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'The trauma of the cyclone has changed us forever': self-reliance, vulnerability and resilience among older Australians in cyclone-prone areas

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ABSTRACT
The combination of population ageing and climate change is creating a new threat for many Australian coastal hamlets vulnerable to the impact of tropical cyclones. Increasingly, elderly people are facing future tropical cyclones alone, without support from family and friends, relying instead on already stretched government and authority resources, despite Emergency Management Australia's (EMA) policy expectation that all citizens must be self-reliant. This research explored the future self-reliance and disaster resilience of coastal hamlets through the lens of the Social Cognitive Theory by outlining the findings from focus groups, personal interviews and questionnaires involving participants over 65 years of age, residing in townships previously impacted by Cyclone Larry (in 2006) and Cyclone Yasi (in 2011). Participants recalled a lack of social support following the cyclones, a fear of evacuating their homes, as well as the trauma of recovering from such intense destruction. Respondents were also concerned about the physical, cognitive and financial impacts of ageing on their ability to prepare and recover from future cyclones, frightened that experiences from the past might be repeated in the future, contributing to feelings of isolation, frustration and the loss of community, and a rethinking of ageing in the place of their choice. These considerations impact on the dependence EMA has that all citizens will remain self-reliant when faced with a natural hazard and should be considered when making future policy decisions in relation to more isolated coastal townships.

KEY WORDS– ageing population, cyclones, natural disaster, self-reliance, resilience, coastal hamlets.

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Introduction

For many communities, anthropogenic climate change (the warming of the atmosphere and oceans due to a build-up of greenhouse gases caused by human activity) will increase the frequency and severity of natural disasters (Intergovernmental Panel Climate Change (IPCC) 2007). In Australia, for example, the current estimated lifetime exposure to natural disasters is one in six, with these storms, cyclones, floods and bushfires costing Aus $1 billion annually (Geoscience Australia 2015; McFarlane 2005). Planning for and managing the coastal impact of climate change is a critical challenge for Australia, as all major cities are coastal and 80 per cent of Australians live within 50 kilometres of the coast (Hugo 2007). Coastal communities are especially vulnerable to the impacts of climate change, due to a combination of sea-level rise, warmer ocean temperatures, hotter dry seasons, wetter wet seasons, and an increase in storm intensity and flooding predicted to increase the intensity of tropical cyclones.

At the same time, rapid population growth in coastal communities due to coastal migration and increasing urbanisation of vulnerable coastal areas increases the risk of harm to people and properties (Berwick 2007; Knutson *et al.* 2010; Pielke *et al.* 2005). The demographic transformation and growth of coastal areas is a global phenomenon, termed 'amenity migration' in the United States of America (USA) and Europe, and 'sea-change' migration in Australia (Gurran, Hamin and Norman 2008), where increasing numbers of people (especially older people) relocate and resettle in high-amenity coastal areas (Bohnet and Pert 2010). Making a 'sea change' is a popular trend amongst older 'baby boomer' retirees, who are changing the demographic profile of coastal communities whose populations are, and will continue to be, older than that of the national average (Berwick 2007; Drozdzewski 2007). For example, there has been significant lifestyle-driven population growth in the wet tropics and non-metropolitan coastal area of Far North Queensland (FNQ), a key regional Australian tourist area of significant natural heritage bordered by the world heritage-listed Great Barrier Reef and tropical rainforests. Each year, approximately 4,000 people move to FNQ attracted by the pleasant climate, natural landscapes and proximity to the coast; over the next two decades, it is predicted there will be 100,000 new residents and the proportion of older people, aged 65 and over, will double (Queensland Government 2009: 18).

Unfortunately, the combination of population ageing and climate change is creating a new threat for many non-metropolitan Australian coastal communities: the out-migration of younger people seeking education and employment opportunities often means the loss of citizens with local

knowledge and the experience necessary to prepare and recover from a natural hazard, leaving behind both older citizens and inexperienced newcomers (Gurran, Hamin and Norman 2007). This means that when disaster strikes these coastal communities, which climate change suggests will occur at an increasing frequency, the local population is more vulnerable. Critically, as a segment of the population, older adults have been identified as most at risk to the effects of a natural disaster due to physical limitations, diminished cognitive ability and fewer economic resources required to complete post-disaster repairs (Cherry *et al.* 2010; Cutter and Finch 2008; Ngo 2001; Wang and Yarnal 2012).

Compared to younger residents, these factors mean older people are disproportionately negatively affected and at greater risk of harm pre-, post- and during a natural hazard event. This is most tangibly demonstrated by the fact that the majority of deaths in Hurricane Katrina (50%), the 2003 European heat wave (70%) and the 2011 Japan tsunami and earthquake (46%) were older people, aged 70 years or older (Astrom, Forsberg and Rocklov 2011; Brunkard, Namulanda and Ratard 2008; International Federation of Red Cross and Red Crescent Societies 2014; Khazai, Daniell and Wenzel 2011). In explaining older people's vulnerability during disasters, researchers have identified a range of social, health and financial factors that intertwine to increase their susceptibility to mortality and morbidity. Socially, as people age, they are at risk of losing traditional social relationships and experiencing social isolation, with limited community-based support networks (Muramatsu and Akiyama 2011). Physically, Wang and Yarnal (2012) warned that degraded eyesight and/or hearing makes it difficult for an aged person to see or hear media hazard warnings, while Cherry *et al.* (2009) added that declining cognitive capacity may impair the ability to interpret and process hazard warnings. Similarly, Fernandez *et al.* (2002) identified the impact of reduced physical capacity on mobility and dexterity, impairing an older person's ability to walk, evacuate or even use the telephone, as well as highlighting that financially, insurance premiums are unsustainable for many elderly who depend on fixed low incomes, such as pensions. Additionally, although material losses are often comparable across all sectors of an affected community, the relative impact may be greater for an older person who often has limited available financial resources (Ngo 2001; Wang and Yarnal 2012).

The reality of global population ageing means that an increasing number of frail and vulnerable older people (whose health is potentially compromised) are more likely to experience injury, death or illness during a natural disaster (Cutter and Finch 2008). In Australia, half of the population (48%) will be aged 50 years and over by 2051, with 60,000 Australians turning 85 years old each year (Australian Bureau of Statistics

(ABS) 2011*a*; Kelly 2015). Critically, although most of these older adults typically cope well with day-to-day situations, the experience of a natural disaster may push them over their coping threshold (Tuohy and Stephens 2015). To date, however, only a handful of studies have explored older people's hurricane, or cyclone, disaster experience (Hrostowski and Rehner 2012). Research in the USA identified that retiree migration into a high-amenity hurricane-prone coastline had led to an increasing number of older people being at risk. As Cherniak *et al.* (2007) explained, older people tended to misunderstand hurricane watches and warnings, leaving this portion of the population relatively unprepared for the impact, with under-preparation ranging from residing in under-maintained homes, not having evacuation plans in place or not having adequate stockpiles of food or medications in the case of an emergency.

Similarly, only a handful of Australian studies have explored the cyclone disaster experience, with none focused specifically on older people, although Astill and Griggs (2014) did note the high proportion of elderly people in the coastal hamlet of Cardwell when conducting their research investigating the hazard preparatory information-seeking habits of those residing in cyclone-prone areas. Following Cyclone Yasi in 2011, research conducted by Woods *et al.* (2014) warned that vital in-home care services such as Meals-on-Wheels (a service delivering meals to the home), Bluecare (an in-home nursing service) and community health services were seriously disrupted after the cyclone, with flooding, communication loss and even personal damage negatively affecting service provision to vulnerable residents.

Indeed, changes in how older people are cared for as they age means that there are increasing numbers of frailer older people living relatively independently in the community. Rather than moving to residential aged care (termed nursing homes elsewhere), older Australians are choosing to 'age in place' and are remaining in their own homes and local communities for as long as possible, supported by the provision of in-home community-based health and services care (Commonwealth of Australia (CW) 2015; Holloway *et al.* 2015; Kelly 2015; Taylor and Donoghue 2015). This change, driven both by government policy and personal preferences, has reduced the percentage of older people residing in aged-care facilities, from 39 per cent in 1991 to 26 per cent in 2011 (ABS 2009). During a natural disaster, however, this suggests that there may be a growing number of potentially vulnerable older people in the community who may be unknown to emergency services.

As emergency services' ability to assist those in need is invariably stretched, this raises serious issues for emergency management authorities relating to natural hazard preparation and recovery, sheltering in place

and evacuation procedures. This is particularly true as Australian disaster management policy and practice emphasises that all individuals should be equally self-reliant when preparing for, or recovering from, a natural hazard (CW 2011). Surprisingly, the term 'self-reliance' is not defined in the Australian disaster management literature. However, for purposes of this study, self-reliance is defined as relying on one's own abilities, decisions and resources rather than depending on assistance from others. This emphasis on self-reliance has been coined the 'self-help' approach to emergency management, and emerges from the concept that a disaster-resilient community is one in which 'individuals and communities should be self-reliant and prepared to take responsibility for the risks they live with' (CW 2011: 12). This neo-liberalist approach to emergency management shifts responsibility away from the State and places it squarely with the individual, which has been criticised by researchers as an individualistic interpretation of resilience that ultimately 'divest[s] the state of responsibility for risk' (Wild, Wiles and Allen 2013: 148).

In Australia, the National Disaster Strategy (CW 2011) adopted a nationwide resilience-based approach to disaster management, defining a resilient community as one that is self-reliant with strong community social capabilities that successfully adapts to changing social, cultural, environmental and economic conditions, and one which functions well when exposed to internal and external stresses (CW 2011). In the context of emergency management, the literature defines being disaster 'resilient' in respect to human–environment interactions, and as such, 'resilience' refers to the capacity of a community or individual to: absorb the impact of a disturbance; return to the state that existed before the disturbance, as well as advancing to a more capable position through learning and adaption (Cutter *et al.* 2008).

To achieve this the National Disaster Strategy outlined that it is expected that each individual and community should be fully aware of the risks that may affect them or their community and that they must have the capacity to both prepare and be adaptive when faced with a potential threat. The National Disaster Strategy describes a resilient community as one that works together to build the capacity of their community by utilising personal and community strengths, networks and structures, and by volunteering their time to support emergency management volunteer groups; essentially, communities must take full responsibility for the risks they face.

These expectations suppose that each individual is adaptive, resourceful and capable of being responsible for themselves during three consecutive stages of a disaster. This 'disaster cycle' is in effect the pre-, during and post-disaster stages of a natural hazard experience. In the case of cyclones, the pre-disaster phase is the stage in which individuals must prepare their

properties, themselves and their families with the aim of reducing damage from the cyclone, as well as preparing for the possibility of an extended period of time without essential services once the cyclone has passed. The second stage occurs during the cyclone, when individuals take cover with their families, friends and pets, remaining indoors and safe in a sturdy building they feel will sustain the high winds associated with a cyclone. The final stage, or the post-disaster stage, requires the most stamina: it is the period when people must clean up and rebuild, and is often a time of high emotion, stress and physical labour.

However, it is the first stage, the pre-disaster period, which is perhaps the most important of these three stages, for it is at this point that a person's cognitive interpretation of environmental and internal feedback shapes their subsequent behaviours and reactions. Theoretically, the Social Cognitive Theory (SCT) emphasises the importance of a person's perception of their ability (self-efficacy) particularly when confronted with a potentially dangerous environmental event, and how this influences their capacity to both develop and implement a plan to protect themselves and their property (Benight and Harper 2002). The SCT endeavours to explain how individuals access certain behaviours and how those behaviours are influenced by environmental factors. According to Benight and Harper (2002), humans self-regulate to ensure behaviours are directed towards a desired outcome by using cognitive interpretations of internal and environmental feedback and by modifying behaviours in response to environmental demands to achieve a determined goal. The model highlights the importance of self-efficacy, a person's belief in their ability to shape events that impact their lives, as the foundation of human motivation, with Benight and Bandura (2004) explaining that a person is likely to lack incentive if it is felt their actions will not make a difference to the outcome of a difficult situation.

The SCT provides a sound starting point to explore the effect of ageing on the self-efficacy of older citizens residing in cyclone prone remote coastal hamlets, as it focuses on the importance of the individual's perceptions of their ability to cope when facing a potential threat. Studying the hazard perceptions of earthquake victims in New Zealand, McIvor and Paton (2007) recognised the importance of an individual's attitudes of self and situation (self-efficacy), which in turn influenced how preparedness decisions are made. Combined with outcome expectancy (action and situation), these variables assist in explaining how the physical, cognitive and financial effects of ageing can impair a person's decision-making process when faced with the possible impact of a severe cyclone, as it is directly linked to risk perception, which is central to hazard behaviour research. This is evident in recent hurricane literature emphasising the importance

of the SCT, with researchers focusing their attention on understanding an individual's reaction within a personal context, including health, age, socio-economic status, location, access to services and financial position (Elliott and Pais 2006; Horney *et al.* 2012; McCann 2011).

Thus, this paper explores the disaster resilience of older people residing in Australia's FNQ coastal communities and whether these individuals can fulfil Emergency Management Australia's (EMA's) expectation of self-reliance in the future, focusing specifically on the cyclone experience for older people, among both lifelong and new 'sea-change' residents. The FNQ coast was chosen for two reasons. Firstly, the region is vulnerable to the effects of tropical cyclones, identified by the IPCC as a coastal hotspot of particular climate change vulnerability (IPCC 2007). FNQ lies in an active tropical cyclone-prone region, which has experienced 207 known impacts from tropical cyclones since 1858, when record-taking first began (Bureau of Meteorology (BOM) 2014*a*). Nott (2006) described tropical cyclones as low-pressure systems that develop over tropical waters between the latitudes of 3 and 30 degrees, typically occurring between November and April. With a diameter of between 80 and 800 kilometres, tropical cyclones are generally associated with strong winds, heavy rain, extensive flooding and storm surge in coastal areas where a cyclone makes landfall (Anderson-Berry 2003).

Secondly, the region consists of coastal hamlets whose populations are ageing faster than the national average. Coastal hamlets are characterised by smaller, ageing populations situated long distances from larger regional centres or cities, which typically lack adequate health services, public transport and diverse economic bases, and which often display a concentration of socio-economic disadvantage (Gurran, Blakeley and Squires 2007). The social vulnerability typifying these centres has the potential to create community vulnerability in relation to natural disaster resilience, and when combined with a population experiencing the consequences of ageing, there may be lower community capacity to cognitively understand or implement the expected self-help approach to emergency management. Thus, with relatively little known about older adults' cyclone experience in smaller coastal communities, this paper utilises a SCT approach to address this knowledge gap.

Method

As the purpose of this research was to understand the real-life cyclone disaster experience of older residents, an exploratory qualitative phenomenological research approach was chosen (Liamputtong and Ezzy 2005). The

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theoretical framework guiding this study was phenomenology, which emphasises, prioritises and deeply explores the individual's unique real-life experience where the 'participant is the knower and it is the researcher's ability to engage with the participant's reality that enables an honest and trustworthy account of the lived experience' (Paton *et al.* 2004: 178).

Case study communities

Figure 1 illustrates the case study region, Australia's FNQ coast located between Cairns (population of 156,169) and Townsville (population 174,462) (ABS 2011*b*, 2011*c*). The study area encapsulates two Local Government Areas (Cairns Regional Council and Cassowary Coast

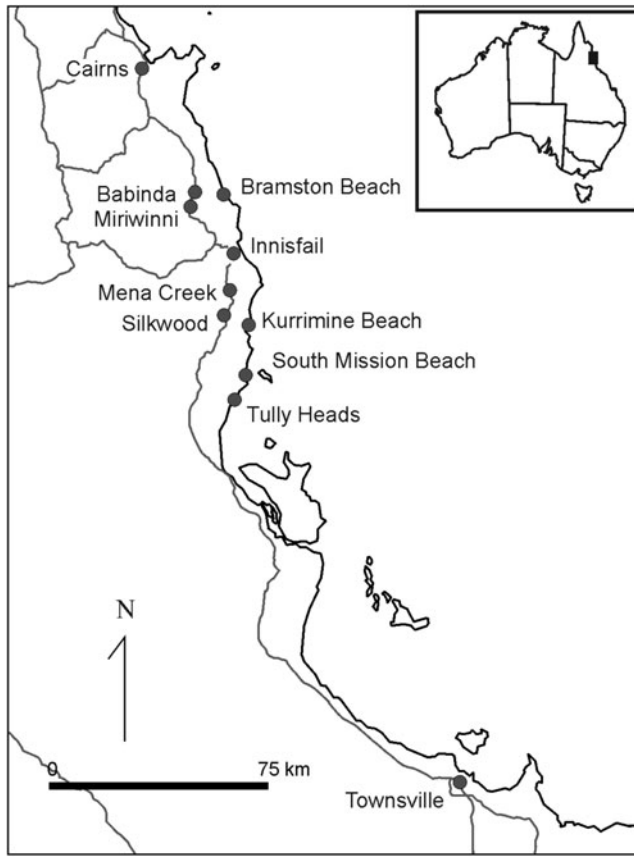

Figure 1. The case study region: Far North Queensland's coast, Australia.

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Regional Council), the smaller main centres of Babinda, Innisfail and Mission Beach, and surrounding rural remote areas of Bramston Beach, Kurrimine Beach, Tully Heads, Mena Creek, Miriwinni and Silkwood. This region was chosen because (a) it is situated in an active tropical cyclone-prone region, with a long history of losses from tropical cyclones and associated storm surges and flooding (Green Cross 2014) and (b) within the next decade, ABS (2011*a*) census data suggest that approximately 30 per cent of their future populations will comprise people over the age of 65 years.

Since 1890, the region has experienced 66 cyclones that have caused 500 deaths and billions of dollars worth of property loss and damage (BOM 2014*a*; Green Cross 2014). In the last decade, FNQ has experienced two major cyclones, Cyclone Larry (Severe Category 4) in 2006 (half a billion dollars of damage; BOM 2014*b*) and Cyclone Yasi (Severe Category 5) in 2011 (almost four billion dollars of damage) (BOM 2014*c*; Kamenev 2011). Despite there being no fatalities, both caused major damage to over 10,000 homes and businesses, vegetation, crops, vital transport links and infrastucture, including the main arterial highway and electricity towers. Both cyclones resulted in an extended period of loss of services and restricted access due to extreme damage to major roads and rail links, with the Army and building contractors, materials, labourers and services being accessed from southern regions, in order to assist the region to recover in a timely fashion (Kamenev 2011).

Participants

As Table 1 illustrates, 36 older, community-dwelling Australians (17 men and 19 women) participated. All were aged 65 years or older, with just over half (56%) over 80 years of age. Approximately half lived either alone (44%) or with a spouse (42%). Almost all (N = 34; 94%) lived in a detached house, with over half reporting that they had lived in the region for over 30 years (58%). A fifth (22%) had lived there less than ten years. Participants reported a range of chronic health conditions, with the most common being arthritis (N = 22), heart disease (N = 12), breathing difficulties (N = 9), diabetes (N = 9), cataracts (N = 8), high blood pressure (N = 8) and depression (N = 7). The majority (N = 27; 75%) reported needing to take medication regularly, and just under half (N = 15; 42%) received assistance to remain living at home, specifically meals, home duties (shopping/mowing/housework), nursing or respite. In terms of access to communication devices, all had a television and radio and most had a landline phone (N = 33), with approximately half owning a mobile phone (N = 22) or having internet access at home (N = 20).

TABLE 1. *Socio-demographic characteristics*

Characteristic	N	%
Gender:		
Female	17	47
Male	19	53
Age (years):		
65–79	16	44
80–94	20	56
Marital status:		
Single/divorced	20	56
Married	16	44
Living situation:		
Lives with spouse	15	42
Lives with relatives	4	11
Lives alone	16	44
Lives in retirement village	1	3
Type of dwelling:		
Detached house	34	94
Duplex	2	6
Tenancy status:		
Own dwelling	27	75
Mortgage	5	14
Rent or lease	2	6
Other	2	6
Length of residency:		
⩽10 years	8	22
11–30 years	4	11
>30 years	21	58
Unsure/unanswered	3	9
Employment status:		
Employed part-time	1	3
Self-funded retiree	1	3
Aged pensioner	32	89
Part aged pension/self funded	2	6
Chronic condition:		
Alzheimer's/dementia	2	6
Arthritis	22	61
Asthma	4	11
Breathing difficulties	9	25
Cancer	3	9
Cataracts	7	19
Depression	7	19
Diabetes	9	25
Glaucoma	9	25
Heart disease	12	33
Hypertension	8	22
Kidney disease	1	3
Osteoporosis	3	9
Requires regular medication	27	75
Requires in-home assistance	15	42
Type of assistance required:		
Meals on Wheels	5	14
Housework/lawns/shopping	11	31
Respite	15	42
Blue Nurses	4	11

TABLE 1. (*Cont.*)

Characteristic	N	%
Communication devices:		
Television	36	100
Radio	36	100
Mobile phone	22	61
Internet	20	56

Note: N = 36.

Procedure

The University Ethics Committee approved the research project, with data collection undertaken from November 2014 to April 2015. Older Australians residing in communities between Babinda and Tully Heads, North Queensland, consented verbally and in writing, engaging in semi-structured interviews and focus groups that allowed participants to reflect on their disaster experience and share their unique opinions and experiences with the researcher. Guided by SCT, the question guide contained a number of open-ended questions asking about their cyclone disaster experience, specifically before, during and after a cyclone or storm surge. Residents were asked about their attitude towards evacuation, perceived need and availability (or not) of informal and formal support, and their views on their ability to remain self-reliant given ageing-related changes in their physical and cognitive ability to prepare and recover from a cyclone.

Older residents were purposely recruited through non-probability snowballing techniques, including presentations about the research at local community meetings (*e.g.* local senior citizens' associations, service clubs (*e.g.* Probus, Lions) and other community groups (*e.g.* the Men's Shed)), hearing the researcher interviewed on local radio and television news programmes or responding to printed advertisements in community health newsletters. A mixed-methods approach was utilised, with all 36 older residents completing a self-administered, paper-based questionnaire (56 questions) and then participating in either an in-depth phone interview (N = 5; 14%) or four focus groups comprising between four and 16 participants (N = 31; 86%) on their cyclone disaster expectations and experiences. Interviews and focus groups, held in community halls, ran for an average of 60 minutes, ranging from 35 to 110 minutes. When a prospective respondent expressed a desire to participate in the research, but could not attend a focus group due to limited mobility or lack of transport, a personal interview was conducted over the telephone. All were digitally recorded and then transcribed verbatim.

Analysis

In order to identify the major issues and topics that emerged from the data, a thematic analysis was conducted. This involved an iterative and inductive process of data immersion and interpretation, with transcripts read and re-read to identify data and common categories, themes and patterns (Liamputtong and Ezzy 2005). Data were manually coded, with key themes and sub-themes highlighted, grouped and labelled in order to understand better the similarities and variations in the cyclone disaster experience for older regional Queenslanders (*see* Table 2). Three key steps were followed in the manual thematic coding process. First, transcripts were closely examined for the participants' explanations of how they viewed and approached cyclone disasters, specifically coping strategies, informal and formal support networks, and their expectations about the future. Second, common and contrasting concepts were identified, highlighted and grouped. In this theme development process, we consciously searched for both common experiences (the dominant or majority voice) and more aberrant experiences (minority voice; Creswell 2008), with both clearly depicted in the Results section. Third, themes were reviewed, categorised and named, with this coding was process repeated until data saturation and no new themes emerged. Critically, the results purposely include multiple excerpts from the raw data to enable readers to understand and evaluate our thematic structures.

Results

The thematic analysis identified the different ways in which older people viewed and approached cyclone disasters, as well as identifying the limitations that stem from residing and ageing in a remote community still recovering from the impact of recent natural disasters. It is important to note that the participants agreed that all residents should be self-reliant, however, they clearly understood the limitations that faced them in regards to ageing in place. Four key themes were drawn from the data and are presented below: the cyclone experience, realising one's limitations, reflecting on the aftermath, and the challenges of being and remaining self-reliant.

Theme 1: The cyclone experience for older regional residents

Despite previous cyclone experience and preparations revealing a well-prepared community, these older residents expressed serious concerns in relation to their future coping capacity. Indicative quotes in Table 2 are

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TABLE 2. *The cyclone experience of older regional residents*

Theme	Indicative quotes
Lack of social support following post-Cyclone Larry/Cyclone Yasi out-migration	• I wouldn't know who to turn to to ask for help, because we have only been here since 2011. We haven't had one [cyclone] in this house yet, but we would have to do it ourselves. We don't have any real friends here. Everyone is retired and keeps to themselves (female, South Mission Beach, 66 years). • Half the population left because there wasn't any work … you can't live without work and survive. Some came back, but most found employment elsewhere and stayed (male, Tully Heads, 70 years).
Fear of evacuating	• I'd rather stay at home to make sure that if something happened I can do something about it to stop other damage from happening. I can't protect my property if I'm not there (female, Babinda, 92 years). • What frightens me is that the police would not let me back – it's scary that you are not allowed to come back (female, Innisfail, 84 years). • So these emergency services are actually telling you to get out and to go to the evacuation centre, yet they were full. We hadn't been notified that they were full. So we just stayed the night in the car and went home (male, Innisfail, 84 years). His wife (81 years): You could have another heart attack.
Fear from past experiences	• The trauma of the cyclone has changed us for ever. When Yasi hit the storm surge ripped the tops off all of the septic tanks. Sanitation was our major concern. Sewerage was everywhere. We had no sewerage, no water, no power and no communication. The residents, and most them were old, had to go into the bush to relieve themselves for two weeks. The water had washed through the houses and taken everything into the trees … freezers and fridges whose contents had spilled out into the bush. There was rotting meat and food everywhere … There was sewerage and slush and people were walking in there to find their belongings – and relieving themselves – for two weeks! People were getting sick with diarrhoea. These old people were ill – they had no way of being able to clean up – but they were there trying to find their belongings. This is how they had to live. Under destroyed houses and tarps, with no sanitation, power, water or communication (male, Tully Heads, 70 years).

grouped into three key categories: lack of social support, fear of evacuating and fear from past experiences. For some, retiring to small coastal communities resulted in social isolation, but many long-term residents, who described how their families and friends had relocated after losing their employment following Cyclone Larry and Cyclone Yasi, now also experienced this phenomenon. Many criticised insurance companies who had opted to use contractors from the state capital Brisbane (approximately 1,600 kilometres away), rather than local businesses, leaving local contractors unable to even submit a quote for repairs. The demise of 95 per cent of the banana industry, although short-lived, also resulted in many people leaving the area to search for work. The loss of younger members of their community means that many elderly people are now ageing in place without the social support they had previously relied upon from family and friends, relying now more frequently on health and community services: 'Without assistance we would have to consider leaving the area' (male, Kurrimine Beach, 72 years).

As part of cyclone preparations, authorities expect all residents to have an evacuation plan in place, but older people explained how making the decision whether to evacuate or not is not straightforward. They feared leaving their homes (their only asset) and wanted to remain to ensure they could deal with damage at the time of the storm, to try to reduce further damage if at all possible. Many feared not being allowed to return to their homes and recalled negative experience of past forced evacuations, where they had made the journey to a centre, only to be turned away as they were full, resulting in high levels of stress and confusion, as roads were blocked making it impossible for them to return to their home safely. Without any options available to them, one elderly couple recalled how they then had to ride out the cyclone in their car. Traumatic past experiences resulted in many having high levels of anxiety in relation to cyclones, fearing the potential of immense damage and long-term impact to their homes and communities. The experiences of previous events meant they had a heightened sense of hazard awareness, understanding that the events of the past could be easily repeated. In this respect, participants were still concerned about inaction from authorities, such as the local council, and were most concerned that the residents in these communities (like them) were mostly elderly.

Theme 2: Realising one's limitations

Cyclone preparation and recovery is a difficult process for all affected residents, regardless of age, but these older residents were most concerned about changes in their physical strength and stamina, their dependence

on others for assistance, as well as their own personal limitations, impeding their ability to prepare for and cope with a cyclone. Indicative quotes (in Table 3) are categorised into physical, social and personal limitations.

Older residents, particularly older men, were acutely aware of their increasing physical limitations, particularly their declining stamina, explaining how they were no longer steady up a ladder or able to sandbag their

TABLE 3. *Realising one's limitations*

Theme	Indicative quotes
Physical limitations	• As you get older your stamina really decreases. I find after lugging sandbags I'm absolutely knackered. Even cutting up logs with a chain-saw – there is a lot of energy needed. I am just not steady enough anymore (male, Innisfail, 79 years). • In rural communities you have to look after yourself. Living up here you have to be self-reliant – and it is hard to admit that you need a hand. I get very angry and ashamed of myself that I can't protect my wife and home like I used to. I can't climb on the roof anymore, in fact I can't really manage anything that is very physical. It is hard to deal with. I am ashamed of myself (male, Mena Creek, 84 years). • We can't check the house anymore. We can only clean up around it. I know that in five years we will have to think about leaving. My husband can't climb on the roof anymore, so no one checks the roof or cleans the gutters out because we can't. I can't lift anything very heavy, so he has to do all the lifting. I can't ask the kids because they are in Townsville, doing their own stuff (female, 66 years, South Mission Beach).
Social support limitations	• Everyone is doing the same thing to their own place. You can't ask them to help (female, Babinda, 92 years). • I will be OK while [my husband] is alive, but I don't know how I will be when something happens to him (female, Innisfail, 81 years). • I'm still angry. Not at the loss, but at how much we all had to suffer and the lack of support. I'm angry still because I really don't think things would be any better if it happened again (male, Innisfail, 75 years).
Personal limitations	• No-one can be truly prepared for a cyclone – old or not. But being older makes it harder. There won't be a next time. Never again … watching the stress and fear on my wife's face was too much … there is nothing you can do … we got no assistance from the authorities … the SES [State Emergency Service(s)] was too busy and the council was unprepared … we had to rely on the kindness of strangers to survive … never again. We have to leave (male, Tully Heads, 70 years). • Well it's not so much before – it's after. I don't cope well emotionally when we don't have electricity, and water, and when the place is a mess. It upsets me (male, Mena Creek, 84 years). • They assume everyone has a computer and in an older community they don't – or maybe they do but aren't on the Net or they don't know how to use it (female, Innisfail, 65 years). • My wife wants to know why we live here – she said she won't go through it again, she's out of here (male, Innisfail, 78 years).

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property efficiently; one elderly man admitted that he was ashamed that he could no longer protect his wife or property. Females were particularly aware of their social support limitations, fearing that the loss of a partner could mean the loss of their independence and ability to cope during a disaster. For older women, the impact of ageing was not about their own physical abilities to prepare for the cyclone, but their limited social support and reliance on their husband, with some explaining that family and neighbours were all busy doing their own preparations leaving no one free to assist them.

Finally, there were significant individual limitations, from limited ability to access and use a computer/internet to access information on the cyclone (many explained that they simply cannot work a computer and felt that the councils' increasing reliance on that for communication was discrimination), to the emotional and psychological toll of the disaster. Approximately a fifth (seven) described how both the experience of the cyclone, and coping with the aftermath, were experiences that decided they could not go through again; thus, next time, their plan was to leave the area early and return after repairs had been completed.

Theme 3: Reflecting on the aftermath

Older residents described how cyclone recovery in smaller coastal communities (Tully Heads, Kurrimine Beach, Bramston Beach, Mena Creek, Miriwinni and Silkwood) was particularly hampered due to limited access, delaying the provision of emergency services, power and telecommunication, food and water, as well as medical and health services. These constraints created feelings of isolation, with some criticising safety regulations and a lack of action in regard to the long-term economic effect a severe cyclone can have on the local economies of coastal hamlets. The indicative quotes in Table 4 illustrate this, categorised into isolation, bureaucratic limitations and long-term economic impact.

While rationally older residents understood that emergency relief delays were the results of the difficulty associated with clearing large quantities of vegetation and debris from single-lane transport routes (which frequently experience restricted access after a cyclone due to flooding and fallen trees), there remained a strong sense that policy makers were unprepared. Residents described how their small communities had lost their emergency power supply and had no communication at all to the outside world, relying on the kindness of strangers, not the authorities, even after the roads were cleared. There was also criticism of bureaucratic regulations that appeared to those most affected to hinder the recovery process rather than help it, with authorities refusing to allow residents to volunteer and participate in the clean up because they did not hold a chain-saw permit. Finally, the

TABLE 4. *Reflecting on the aftermath*

Theme	Indicative quotes
Feelings of isolation and relying on the kindness of strangers	• No one knew how badly we had been hit. We got absolutely no assistance from authorities. The SES [State Emergency Service(s)] was too busy, and the Council was totally unprepared. If it hadn't been for the kindness of strangers we would have received no help and there are people here that are too old and too ill to be able to do what was expected of them. There were two young girls who came down from the Tablelands everyday and cooked us all food on the back of their ute. They knocked on doors to make sure everyone had eaten. Then there were the two young fellas who came in with a chain-saw and asked if I needed a hand to get the trees off my roof. They were great. I still to this day do not know who they were (male, Tully Heads, 70 years).
Bureaucratic restrictions	• After [Cyclone] Larry I cleaned up my place and went out to help up the street and the SES asked me if I had a chain-saw licence! What are you talking about! Bullshit! I have spent 35 years of my working life in the timber industry and I have never had to have a chain-saw licence! (male, Innisfail, 76 years).
Long-term economic impact	• There has been a big difference in business. I was in business. I was a carpenter for 48 years. After Cyclone Larry business peaked for two to three months and then stagnated, then we got (Cyclone) Yasi and it continued to stagnate. Not only my trade – but all businesses, especially the building trade. It peaked and then fell and it is still at the same level. Financially the town was badly affected (male, Innisfail, 74 years). • Half the population left because there wasn't any work. We rely on the banana industry and that was flattened. Even though [the bananas] recovered about a year later, there was no one left because they had moved on. You can't live without work and survive. There are so many vacant shops in Tully. Some came back, but most found employment elsewhere and happily stayed there (male, Tully Heads, 70 years).

long-term economic impact on the region was also a matter of deep concern for Innisfail residents, in particular, with the impact and flow-on effect of two major cyclones.

Theme 4: Challenges of being/remaining self-reliant

EMA's expectation that all citizens must be self-reliant was not something these residents disputed; in fact, overwhelmingly all agreed that people

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had to be responsible for themselves and their own properties. However, as the quotes in Table 5 illustrate, remaining self-reliant was difficult given the physical effects of ageing, their increased dependence on authorities to assist with recovery, problems facing smaller communities in relation to the loss of services, their limited financial ability and coming to terms with reconsidering their choice of location in which to age in place.

Most stated that preparation of the family home was something they mostly did on their own, but the effects of ageing now prevented them from preparing as they once did. The magnitude of the clean-up and recovery stage of a cyclone was the area of significant concern. Assistance of neighbours, family, friends and, where possible, the Army, State Emergency Service and contractors were all listed as vital if they were to have any chance of returning their lives back to some semblance of normality. Others raised the need for physical assistance to take the rubbish away, or to at least move the debris to the footpath, where the council will collect and remove it. This was a reoccurring issue, with many disappointed that the council no longer had a pre-cyclone clean up, allowing each resident to clear their property of anything that might be a problem should a cyclone occur. These concerns were exacerbated by the fact that all had limited finances and were dependent on their pensions, thus limiting their ability to pay contractors to remove rubbish, stockpile food or afford insurance. Lastly, for those who were facing the reality of no longer being able to be self-reliant, the realisation of having to leave the place they intended to remain in forever was an emotional admission. Approximately a fifth admitted that they knew decisions would need to be made in the near future regarding their ability to remain residing on their own, particularly during cyclone season; the reality was that the threat of future cyclones was playing a major role in their future decision to potentially leave the area permanently.

Discussion

This study sought to explore the cyclone experience of older residents residing in smaller coastal hamlets located on the FNQ coastline, focusing on understanding the impact an ageing population will have on the future resilience of these cyclone-prone communities. All participants were residing independently; choosing to age in place in their own homes, in the community of their choice, which past research affirms provides older people with a sense of connection, familiarity and security (Wiles *et al.* 2011). These older residents were concerned with their reduced ability to recover from future intense cyclones if the future meant facing these events without sufficient

TABLE 5. *Challenges of being or remaining self-reliant*

Theme	Indicative quotes
The physical affect of ageing	• I can't climb on the roof anymore (male, Kurrimine Beach, 72 years). • I can't manage anything that is very physical anymore (male, Mena Creek, 84 years).
Dependence on assistance from authorities	• The thing that worries me the most is that if the Army are not available because they have the machinery and the manpower to remove debris and trees. No community can function if these things are lying around. We wouldn't have the capacity to do this in any realistic time-frame (male, Innisfail, 70 years). • I don't know how I will cope if Meals on Wheels and the Blue Nurses can't get to me. I just have to hope that doesn't happen (female, South Mission Beach, 66 years).
Restrictive nature of regulations	• We can't get the stuff on to the footpath. My daughter had a broken foot and the council workers just sat there and watched her try to drag the stuff out. They wouldn't help her (female, South Mission Beach, 66 years).
Loss of vital services	• I had to drag all [the trees] out. We used to get a [pre-cyclone] clean-up, but not any more. That helped because it meant we could clean up the yard and someone would take it away. Now, if you don't know anyone with a ute or a trailer, you can't get rid of the rubbish. Besides it costs you to dump your stuff too, so it is too expensive (female, Babinda, 92 years).
Limited financial ability	• We are pensioners – we can't afford to even go out once a month. We have to be very careful with our money. Insurance is so expensive but we do without to pay for that, and if something happens, then we just have to hope insurance will pay to get it fixed. It's all we can do (female, South Mission Beach, 66 years). • They tell us to buy a heap of tinned food just in case, but I haven't got the spare money to do that. It's hard enough trying to manage on the pension on a week-to-week basis (female, South Mission Beach, 66 years).
Reconsidering ageing in place of their choice	• Without assistance we would have to consider leaving the area. Our home took 30 years of planning. We have our dream home – our retirement dream. We love it. But we can't go through that again (male, Kurrimine Beach, 72 years). • The community is one reason why we have stayed. The environment is the other reason. It is beautiful here (*respondent suddenly stopped as he was too emotional to continue*). The environment means a lot to us … but there comes a time when we will have to leave … my wife wants to go Mareeba [retirement village] because it's closer to medical facilities in Cairns, but it's not near family. My daughter has a unit in Cairns, we might end up there, but that would be like getting into a coffin. I don't want to think about it (male, Mena Creek, 84 years).

levels of physical, psychological, financial and medical support. These findings, of course, must be examined within the limitations of this research: these older residents volunteered to participate because they wanted to discuss their cyclone experience and thus may have been more concerned about their future ability to remain in their homes living independently. Data were collected only in townships that had experienced the effects of two severe cyclones and at the beginning of the 2014–15 cyclone season, when the FNQ coastline was under cyclone watch, creating a heightened sense of awareness.

In terms of theoretical implications, examining the outcomes of this study through the lens of the SCT, it is clear that self-efficacy was a critical component enabling people to fulfil EMA's expectation of self-reliance. These older FNQ residents were fully aware of the implications the effects of ageing had on their individual cyclone resilience, with many stating that they were facing issues that previously had not been major considerations (*e.g.* reduced stamina and physical endurance, limited financial capacity, increasing dependence on medical and community support, reduced support from family and friends). In fact, no participant made any positive ageing comments. However, critically, despite the participants' high levels of hazard awareness and past cyclone experiences, particularly following their recent challenges faced during Cyclone Larry (in 2006) and Cyclone Yasi (in 2011), these findings suggest that ageing, combined with the widespread devastation of their local communities from previous cyclones, had negatively impacted the participants' levels of self-efficacy.

The concerns these participants had regarding their limited physical ability, coupled with a reluctance to ask for assistance, resulted in many admitting that they could no longer ensure even the general maintenance and pre-cyclone checks on their properties could be carried out, an area easily addressed previously. Similarly, this phenomenon also affected how effectively they were able to undertake repairs once the storm had passed, exacerbated by their reliance on others to inspect and repair damage, which many stated resulted in expensive, unaffordable repair bills, which they felt they could not endure again if the region was affected in the future.

Overwhelmingly respondents felt that they did not possess the resources required to remain self-reliant in sufficient quantity, admitting their dependence on the services of authorities, particularly the Army, to assist with recovery post-event, as well as government-funded disaster relief, a situation Burby (2006) and Paton (2003) both warned could lead to a reduction in the incentive to be prepared adequately for a natural hazard event. These findings illustrate a shift in a person's level of perceived responsibility over time, from believing it is an individual's responsibility to prepare adequately and recover from a cyclone when that person is

younger and physically, mentally and financially fit, to one of dependence on authorities when a person suffers the effects of ageing. The practical implications here are that as coastal hamlet populations age, these communities could become more reliant on authorities to implement plans to protect them against the effects of future cyclones, leading to a reduction in the adaptive capacity of both older citizens and the communities in which they reside, which could jeopardise the effectiveness of EMA's disaster strategy (CW 2011).

Policy implications

Most participants were long-term residents of FNQ, and were therefore experienced with coping and recovering from intense cyclones. However, the long-term effects of both Cyclone Larry and Cyclone Yasi on their communities, coupled with their deteriorating health and physical stamina, resulted in many older residents doubting their ability to remain self-reliant. These claims have serious implications for EMA whose policies emphasise the importance of all individuals and communities remaining self-reliant (CW 2011). This research highlights the National Disaster Strategy's limitations associated with viewing self-reliance solely as utilising individual and community strengths, without acknowledging the need to recognise the reliance smaller communities, in particular, have on institutional resources. Although respondents were adamant that they wanted to remain independent, they admitted that to do so required a commitment from all levels of government that adequate resources are made available, including social support (physical help) and institutional resources, such as adequate transport, financial assistance, in-home medical and community support, adequate shelter, long-term psychological help and easy reliable access to information. Respondents claimed that these commitments were particularly necessary now that there were a greater proportion of older people in their communities. This concern was also highlighted in the literature by Cutter and Finch (2008), who stated that the higher the proportion of older people in the community, the more vulnerable that community is, and the longer it will take to recover fully from the impact of a natural disaster.

Of greatest concern to the respondents was the physical stamina required with the pre- and post-disaster stages of the disaster cycle, with many claiming that the resource that had the highest priority was the need for physical assistance to prepare adequately for, and clean up after, an event. They desired assurance that the Army would be made available (as it had been following Cyclone Larry) to assist with rebuilding infrastructure, clearing major roads and restoring essential services. However, memories of

Cyclone Yasi vividly recalled the Army being taken from the FNQ area and reassigned to assist in the Brisbane area (located some 1,500 kilometres away), which had experienced the second-highest recorded flood in the past 100 years affecting 29,000 homes and businesses and 2,500,000 people (Brisbane City Council 2011; Queensland Floods Commission of Inquiry 2012). This reassignment left the residents of FNQ feeling deserted and devastated. Older residents also stated that without adequate transport it was impossible for them to reach a cyclone shelter, or to return home, and that authorities also had to ensure that buildings chosen as cyclone shelters have the capacity to accept local residents, rather than turning them away without an alternative solution. This erosion of trust in authorities was also identified by Paton (2003) as a vital factor that could negatively impact on the link between intention and the act of preparing for a natural hazard.

There was also a concern that future governments might restrict the availability of disaster relief funding, which they felt would impact severely on their ability to recover due to their already limited financial capacity. As most were pensioners, these concerns were exacerbated by soaring home insurance costs for FNQ residents, as well as their inability to stockpile food, as recommended by EMA, due to the financial constraints of their pensions. The fear for many was that any disruption to vital in-home services would mean they would have to leave their homes and their communities permanently, losing not only all that was familiar, but also their social network and community ties. These findings are consistent with research by Davis and Bartlett (2008), who added that statistics that show lower medical visitation rates amongst older people in remote areas are attributed to stoicism and independence, rather than reflecting the lack of medical services in these communities. This, coupled with poor access to transport and financial constraints preventing older people from travelling long distances for medical attention, often resulted in difficult decisions as to the viability of ageing in the place of one's choice.

Finally, this study has policy implications in regards to the long-term economic support of regional towns reliant on primary industries following a natural disaster. The out-migration of those left unemployed following the destruction of the banana crop (a vital primary industry in the region) in 2006, and again in 2011, as well as the decisions made by the insurance industry to use southern contractors to rebuild and repair after Cyclone Larry in 2006, had the flow-on effect that saw businesses that supported the agricultural and building industries close their doors, leaving townships, such as Innisfail and Tully, with an economic down-turn, with effects which are still being felt today. Yet these outcomes have occurred in the past, with the *World Disaster Report* identifying that typically recovery

efforts that focus on rebuilding assets usually result in financial incentives allocated to large companies located outside the affected region, and that this results in a down-turn in local economies as money is redirected elsewhere (Rietveld, Simms and Sparrow 2001). This study supports these conclusions and those of Handmer and Millman (2004) who warned of the importance of protecting economic flows in regional centres reliant on primary industries, especially when the recovery (of fruit trees, for example) could take several years.

This study also supports recent research by Davis and Bartlett (2008), who found that the loss of social capital and expertise from smaller regional centres often resulted in older and otherwise socially disadvantaged people remaining behind because of a lack of resources. Their findings found that these people have little choice but to remain to face the challenges of distance, isolation, inadequate services and transport, and financial hardship, impacting on not only their wellbeing, but also their independence. This research agrees with those findings and recommends that policy makers consider strategies to ensure regional areas remain economically resilient by encouraging residents to return following a natural disaster by providing incentives to assist residents to reinstate their businesses and/or find adequate employment. Such a policy could assist in ensuring the older members of remote communities continue to receive much needed assistance and support from family and friends, rather than having an increased dependence on in-home community care.

Further research is required to understand better the issue of choosing to age in place in remote coastal locations vulnerable to cyclones, along with the impact the ageing population of remote coastal communities will have on current emergency management strategies. If coastal hamlets are to remain viable, much needs to be done to ensure that these centres are economically resilient, especially following a natural disaster. The economic downturn following two severe tropical cyclones has resulted in many older citizens in FNQ facing a future without the support of family or friends, relying instead on government services. The out-migration of those no longer able to find employment has resulted in a reduction of services, leaving the older members of these coastal hamlets to deal with the consequences, paradoxically at a time in their lives when many require specialist care. Most importantly, future research must address the consequences of the reduced ability of some older people to be self-reliant and the impact this could have on the resilience of these communities, particularly in light of the predicted increases in intensities and frequencies of future cyclones in the region.

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