2007, *Consumer perspective: narrative analysis of a disaster preparedness and emergency response survey from persons with mobility impairments*. *Journal of Disability Policy Studies*, vol. 17, pp. 206-215.

Smith DL & Notaro SJ 2009, *Personal emergency preparedness for people with disabilities from the 2006-2007 Behavioral Risk Factor Surveillance System*. *Disability and Health Journal*, vol. 2, pp. 86-94.

Takahashi K & Kitamura Y 2016, *Disaster anxiety and self-assistance behaviours among persons with cervical cord injury in Japan: a qualitative study*. *BMJ Open*, vol. 6. At: <http://bmjopen.bmj.com/content/6/4/e009929>.

The United Nations Office for Disaster Risk Reduction 2015, *Sendai Framework for Disaster Risk Reduction 2015-2030*. At: www.unisdr.org/we/coordinate/sendai-framework.

University of Sydney 2015, *Disability inclusive disaster preparedness in NSW: enabling local community resilience through collaboration 2015-2017 project*.

Van Willigen M, Edwards T, Edwards B & Hessee S 2002, *Riding out the storm: experiences of the physically disabled during Hurricanes Bonnie, Dennis and Floyd*. *Natural Hazards Review*, vol. 3, pp. 98-106.

World Health Organization 2013, *Guidance note on disability and emergency risk management for health*. Geneva. Switzerland.

Zakour MJ 2015, *Effects of support on evacuation preparedness of persons with disabilities*. *Journal of Social Work in Disability & Rehabilitation*, vol. 14, pp. 1-22.

About the authors

Jennifer Quail is the Assistant Director of Physiotherapy for Rehabilitation at the Gold Coast University Hospital. She specialises in neurological rehabilitation and is actively involved in research into disability inclusive disaster management.

Associate Professor Ruth Barker is a researcher, educator and clinician with interests in neurological rehabilitation, innovative models of clinical service delivery for rural, remote and Indigenous communities and building research capacity across Allied Health disciplines. She has been instrumental in the design, piloting, implementing and evaluating of community rehabilitation services in Townsville and Mt Isa with outreach services to surrounding communities.

Associate Professor Caryn West has a diverse research portfolio within nursing and public health through her professional roles and awards including an Early Career Fellowship with the National Health and Medical Research Council and directorship of the World Health Organisation Collaborating Centre for Nursing, Midwifery Education and Research Capacity Building. Her areas of research include disaster management, nursing and midwifery education, capacity building and alcohol-related injuries and domestic violence in Australian Indigenous communities.