Post-disaster residential mobility: Considerations for Aotearoa New Zealand

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Abstract

A range of hazards such as earthquakes and fires can propel people and communities to flee or seek safety to protect or rebuild their lives. These forms of residential mobility can encompass temporary and permanent displacement, relocation, and return. They also impact on individuals, relationships, and experiences of security. Here, residential mobility research is examined with a specific focus on two events in Aotearoa New Zealand and Australia to highlight the need for ongoing consideration of residential mobility in preparation for and recovery from a disaster. Applying a push/pull lens, this article outlines critical drivers for people's movements after a disaster. Areas of interest are noted as well as considerations for future research. How and why people relocate is complex and contextual, and influences community recovery and wellbeing. As such, greater knowledge about residential mobility is essential to assist people and communities to recover well.

Keywords: *Residential mobility, relocation, displacement, earthquakes, bushfires, disasters, Aotearoa New Zealand, Australia*

Residential mobility – the processes of temporary displacement or more permanent relocation – has been evidenced following various natural hazard-related events (for example see Groen & Polivka, 2010). In extreme cases, with particular hazards such as earthquakes and fires, entire communities in an affected area need to flee to find safety and rebuild their lives due to houses being destroyed or to seek better air quality (Belcher & Bates, 1983; Peacock et al., 2018). Drivers to relocate, known as push or pull factors, are complex and many. Relocating after a disaster, as with staying in place, has been associated with a range of poor psychological outcomes and can impinge on individual wellbeing, social relationships, and experiences of security (Uscher-Pines, 2009). This in turn influences whether people and communities recover well and re-engage in their various everyday activities and routines (Peacock et al., 2018).

Foregrounding the various push/pull drivers can aid in advancing natural hazard preparedness and recovery practices (Peacock et al., 2018) and benefit those working at the coalface of emergency management and at the policy level. This paper considers some of the push/pull elements that have been shown to contribute to residential mobility following a disaster generally, then explores how these elements materialised in research following the 2010/11 Canterbury earthquakes in Aotearoa New Zealand and the 2009 Black Saturday bushfires in Victoria, Australia. While this is not a comprehensive literature review, the two case studies offer insights into working with communities to rebuild and recover after natural hazard-related events in both Aotearoa New Zealand and Australia. We then suggest key areas of interest as well as considerations for future research. This article was produced prior to the ongoing COVID-19 pandemic, so it provides a broad overview of residential mobility in natural hazard situations not including pandemics or related considerations.

The Need to Move

In response to or following a disaster, residential mobility is often associated with types of housing and housing needs which can be categorised as follows: initial emergency sheltering required directly during/ after a disaster, temporary sheltering based on short-term accommodation, temporary housing which spans
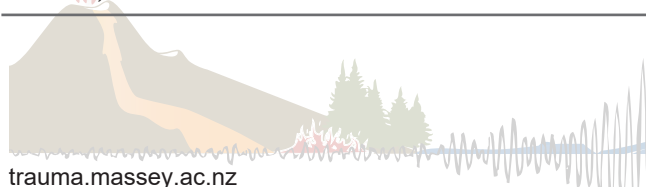
a longer period of time due to housing repairs or limited access to longer-term housing, and permanent housing which includes returning to original dwellings at the time of the event or relocating permanently (Peacock et al., 2018; Quarantelli, 1982; Scheele & Horspool, 2018). The types of housing required after a disaster are important, however residential mobility encompasses more than just housing; it is about people's wherewithal and capacity to move or not. At times after a disaster, people relocate initially because of housing needs and either return or permanently remain at their relocation area. At other times, however, people will not immediately relocate but do so later. Notably, relocation is not a linear process; some people have to withstand various shifts back and forward between multiple forms of shelter due to ongoing housing and social issues, such as rebuild complications or constant environmental dangers (Scheele & Horspool, 2018). Residential mobility, in this article, considers the range of mobility experiences and people's social and cultural experiences, their agency to move, and the complexity surrounding movement within everyday lives.

Push and/or Pull Influences on Residential Mobility

Residential mobility involves a dynamic interplay between individual, social, cultural, financial, political, and environmental push and pull drivers that interact with people's motivation and decisions to move (Hugo, 1996; Myers et al., 2008). Push factors include the natural hazard-related event itself and other unfavourable conditions that people want to avoid, such as environmental degradation, loss of income, or reduced sense of safety. Pull factors entice people to relocate to new environments (Pullin, 2017) or to stay and rebuild. Elements that pull include a better climate, increased wealth, or security. Either way, a different result or living condition is sought. The push and pull interplay is multi-dimensional and layered (Dickinson, 2013; Lee, 1966).

Personal and social characteristics like age, ethnicity, gender, and education, alongside personal circumstances and life events such as becoming parents, divorce, exposure to domestic violence, and carer responsibilities, all interact with the push and pull elements that affect people's actions. In addition, social features include cultural beliefs and practices and spiritual attachment to places and the land (Becker et al., 2018; Groen & Polivka, 2010; Morris et al., 2018). Connection to kinship and land is especially relevant for Indigenous people (for example see Lambert, 2014; Williamson et al., 2020). In this way, various anchors such as attachment to kinship groups or ancestral networks and place can consciously or unconsciously contribute to residential mobility actions and outcomes, which are also moderated by the conditions surrounding the natural hazard-related event. Cultural and emotional connections to dwellings and to communities are recognised as potentially intrinsic to where people reside (Adams-Hutcheson, 2014; Becker et al., 2018; Gibbs et al., 2016; D. King et al., 2014; Lee, 1966).

Push and/or pull triggers on people's mobility are related to community ties and socio-political elements generally, such as the demographics of a neighbourhood before and after a disaster, location of the dwelling(s), owning or renting, and access to more suitable dwellings (Storr & Haeffele-Balch, 2012). For instance, the pull to stay can be influenced by the likelihood of other community members remaining and rebuilding, especially with communities that have a high level of connection, cohesion, and shared identity and who are more able to collectively mobilise to rebuild and recover well (Chamlee-Wright & Storr, 2011; Storr & Haeffele-Balch, 2012).

It is well known that socially disadvantaged or marginalised groups are disproportionately susceptible to displacement from natural hazard-related disasters (Groen & Polivka, 2010; Hunter, 2005). Low-income households are more affected because they are more likely to rent or reside in substandard or unsafe housing. People who do not own a home tend to be the most mobile (Elliot, 2014), which likely arises from a combination of factors including poverty, fewer resources, and less social capital to draw on for mobility or recovery actions (Blake et al., 2017; Scheele et al., 2019).

Hazard-related property damage is considered a strong and consistent predictor of any push or pull to relocate or stay (Gibbs et al., 2016), over and above the influence of other elements. People respond to hazards through existing social structures. Entrenched in issues surrounding property damage and the ability to move are insurance claims and the length of time it takes to repair or rebuild through those official mechanisms (Insurance Council of New Zealand, 2021; A. King et al., 2014; Nguyen & Noy, 2017). The type and severity of a hazard and government policy are reasons for moving and influence how that moving unfolds.

This summary emphasises that whether people move or stay is contextual and situationally complex. A range of push and pull elements contribute to any actions regarding residential mobility (or lack thereof) for people exposed to hazards. Ideally, any research, policy, or

practice should consider all elements across individual, social, cultural, financial, political, and environmental spheres to understand residential mobility more fully and what influences the capacity to be mobile (Quarantelli, 1982); however, this can be difficult due to constraints such as time and resourcing.

Case Study Method

This article evolved from a collaboration between Australian and Aotearoa New Zealand researchers and key stakeholders working in disaster recovery, funded by the Bushfire Natural Hazards Cooperative Research Centre. The broader project focused on the development of a "Recovery Capitals" resource that emphasises community capitals (social, natural, political, built, human, financial, and cultural) and resources within communities to support disaster recovery (for example see Campbell et al., 2021; Quinn et al., 2021).

The following section explores the push/pull of residential mobility using two cases studies, namely the Aotearoa New Zealand Canterbury earthquakes and the Australian Black Saturday bushfires. We saw value in combining our research spaces to underscore contextuality within residential mobility. The Aotearoa New Zealand researchers chose the Canterbury earthquake sequence as it remains one of the most significant disasters to occur in Aotearoa in recent times (Ministry of Business Innovation and Employment, 2017), and initiated significant residential movement. The Australian researchers have in-depth knowledge of, and research experience with, the Black Saturday bushfires, which also triggered significant residential movement. Case studies further enable investigations of community-situated and contextually embedded events in ways that support in-depth understandings (Yin, 2014).

Post-disaster Residential Mobility Following the Canterbury Earthquakes in Aotearoa New Zealand

Aotearoa New Zealand's literature on post-disaster residential mobility mainly results from the 2010/11 Canterbury earthquake sequence and more specifically the 22nd of February, 2011, Christchurch earthquake, where 185 people lost their lives following the widespread destruction of Ōtautahi (Christchurch) city. As Aotearoa New Zealand's major contemporary disaster, the earthquakes shaped post-disaster mobility (or immobility) in that it precipitated Aotearoa New Zealand's greatest temporary and permanent residential movement (Dickinson, 2013; Potter et al., 2015).

The population of Christchurch decreased by 8,900 (2.5%) between June 2010 and June 2011, as recorded by Statistics New Zealand (2011). The exact numbers of people who relocated from Christchurch to regions beyond Canterbury have been difficult to find, however. National census data from Christchurch at the time of the earthquakes was compromised because the timing of the data collection was delayed until 2013. Further, any known figures represent population shifts at a broad level, not internal displacement or movement within the city or short-term relocation after the earthquakes. Internal migration across Christchurch city transpired as people needed to shift from damaged homes for non-specific time periods (Murphy, 2021), as indicated by population increases in certain suburbs of Christchurch after the earthquakes (Statistics New Zealand, 2011). Broader literature on the Christchurch earthquakes signals toward residential mobility as part of the recovery process (for example see Cloke & Conradson, 2018; Marlowe, 2013, 2015; Vallance, 2011).

With a psychological focus, Hogg et al. (2016) investigated the relationship between different forms of relocation and treatment for mood and anxiety 1 year before and 1 and 2 years following the 2011 Christchurch earthquake. Participants were a subset of residents from Christchurch who lived in different areas of the city; these people were described as stayers, within-city movers, out-of-city movers, and returners. Findings indicated that moving within the city had a protective effect on wellbeing over time while returning produced short-term risk for mood and anxiety symptoms in the first year only after the earthquake. Out-of-city movers from minor to severely damaged areas were more vulnerable to mood and anxiety symptoms 2 years after the earthquake. For those who resided in more impoverished areas, moving out of the city was associated with longer-term risk (after 2 years) for mood and anxiety symptoms. These outcomes may have intersected with other conditions, such as living in hazard-prone areas or having little political agency or power. As expected, groups more affected were older adults, those who identified as female, and those with pre-existing mental distress.

Lambert (2014) also acknowledged wider social inequalities relating to post-disaster residential mobility. Lambert analysed government data and various reports for information about Māori responses and locations affected by the earthquake. Twelve interviews with first responders, marae (complex of buildings) managers, and others were held 6 months after the February 2011 earthquake and a further 14 interviews were held 12-

14 months after the earthquakes. Data revealed that Māori communities resided in the hardest hit and often lowest socioeconomic areas of Christchurch (such as the Eastern suburbs). For these communities, mobility was greater due to property and infrastructure damage. Estimating habitability, displacement, and sheltering needs for tsunami in the coastal areas of Christchurch, Scheele et al. (2019) corroborates Lambert's work (Lambert, 2014, 2015; Lambert et al., 2012), citing relocation actions as an outcome of low income, the prevalence of renting, poor standards of housing, and lack of resources.

Regarding refugee communities following the Canterbury earthquake sequence, Marlowe (2015) explored belonging and anchoring for families who were already inherently mobile due to previous resettlement. Christchurch was a primary resettlement locality for refugees before the earthquakes (Marlowe, 2018). Talking to 101 people with refugee backgrounds, Marlowe's (2015) research points to the complexities of refugees' ethno-backgrounds and experiences of people held under the conflated banner of "refugees". For example, Marlowe (2018) estimated that half of the Somali community and 75% of Ethiopian communities relocated after the 2011 earthquake to find work. Kurdish and Eritrean communities felt that they had "almost no-one left following the earthquakes" (p. 113). Marlowe highlights how the push/pull of belonging and relationality and contextual elements (e.g., time, culture, and language) as part of recovery processes are connected to disaster mobility.

Some research is noted in reference to insurance. While these studies are not specific to residential mobility, they allude to issues that underscore drivers of movement for households and dwellings and contribute to the push/pull process. Merkin (2012) and A. King et al. (2014) studied the complexity of the insurance settlement processes following the 2010/2011 earthquakes. With 17 earthquakes causing intense shaking and extensive damage, the period between the earthquake events was not sufficient to assess buildings or repair any damage. There were over 500,000 residential claims for property, land, and household contents. Approximately 160,000 of those were for dwellings.

Aotearoa New Zealand has one of the highest uptakes of insurance in the world, and the 2011 earthquake sequence was the most heavily insured earthquake event in history (Nguyen & Noy, 2017). Brown et al. (2013, 2017) studied the role and efficacy of commercial insurance policies but suggest improvements relevant

to residential policies and ultimately to residential mobility because of household damage or repair. These suggestions included having clearer phrasing in insurance policies, creating sector-specific polices, better systems for claim assessment, and policy incentives to reduce risk prior to a natural hazard-related event. Poontirakula et al. (2017) argued that prompt and full claim pay-outs resulted in improved recovery if the claim was adequate.

Land zoning also propelled residential mobility following the more damaging M6.2 Christchurch earthquake in 2011. Land was zoned to denote levels of damage and ongoing risk (red, orange, green, and white; Dickinson, 2013, 2021). Focussing on post-disaster residential mobility, Dickinson (2013) produced a typological analysis of 31 relocatees (within-city) who were forced to sell their homes following a government buy-back scheme for those in the red zone. Dickinson found that the majority were not keen on short-term relocation, and those who did relocate before the compulsory zoning decision had a social connection with someone outside of the earthquake area. Others potentially experienced push/pull drivers because they were without electricity or water. When purchasing a post-quake house, cost and safety were important elements. Housing relocations were also influenced by agency over moving, interactions with official government organisations and insurance companies, and time lived in the red-zoned areas.

Adams-Hutcheson (2015) studied a cohort of relocatees who moved from Christchurch to another Aotearoa New Zealand region in the North Island. Most of the people included in the study relocated from significantly damaged suburbs between 2010-2012 rather than in the immediate aftermath. The research focussed on emotion and affect to elucidate the trauma and ambiguity infusing decisions to relocate, offering insight into the lived reality of decisions on leaving a post-disaster city (Adams-Hutcheson, 2014, 2015, 2017). A participant summed up respondents' views on relocation by stating that:

> "[Relocation is] like being wrenched away from everything you know, our house was smashed, unliveable, we didn't know anyone up here [Waikato] but I moved for the kids. The kids are safe now and my relief at that is profound. But, we left behind everything, family, work, friends, yeah, everything. And it became very clear to me that the kids and I are alone in our grief and alone in our loss and that still really hurts." (Alexis; Adams-Hutcheson 2018, p. 151)

This narrative powerfully describes how people can feel "wrenched away" when houses are damaged and movement is forced. It also highlights how isolated people can feel in the process of moving. The Adams-Hutcheson (2018) study also found that relocating from Christchurch was considered a "blessing" because it meant no longer enduring instability, ongoing earthquake shaking, and the lack of familiar routine; instead, people were able to regain a sense of stability through school, work, and home life. Yet, the overpowering guilt of "leaving behind" friends and family and the difficulty adjusting to new surroundings, temperatures, and cultures left some relocatees emotionally wrought. People who moved continued to suffer mild to severe forms of post-traumatic stress disorder. Trauma was multi-located, in that some residents not only survived the earthquakes but relocated as well. Families who moved were separated from each other and their beloved city, such that relocating was trauma in and of itself (Adams-Hutcheson, 2014, 2015, 2017).

The research surrounding this case study speaks to the complexity of relocation and how it can influence moods and psychological states, and that relocation mostly impacts disadvantaged and marginalised communities with insurance processes and land zoning being highly emotive and stressfully laden events. Moving to another area can offer a reprieve from the challenges of ongoing disaster recovery but does not entirely negate ongoing emotional traumas. This work suggests that relational and contextual elements are connected to disaster mobility.

Case Study: Residential Mobility Following the Black Saturday Bushfires in Victoria, Australia

In the summer of 2008/2009, after a decade of severe drought, bushfires ravaged the Australian landscape. The worst of the fires occurred across the state of Victoria on the 7th of February, 2009. These fires are commonly referred to as the Black Saturday bushfires. They resulted in the loss of 173 lives and over 2,000 homes and caused widespread damage to townships, landscapes, and infrastructure (Victorian Bushfires Royal Commission, 2009). As a result, many people had to seek temporary alternative housing and make decisions about whether to rebuild and stay living in their community or relocate and begin a new life somewhere else. The State Government provided a range of housing assistance options, and 3 years after the fires introduced a non-compulsory buy-back scheme for high bushfire risk land where properties had been destroyed.

One of the immediate barriers to rebuilding damaged and destroyed homes after the Black Saturday bushfires was lack of resources. Chang-Richards and colleagues (2013) conducted a longitudinal mixed methods study after Black Saturday, collecting data in Marysville, Kinglake, Flowerdale, and Melbourne. This included a questionnaire with 22 respondents 16 months after the bushfires and interviews 6-, 16-, and 28-months post-disaster with 15, 27, and 10 participants respectively. Participants included government officials, rebuilding advisors, construction professionals, researchers, and community representatives. They found that 28 months after the bushfires, reconstruction was slow primarily due to changed building standards, risk perceptions by construction professionals, economic conditions in the building market, and the socioeconomic circumstances of those who had lost their homes. For example, changes in fire safety requirements for building materials undermined the affordability of rebuilding houses. These factors had a particularly strong impact on people who were financially vulnerable, such as those uninsured or underinsured, limiting options for decisions on whether to rebuild rather than relocate.

Ireton and colleagues (2014) note the importance of appreciating that deciding to stay locally would have required going through the process of rebuilding and that there were numerous reasons why this was not feasible or desirable for many. Despite prevailing assumptions and pressure from government and media, the process of planning and carrying out a rebuild and re-establishing gardens was something for which many were not physically, emotionally, or mentally fit or interested. Indeed, some people had tentative plans to relocate prior to the bushfires, and the hazard served as a catalyst for enacting those plans. Ireton and colleagues outlined considerations for improved support for people in the process of rebuilding or relocating after future disasters. These considerations include better temporary accommodation options that enable people to live more comfortably and retain their financial capital for longer periods so that decisions can be made more slowly and with less pressure.

Challenges for rebuilding included that people were more likely to move out of the community in the 3 years after the Black Saturday bushfires if their property was damaged or destroyed (Gibbs et al., 2016). The Beyond Bushfires (2021) study was a longitudinal mixed method study which focussed on individual and community resilience and recovery following the Black Saturday bushfires, initially focussing on the first 5 years (Gibbs et

al., 2013) and then extending to 10 years post-bushfires. It involved over 1,000 participants from 25 Victorian communities with varying levels of bushfire impact, categorised as high, medium, and low/no impact. A sub-study was conducted to compare experiences for those who stayed living within their communities compared to those who relocated, using interview and survey data 3 years post-bushfires. The quantitative analysis involved structural equation modelling of the relationship between bushfire exposure, major life stressors, sense of community, and wellbeing (Gibbs et al., 2016). While the analysis showed the relationship between property loss and relocation, it was the interview data that revealed that decisions relating to residential mobility were highly emotive due to people's fears about ongoing danger from bushfires conflicting with guilt about leaving neighbours and community recovery efforts. Conflicting push and pull factors for relocation were also described by Boon et al. (2012), who conducted a stepwise mixed methods study across four locations and disaster types, including a quantitative survey of 249 residents of Beechworth after the Black Saturday bushfires. Structural equation modelling revealed that amongst Beechworth participants, relocating was associated with infrastructure problems, low sense of place, low financial capacity, and prior disaster experiences.

The Beyond Bushfires interview data also showed that those who decided to stay living in their community described feeling abandoned by their friends and neighbours who decided to leave (Gibbs et al., 2016). A separate analysis of the survey data using a network statistical model showed that the risk of depression was higher for those who remained living in the community but whose close social contacts had relocated (Bryant et al., 2017).

A separate study situates these experiences and decisions within the complexity of people's lives, including dynamics within couples and families. Proudley (2013, 2018) offers a nuanced examination of residential mobility through a qualitative case study based on in-depth interviews with 33 adults in Gippsland after the Black Saturday bushfires. This study highlighted that residential mobility decisions were often made collectively rather than individually, yet people within a couple or family have different needs and desires regarding post-disaster residence. In many cases, this gave rise to tensions, compromises, and relationship breakdown in some cases. Proudley (2013) showed that age, gender, and socioeconomic factors (particularly insurance status) played important roles in residential

mobility and recovery experiences for study participants. For example, for many older study participants, the decision to relocate was directly tied to their life stage as they felt that rebuilding would not be feasible or worthwhile for them given their age (Proudley, 2018). Similarly, an in-depth qualitative analysis of the 35 child and adult interviews in the Beyond Bushfires study revealed that family decisions about where to live included consideration of the recovery experiences of the children and teenagers and their need for a sense of safety and stability. For some families, this meant staying locally where people and place were familiar, whereas others felt that their children's wellbeing would be better supported if they relocated elsewhere away from the damage and disruption (Gibbs et al., 2015).

Reflecting on the role of government and service providers in the process of residential rebuilding after Black Saturday, Ireton and colleagues (2014) observed that decisions about rebuilding or relocating were made more difficult by the lack of evidence and guidance available. Consistent with the findings of Proudley (2018) and D. King et al. (2014), the authors posited that although post-disaster experiences would be different for those who relocated compared to those who rebuilt or remained locally after the bushfires, the most important influence on long-term wellbeing was likely to be whether people felt they had agency, control, and a range of options in making those decisions.

The Beyond Bushfires quantitative findings provided evidence to guide future decision making about relocation. They showed that, overall, the wellbeing levels of those who stayed and those who relocated were about the same 3 years after the bushfires, but for different reasons (Gibbs et al., 2016). Those who moved benefited from reduced post-disaster disruption in their lives but had a lower sense of community, and the trauma of the disaster event still affected their wellbeing 3 years later. Those who remained living in the bushfire affected community had to deal with a range of post-disaster stressors such as rebuilding and reduced income but also had the opportunity for shared processing of the disaster experience. Connection to place and community motivated some people to stay living locally.

Conversely, others were motivated to relocate due to changes to the local area, social tensions, or painful memories (Gibbs et al., 2015; Gibbs et al., 2016). Proudley's (2013, 2018) study adds to these findings by demonstrating the centrality of place attachment, identity, sense of control, loss, feelings of being unsettled, and the yearning for "home" in residential mobility experiences.

Similarly, D. King et al. (2014) reported that people who moved and people who stayed were both adaptable and demonstrated resilience. Relocation outcomes appeared to be better when people experienced agency and control over decisions to move.

In summary, the Victorian Black Saturday bushfires case study highlights the importance of a sense of agency in making decisions about rebuilding and residential location and the many considerations involved, including financial capacity, family circumstances, social ties, and community connections.

Discussion

These two case studies represent several push/pull themes. Both case studies featured psychological distress like risk of anxiety and depression for those who remained or returned to disaster affected areas. Emotional and trauma related responses also impacted decisions to move, stay, or return. Research following the Black Saturday bushfires, in particular, found that people who left experienced emotional turmoil, such as guilt for leaving, while those who stayed felt abandoned by those who moved. Both events demonstrated how belonging and community connection influenced decisions to leave, stay, or return. Both studies also highlighted how contextual and structural elements such as poverty, dwelling type (renting or owning), and housing damage impact actions around residential mobility. Financial issues such as adequate insurance featured in both case studies, which included the cost of rebuilding and whether people had the appetite to endure rebuilding. In particular, being uninsured or underinsured constrained people's decisions to rebuild or leave. Research following the Canterbury earthquakes demonstrated how land zoning and ongoing risks from hazards influenced moving decisions. One key influence on long-term wellbeing, as shown by longitudinal studies after the Black Saturday bushfires, was people's experiences of having agency or control and options. People needed to feel like they had agency or the ability to make decisions on staying or moving. Collectively, these push/pull elements were layered, interwoven, and complex, but all influenced the quality of social relationships and experiences of security.

While the two case studies are situated in different lands and represent different natural hazard events, both demonstrate the complexity of residential mobility and its key role in community flourishment and disaster recovery. Recognising the multi-layered and complex individual, social, cultural, and political elements that propel residential mobility should help inform actions and practices for emergency management and housing stakeholders after a disaster. There is no linear trajectory for people's mobility needs; some might initially relocate and return while others will permanently relocate or change residential location multiple times, moving in and out of the original community (Groen & Polivka, 2010).

Ongoing Research Considerations

According to a review of the literature by Scheele and colleagues (2019), relocation research is limited and often under-conceptualised. Comprehensive data on residential mobility following a natural hazard event can also be challenging due to the lack of specific details about events and ethics or regulations preventing release or access to personal information. More detail is needed about the specificity of residential mobility within studies, including directly exploring the complex processes (push/pull forces) that precipitate relocation actions. Previous studies of post-disaster residential mobility have relied on mobile phone information, postal address changes, and school roll data, but do not necessarily acknowledge the assumptions underlying those data sources. For instance, telecommunication data implies ownership of a mobile device or similar technology, and postal service data assumes a home. Similarly, school attendance to log residential location relies on a family-based household (Scheele et al., 2019).

Moving forward, this exploration of the push/pull of residential mobility shows the imperative to continue to explore the range of elements that intersect with residential mobility actions. This could entail looking beyond decision-making processes to include more in-depth knowledge about the role of physical safety, emotional and cultural attachment to land, and local and national government policy on people's experiences and residential mobility (D. King et al., 2014; Peek et al., 2011). In-depth narrative accounts may assist in shedding light on motivations to stay or relocate, future intentions, and counterfactual information (such as whether people would have relocated regardless of the disaster). Analysis of disaster recovery policies (e.g., property buy-back schemes in high-risk locations) and recovery services (e.g., location of temporary housing) would also provide useful contextual information.

Any narrative accounts should include community-driven research that is culturally appropriate and that centres Indigenous experience to gain insight to support safe mobility for all. This type of research could also encapsulate the longer-term effects of colonisation and

settler mobility regarding post-disaster relocation and the challenges it poses (Williamson et al., 2020). As profoundly acknowledged by Howitt et al. (2012), policies that mandate that Indigenous people move away from their places of connection are unjust. It causes undue strain on relationships that are founded on kinship, togetherness, and access to homelands.

Residential mobility and disaster research structured to include different residential circumstances based on solid study designs rather than opportunistic methods (Hogg et al., 2016) would make it possible to theorise residential mobility and broader housing issues more fully. This could involve exploring the impact of the housing crisis, including renting and overcrowding (Johnson et al., 2018), on people's ability to move or stay following a disaster or drawing on longitudinal designs (retrospective and prospective) to investigate the long-term consequences of the increasing severity and scale of disasters.

To reduce risk exposure and prevent the need for post-disaster residential mobility, environment and lifestyle push/pull elements (e.g., where we build, insurance bail-out culture) also require attention. People assume they will be protected or rescued by insurance, but policy and practices change. For example, current framing of insurance in Aotearoa New Zealand has shifted from total replacement cost to only replacing the sum insured (Dickinson, 2013; A. King et al., 2014) and, as uncovered by Miles (2012), insurance schemes can benefit corporate profits over the needs of people or economic recovery. Therefore, ongoing investigation into the impact of under-insurance or un-insurability on residential mobility (relocation and staying) in areas that are high risk could help people navigate any future disaster events.

Of course, as previously noted, this examination of residential issues occurred prior to the COVID-19 pandemic. In these current pandemic times, residential mobility (Mendolia et al., 2020) is likely reduced due to travel restrictions and/or health risks. It is important to ask how the widespread acceptance of mobile tracking, economic insecurity, technological changes, increased acceptability of remote working arrangements, and changes in the insurance sector due to COVID-19 will act as push/pull elements in residential mobility. Further, COVID-19 and multiple cascading disasters have implications for residential mobility and emergency management. How and why people relocate is complex, context-specific, and matters to disaster preparedness

and recovery policies and practices (Peacock et al., 2018).

In this article, we have explored some of the push/pull elements that contribute to residential mobility, with a specific focus on natural hazard events in Aotearoa New Zealand and Australia. By presenting case studies about post-disaster residential mobility in Aotearoa New Zealand and Australia we demonstrate that relocation is complex, non-linear, and intimately tied to context. Understanding the various push/pull drivers of residential mobility would aid in supporting recovery and resilience for people and communities impacted by disaster.

References

Adams-Hutcheson, G. (2014). *Stories of relocation to the Waikato: Spaces of emotion and affect in the 2010/2011 Canterbury earthquakes, Aotearoa New Zealand* [Doctoral dissertation, University of Canterbury]. https://ir.canterbury.ac.nz/bitstream/handle/10092/8797/thesis_fulltext.pdf?sequence=2

Adams-Hutcheson, G. (2015). Voices from the margins of recovery: Relocated Cantabrians in Waikato. *Kōtuitui: New Zealand Journal of Social Sciences Online, 10*(2), 135-143. https://doi.org/10.1080/1177083X.2015.1068184

Adams-Hutcheson, G. (2017). Embodied vibrations: Disastrous mobilities in relocation from the Christchurch earthquakes, Aotearoa New Zealand. *Transfers, 7*(3), 23-37. https://doi.org/10.3167/TRANS.2017.070304

Adams-Hutcheson, G. (2018). Challenging the masculinist framing of disaster research. *Gender, Place & Culture, 25*(1), 149-153. https://doi.org/10.1080/0966369X.2017.1407297

Becker, J. S., Coomer, M. A., Blake, D., Garden, E., Rampton, A., Newman-Hall, G., Johnston, D. M., & Van der Velde, M. (2018). Impact of the 2016 Kaikōura earthquake on Wellington CBD apartment residents: Results of a survey. *GNS Science Report 2018,* (45), 19 p.

Belcher, J. C., & Bates, F. L. (1983). Aftermath of natural disasters: Coping through residential mobility. *Disasters, 7*(2), 118-127. https://doi.org/10.1111/j.1467-7717.1983.tb00805.x

Beyond Bushfires. (2021). *10 Years Beyond Bushfires. Community, resilience and recovery*. https://mspgh.unimelb.edu.au/centres-institutes/centre-for-health-equity/research-group/beyond-bushfires

Blake, D., Marlowe, J., & Johnston, D. (2017). Get prepared: Discourse for the privileged? *International Journal of Disaster Risk Reduction, 25*, 283-288. https://doi.org/10.1016/j.ijdrr.2017.09.012

Boon, H., Millar, J., Lake, D., Cottrell, A., & King, D. (2012). *Recovery from disaster: Resilience, adaptability and perceptions of climate change effect on perceptions of climate change risk and on adaptive behaviours to prevent, prepare, and respond to future climate contingencies*. National Climate Change Adaptation Research Facility.

Brown, C., Seville, E., & Vargo, J. (2013). *The role of insurance in organisational recovery following the 2010 and 2011 Canterbury earthquakes*. Resilient Organisations. www.resorgs.org.nz

Brown, C., Seville, E., & Vargo, J. (2017). Efficacy of insurance for organisational disaster recovery: Case study of the 2010

and 2011 Canterbury earthquakes. *Disasters, 41*(2), 388-408. https://doi.org/10.1111/disa.12201

Bryant, R. A., Gallagher, H. C., Gibbs, L., Pattison, P., MacDougall, C., Harms, L., Block, K., Baker, E., Sinnott, V., & Ireton, G. (2017). Mental health and social networks after disaster. *American Journal of Psychiatry, 174*(3), 277-285. https://doi.org/10.1176/appi.ajp.2016.15111403

Campbell, E., Blake., D., Aotearoa New Zealand Edition adapted from, Quinn, P., Gibbs L., Blake D., Campbell, E., Johnston, D., & Ireton, G. (2021). *Guide to Disaster Recovery Capitals (ReCap). Aotearoa New Zealand edition.* https://recoverycapitals.org.au

Chamlee-Wright, E., & Storr, V. H. (2011). Social capital as collective narratives and post-disaster community recovery. *Sociological Review, 59*(2), 266-282. https://doi.org/10.1111/j.1467-954X.2011.02008.x

Chang-Richards, Y., Wilkinson, S., Potangaroa, R., & Seville, E. (2013). Resource challenges for housing reconstruction: A longitudinal study of the Australian bushfires. *Disaster Prevention and Management, 22*(2), 172-181. https://doi.org/10.1108/09653561311325316

Cloke, P., & Conradson, D. (2018). Transitional organisations, affective atmospheres and new forms of being-in-common: Post-disaster recovery in Christchurch, New Zealand. *Transactions of the Institute of British Geographers, 43*(3), 360-376. https://doi.org/10.1111/tran.12240

Dickinson, S. (2013). *Post-disaster mobilities: Exploring household relocation after the Canterbury earthquakes.* [Master's thesis, University of Canterbury]. UC Research Repository. https://ir.canterbury.ac.nz/handle/10092/8797

Dickinson, S. (2021). Alternative narrations and imaginations of disaster recovery: A case study of relocatees after the Christchurch, New Zealand, earthquakes. *Social & Cultural Geography, 22*(2), 273-293. https://doi.org/10.1080/14649365.2019.1574883

Elliot, J. R. (2014). Natural hazards and residential mobility: General patterns and racially unequal outcomes in the United States. *Social Forces, 93*(4), 1723-1747. https://doi.org/10.1093/sf/sou120

Gibbs, L., Block, K., Harms, L., MacDougall, C., Baker, E., Ireton, G., Forbes, D., Richardson, J., & Waters, E. (2015). Children and young people's wellbeing post-disaster: Safety and stability are critical. *International Journal of Disaster Risk Reduction, 14*, 195-201. https://doi.org/10.1016/j.ijdrr.2015.06.006

Gibbs, L., Gallagher, H. C., Block, K., Snowdon, E., Bryant, R., Harms, L., Ireton, G., Kellett, C., Sinnott, V., Richardson, J., Lusher, D., Forbes, D., MacDougall, C., & Waters, E. (2016). Post-bushfire relocation decision-making and personal wellbeing: A case study from Victoria, Australia. In A. Awotona (Ed.), *Planning for community-based disaster resilience worldwide: Learning from case studies in six continents* (pp. 333-356). Routledge.

Gibbs, L., Waters, E., Bryant, R. A., Pattison, P., Lusher, D., Harms, L., Richardson, J., MacDougall, C., Block, K., Snowdon, E., Gallagher, H. C., Sinnott, V., Ireton, G., & Forbes, D. (2013). Beyond Bushfires: Community, Resilience and Recovery - A longitudinal mixed method study of the medium to long term impacts of bushfires on mental health and social connectedness. *BMC Public Health, 13*(1), 1036. https://doi.org/10.1186/1471-2458-13-1036

Groen, J. A., & Polivka, A. E. (2010). Going home after Hurricane Katrina: Determinants of return migration and

changes in affected areas. *Demography, 47*(4), 821-844. https://doi.org/10.1007/BF03214587

Hogg, D., Kingham, S., Wilson, T. M., & Ardagh, M. (2016). The effects of relocation and level of affectedness on mood and anxiety symptom treatments after the 2011 Christchurch earthquake. *Social Science & Medicine, 152*, 18-26. https://doi.org/10.1016/j.socscimed.2016.01.025

Howitt, R., Havnen, O., & Veland, S. (2012). Natural and unnatural disasters: Responding with respect for Indigenous rights and knowledges. *Geographical Research, 50*, 47–59. https://doi.org/10.1111/j.1745-5871.2011.00709.x

Hugo, G. (1996). Environmental concerns and international migration. *International Migration Review, 30*, 105–131.

Hunter, L. M. (2005). Migration and environmental hazards. *Population and Environment, 26*(4), 273–302. https://doi.org/10.1007/s11111-005-3343-x

Insurance Council of New Zealand. (2021). *Canterbury earthquakes.* www.icnz.org.nz/natural-disasters/canterbury-earthquakes/

Ireton, G., Ahmed, I., & Charlesworth, E. (2014). Reflections on residential rebuilding after the Victorian Black Saturday bushfires. *Open House International, 39*(3), 70-76. https://doi.org/10.1108/OHI-03-2014-B0008

Johnson, A., Howden-Chapman, P., & Eaqub, S. (2018). *A stocktake of New Zealand's housing.* www.beehive.govt.nz/sites/default/files/2018-02/A%20Stocktake%20Of%20New%20Zealand%27s%20Housing.pdf

King, D., Bird, D., Haynes, K., Boon, H., Cottrell, A., Millar, J., Okada, T., Box, P., Keogh, D., & Thomas, M. (2014). Voluntary relocation as an adaptation strategy to extreme weather events. *International Journal of Disaster Risk Reduction, 8*, 83-90. https://doi.org/10.1016/j.ijdrr.2014.02.006

King, A., Middleton, D., Brown, C., Johnston, D., & Johal, S. (2014). Insurance: Its role in recovery from the 2010–2011 Canterbury earthquake sequence. *Earthquake Spectra, 30*(1), 475-491. https://doi.org/10.1193/022813eqs058m

Lambert, S. (2014). Indigenous peoples and urban disaster: Māori responses to the 2010-12 Christchurch earthquakes. *Australasian Journal of Disaster and Trauma Studies, 18*(1), 39-48. http://trauma.massey.ac.nz/issues/2014-1/AJDTS_18-1_Lambert.pdf

Lambert, S. (2015). Indigenous communities and disaster research: Maori and the Christchurch earthquakes of 2010-2011. *Third Sector Review, 21*(2), 31.

Lambert, S., Shadbolt, M., Ataria, J. M., & Black, A. (2012). *Indigenous resilience through urban disaster: The Maori response to the 2010 and 2011 Christchurch Ōtautahi earthquakes.* https://researcharchive.lincoln.ac.nz/handle/10182/5351

Lee, E. S. (1966). A theory of migration. *Demography, 3*(1), 47-57. https://doi.org/10.2307/2060063

Marlowe, J. (2013). Resettled refugee community perspectives to the Canterbury earthquakes: Implications for organizational response. *Disaster Prevention and Management, 22*(5), 434-444. https://doi.org/10.1108/DPM-01-2013-0019

Marlowe, J. (2015). Belonging and disaster recovery: Refugee-background communities and the Canterbury earthquakes. *British Journal of Social Work, 45*(suppl. 1), i188-i204. https://doi.org/10.1093/bjsw/bcv090

Marlowe, J. (2018). *Belonging and transnational refugee settlement: Unsettling the everyday and the extraordinary.* Routledge.

Mendolia, S., Stavrunova, O., & Yerokhin, O. (2020). *Determinants of the community mobility during the COVID-19 epidemic: The role of government regulations and information* [IZA DP No. 13778]. Institute of Labor Economics. http://ftp.iza.org/dp13778.pdf

Merkin, R. (2012). The Christchurch earthquakes insurance and reinsurance issues. *Canterbury Law Review, 18*, 119-128.

Miles, S. (2012). *The Christchurch fiasco and the insurance aftershock*. Dunmore Publishing.

Ministry of Business Innovation and Employment. (2017). *Responses to the Canterbury Earthquakes Royal Commission Recommendations*. www.mbie.govt.nz/assets/27c53c4193/responses-cerc-recommendations.pdf

Morris, T., Manley, D., & Sabel, C. E. (2018). Residential mobility: Towards progress in mobility health research. *Progress in Human Geography, 42*(1), 112–133. https://doi.org/10.1177/0309132516649454

Murphy, S. (2021). Christchurch city fringe suburbs see huge growth 10 years since earthquake. *Radio New Zealand*. www.rnz.co.nz/news/national/436735/christchurch-city-fringe-suburbs-see-huge-growth-10-years-since-earthquake

Myers, C. A., Slack, T., & Singelmann, J. (2008). Social vulnerability and migration in the wake of disaster: The case of Hurricanes Katrina and Rita. *Population and Environment, 29*(6), 271-291.

Nguyen, C., & Noy, I. (2017). *Insuring earthquakes: How would the Californian and Japanese insurance programs have fared after the 2011 New Zealand earthquake?* [School of Economics and Finance Working Paper 14/2017]. Victoria University of Wellington. https://www.victoria.ac.nz/__data/assets/pdf_file/0009/909468/SEF-WP_14-2017.pdf

Peacock, W. G., Dash, N., Zhang, Y., & Van Zandt, S. (2018). Post-disaster sheltering, temporary housing and permanent housing recovery. In H. Rodríguez, W. Donner, & J. E. Trainor (Eds.), *Handbook of disaster research* (2nd ed., pp. 569-594). Springer.

Peek, L., Morrissey, B., & Marlatt, H. (2011). Disaster hits home: A model of displaced family adjustment after Hurricane Katrina. *Journal of Family Issues, 32*(10), 1371-1396. https://doi.org/10.1177/0192513X11412496

Poontirakula, P., Brown, C., Seville, E., Vargo, J., & Noy, I. (2017). Insurance as a double-edged sword: Quantitative evidence from the 2011 Christchurch Earthquake. *The Geneva Papers, 42*, 609–632. https://doi.org/10.1057/s41288-017-0067-y

Potter, S. H., Becker, J. S., Johnston, D. M., & Rossiter, K. P. (2015). An overview of the impacts of the 2010-2011 Canterbury earthquakes. *International Journal of Disaster Risk Reduction, 14*, 6-14. https://doi.org/http://dx.doi.org/10.1016/j.ijdrr.2015.01.014

Proudley, M. (2013). Place matters. *Australian Journal of Emergency Management, 28*(2), 11-16.

Proudley, M. A. (2018). Language, loss and time: 2009 Black Saturday bushfires in Victoria [Doctoral dissertation, Monash University]. Monash University Theses. https://bridges.monash.edu/articles/thesis/Language_loss_and_time_2009_Black_Saturday_bushfires_in_Victoria/7841528

Pullin, M. (2017). Environmental disruption: Push/pull factors, human migration, and homeland security. *Journal of Political Sciences & Public Affairs, 5*, 264. https://doi.org/10.4172/2332-0761.1000264

Quarantelli, E. (1982). *Sheltering and housing after major community disasters: Case studies and general observations.* Ohio State University Research Foundation. http://udspace.udel.edu/handle/19716/1132

Quinn, P., Gibbs, L., Blake, D., Campbell, E., Johnston, D., Richardson, J., & Coghlan, A. (2021). Recovery capitals: A collaborative approach to post-disaster guidance. *Australian Journal of Emergency Management, 37*(2). http://www.doi.org/10.47389/37.2.52

Scheele, F., & Horspool, N. (2018). Modelling fire following earthquake in Wellington: A review of globally available methodologies. *GNS Science report 2017*(42), 23 p.

Scheele, F., Wilson, T., Lane, E. M., Crowley, K., Hughes, M. W., Davies, T., Horspool, N., Williams, J. H., Le, L., Uma, S. R., Lukovic, B., Schoenfeld, M., & Thompson, J. (2019). Modelling residential habitability and human displacement for tsunami scenarios in Christchurch, New Zealand. *International Journal of Disaster Risk Reduction, 43*, 101403. https://doi.org/10.1016/j.ijdrr.2019.101403

Statistics New Zealand. (2011). *Estimating local populations after the 2010/2011 Canterbury earthquakes*. www.stats.govt.nz/assets/Reports/Canterbury-the-rebuild-by-the-numbers/Canterbury-the-rebuild-by-the-numbers.pdf

Storr, V. H., & Haeffele-Balch, S. (2012). Post-disaster community recovery in heterogeneous, loosely connected communities. *Review of Social Economy, 70*(3), 295-314. https://doi.org/10.1080/00346764.2012.662786

Uscher-Pines, L. (2009). Health effects of relocation following disaster: A systematic review of the literature. *Disasters*, *33*(1), 1-22. https://doi.org/10.1111/j.1467-7717.2008.01059.x

Vallance, S. (2011). Community, resilience and recovery: Building bridges or burning bridges. *Lincoln Planning Review, 3*, 4–8.

Victorian Bushfires Royal Commission. (2009). *The 2009 Victorian Bushfires Royal Commission final report summary* [332 - Session 2006-10]. Government Printer for the State of Victoria. http://royalcommission.vic.gov.au/finaldocuments/summary/PF/VBRC_Summary_PF.pdf

Williamson, B., Markham, F., & Weir, J. (2020). *Aboriginal peoples and the response to the 2019–2020 bushfires* (Working Paper No. 134/2020). https://openresearch-repository.anu.edu.au

Yin, R. K. (2014). *Case study research: Design and methods* (5th ed.). SAGE Publications.