

Advancing Accessible Emergency Communication: Co-Designing Digital Solutions for Deaf and Hard of Hearing Communities in Queensland



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1.Introduction and background to the study

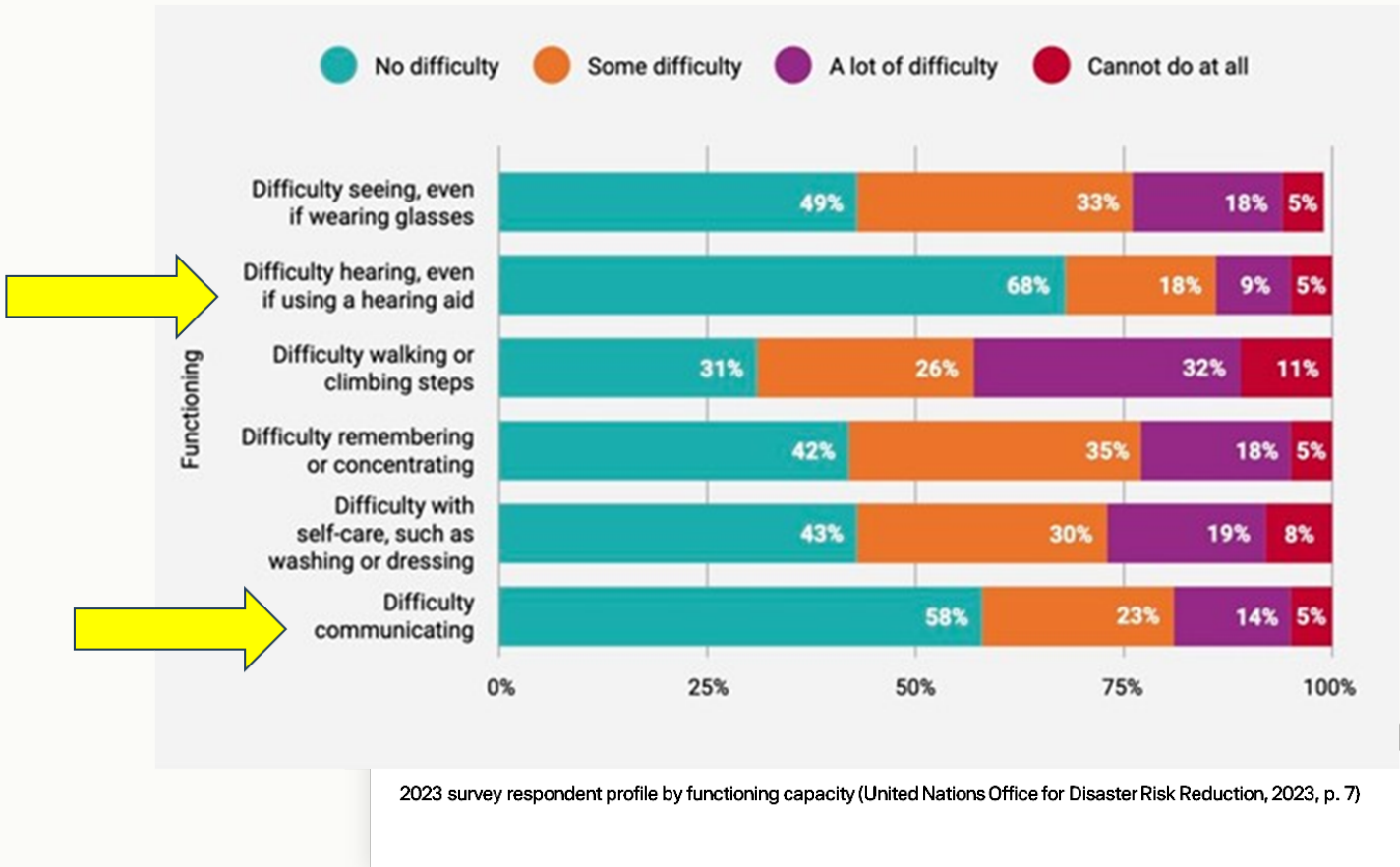
Deaf and Hard-of-Hearing (DHH) communities continue to face significant barriers in accessing timely and comprehensible emergency information, largely due to the lack of inclusive, two-way communication during crises (1,2). Despite the existence of supportive frameworks, current emergency communication systems remain inadequate, often excluding DHH individuals from critical preparedness and response efforts (3).

While digital innovations have been introduced in various settings to improve emergency communication, reports indicate that DHH communities still face persistent challenges in using these tools (4). This is largely attributed to the lack of involvement of DHH individuals in the design and development of such solutions. Moreover, current initiatives frequently lack meaningful engagement with the DHH community (5,6).

This study aims to adopt a co-design approach to develop an inclusive digital tool that facilitates effective two-way communication, enabling DHH communities in Queensland to better access emergency services during disaster events.

2.Literature Review

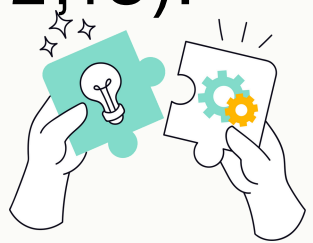
2.1. DHH in disaster context



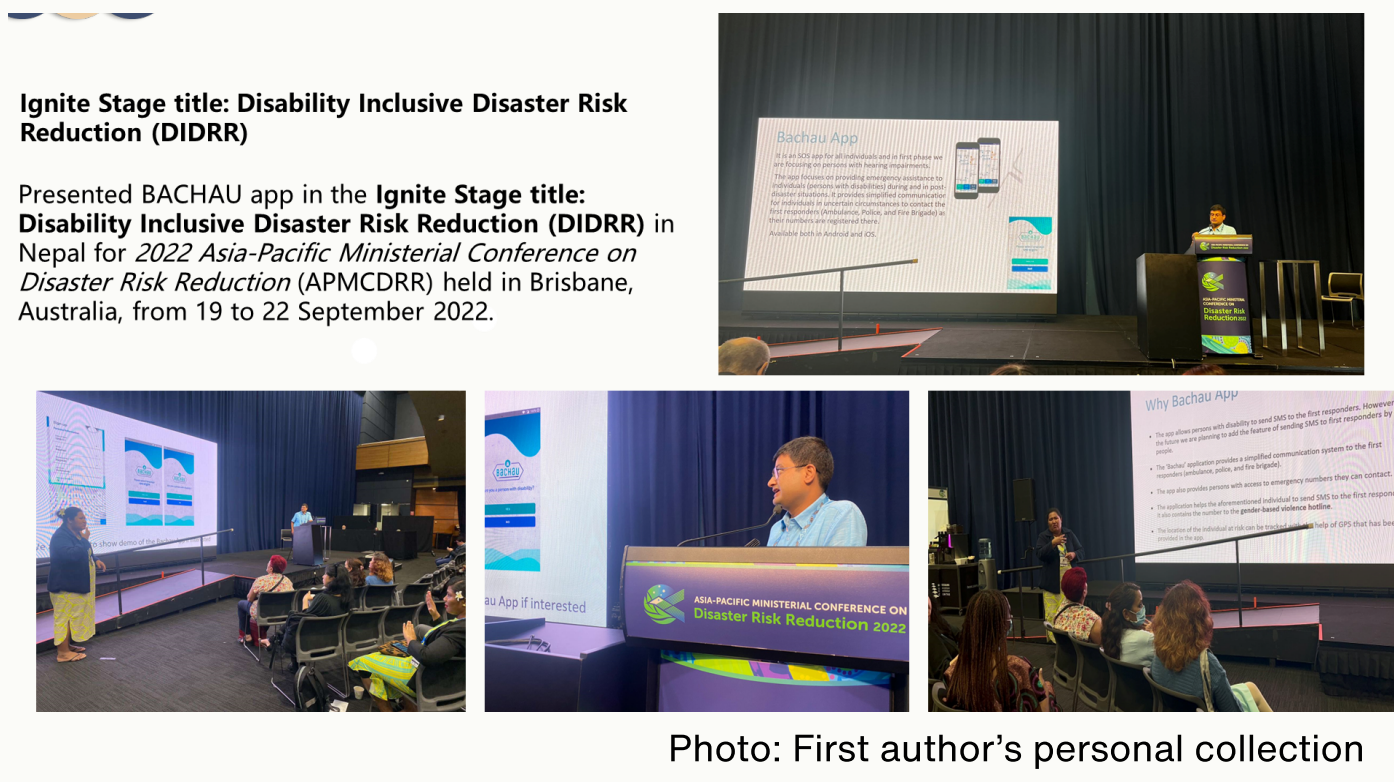
A 2023 survey by the United Nations Office for Disaster Risk Reduction (UNDRR) highlighted key challenges among respondents with functional limitations, including difficulty hearing even with hearing aids, as well as broader communication barriers (7).

2.1. Existing global efforts

- International frameworks, including the United Nations Convention on the Rights of Persons with Disabilities and the Sendai Framework for Disaster Risk Reduction, emphasise inclusivity in emergency communication(8,9).
- Many countries have initiatives to improve accessibility, such as training interpreters and providing accessible technologies like video relay services and captioning(10).
- However, implementation gaps remain, particularly for two-way communication access and culturally appropriate communication for DHH communities(11,12,13).



- There's growing recognition of inclusive emergency communication systems that address the needs of persons with disabilities, including Deaf and hard-of-hearing communities (14).
- Efforts are already underway, such as the development of the “BACHAU” app in Nepal (15).



2.2. Australian context

- Around 1 in 6 Australians experience some level of hearing loss (16).
- In Queensland alone, this equates to over 900,000 individuals (17).
- By 2032, 1 in 2 Australians over 60 will experience hearing loss (18).
- Why Queensland: Queensland is highly disaster-prone, with climate change driving an increase in the frequency and severity of hazard events. Projections for 2060 indicate escalating risks, underscoring the urgency for targeted interventions (19,20,21).



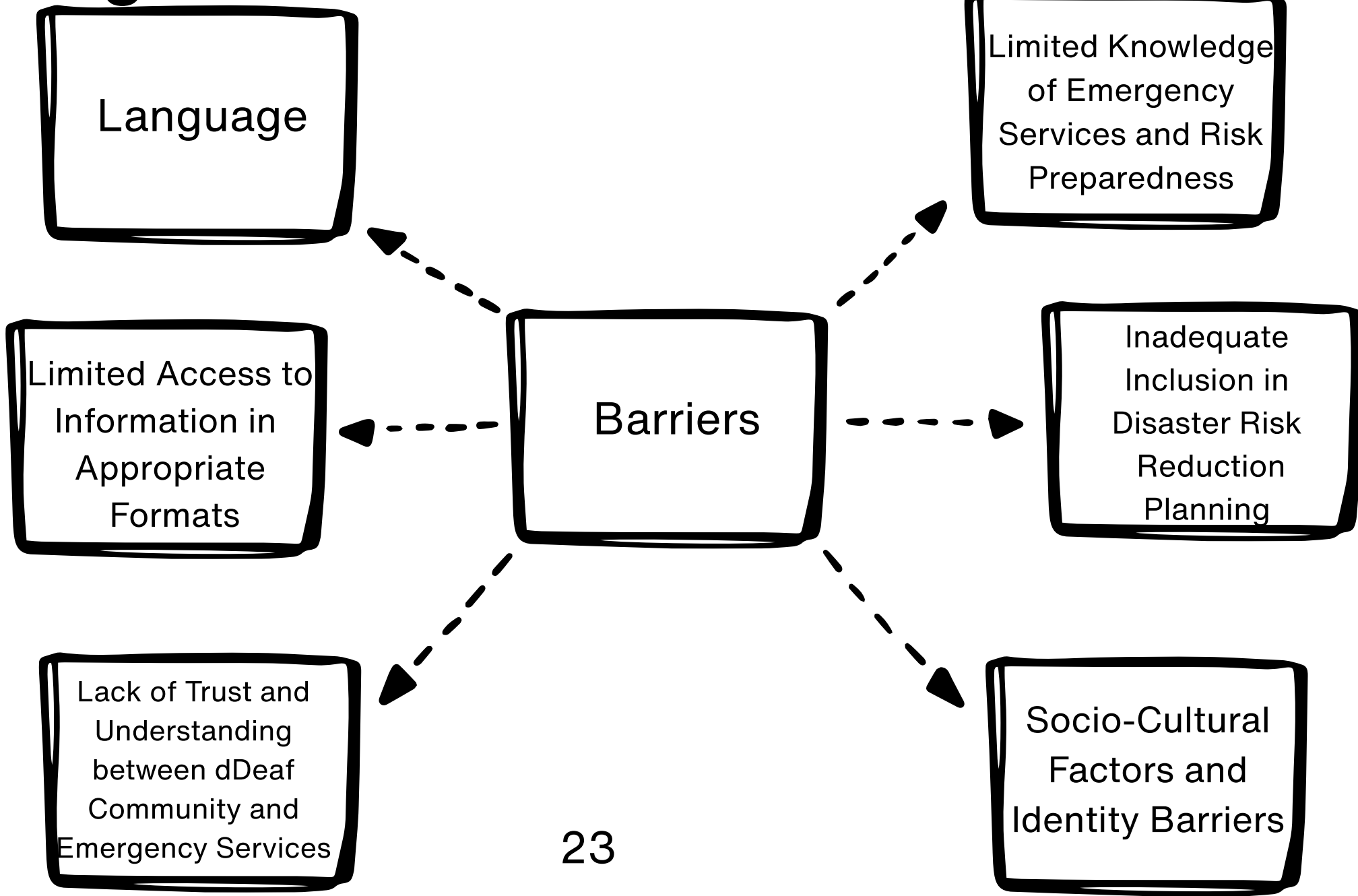
2.3. DHH Communication method in Australia

Communication Methods



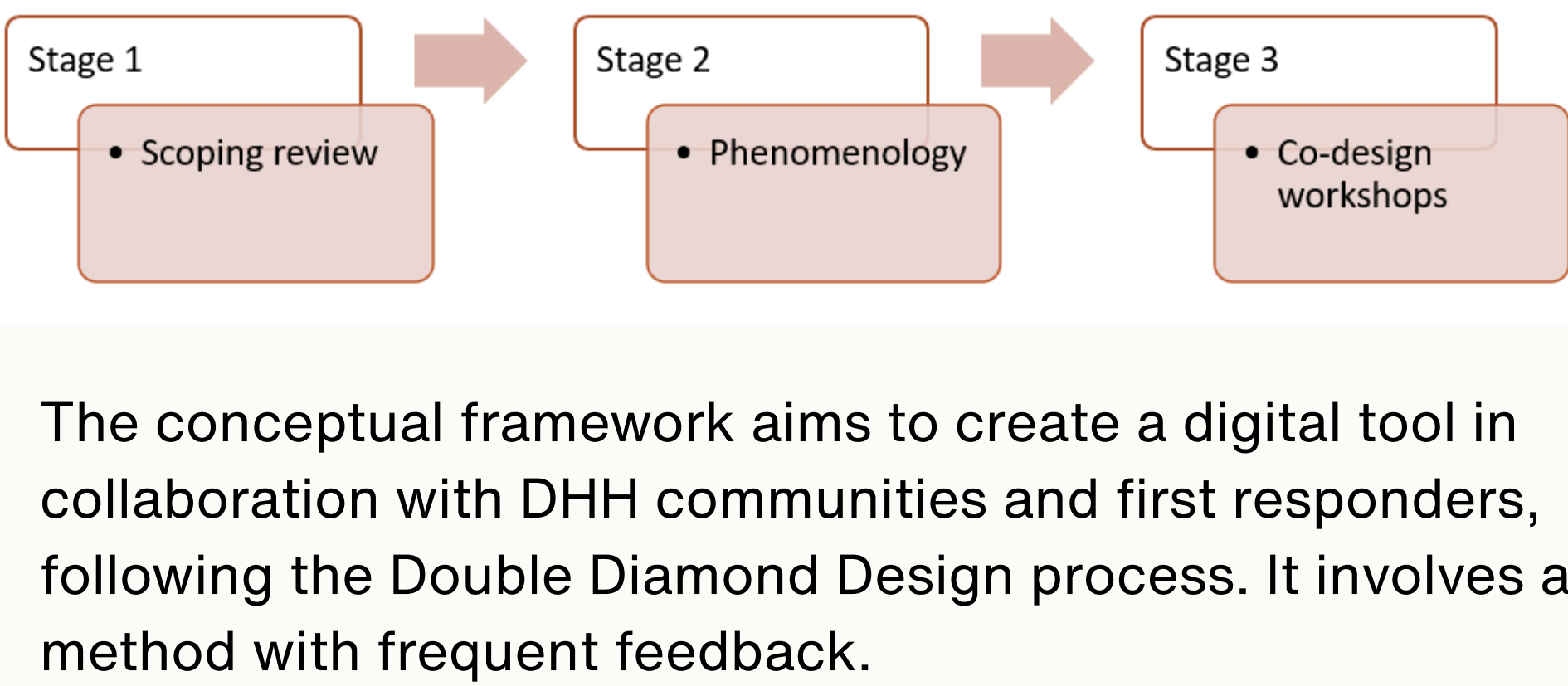
- Deaf and Hard-of-Hearing (HoH) individuals use various methods to communicate, such as Auslan for d/Deaf and hearing aids for HoH. English can be their second or third language (22)

2.4. Existing communication barriers



3.Methodology

- This study uses a multi-stage, qualitative co-design approach.
- The study begins with a scoping review, followed by interviews with Deaf and Hard-of-Hearing (DHH) individuals and key stakeholders. These insights shape participatory co-design workshops, where DHH community members and emergency services collaboratively develop user-centred digital communication solutions. The process prioritises engagement, iterative feedback, and practical prototyping to meet real community needs.



3.1. Research framework



4.Expected outcomes of research

This research will deliver co-designed, user-centred digital communication solutions that enhance emergency accessibility for Deaf and Hard-of-Hearing (DHH) communities. It will provide evidence-based recommendations to inform inclusive policy and practice, fostering equitable disaster response and real-time information access. The outcomes aim to strengthen resilient, inclusive emergency systems in Queensland and contribute to disability-inclusive preparedness globally.

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To connect with the first author

5.References

- Galgaro, E., Craig, N., Craig, L., Dominey-Howes, D., & Allen, J. (2021). Silent no more: Identifying and breaking through the barriers that d/Deaf people face in responding to hazards and disasters. *International Journal of Disaster Risk Reduction*, 57, 102156.
- Fogelman, A., Ivey, S. I., Tseng, W., Dainoff, D., Brune, J., & Neubauer, L. (2013). Responding to the deaf in disasters: establishing the need for systematic training for state-level emergency management agencies and community organizations. *BMC health services research*, 13, 130.
- Global disability summit. (2025). Global Disability Inclusion Report Accelerating Disability Inclusion in a Changing and Diverse World. https://peintimeline.org/hot-cgi-bin/get_pdf.cgi?handle=hein/journals/issw5§ion=16&case_token=tqZPA0sW8AAAAACr5C5CvR5VHRT4on1w6wGZ5xm9pQvQWkRn5ShpwBfIG0xw9p3E5NT5h1chup2t5Q
- Galgaro, E., Craig, N., Craig, L., Dominey-Howes, D., & Allen, J. (2021). Silent no more: Identifying and breaking through the barriers that d/Deaf people face in responding to hazards and disasters. *International Journal of Disaster Risk Reduction*, 57, 102156.
- Galgaro, E., Craig, N., Craig, L., Dominey-Howes, D., & Allen, J. (2021). Silent no more: Identifying and breaking through the barriers that d/Deaf people face in responding to hazards and disasters. *International Journal of Disaster Risk Reduction*, 57, 102156.
- Chapman, K., Allen, C., & Kendall, E. (2025). Methods for Co-designing Health Communication Initiatives with People with Disability: A Scoping Review. *Journal of Health Communication*, 133.
- United Nations Office for Disaster Risk Reduction. (2023). 2023 Global Survey Report on Persons with Disabilities and Disasters. Geneva.
- United Nations. (2006). Convention on the Rights of Persons with Disabilities and Optional Protocol (A/RES/61/106). United Nations Retrieved from <https://www.un.org/disabilities/documents/convention/convoptprot-e.pdf>
- United Nations. (2015). Sendai Framework for Disaster Risk Reduction 2015 - 2030. United Nations Office for Disaster Risk Reduction (UNDRR) Retrieved from <https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030>
- Constantinou, V. (2018). Inclusive Access to Emergency Services: A Complete System Focused on Hearing-Impaired Citizens. In *Interactive Mobile Communication Technologies and Learning* (pp. 969-976). https://doi.org/10.1007/978-3-319-75176-7_34
- Craig, L., Craig, N., Galgaro, E., Dominey-Howes, D., & Johnson, K. (2019). People with disabilities becoming agents of change in disaster risk reduction. In *Emerging voices in natural hazards research* (pp. 327-356). Elsevier.
- Ironhead, H. (2020). Making messages effective for all: South East Queensland flood warnings and alerts. *The Australian Journal of Emergency Management*, 38(4), 47-51.
- Hall, S., & Ballard, M. (2024). Deaf patients' preferred communication in clinical settings: implications for healthcare providers. *Journal of Deaf Studies and Deaf Education*, 29(2), 170-186.
- Identifying and breaking through the barriers that d/Deaf people face in responding to hazards and disasters. *International Journal of Disaster Risk Reduction*, 57, 102156.
- Kutyla Foundation. (2023). Bachau App. Kutyla Foundation Private Limited. <https://kutyla.com.ng/bachau-app/>
- Australian Bureau of Statistics. (2021). Disability and Carers Census. Australian Bureau of Statistics. <https://www.abs.gov.au/statistics/health/disability/disability-and-carers-census/2021>
- Better Hearing Australia. (2025). Submission to Brisbane 2032 Olympic and Paralympic Games Infrastructure Planning. <https://bhabrisbane.org.au/hearing-augmentation-brisbane-2032/#text=Hearing%20augmentation%20for%20the%20effectiveness%20of%20the%20accessibility%20standards>
- Kiely, K. M., & Anstey, K. J. (2021). Putting age-related hearing loss on the public health agenda in Australia. *Public Health Research & Practice*, 31(5).
- Johnson, L., O'Rourke, S., Mullins, G., Rice, M., & Tidwell, K. (2024). STATE OF QUEENSLAND: DISASTER GROUND ZERO.
- Ryan, B., King, R., Lukuge, W., Karunasena, W., & Anderson, E. (2023). Using an inventory cluster approach for assessing bushfire preparedness and information needs in vulnerable communities. *Natural Hazards*, 115(2), 1697-1714.
- Coffey, S. (2021). A deeper look at the economic cost drivers of natural disasters. *Australian Disaster Resilience Conference. Australian Institute for Disaster Resilience*. <https://knowledge.aidr.org.au/media/8964/shauna-coffey-a-deeper-look-at-the-economic-cost-drivers-of-natural-disasters-adrc21.pdf>
- Metro South Health Equity and Access Team. (n.d.). Working with people who are Deaf or hard of hearing. Queensland Health.
- Galgaro, E., Craig, N., Craig, L., Dominey-Howes, D., & Allen, J. (2021). Silent no more: Identifying and breaking through the barriers that d/Deaf people face in responding to hazards and disasters. *International Journal of Disaster Risk Reduction*, 57, 102156.