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# **Future challenges for older adults residing in ageing coastal hamlets on Queensland's cyclone-prone coastline**

Thesis submitted by

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James Cook University

20 December, 2016

for the degree of  
Doctor of Philosophy  
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James Cook University  
Australia

## Acknowledgements

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## Statement of Original Authorship

I declare that this dissertation is my own work and has not been submitted in any form for another degree or diploma at any university or institution of tertiary education.

Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

20 December 2016

Signature

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Date

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## Statement on the Contribution of Others

<b>Nature of Assistance</b>	<b>Contribution</b>	<b>Names, Titles and Affiliations of Co-Contributors</b>
Intellectual support	Editorial assistance	Katharine J Fowler
	Data Analysis	Associate Professor Evonne Miller
Financial support	Stipend	Australian Postgraduate Award

## Statement of Contribution of Co-authors for Thesis to Published Paper in Chapter 7

The authors listed below have certified that:

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2. They take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
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Sandra Astill	Chief investigator, significant contribution to the planning of the study, data collection and analysis, literature review and writing manuscript
Associate Professor Evonne Miller	Assisted with the data analysis, preparation and evaluation of the manuscript (as adjunct supervisor).

Principal Supervisor Confirmation

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Associate Professor Evonne Miller	Assisted with the data analysis, preparation and evaluation of the manuscript (as adjunct supervisor).

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## Abstract

The contemporary political shift towards self-reliant natural hazard disaster management assumes all citizens possess the resources necessary to mitigate the risks they face (Council of Australian Governments (COAG) 2011). Despite the expanding body of literature identifying the potential vulnerability of older adults during a natural hazard, few authors have questioned the neo-liberalist shift in natural hazard disaster management in relation to the impact of these policies on older adults. Moreover, there is limited knowledge in regard to how ageing coastal hamlets will prepare and recover from the impacts of climate-induced natural hazards in the future, particularly in the face of climate change predictions. This dissertation addresses this knowledge gap from the perspectives of 36 older adults aged 65 years or more, ten emergency services officers, seven *in situ* community health care providers and four local government disaster managers located in townships impacted by both Cyclone Larry (2006) and Cyclone Yasi (2011) in Far North Queensland, Australia. This research presents an insight into the issues facing both older adults, and those who are charged with caring for them on a day-to-day basis and during times of an emergency, by providing an in-depth understanding of the lived cyclone experience of older adults residing in more remote communities impacted by successive cyclones. As such, this dissertation focuses on the self-reliance expectations of national policies and of local government disaster managers, highlighting a contradiction between what is expected and what is achievable.

Past post-disaster policies and decisions have negatively impacted the region's fragile economy, resulting in an out-migration by those seeking employment and a consequential reduction in population statistics-reliant health and community services. Those who remained, many of whom were older adults, did so because of their lack of capacity to migrate, creating an over-representation of social disadvantage, raising questions as to the future adaptive capacity and resilience of these ageing, exposed remote communities. Consequentially, increasing numbers of older adults are facing future tropical cyclones alone, without support from family and friends, relying instead on already stretched government resources, despite policy expectations that all citizens must be self-reliant.

Conceptually, this dissertation explored the future adaptive capacities and disaster resilience of ageing coastal hamlets through the lens of Paton's (2003) Social Cognitive Theory, focusing on the influence of individual and collective efficacies on future self-reliance capabilities. By using Paton's (2003) model, the factors that motivate a person to prepare for the impact of a natural hazard, could be identified, thus outlining a simple, clear link between motivation and intention. Paton's (2003) model provided an understanding of the impacts of past political decisions on a community's normative beliefs and the consequential influence normative beliefs have on an individual's outcome expectancy, by focusing on the important role played by self-efficacy in relation to outcome expectancy.

Using a mixed-methods approach, with a focus on phenomenological qualitative analysis, this dissertation utilised a self-administered questionnaire, focus groups and face-to-face interviews to examine the cyclone experience of independent-living older adults residing in vulnerable coastal Far North Queensland locations. Results revealed that in order for independent-living older adults in remote communities to remain self-reliant, natural hazard management authorities need to develop policies that consider the needs, preferences and capacities of these people. In order to do so it is acknowledged that older people's voices need to be heard by engaging them in policy development. Disaster policy must recognise that self-reliance is not simply the ability to utilise individual and community strengths, it must also acknowledge the increasing dependence more fragile communities have on the provision of institutional resources. The findings of this research have significant implications for disaster policy in the future, particularly in light of climate change and population ageing predictions. This dissertation makes an important contribution to the field of emergency management and gerontological disaster research.

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## List of Abbreviations

<b>CCRC</b>	Cassowary Coast Regional Council
<b>CHC</b>	<i>In situ</i> community health care providers
<b>CRC</b>	Cairns Regional Council
<b>DM</b>	Local government disaster managers
<b>EMA</b>	Emergency Management Australia
<b>ESO</b>	Emergency Services Officers
<b>FNQ</b>	Far North Queensland
<b>HREC</b>	Human Research Ethics Committee
<b>NDOA</b>	National Disaster Response Strategy
<b>OA</b>	Older adult participants

## Definitions

<b>Older adult</b>	Person 65 years of age or older.
<b><i>In situ</i> health and community care</b>	Home-based support from nurses, social workers and community workers providing basic medical treatments and medication allocations, social support, house-work, cooking, shopping and house and yard maintenance. Recipients must pay for this service, with the help from government subsidies.
<b>Remote</b>	For the purposes of this dissertation the Accessibility/Remoteness Index of Australia (ARIA) was used to determine the ‘remoteness’ of the Study sites. ARIA measures remoteness in terms of access along the road network from populated localities to each of five categories of Service Centre. Localities that are more remote have less access to Service Centres; those that are less remote have greater access to Service Centres (University of Adelaide, 2015). Using this index, the study sites for this dissertation are regarded as remote.

## Key Words

Ageing populations, cyclones, natural hazard, self-reliance, resilience, coastal hamlets, disaster management.

## Conference Presentations

Australian Institute of Geographers (July 2014, Melbourne)

Awarded Outstanding Presentation Award

*“In harm's way: Investigating the information seeking habits and determining its influence on future intentions to prepare for cyclones in coastal Far North Queensland communities”*

Australian Institute of Geographers (April 2015, Canberra)

*“Self-reliant or disaster-prone: Can ageing North Queensland Communities cope with future intense cyclones?”*

## Publications

### Paper One:

*“The trauma of the cyclone has changed us forever”: Self-reliance, vulnerability and resilience amongst older Australians in cyclone-prone areas.”* (Submitted 6 April 2016 to *Ageing and Society*. Accepted for publication 8 September 2016)

### Paper Two:

*“We expect older adults to be able to prepare and recover from a cyclone as well as younger members of the community.” Emergency management’s expectations of older adults residing in ageing, remote coastal hamlets on Australia’s cyclone-prone coastline.”* (Revise and resubmit: Resubmitted 12 June 2016 to *Disaster Medicine and Public Health Preparedness*)

### Paper Three:

*Ageing in remote and cyclone-prone communities: geography, policy and disaster relief.”* (Revise and resubmit: Resubmitted 19 October 2016 to *Geographical Research*. Accepted for publication 9 November 2016)

# Chapter 1 Introduction

## 1.0 Background to the Research

The increase in sea surface temperatures (SSTs) in tropical regions attributed to anthropogenic climate change has raised concerns regarding future cyclone frequencies and intensities (Bouwer 2012; Knutson *et al.* 2010). Predictions are that globally, tropical cyclones will become more intense, translating to significant increases in the potential for damage, and even death, due mainly to the modern trend of coastal migration and urbanisation of vulnerable coastal areas (Mendelsohn *et al.* 2011; Pielke *et al.* 2005). Increasing coastal populations and the placement of valuable infrastructure in coastal locations prone to tropical cyclones have led to an increase in economic losses and disruption following the impact of a tropical cyclone, particularly in more developed countries (Knutson *et al.* 2010). The Intergovernmental Panel for Climate Change (IPCC 2007) has warned that the primary factors that govern the pattern and magnitude of future economic and social losses depends on how societies prepare for climate change induced changes to weather patterns, rather than on the expected changes in the physical characteristics of the events themselves (Pielke *et al.* 2005). It is, therefore, important to consider changes in future potential impacts, principally, changes in exposed populations and assets, and their associated vulnerabilities.

Lifestyle driven migration from metropolitan to non-metropolitan and peri-metropolitan coastal areas has been commonly referred to in Australia as ‘sea-change’ (Gurran *et al.* 2008). This major demographic trend is not, however, restricted to Australia, with a similar phenomenon also occurring in North America and Western Europe, where it is also known as ‘amenity migration’, ‘sun belt migration’ and ‘retiree migration’ (Gurran 2008). Regardless of the term, ‘sea-change’ migration is a major lifestyle shift, transforming some coastal areas globally (Gurran 2008). Western European countries, such as France, Italy, Greece, Spain and Turkey, are well-documented favoured destinations for those trying to escape the cold, damp climate of the United Kingdom (Bahar *et al.* 2009). In the United States of America (USA), Florida’s warm sunny weather, high amenity and attractive state income tax laws have long attracted both seasonal and long-term retired North Americans to resettle along its coastline (Sharma 2012; Sheng *et al.* 2014). Currently ranked as the USA’s state with the highest

proportion of people over the age of 65 years, predictions are that by 2030 Florida will have over 27% of its population exceeding 65 years of age. Of concern to researchers has been the vulnerability of these older migrants, particularly in relation to hurricanes (also known as cyclones in Australia).

Similar concerns exist in Australia, as supported by 2010 figures showing 6 million Australians reside in coastal hamlets outside of a capital city (Australian Bureau of Statistics (ABS) 2014). These statistics are problematic as they accompany other figures that identify coastal hamlets as experiencing higher environmental pressures and less economic resilience than their city counterparts (Smith & Doherty 2006).

The desirability of an area has been explained using the terms ‘push’ and ‘pull’ factors, described by the ABS (2004) as “...those that encourage people to leave a region, and those that attract people to a region”. Drysdale (1991) described the ‘pull’ factors of a ‘sea-change’ location as one that offered a favourable climate and lifestyle. Gurran (2008) explained that the beach has always played an important role in Australia’s national psyche, and it is for this reason beach communities have experienced increased popularity as ‘sea-change’ destinations. As such, those who migrate seeing an improved lifestyle, are known as amenity migrants (Gurran *et al.* 2005; Gurran 2008; Marshall *et al.* 2003).

Although population growth in some Australian coastal regions remains constant, overall population growth rates within many Australian coastal Local Government Areas<sup>1</sup> (LGAs) are higher than those of metropolitan areas (Berwick 2007). Berwick (2007) warned that these population trends are predicted to continue over the next 10 – 15 years, due mainly to the ‘baby-boomer’ generation reaching retirement age and migrating to coastal areas in search of a better lifestyle. Drozdowski (2007) warned that this trend will also mean that populations in smaller coastal amenity communities will continue to remain older than the national average, as younger people depart these communities in search of education and employment opportunities.

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<sup>1</sup> Local Government Areas are spatial units representing the whole geographical area of responsibility of a Local Government Council (AIHW 2016)

In an attempt to understand the ‘push’ and ‘pull’ factors of ‘sea-change’ communities, Gurran *et al.* (2007) developed five profiles of coastal hamlets. These profiles characterise, analyse and develop policy and management approaches responsive to the needs of each community. This dissertation will focus on what Gurran *et al.* (2007) referred to as coastal hamlets, in particular, the coastal hamlets of Far North Queensland. Coastal hamlets are classified as remote LGAs located more than three hours drive from a capital city, with populations of less than 15,000 people (Gurran *et al.* 2007). Due to the isolation of some of these communities, little major development has occurred, usually because of the surrounding protected conservation areas, which serve the purpose of natural development boundaries. Due to their high lifestyle amenity, these areas are highly attractive to both tourists and ‘sea-change’ migrants seeking alternative lifestyles away from larger more populated and developed areas. Of most significance to this dissertation is the vulnerability of these centres to natural hazards, particularly cyclones and storm surges.

Environmental and socioeconomic consequences of amenity migration are problematic for coastal hamlets, as significant population growth into these settings often occurs in environmentally sensitive or culturally significant areas, unprepared for the demands of population growth (Gurran *et al.* 2007). In addition, the social impact of population increases can be profound, with ‘sea-change’ communities characteristically experiencing higher socioeconomic disadvantage, seasonal employment, lower incomes and poorer health outcomes, particularly in those centres located large distances from metropolitan centres: characteristics that are exacerbated by the high proportion of older adults (Gurran *et al.* 2007). Finally, Gurran *et al.* (2007) described a loss of ‘sense of place’ amongst long-term residents of coastal hamlets, brought about by population growth affecting the character of a township, particularly when new residential, commercial and tourism developments change the landscape of the centre. As such, individual social vulnerability can lead to community vulnerability, particularly in relation to natural hazard resilience.

Increases in community vulnerability have been identified amongst researchers as those associated with changes in a population’s physical health and financial capacity. Cutter and Finch (2008) warned of the risk associated with retirees, whose health may be compromised, migrating from cities, where medical facilities are plentiful, to coastal

hamlets with limited health resources. Such moves, particularly when physical and mental stamina are necessary to ensure adequate cyclone preparedness, can lead to an individual having a higher likelihood of injury, death or illness, both during and post a natural hazard (Cutter & Finch 2008). Similarly, Few (2007) warned of the need to ensure adequate financial resources to prepare and recover from a hazard, saying that as coastal hamlets usually only offer seasonal, lower income-earning potential, such centres are often economically vulnerable and unable to sustain major changes to their economic structure following a catastrophic event.

The combination of these factors leads to community vulnerability in relation to natural hazard resilience, and that must be considered in light of climate predictions. This dissertation will seek to determine the impact of an ageing population on the resilience of coastal hamlets in relation to natural hazards.

A search of the literature has revealed older adults are disproportionately affected during a natural hazard. In 2005, Hurricane Katrina claimed the lives of 1,836 people, 74% of whom were over the age of 60 years, while in 2003 the European heat wave claimed approximately 70,000 lives, 70% of whom were over the age of 70 years (Wang & Yarnal 2012; International Federation of Red Cross and Red Crescent Societies 2007; Astrom *et al.* 2011). The 2011 Japan tsunami and earthquake took 15,884 lives, 77% of whom were older adults, and 46% over the age of 70 years (Khazai *et al.* 2011). Cherniak *et al.* (2007) reported that in 2005, more than 1000 older adults perished in 14 hurricanes globally, while 50% of the death-toll in 2004, attributed to the impact of Hurricane Charley on southern and central Florida, was older persons. Finally, between 1900 and 2008, 1104 people lost their lives during bushfires in Australia, with two-thirds over the age of 60 years (Haynes *et al.* 2008).

Past studies have identified older adults as a specific portion of the population most at risk of the effects of a natural hazard (Ngo 2001). Research has identified those areas of vulnerability as physical limitations (impeding mobility), diminished cognitive ability (reducing the individual's ability to process hazard warnings), fewer economic resources (for post-disaster repairs), and post-disaster psychological stress (requiring specialised social services) (Cherry *et al.* 2010; Cutter & Finch 2008; Wang & Yarnal 2012). These factors generally place the aged at greater risk of harm pre, during and



post a natural hazard event than younger members of the population. This dissertation will focus on older adult residents over the age of 65 years residing independently in coastal hamlets on the cyclone-prone Far North Queensland coast, focusing on those hamlets that have been impacted by successive tropical cyclones since 2006.

Of particular interest to this research is how older adults are cared for as they age. In Australia an increasing number of frail older adults are now living relatively independently in their own homes, primarily as a result of personal choice, as well as government supported programs subsidising the cost for *in situ* care, or in-home community-based health care and services (Australia.myagedcare 2015; Holloway *et al.* 2015; Kelly 2015; Taylor & Donoghue 2015). Although these services are limited in more remote locations, issues arise when services such as these are unable to be provided during periods of extreme weather, placing added pressure on already stretched emergency services.

Challenges exist within the vast spectrum of activities required pre, during and post a natural hazard event, which can easily overwhelm the available emergency services and volunteers, not to mention the affected individual. The recognition of these shortcomings has led to the concept of disaster resilient communities (COAG 2011). Disaster resilient communities are described as self-reliant with strong social capacities; as those that have successfully adapted to changing social, cultural, environmental and economic conditions; and as communities which function well when exposed to internal and external stresses (COAG 2011). The Australian National Strategy for Disaster Resilience (NSDR) outlined that communities must be empowered to share responsibility in order to be self-reliant when coping with disasters (COAG 2011). In short, individuals, households and communities must adopt a 'self-help' approach to natural hazard disaster management. As such, Commonwealth, State and local government policies have been developed that encourage community engagement to educate individuals in the areas of preparation and protection procedures, along with mitigation strategies that protect both lives and property.

These policies are designed to encourage individuals to take full responsibility for their own safety by providing information on: preparing property and households for extreme weather; planning for the likelihood of damage and loss of essential services; ensuring

the structural integrity of property; and, having in place evacuation plans, emergency kits, and warning systems. To facilitate this, disaster management authorities make available cyclone preparatory information via the media (print, television and radio), social network sites, websites and billboards. This information reiterates the importance of being self-reliant, encouraging individuals to carry out actions that assume physical, cognitive and financial ability. In short, these assumptions presume the individual is physically, mentally and financially capable of carrying out activities that far exceed those required for daily life; has strong social and community networks to call upon for assistance; has a clear understanding of the risks associated with the impact of the natural hazard; has a high level of self-efficacy and critical awareness; has accurately assessed risks; is active and alert; and, understands the concept of the 'self-help' approach.

This dissertation raises questions as to the ability of independent-living older adults, particularly those reliant on *in situ* care, residing in Far North Queensland coastal hamlets to remain self-reliant in the face of more intense natural hazards. The search for literature relating to the future implications of an ageing population on coastal hamlets vulnerable to climatic hazards has highlighted a gap in the knowledge that this research seeks to fill. Although past research has identified the vulnerability of older adults, there is a lack of understanding in regard to how ageing coastal hamlets will prepare and recover from future climatic events without the support of younger members of the community. There is also a need to identify the issues facing disaster management in the future if vulnerable, smaller, coastal hamlets are to comprise primarily of older adults whose physical and mental capabilities are diminishing, and whose reduced financial security could impact on recovery processes. The dissertation will provide disaster management with information that increases the hazard preparatory capacity of ageing coastal populations in Far North Queensland. It is also hoped that this dissertation will also prove useful to other populations in Australia and internationally.

## **1.1 Aims of this Dissertation**

This dissertation has three aims. First, it aims to understand the impact of disaster policy, which advocates a self-help approach, on older adults residing in remote ageing coastal hamlets in Far North Queensland, Australia. Second, it aims to gain an

appreciation of the collective efficacies of older adults residing in cyclone-prone remote coastal hamlets: and finally, this dissertation aims to determine how older adults' collective efficacies affect their motivation and intentional behaviours in response to cyclone disasters.

## **1.2 Research Questions Guiding this Dissertation**

This dissertation addressed three specific research questions. The first asked, what is the disaster experience of older Far North Queensland (FNQ) residents? The second question asked, do local government disaster managers, emergency services officers and *in situ* health and community health care providers think older independent-living adults in the community are prepared for cyclones? The final question asked, what is the role of policy in disaster preparation and response in small regional communities?

## **1.3 The Contributions of this Dissertation**

The contributions of this dissertation to knowledge include a multi-discipline literature review of wide research perspectives that have been identified as being relevant to both the older person's natural hazard experience, and that of the more isolated community. In addition, this dissertation's contribution also includes an understanding of the real-life cyclone experience of older adults. These experiences were collected using mixed-methods, combining the use of a questionnaire with a phenomenological methodological approach of data collection, challenging the dominant positivists' paradigm typically found in disaster studies and disaster management research (Ferrier & Haque 2003). To date Australian disaster management policies do not appear to consider the needs, preferences or capacities of older adults, nor has the participation of older adults been encouraged in current policy development. Therefore, this research sought to provide older adults with a voice with which to share their disaster experiences and concerns, which were supported by the views and experiences of *in situ* community health care providers and emergency services officers. Similarly, the experiences and views of local government disaster managers provided an understanding of the limitations of current disaster policies, and the potential concerns of policies in the future.

This dissertation also contributed to the field of knowledge by contributing thus far three papers (all of which are in press), which collectively presented the findings of this study. A critical finding of this study was that the experience of poor post-disaster policies and decisions had not only contributed to the economic downturn of the study sites, but had also exacerbated each community's ageing population statistics. The long-term consequence of past post-disaster decisions had resulted in the closure of many local businesses and industries, resulting in the loss of employment for many of its locals. The subsequent out-migration of those seeking employment has resulted in many older adults facing a future without family or friends, a decrease in essential health and community services, and the consequent social isolation of many independent-living older adults. As such, poor policy decisions of the past have now contributed to the decline in the region's natural hazard adaptive capacity. An increasing number of independent-living older adults now reliant on *in situ* home care, whereby reducing their ability to be self-reliant, both on a day-to-day basis and during times of emergency. The final contribution is that of advancing theoretical perspectives by adding to Social Cognitive Theory.

Currently, disaster management policies advocate self-reliance, assuming that positive outcome expectancies can be achieved by following disaster management recommendations, which when attained, result in high levels of collective-efficacies. The assumption that all citizens are well prepared assumes high levels of collective response efficacies and problem-solving capacities, leading to community empowerment and self-reliance. However, this dissertation highlights that such assumptions could have an adverse effect in socially vulnerable communities when a community consists of a vulnerable demographic composition, high levels of chronic illness, high reliance on *in situ* care, social isolation and poor access to services. As such, variables such as these could result in negatively impacting collective outcome expectancies, collective efficacies, response efficacies and problem-solving abilities, leading to community disempowerment and an increased reliance on assistance by authorities. These outcomes pose serious concerns for Australian disaster management authorities whose policies rely on all citizens remaining self-reliant.

From an ontological perspective, this dissertation assumes that many older adults residing in remote coastal hamlets exposed to natural hazards have in the past had the

capacity to prepare and recover from past natural hazard events that have affected their community. The reduction in one's physical and cognitive abilities due to the biological effects of ageing, along with reduced financial capacity of those unable to work, or without adequate retirement funds, could reduce older adults' future capacity to remain self-reliant when faced with a natural hazard in the future.

Epistemologically, this dissertation seeks to determine if older adults in coastal hamlets are as vulnerable to the effects of a natural hazard as the literature infers. This research was undertaken using mixed-methods, with an emphasis on an exploratory qualitative phenomenological research approach, which emphasises, prioritizes and deeply explores the individual's unique real-life experience (Paton *et al.* 2004), in conjunction with a descriptive quantitative approach.

#### **1.4 The Scope of this Research**

This research focuses on the real-life cyclone experience of older adults aged over the age of 65 years residing in coastal hamlets on the Far North Queensland coast recovering from the impacts of Cyclone Larry (2006) and Cyclone Yasi (2011). Data were collected from older adults living independently in the region, as well as local government disaster managers, emergency services officers and *in situ* community health care providers who assist older adults both on a day-to-day basis, and during times of an emergency. This area of the Queensland coast was chosen because of its most recent cyclone history and its ageing population characteristics. As the study site exhibits similar characteristics to other exposed coastal hamlets both here in Australia and overseas, this study should provide a context that can be applied to other remote cyclone-prone communities.

#### **1.5 Research Logic and Dissertation Structure**

As well as meeting James Cook University's requirements for a dissertation by publication, the structure of this dissertation encapsulates the journey undertaken by the researcher and the participants in order to fully understand the cyclone experience of older adults residing in coastal hamlets in Far North Queensland recovering from successive cyclones. Research for this dissertation is presented in a series of chapters, and complete journal articles, all of which are in press. As a dissertation by publication,

the structure of the dissertation differs from a traditional thesis, with no ‘single’ results chapter. As such, the findings of this research are presented through Chapters 6-9, with Chapter 6 reporting on the data collected using a questionnaire and Chapters 7-9 presenting three papers, each addressing one of the specific research questions presented in chronological order. Aspects of the literature review are also published (see Chapter 2). Table 1.1 illustrates the research aims and questions in relation to the structure and outcomes of this research, which is also summarised below.

Table 1.1 Relationship between research aims, questions, chapters and outcomes.

Theoretical framework						
Exploratory qualitative phenomenological framework						
Keywords						
Ageing Populations	Cyclones	Natural Hazards	Coastal Hamlets	Self Reliance	Resilience	Disaster Management
Main research aims						
To understand the impact of disaster policy, which advocates a self-help approach, on older adults residing in remote ageing coastal hamlets in Far North Queensland, Australia.						
To gain an appreciation of the collective efficacies of older adults residing in cyclone-prone remote coastal hamlets.						
To determine how older adults’ collective efficacies affects their motivation and intentional behaviours in response to cyclone disasters.						
Method						
Mixed-methods – Focus groups, interviews and questionnaire						
Research questions						
RQ1	RQ2				RQ3	
What is the disaster experience for older Far North Queensland residents?	Do local government disaster managers, emergency services officers and <i>in situ</i> health carers think older independent-living adults in the community are prepared for cyclones?				What is the role of policy in disaster preparation and response in small regional communities?	
Chapters addressing each research question						
7	8				9	
Outcomes						
Social support	Disaster management				Impact of past decisions	
Fear of evacuating	policy expectations				Declining economic viability	
Fear from past experiences	Identifying and locating the vulnerable				Loss of social support	
Physical limitations	Importance of social-networks				Loss of services	
Personal limitations	Vulnerability of older adults				Inconsistent local government disaster management policies	
Social isolation	Misinterpretation of self-reliant				Reliance on past disaster relief practices	
Long-term economic impact	Dependence on assistance				Reliance on <i>in situ</i> care	
Dependence on assistance from authorities	Stoicism				Barriers to the provision of <i>in situ</i> care	
Loss of vital services	Dependence on disaster relief					
Financial limitations						

### *Chapter 2: Literature Review*

Chapter 2 situates the research within the literature pertaining to natural hazards, physical sciences, human geography, government and authority disaster management, social sciences and psychology. The review begins by defining natural hazards, and then outlining climate change predictions that are expected to impact North Queensland in the future. The migratory phenomenon of sea-change is then explained, along with an understanding and implications of the ageing population, a definition of who are classified as older adults, and what identifies older adults as vulnerable in a natural hazard. The review then continues with an explanation of current disaster management approaches and an explanation of the ‘self-help’ approach to disaster management, the role of politics in natural hazard disaster management and an understanding of the factors that influence a person’s perception of risk. The chapter concludes with a review of past research into natural hazard planning for older adults.

### *Chapter 3: Theoretical and Conceptual Frameworks*

Chapter 3 outlines the theoretical perspectives and conceptual model used in this research. It begins with an overview of the theoretical perspective of risk is followed by an explanation of Social Cognitive Theory, which is the overarching theoretical framework for this dissertation.



#### *Chapter 4: Methodology and Research Strategy*

The chapter begins by situating this research in the discipline of human geography. This is achieved by defining, outlining and explaining the humanistic approach adopted for this dissertation. Then it continues with an explanation of pluralism and triangulation, focusing on the reasons for using mixed, or multiple, methods to collect the necessary data by drawing on the strengths and weaknesses of both qualitative and quantitative data collection methods. This chapter outlines comprehensively the methodology process, sampling design, data collection instruments, as well as the relationship between the research questions, research aims, the literature and the questions developed for the questionnaire, focus groups and personal interviews. The chapter concludes with an explanation of the pilot studies, ethics procedure and data analysis techniques.

#### *Chapter 5: Characteristics of Study Sites – coastal hamlets in Far North Queensland*

Chapter 5 presents the study sites for this research by first outlining the scope of this research by defining the region known as Far North Queensland, followed by a brief history of European settlement and population growth in the region. The chapter continues with the identification of Far North Queensland's coastal hamlets, its past natural hazard histories and individual population growth since 1890. The coastal hamlets with the most significant ageing population projections are then identified as the study sites for this research, followed by an explanation of the available statistics relating to the factors that influence individual and community perception of risk, vulnerability and resilience. Chapter 5 contains a discussion of the significance of these statistics in relation to natural hazard disaster management strategies.

#### *Chapter 6: Results from Self-administered questionnaire*

The quantitative data collected from the self-administered questionnaire presented to the older adult participants immediately before they joined a focus group are presented in Chapter 6 as simple descriptive statistics. As this sample size was small, (N=36), the validity of any statistical analysis would not have produced results of any significance, as this was not the intention for its use. Instead, the questionnaire was a convenient way in which to collect demographic and health data, as well as collecting information in relation to past cyclone experiences and preparatory habits. The chapter presents this

data as a series of graphs and tables, which are cross-referenced throughout Chapters 7, 8 and 9.

*Chapter 7: "The trauma of the cyclone has changed us forever": Self-reliance, vulnerability and resilience amongst older Australian in cyclone-prone areas (paper one)*

Chapter 7 presents qualitative data outlining the cyclone experience for older adults residing within the study sites, highlighting the concerns older adult participants have about the physical, cognitive and financial impact of ageing on their ability to adequately prepare their properties before a future cyclone. The chapter highlights how these limitations impact the future ability of older residents to both prepare and recover from future extreme weather events. The theoretical implications of the results on the future ability of these participants to remain self-reliant are also outlined by examining the outcomes through the lens of Social Cognitive Theory, which emphasises the importance of self-efficacy during times of high anxiety. These findings highlight the impact a loss of self-efficacy will have on disaster management policies that expect all citizens to remain self-reliant.

*Chapter 8: "We expect older adults to be able to prepare and recover from a cyclone as well as younger members of this community" (paper two)*

Focussing on comparing the views of the older adult participants, emergency services officers and health care providers with those of local government disaster managers, this chapter analyses qualitative data from each participant group, highlighting the differences between the real-life experiences of older adults, and those who care for them, and the expectations from authorities. The results identified the inability of independent-living older adults reliant on *in situ* care to remain self-reliant during the impact of a tropical cyclone, despite disaster management's insistence that all citizens must be self-reliant irrespective of their age and health. This chapter outlines the lack of knowledge authorities have regarding the location of vulnerable people, the public lack of understanding over the definition of the term 'self-reliant', as well as the confusion that exists over who is responsible for vulnerable older adults during extreme weather events. The findings cast doubt over the future adaptive capacity of ageing remote coastal hamlets, under the present policies and procedures in place.

*Chapter 9: Ageing in remote and cyclone-prone communities: geography, policy and disaster relief (paper three)*

This chapter presents qualitative data revealing the social implications of past post-cyclone recovery decisions on communities with fragile economies and the impact these have had on older adult residents. The chapter also outlines the unrealistic reliance local government disaster managers have on *in situ* care providers during periods of cyclone impact, as well as the reluctance of older female participants, in particular, to accept assistance. The outcomes of these findings highlight the importance of disaster management to reassess the future ability of ageing remote communities to remain ‘self-reliant’ during a natural hazard event.

*Chapter 10: Discussion, recommendations and conclusions*

Chapter 10 concludes the dissertation by discussing the theoretical implications of the research, as well as responding to the research questions and outlining the practical and policy implications of the findings. This chapter also outlines the contributions this study has made to the area of natural hazards, gerontology and disaster management research fields, concluding with an overview of research limitations, recommendations and a conclusion.

***Synopsis of Chapter 1***

Chapter 1 provided the background this dissertation is based on. Specifically it provided background to the research, the research aims and questions, the contributions made by this dissertation, as well as the scope, research logic and dissertation structure and an overview of each chapter. The following chapter will present a detailed review of the relevant literature.

## **Chapter 2      Literature Review**

### **2.0    Introduction**

As foreshadowed in the previous chapter, to follow is a review of the literature. This dissertation considers that in the future, local government disaster managers may have to rethink the ‘self-help’ approach to natural hazard disaster management, particularly in remote, ageing coastal hamlets in Far North Queensland (FNQ). This chapter begins by reviewing the literature in relation to natural hazards, coastal migration trends, and the impact of future natural hazard predictions in a changing climate. The chapter continues with an investigation of the literature regarding population ageing and the vulnerabilities of older adults faced with the threat of a natural hazard. An understanding of Australian current disaster management approaches and the political economy surrounding resource allocation follows. The chapter concludes by identifying the gaps in the knowledge relating to the future impact of disaster preparation and recovery on the ageing populations of smaller FNQ coastal hamlets affected by cyclones and storm surges.

### **2.1    Natural Hazards**

According to Burton *et al.* (1978), a natural hazard comprises elements of the natural world causing extraneous forces that pose a threat to humans. These elements include atmospheric (including climatic) and geologic (including seismic and volcanic) events, which threaten human life and property because of their locality, severity and frequency (Bryant 2005) (see Table 2.1). Despite the term ‘natural’, a natural hazard infers collaboration with humans, for if a physical event does not affect human beings, the event is regarded as a natural phenomenon (Organisation of American States (OAS) 1990). If, however, this event impacts a concentration of people, then it is classified as a *hazardous event*, with this classification changing to *natural hazard* should it result in a high level of loss in terms of life, infrastructure, livelihoods and property (OAS 1990).

Table 2.1 List of natural hazards known to pose a threat to human settlements.

Hazard Type	Hazard
Atmospheric (including Climatic)	Tropical cyclones, hurricanes, typhoons
	Snowstorms, blizzards, freezing rain
	Storms
	Dust storms
	Tornados
	Thunderstorms
	Lightning
	Hail
	Floods, flash floods
	Storm surges
	Droughts
	Bushfires
	Sea ice
	Beach erosion
	Sea level rise
	Wave action
	Heat wave
Geologic	Volcanoes
	Earthquakes
	Tsunamis
	Liquefaction
	Landslides

Source: Compiled using details from Bryant (2005),  
*Natural Hazards*, Cambridge University Press, Cambridge.

Natural hazard research comprises an extensive body of literature covering several disciplines that have investigated the interaction between natural hazards and human civilisations. For the purpose of this dissertation, these disciplines have been used to categorise past research under the areas of physical sciences, social sciences and psychology, government and authority, urban planning and design, medical and health, and human geography (see Table 2.2). As this dissertation seeks to understand the

implications for natural hazard disaster management faced with ageing populations in small FNQ coastal hamlets, the findings will contribute to the categories of social sciences and psychology, human geography, and government and authority.

Table 2.2 Natural hazard research literature categories.

Category	Natural Hazard Concerns
Government and Authority	Disaster management policies and strategies including evacuation and protective action Strategic planning Building codes Community engagement Education and information Economic risk and vulnerability Environmental policies Sustainability
Social Sciences and Psychology	Identifying those at risk Identifying risky behaviour Individual, societal and political perceptions of risk Psychological impacts and risk factors Demographic risk factors including age and gender Experiential risk factors Socio-situational risk factors Self-efficacy Social vulnerability
Medical and Health	Identifying who is vulnerable Post disaster care Cognitive health Disaster planning for those at risk Behavioural science Gerontology
Urban Planning and Design	Education Community engagement Urban design and planning Mapping Floodplain and coastal management Building codes Resilience Climate change adaption
Physical Sciences	Climate change predictions Variability analysis Hazard predictions Ecosystem sustainability and vulnerability Risk assessment Physical characteristics
Human Geography	Population distribution Migratory patterns Human settlement patterns Population characteristics

Source: Developed for this dissertation.

Many areas of natural hazard research have required an interdisciplinary investigation to understand the complexities associated with natural hazards. This approach has

assisted researchers to better understand natural hazard prediction and future behaviour, the identification of risks and vulnerabilities of those in harm's way, as well as developing strategies and procedures to reduce loss of life and property (Cutter & Finch 2008; Etkin & Ho 2007; Few 2007; Jia *et al.* 2010).

Past natural hazard research has identified coastal hamlets as highly vulnerable to several types of natural hazards. These include climatic hazards (cyclones and severe storms), geological hazards (land instability) and tsunamis (Bryant 2005). The vulnerability of coastal hamlets is influenced by a large list of variables identified by sociologists, geographers, urban planners, political scientists and other researchers outlined in Table 2.3. This table is by no means exhaustive, although the research listed by the authors presented have been used in this dissertation.

As FNQ coastal hamlets are the focus of this research, this dissertation is most interested in the natural hazards that affect those communities. This area of the Queensland coastline lies in an active tropical cyclone-prone region, which, according to the Australian Bureau of Meteorology (BOM 2014b), has experienced 207 known impacts from tropical cyclones since 1858, when record-taking first began, to 2014. Cyclones are described as low-pressure systems that develop over tropical waters where sea surface temperatures (SST) are at least 27° Celsius, between the latitudes of 3° and 30° North and South of the equator (Nott 2006). These systems can be between 80 – 800 kilometres in diameter, have a well-defined eye, or core, of warm subsiding air, around which inward and upward air spirals, deflecting clockwise in the southern hemisphere, and anti-clockwise in the northern, where they are called typhoons (Anderson-Berry 2003; Nott 2006). Cyclones are generally associated with strong winds, heavy rain and extensive flooding, along with storm surges in coastal areas where a cyclone makes landfall (Anderson-Berry 2003). Storm surge is the most destructive element of a cyclone, particularly if the associated cyclone makes landfall at the same time as an astronomical high tide (BOM 2014a). The destructive nature of a storm surge results from the elevation of the sea surface, typically 60 to 80 kilometres across and 2 to 5 metres higher than the normal tide level, exacerbated by wave action and wave set-up, inundating low-lying coastal areas (BOM 2014a). Thus, the potential impact of cyclones and storm surges on human communities and populations may be substantial.



Table 2.3 Previous research identifying the vulnerability of coastal hamlets to natural hazards.

Research Area	Article
Government and Authority	Burby 2006 Cohen & Walker 2008 Cova <i>et al.</i> 2011, 2009 Etkin & Ho 2007 Horney <i>et al.</i> 2010, 2012 Khazai <i>et al.</i> 2011 Krongkant & Ahman 2010 McCann 2011
Social Sciences and Psychology	Adger <i>et al.</i> 2005 Blaikie <i>et al.</i> 1994 Cherry <i>et al.</i> 2009, 2010 Cutter 1996 2008 Elliott & Pais, 2006 Few 2007 King & McGregor 2000 Li 2008 O'Connor <i>et al.</i> 1999
Medical and Health	Furukawa <i>et al.</i> 2012 Goldstraw <i>et al.</i> 2012 Huerta & Horton 1978 Silverman <i>et al.</i> 1995
Urban Planning and Design	Burby 2006 Crawford <i>et al.</i> 2013 Gurran <i>et al.</i> 2005, 2007, 2008 Liston 1993 Mileti <i>et al.</i> 1990, 1999 Smith and Doherty 2006
Physical Sciences	Bord <i>et al.</i> 2000 Bouwer 2012 Bryant 2005 Christensen <i>et al.</i> 2007 Emanuel 2005 Gaudi <i>et al.</i> 2007 Knutson <i>et al.</i> 2010 Mendelsohn <i>et al.</i> 2011 Morrissey & Reser 2003 Nott 2006
Human Geography	Drysdale 1991 Hogan & Marandola 2007 Peduzzi <i>et al.</i> 2012

Source: Author's impression.

Natural hazard research in the area of the physical sciences has, in recent times, focussed on the changes that may lay ahead in relation to the changing nature of cyclones due to anthropogenic climate change (Bouwer 2012; Peduzzi *et al.* 2012; Pielke *et al.* 2005; Vincent 2008). Social scientists, urban planners and human geographers have also centred much of their studies on predicting the vulnerability of

coastal hamlets facing a changing climate, as well as developing strategies to mitigate future risk aimed at building stronger, more resilient communities (Anderson-Berry 2003; Cutter 1996; Cutter & Finch 2008; Eisenmann *et al.* 2007; Gurran *et al.* 2007, 2008). In order to understand the future social vulnerability of coastal hamlets, an understanding of the predicted changes of cyclones and their associated impacts must be examined.

## **2.2 Climate Change Predictions**

According to the Intergovernmental Panel on Climate Change (IPCC) (2007), the term ‘climate change’ refers to changes in the earth’s atmosphere over time. Although some of these changes occur naturally, the rate of change has, over the past 200 years, and most particularly in the past 100 years, increased significantly. Shifts and changes in the composition of the earth’s atmospheric gases have triggered these changes, with large increases in the levels of concentration of greenhouse gases<sup>2</sup> being recorded, resulting in a warming effect of the earth’s climatic system<sup>3</sup> (IPCC 2007). The IPCC (2007) warned that even if greenhouse gas emissions stabilised, the earth would continue to warm, inferring sea level rises would be inevitable. A predicted outcome of diverse climate change is the potential for changes in the frequency and intensity of climatic events. As this dissertation is concerned with the vulnerabilities of smaller FNQ coastal hamlets in Australia, tropical cyclones and associated flooding and storm surge will be the focus of this section.

Over the past several decades, SSTs have increased in most tropical regions by several tenths of a degree Celsius, a phenomenon attributed to anthropogenic greenhouse gas concentrations (Knutson *et al.* 2010). These findings have raised concerns regarding future cyclone intensities, particularly if SSTs continue to increase (Bouwer 2012). Of major concern is the potential increases in the impacts of severe tropical cyclones, namely increases in the intensity of extreme winds, severe flooding and landslides

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<sup>2</sup> IPCC (2007) has identified oxygen, methane and nitrous oxide as the greenhouse gasses that have markedly increased as a result of human activities since 1750.

<sup>3</sup> There exist those who do not believe that climate change predictions are accurate. Despite scientific evidence to the contrary, sceptics contest that climate change is a natural phenomenon, denying that activities of humans are the cause (Oreskes & Conway 2010; Elmer 2015). This dissertation does not follow this line of thought, and as such dismisses it unequivocally.

caused by torrential rain, as well as coastal inundation caused by damaging storm surges on coastal hamlets (Peduzzi *et al.* 2012).

While consensus appears to be that the frequency of tropical cyclones will decrease or remain constant<sup>4</sup>, the opposite is predicted for their intensities (Bouwer 2012; Emanuel 2005; Gualdi *et al.* 2007; Knutson *et al.* 2010; Mendelsohn *et al.* 2011; Peduzzi *et al.* 2012). Predictions are that, globally, tropical cyclones will become more intense, translating to significant increases in the potential for damage, and even death, due mainly to the modern trend of coastal migration and urbanisation of vulnerable coastal areas (Mendelsohn *et al.* 2011; Pielke *et al.* 2005). Rising coastal populations and the placement of valuable infrastructure in coastal locations prone to tropical cyclones, have already resulted in large economic losses and disruption following a tropical cyclone, particularly in more developed countries (Knutson *et al.* 2010). In less developed countries, social factors have been cited as the reason for the movement of large numbers of people to coastal locations where they are often forced to reside in sub-standard housing within large low-socioeconomic communities, located on unstable hill slopes, or on the water's edge (Knutson *et al.* 2010). As a result, less developed countries generally suffer great loss of life and intense human suffering following a natural hazard (Bouwer 2012). With the world's population projected to be in excess of 8.3 billion people by 2030, it is anticipated that of the 50% of the population projected to reside in urban areas globally, over one-third of all urban-dwelling citizens will be forced to live in housing that will provide neither adequate shelter nor protection from natural hazards (Peduzzi *et al.* 2012). Rising sea levels and more intense tropical cyclones will potentially result in higher death rates, human suffering and economic losses in the future.

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<sup>4</sup> Not all scientists agree with these claims. Non-consensus positions claim a large increase in tropical cyclone energy, numbers and wind-speeds in some areas during the past few decades, which the Landsea (2007) states is due to improvements in observational techniques and instrumentation facilitating more accurate records.

The social vulnerability<sup>5</sup> of coastal hamlets to future climatic events could have a more far-reaching effect than the projected effects of future climatic events themselves. The IPCC (2007) warned that the primary factors that govern the pattern and magnitude of future losses, both economic and social, are how society prepares and develops for climate change induced changes to weather patterns, rather than on the expected changes in the physical characteristics of the events themselves (Pielke *et al.* 2005). According to Bouwer (2012) one of the most important indicators of the severity of a natural hazard is the level of economic loss, an indicator that has continued to rise rapidly over the decades. According to Riebeek (2005) the global cost of natural hazards in the 1950s equated to approximately \$US3.9 billion dollars at the time. A report by Luxton (2005) stated that this had increased to \$US1.5 trillion between 2003 and 2013. It is, therefore, important to consider changes in future potential impacts, principally, changes in exposed populations and assets, and their associated vulnerabilities (Bouwer 2012).

Climate change is also anticipated to impact low-lying coastal hamlets throughout Australia, with researchers warning that these changes need to be considered in conjunction with each community's unique features, including geographic location, demographics, economic structure, rates of growth, and changes in human behaviour (Gurran *et al.* 2008). This is vital in order to fully understand the impact on each individual community. In 2007 the Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO) predicted that temperatures would rise in Australia by 0.7 – 0.9 degrees by 2030, with sea levels anticipated to rise between 18-59 cm by 2100 (Gurran *et al.* 2008). It is predicted that temperature changes will exacerbate the formation of tropical cyclones in tropical regions. Accordingly, Christensen *et al.* (2007) predict cyclone intensity in the Far North Queensland (FNQ) region will increase by approximately 10% from 2007 to 2100, with "... increases in the frequency of a 1 in 100 year event to a 1 in 70 year event, and a doubling of the area affected by inundation" (p.916). These predictions, if accurate, could potentially result in

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<sup>5</sup> Cutter *et al.* (2003) identified a community's social vulnerability as including: socioeconomic status, gender, race/ethnicity, age, commercial and industrial development (as an indicator of the economic state of the community), employment loss, location (rural or urban), quality of residential property, infrastructure and lifelines (loss of sewerage, bridges, water), number of renters (as renters are usually transient), occupations (if reliant on industries affected by the hazard), family structure (number of dependents), education, population growth (an indication of availability of health services, social dependence (level of community dependence on social services) and the numbers of people in the community with special needs.

catastrophic losses that could see many smaller, regional, coastal hamlets unable to recover to their pre-disaster state. To fully understand the implications of these predictions, coastal migration trends must be examined along with a clear understanding of the characteristics of those who choose a ‘sea-change’ lifestyle.

## **2.3 ‘Sea-Change’ and Coastal Migration**

Lifestyle driven migration from metropolitan to non-metropolitan and peri-metropolitan (areas that surround metropolitan areas and cities) coastal areas is commonly referred to in Australia as ‘sea-change’ (Gurran *et al.* 2008). This major demographic trend is not, however, restricted to Australia, for a similar phenomenon also occurs in North America and Western Europe, where it is also known as ‘amenity migration’, ‘sun-belt migration’ or ‘retiree migration’, terms incorporating both lifestyle driven coastal and rural migration (Gurran 2008). Whatever the terminology, this trend describes a major lifestyle shift, which is transforming some global coastal areas (Gurran & Blakely 2007; Gurran 2008).

France, Italy, Greece and Spain have been well-documented favoured destinations for those trying to escape the cold, damp climate of the United Kingdom (Bahar *et al.* 2009). Mediterranean countries have, since the 1960s, been popular with the British, firstly as holiday destinations, and later as retirement resettlement destinations. Seeking sunshine, an outdoor lifestyle, affordable housing and high amenity seaside locations, some healthier and wealthier, newly retired British nationals, cross the English Channel in search of an improved lifestyle to live out their later years (Bahar *et al.* 2009).

King *et al.* (1998) remarked that many older migrants, usually from the city, seek a new lifestyle that is the polar opposite to the one that they left behind, preferring to secure properties located in rural areas along formerly uninhabited coastlines. The consequence of this trend has been an increase in population numbers and the age structure of smaller regional and remote communities, impacting particularly on economies at the local level. As the popularity of these destinations attracts yet more retirement migrants, housing investment and consumer spending impacts greatly on the local economy, tending to price local buyers, and less wealthy expats, out of the property market (King *et al.* 1998). Such changes in local communities have also been

noted in North America, where retirees, pursuing an improved lifestyle, head south to areas such as Florida and Mexico seeking warmth and sunshine (Crawford *et al.* 2013).

Florida's warm sunny weather, high amenity and appealing state income tax laws have been the main contributing factors attracting both seasonal and long-term retired American citizens to resettle along its coastline (Sharma 2012; Shen *et al.* 2014). Ranked as the United States of America's (USA) state with the highest number of people over the age of 65 years, predictions are that by 2030 27% of Florida's population will exceed 65 years of age. This prediction is of concern, as it goes beyond the predicted national average of 20% (Sharma 2012). Of equal concern to researchers has been the vulnerability of these older migrants, particularly in relation to hurricanes (referred to as cyclones in Australia). Silvermann *et al.* (1995) first raised concerns in relation to the safety of inexperienced migrants settling in vulnerable coastal locations, an issue that was raised again by McCann (2011) after data identified 82% of Florida's older adults residing in exposed coastal areas. These estimates raise serious issues for disaster management in relation to natural hazard preparation and recovery, sheltering-in-place and evacuation procedures. Such issues are also prevalent in Australia, where coastal living has, in recent times, been highly sought out by those seeking a 'sea-change'.

Since the time of European settlement (1770), Australia has experienced three dominant demographic 'cultures', described by Smith and Doherty (2006) as: i) the 'culture of the bush', occurring at the time of settlement up to Federation in 1901; ii) the 'culture of the suburbs' occurring since 1901; and, iii) and in recent times, a 'culture of the coast'. Confirmation of the culture of the coast is supported by the 2011 Census data that showed that 530,500 people moved to a coastal centre between 2006 and 2011, while between 2012 and 2013, the most prominent growth outside of a capital city occurred in coastal regions of Australia, particularly Queensland (ABS 2014). Although these statistics may not appear significant compared to the growth in the capital cities, Smith and Doherty (2006) stated that they were significant when compared to state and national averages, particularly considering these areas were experiencing environmental pressures and were less resilient economically than their city counterparts. Despite these negative characteristics, research has identified that the motivation for the

migration to these regions has been primarily the desire for an improved lifestyle, referred to in the literature as amenity migration (Gurran *et al.* 2005).

Amenity migration describes the desirability of one area over another and is explained using the terms ‘push’ and ‘pull’ factors<sup>6</sup>. Burnley and Murphy (2004) explained ‘push’ factors, such as reduced work opportunities, high crime rates or increased cost of living, ‘push’ people from one area into other locations usually where climate, housing and environmental conditions are more favourable, thereby ‘pulling’ people and encouraging them to relocate. These terms are also endorsed by the ABS in which they described ‘push and pull factors’ as “...those that encourage people to leave a region, and those that attract people to a region” (2004). The ABS (2004) warned, that, these complex factors are usually combined with personal reasons motivating a person, or a family unit, to relocate. Drysdale (1991) added that ‘pull’ factors described the choice of a ‘sea-change’ location as one that offered favourable climate and lifestyle. This sentiment is echoed across the ‘sea-change’ literature with authors adding further detailed insight into the migration choice as the special place that offered childhood, beachside, holiday memories (Drysdale 1991; Gurran 2008). The availability of the Internet, for instance, has altered traditional work patterns, encouraging some professionals to work from rural homes, while city to coastal migration patterns, driven by urban-Australian economic prosperity during the past few decades, has resulted in unaffordable housing prices in larger urban centres ‘pushing’ residents to seek affordable housing in remote coastal locations (Smith & Doherty 2006). Alternatively, those who profited by the urban real estate booms have typically ‘cashed-in’, using their newfound equity to purchase properties in areas that promote an improved lifestyle (Smith & Doherty 2006).

Although the growth in some Australian coastal regions remains constant, overall population growth rates within many coastal local government areas (LGAs) are higher than those of metropolitan areas (Berwick 2007). An examination of the statistical research compiled by Queensland Government Statistician's Office (2013) between 2003 and 2009 supports this claim, with ‘sea-change’ LGAs, such as the Sunshine Coast

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<sup>6</sup> It is acknowledged that there is a growing demographic literature questioning the viability of the ‘push-pull’ model of migration as it does not explain why some regions supply migrants, while others do not, or why within regions some people move and others stay, nor does it explain the direction of flows (Heering *et al.* 2000).

Regional Council, Cairns City Council, Gold Coast City Council and Fraser Coast Regional Council all displaying significantly higher population percentage increases than those for the Brisbane City Council (see Table 2.4).

Table 2.4 Population increases between 2003-2009 for Brisbane City, Sunshine Coast, Cairns City, Gold Coast and Fraser Coast LGAs.

Local Government Authority (LGA)	Population Increase between 2003-2009 (persons)	Population Increase (%)	Increase per Year (%)
Brisbane City Council	113,389	10.77	1.7 – 2.3
Sunshine Coast Regional Council	55,806	17.25	3.0 – 4.4
Cairns City Council	30,232	18.39	2.7 – 4.3
Gold Coast City Council	93,924	18.24	3.1 – 4.3
Fraser Coast Regional Council	20,535	20.64	3.6 – 4.2

Source: Compiled from statistical information from Queensland Government Statistician's Office (2013).

Berwick (2007) warned that these population trends are predicted to continue within the next 10 – 15 years, due mainly to the ‘baby-boomer’ generation reaching retirement age and many of this group migrating to coastal areas in search of a better lifestyle.

Drozdowski (2007) warned that this trend could also mean that populations in coastal amenity communities will continue to remain older than that of the national average, as many younger people depart these rural centres in search of education and employment opportunities. A further investigation of the statistical literature confirms this prediction. The typology outlined in Table 2.5 shows population distribution by age groups in 2006 from the coastal LGAs mentioned previously, with predictions for 2031. These predicted population increases indicate that ‘sea-change’ communities in Queensland are expected to continue to attract more migrants between the ages of 45-64 years, and more particularly, those over the age of 65 years of age.



Table 2.5 Percentage population distribution by age group for 2006 and predictions for 2031 for Brisbane City, Sunshine Coast, Cairns City, Gold Coast and Fraser Coast Local Government Areas.

Local Government Area	Year	Total Population	0-14 yrs. (%)	15-24 yrs. (%)	25-44 yrs. (%)	45-64 yrs. (%)	65+ yrs. (%)
Brisbane City Council	2006	991,260	17.7	16.1	31.8	23.0	11.4
	<b>2031</b>	<b>1,198,115</b>	<b>15.5</b>	<b>13.8</b>	<b>28.7</b>	<b>25.3</b>	<b>16.7</b>
Sunshine Coast Regional Council	2006	295,084	19.2	11.9	25.2	27.5	16.2
	<b>2031</b>	<b>446,187</b>	<b>17.8</b>	<b>10.6</b>	<b>24.1</b>	<b>24.5</b>	<b>23.0</b>
Cairns City Council	2006	147,538	21.5	13.1	31.9	24.8	8.7
	<b>2031</b>	<b>215,805</b>	<b>17.4</b>	<b>11.5</b>	<b>27.5</b>	<b>25.8</b>	<b>17.8</b>
Gold Coast City Council	2006	446,433	18.0	13.9	28.8	25.4	13.9
	<b>2031</b>	<b>724,492</b>	<b>16.6</b>	<b>12.4</b>	<b>26.2</b>	<b>24.8</b>	<b>20.2</b>
Fraser Coast Regional Council	2006	89,247	19.4	10.8	22.4	28.4	19.0
	<b>2031</b>	<b>147,619</b>	<b>18.2</b>	<b>9.7</b>	<b>23.4</b>	<b>25.3</b>	<b>23.4</b>

Source: Compiled from statistical information from Queensland Government (2014).

Previous research has identified the Wet Tropics region of FNQ, the area of interest for this dissertation, as a favourite destination of not only ‘sea-changers’, but also what is known as ‘tree-changers’ (Bohnet & Moore 2011). The Wet Tropics is an area approximately 500 km long and 50 km wide between Townsville and Cooktown, North Queensland. The region covers 900,000 hectares, 48% of which is rainforest, containing the highest biological diversity in Australia and is recognised as one of the mega-diverse regions of the world (Bohnet & Moore 2011). As with ‘sea-changers’, ‘tree-changers’ are described as people who move to forested areas, often picturesque, coastal hinterland, seeking an improved lifestyle. Reporting on research into the ‘sea and tree change’ phenomena in FNQ, Bohnet and Moore (2011) reported that the Wet Tropics region was one of the most rapidly growing populations in Queensland, outside the heavily populated southeast corner of the state. Those who had migrated to the region identified themselves, not merely as ‘sea-changers’ or ‘tree-changers’, but as both ‘sea and tree changers’, choosing to live between the beach and the nearby

hinterland in order to enjoy the beauty of both (Bohnet & Moore 2011). These outcomes corroborated with the definition of ‘push’ and ‘pull’ factors of amenity migration outlined earlier by Burnley and Murphy (2004).

In an attempt to understand the ‘push’ and ‘pull’ factors of ‘sea-change’ communities, Gurran *et al.* (2007) developed five profiles of coastal hamlets (see Table 2.6). These profiles assist to characterise, analyse and develop policy and management approaches responsive to the needs of each community. This dissertation will focus on what Gurran *et al.* (2007) referred to as coastal hamlets, in particular, the coastal hamlets of FNQ whose population projections reflect their populations as comprising of significant increases in the proportion of people over the age of 65 years within five to ten years (see Table 5.2). Coastal hamlets are classified as remote LGAs located more than three hours drive from a capital city with populations of less than 15,000 people (Gurran *et al.* 2007). Due to the isolation of some of these communities, little major development has occurred, usually because of the surrounding protected conservation areas or agricultural lands, which serve the purpose of natural development boundaries. Due to their high lifestyle amenity, these areas are highly attractive to both tourists and ‘sea-change’ migrants seeking alternative lifestyles away from larger more populated and developed areas. Coastal hamlets are in fact small towns surrounded by rural or protected natural hinterland.

Table 2.6 Typology of sea-change communities.

Coastal Model	Description
Coastal Commuter	Suburbanised satellite communities in peri-metropolitan locations adjoining Australia's state capital cities, e.g. Gosford near Sydney.
Coastal Getaway	Small to medium coastal hamlets and groupings of settlements within three hours' drive of a state capital city, e.g. Victor Harbour in South Australia.
Coastal City	Substantial urban communities whose populations exceed 100,000, situated beyond a state capital city, e.g. Cairns, Queensland.
Coastal Lifestyle Destination	Predominantly tourism and leisure communities more than three hours' drive from a state capital city, e.g. Coffs Harbour in New South Wales.
Coastal Hamlets	Remote coastal hamlets often surrounded by protected areas, with populations below 15,000 people, situated more than three hours' drive of a state capital city, e.g. Cardwell in Queensland

Source: Compiled using details from Gurran *et al.* (2007)

Further to the development of the typology of 'sea-change' communities, Gurran *et al.* (2007) also identified social, economic, infrastructure, governance and environmental issues that amenity migration has caused within coastal hamlets (see Table 2.7).

Environmental and socioeconomic consequences of amenity migration in these centres are significant, as population growth often occurs in environmentally sensitive locations, unprepared for the demands of population growth (Gurran *et al.* 2007). In addition, the social impact of population increases can be profound, particularly for younger migrants, as coastal hamlets characteristically experience higher socioeconomic disadvantage and unemployment rates, with considerations, such as,

lower incomes and poorer health outcomes, a consideration for retirees, particularly in those centres located large distances from metropolitan centres (Gurran *et al.* 2007).<sup>7</sup>

Table 2.7 Typical issues affecting coastal hamlet sea-change communities.

Issue	Coastal Hamlet
Environment	Loss of biodiversity/habitat fragmentation Coastal wetlands threatened Water quality threatened Urban encroachment on natural hinterland areas Loss of rural land Loss of cultural heritage
Social	High seasonal populations Loss of local character Ageing population Concentration of socioeconomic disadvantage
Economic	Loss and decline of traditional industries Lack of diverse economic base Seasonal economy High unemployment
Infrastructure	Insufficient physical infrastructure (roads, sewerage, water services) Lack of health services Lack of education/training opportunities Lack of public transport Seasonal infrastructure demands Too small to support a wide range of infrastructure and services
Governance	Lack of detailed/appropriate local planning controls Lack of effective regional planning Competing coastal management, natural resource, conservation and planning legislation Overlapping State/local jurisdiction

Source: Compiled using details from Gurran *et al.* (2007).

<sup>7</sup> In coastal regions experiencing high growth, population distribution statistics often show a younger profile than the national population profile, with an average of 79% of new residents categorized as less than 50 years of age (ABS 2004). Burnley and Murphy (2004) stated that the migration of retirees into these centres is significant for younger migrants, for it is the spending patterns of retirees, along with the demand for medical, transport, service and social services, combined with tourism spending in these high amenity locations, that stimulated employment and business opportunities. Gurran *et al.* (2007) stated these centres are typically those known as Coastal Lifestyle Destinations (see Table 2.6).

The high proportions of more mature-aged residents exacerbate these social impacts. Furthermore, Gurran *et al.* (2007) warned that as more affluent amenity migrants relocate to smaller coastal locations, higher demands are placed on low cost and affordable housing, with supply and demand typically driving up prices, reducing affordability and availability. As environmental policies restrict growth in high amenity locations, forcing low to middle income earners to shift to less well-serviced locations, socio-spatial polarisation becomes increasingly apparent. Gurran *et al.* (2007) also described a loss of 'sense of place', brought about by rapid population growth affecting the character of a township, particularly when new residential, commercial and tourism developments change the landscape of the centre. Closely related is the loss of a 'sense of community', as social networks alter to accommodate an influx of new residents and visitors. These findings were confirmed by Bohnet and Moore (2011) who stated amenity migration into the Wet Tropics region of FNQ linked social, cultural and economic effects based on changes in land use, loss of cultural, spiritual and historical sites, loss of agricultural land and of affordable housing.

Most importantly in coastal regions vulnerable to natural climatic events, social vulnerability has the potential to lead to community vulnerability in relation to natural hazard resilience. The out-migration of experienced residents seeking employment and education opportunities results in a loss of local knowledge and experience necessary to ensure natural hazard resilience. Population changes also result in an increase in the numbers of older people facing natural hazard preparation and recovery without family support, which, according to Cutter and Finch (2008), can lead to a higher likelihood of injury, death or illness. Few (2007) also warned that the fragile economies which typify coastal hamlets often leave residents with fewer resources required to adequately prepare and recover from a natural hazard. Burby *et al.* (2003) also warned that if new inexperienced residents are residing in low-cost rental properties, considerations must be given to the integrity of the dwelling, and to the likelihood that these residents will be less able to adapt their homes to future climatic events.

The combination of these factors can lead to reduced community adaptive capacity and increased vulnerability in relation to natural hazard resilience, and are issues that must be considered in light of climate predictions warning of increases in the intensity of tropical cyclones in the future. As Australia's exposed coastal hamlets age,

considerations must be made as to the influence the ageing population will have on the resilience of vulnerable coastal hamlets in the future.

## **2.4 The Ageing Population**

According to the United Nations (UN) (2015), population ageing, the most distinctive demographic feature of both the twentieth and twenty-first centuries, occurs when the proportion of the population over the age of 65 years exceeds the proportion of the population under the age of 15 years<sup>8</sup>. This shift in the age structure of populations, first noticed in developed countries, and then later in some developing countries, is predicted to have a profound impact on all aspects of society in the future (UN 2015). Data from the World Bank (2015a) show that these trends are already prevalent in developed countries such as Japan, Germany, Italy and Greece (see Table 2.8). HelpAge International (HAI) (2008) stated that of the world's 580 million older adults aged 60+ years, approximately 355 million are located in developing countries, with forecasts estimating that by 2020, 710 million of the estimated 1 billion ageing persons will be residing in developing countries, including China, India, Brazil, Indonesia, Pakistan, Mexico and Bangladesh.

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<sup>8</sup> It is acknowledged that medium and long-term population projections have, in the past, proven to be notoriously inaccurate, due to changes in government policies and natural events. This also applies to age structure of a population, hence, groups, such as the ABS, revise their projections every few years and most certainly after each population census.

Table 2.8 Countries with fastest ageing populations (2015)<sup>9</sup>.

Country	Population 0 – 14 years as a percentage of the total population	Population aged 65 and above as a percentage of the total population
Japan	13	26
Italy	14	22
Greece	15	21
Germany	13	21
Portugal	14	21
Finland	16	20
Bulgaria	14	20
Sweden	17	20
Latvia	15	19
Malta	14	19
France	18	19
Croatia	15	19
Denmark	17	19
Austria	14	19
Spain	15	19
Estonia	16	19
Lithuania	15	19
Belgium	17	18
Netherlands	17	18
Czech Republic	15	18
Switzerland	15	18
Slovenia	15	18
Hungary	15	18
United Kingdom	18	18

Source: Compiled using details from the World Bank (2015c; 2015d).

<sup>9</sup> According to World bank (2015c; 2015d) Australia's population of people aged 0-14 years as a percentage of the total population = 19, with the population of those aged 65 years and over as a percentage of the total population = 9.

Population ageing is a consequence of two critical factors: increases in life expectancy and decreases in fertility rates (UN 2002). As declining fertility rates are generally the primary determinant feature of population ageing, the decrease in these rates globally by almost half over the last half of the last century has resulted in a notable impact as communities are unable to secure generational replacement (Sleeboos 2003; UN 2002). A number of reasons can explain the declining fertility rate. These include: the trend to either delay childbirth or the deliberate choice to remain childless; decreases in child mortality rates resulting in lower replacement child births; changes in the educational opportunities afforded women; preference of women to follow a career rather than start a family; increases in female labour force participation; and increases in the age of mothers at the birth of their first child (Sleeboos 2003). These changes result in smaller family units, particularly in developed countries (Adserà 2004; Sleeboos 2003). Although societal changes such as these have played an important role in the increasing age of populations, our longer life expectancy has also exacerbated the problem (Adserà, 2004; Richmond 2008).

Increases in life expectancies have been one of the most significant accomplishments of the twentieth and twenty-first centuries, with a remarkable gain of approximately 30 years in the life expectancy of people from developed countries during the twentieth century (Christensen *et al.* 2009). According to the World Bank (2015a; 2015b), global life expectancy of females has grown from 54.4 years in 1960 to 73.6 years in 2014, while males are predicted to live until 69.4 years in 2014 compared to 50.6 years in 1960. Rapid declines in mortality rates, increases in the survival rates of the sick and injured, the slower progression of some chronic diseases, changes to lifestyles and improvements in the health status of ageing people, have all contributed to extending a human's life span (Muramatsu & Akiyama 2011; Palacios 2002; Richmond 2008). According to the UN (2015) this accomplishment has meant that the world's total number of persons over the age of 60 years is expected to grow 56%, from 901 million to 1.4 billion between 2015 and 2030, with predictions that the global population of older people will double to 2.1 billion by 2050.

More developed countries, including Japan, Italy, Greece and Sweden have reported that their populations are now comprised of more people 65+ years than of children under the age of 15 years (ABS 2013a), as previously observed in Table 2.8. Japan, in



particular, is facing unprecedented population ageing with census figures revealing that 23% of its population was over 65 years of age in 2009 (Muramatsu & Akiyama 2011). It is anticipated that by 2030 one in every three people in Japan will be more than 65 years old, and one in every five over 75 years of age. Coupled with the declining fertility rates, Muramatsu and Akiyama (2011) reported that one of the most critical societal issues for Japan is that its population is ageing and declining in size simultaneously. Although Europe and Japan generally have smaller proportions of children and higher proportions of older people than Australia (ABS 2013a), our future demographic profiles face the same issues as that of other developed countries.

Australia's population is also ageing, with the number of persons aged over 85 years of age increasing by 156% over the past two decades (ABS 2013a). The ABS (2013a) stated that there had been a 4.6% increase (19,300 people) in the number of persons aged over 85 years of age during the 2012/2013<sup>10</sup> financial year, bringing the total for that period to 439,600 people aged 85+ years. The latter figure comprised of almost twice as many females (283,100) as males (156,500), reflecting the longer life expectancies of females. In addition, the number of centenarians in Australia has increased by 271% over the past two decades, with the number of people aged over 100 years of age increasing by 13.9% over the 2012/2013 financial year (ABS 2013a). This was an increase of 500 people, making a total of 3,800 centenarians, of which there were almost four times as many females (2,900) as males (800), reflective of the higher life expectancy of females (ABS 2013a). These trends have been recorded across all states and territories of Australia, although at differing rates.

According to the ABS (2013a), Tasmania has experienced the most rapid ageing of its population, followed by South Australia, New South Wales, Victoria, Queensland, Western Australia, the Australian Capital Territory, and finally, the Northern Territory<sup>11</sup>. The migration to the mainland by younger adults from Tasmania has been attributed to its accelerated ageing population, with the more slowly ageing population

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<sup>10</sup> 1 July 2012 to 30 June 2013.

<sup>11</sup> New South Wales, Western Australia, Queensland and the Northern Territory's populations are ageing more slowly due to higher numbers of Aboriginal and Torres Strait Islander (ATSI). According to the ABS (2010), the total fertility rate for ATSI women was 2.74 babies compared to the total fertility rate for all women in Australia of 1.88.

rates of Queensland and Western Australia attributed to the mining employment opportunities in those states attracting younger workers and their families.

Despite these migratory trends, Queensland's population is predicted to reach 10 million by 2061, with projections estimating 24.2% of the population will be over 65 years of age, while 6% are projected to be over the age of 85 years (Queensland Government Statistician's Office 2015). The implications of this change in the demographic profile of Australia raises concerns for governments and authorities focussed on areas such as economic growth, changes to the workforce, increased demand on health services and government policy priorities (ABS 2009). There are two distinct discourses in the literature in regard to the negative and positive implications of an ageing population, while a third is concerned with the problem of uneven ageing throughout metropolitan, regional and remote areas of Australia, as well as the challenges associated with ageing healthily and well in place, especially in more remote and less-serviced locations (Smailes *et al.* 2014).

## **2.5 Negative and Positive Implications of an Ageing Population in Australia**

Concerns relating to the impact the ageing population will have on the workforce in Australia were first raised in the Australian Federal Government's Intergenerational Report released in 2002, in which it outlined the predicted rapid increase in the cohort aged  $\geq 65$  years, and the slowing down of growth in the cohort aged 15-64 years, and the decline in those aged  $\leq 14$  years (Doughney & King 2002). Such projections resulted in the Report concluding that Australia would see low growth in the labour force, falling participation rates in the labour market and a consequent reduction in the growth in real GDP per person<sup>12</sup>.

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<sup>12</sup> The Australian Government's Intergenerational Report (2002) was criticised by Access Economic (2006) on behalf of Medicines Australia for the following: (1) Assumptions that past increases in the relative cost of health would continue into the future due to population ageing; (2) Ignoring continued productivity growth could raise the average income of Australians above the levels in 2002, meaning any need to raise tax rates to pay for a rising number of older adults may be achievable; (3) Failure to take into account the potential effect on future political pressures from the ageing baby boomer generation for higher age pensions and spending; (4) For focusing on the Australian Budget in regards to the success or failure of any policy change, stating that shifting costs to the States or households does not deal with the costs of an ageing population, rather, it simply shifts the responsibility for paying for the costs; and, (5) Not taking into account 'feedback loops' where growth in one variable would influence growth in other variables, such as health and medicines spending.

Added to these concerns were predictions relating to future increased demand on health and aged-care services. Hugo (2007) explained that the improved health and the subsequent unprecedented longevity of older Australians had resulted in an increase in the numbers of older adults who will inevitably be seeking either institutional care or intensive in-home assistance. He warned that the mobility of modern populations could result in the likelihood that older people may not have the luxury of family support. This viewpoint is shared by Tuohy and Stephens (2015) who stated the loss of traditional forms of social assistance challenges older adults' abilities to maintain independence, linking both social and community vulnerability to poorer health and social outcomes, which are exacerbated by the impact of a disaster.

Hugo (2007) also claimed that despite medical science's ability to treat conditions that prolong the life of an older person, treatments often leave many with a disability or weakness, with the author predicting that twice as many older Australian adults could be living with a disability by 2032 compared to the number in 2007. This prediction was supported by the Australian Institute of Health and Welfare (2002), which stated in 2002 that on average, Australian men could expect the last 13 years of life to be affected by ill health and/or disability<sup>13</sup>, while on average, women could expect the final 24 years of life to be similarly affected. While these claims paint a dreary picture for an ageing Australia, a contrasting body of literature claims that an ageing population is not necessarily a sicker one.

The ageing baby boomer generation is depicted in the literature as more healthy, active and productive than older populations of the past (Healy 2004), with authors, such as Warburton and Bartlett (2004), warning governments and economists not to focus on the negativities associated with a declining workforce and increased need for aged care facilities and health services. Warburton and Bartlett (2004) advised instead of the benefits that are to be gained by focusing on the contribution of older people to society,

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<sup>13</sup> According to AIHW (2016) one in five Australians are affected by a chronic disease, a group of diseases that are long lasting and persistent, impacting on an individual's quality of life, as well as their broader social and economic well-being. In Australia, chronic diseases are the leading cause of 'fatal burden of disease', or, the amount of life lost due to people dying early, and are the leading cause of illness, disability and death in Australia, accounting for 90% of all deaths in 2011.

particularly the financial, emotional and practical help older people can offer younger members of their own family and possibly their own communities.

Warburton and Bartlett (2004) also outlined the valuable role older people play as volunteers in their communities, as well as the vital capacity they have as carers of disabled and ill partners. They stated that these activities not only had an estimated economic value of between \$24 billion and \$31 billion in 2003, but one which has a value that far exceeds simply an economic dimension. Warburton and Bartlett (2004) warned that the prohibitive cost of such services often means that these would not exist if it were not for those who volunteer their time, and as such, the volunteering activities of older Australians provides a healthier society. The strong attachment to home and place experienced by many older people, as well as the role they play in their community, has been accredited as the reasons why older people volunteer their time, and has also been cited as the reason why many older Australians have a tendency to prefer to 'age in place' (Han & Corcoran 2013).

## **2.6 'Ageing-in-Place' Healthily and Well**

'Ageing-in-place' has been described by Wiles *et al.* as, "...remaining in the community, with some level of independence, rather than in residential care" (2011, p.357), and is described as giving older adults the choice as to where and how they age by allowing the sense of attachment a person has to both their home and community to provide them with a sense of connection, familiarity and security. However, Han and Corcoran (2014) argue that older people are restricted in their choice due to the risks associated with chronic disease and the need for reliable and accessible health services. Examining the international research surrounding the mobility of older people, consensus is that older people in the USA and UK adjust their lifestyles to meet their changing abilities and situations with many moving as young retirees, often after the last child has left home, and then again in later life, after their health has diminished, or after the loss of a partner (Han & Corcoran 2014).

Statistics in Australia, however, show that older Australians are less likely to migrate on retirement, preferring instead to 'age in place' (Han & Corcoran 2014). Factors that contribute to this decision are said to be a person's social networks and ties (which tend

to decline with age), as well as the desire to participate in local community activities, suitability of their housing, and the accessibility of local infrastructure, such as shopping, service and health-care facilities (Han & Corcoran 2014). The home, in particular, has been identified as vital to the health of older independent-living adults. Cornell *et al.* (2012) outlined the dependence an older person has on the familiarity, functionality and safety of their homes, stating that the home is a source of support for an older person facing a declining physical, mental and financial capacity. This is an important consideration for those residing in a cyclone-prone location, where the on-going maintenance of property is vital to cyclone preparation and resilience.

Davis and Bartlett (2008) warned, however, that ageing-in-place is not without its difficulties, especially in smaller remote or regional communities. General misconceptions of older people residing in rural and remote communities include their self-reliance, hardiness, conservativeness, independence and cohesiveness. These misconceptions tend not to reflect statistics showing lower medical visitations amongst older people in remote areas, along with a delay in seeking health care, reflecting the lack of available health services in these regions, along with a lack of financial resources, further limiting the person's ability to travel long distances to seek medical advice.

Clemens *et al.* (2013) agreed with these claims, stating that the health of those residing in rural and remote areas of Australia is consistently worse than their urban peers, blaming higher levels of disadvantage and poor access to services, which are exacerbated and more complex in the context of disasters. Clemens *et al.* (2013) warned that these factors impact on disaster preparedness and planning amongst these communities.

This overrepresentation of disadvantage in small remote communities is the outcome of an out-migration of younger members of the community seeking employment and education, leaving those who have the least resources (Davis & Bartlett 2008). These sentiments are echoed by Adams (2015), who stated populations most affected by environmental risk often remain because of their lack of capacity to migrate away. As such, the by-product of a reduced population usually is the further reduction of specialised health-care services, leaving those wanting to 'age in place' to face

challenges in relation to distance, isolation, income and poor access to services and transport; issues that an older person perceives as of great benefit for their independence. These issues pose serious questions as to the resilience and sustainability of these coastal retreats in relation to natural hazards.

## **2.7 The Vulnerability of the Aged During a Natural Hazard**

### *2.7.1 Vulnerability*

Vulnerability is defined as the potential for loss (Cutter, 1996). Widely used in the field of natural hazard research, the term is used to estimate the potential for loss and damage from natural hazards, of individuals, property and communities (Cutter, 1996).

Expanding this definition, Cutter (1996) introduced the hazards-of-place model of vulnerability, in which vulnerability is viewed as a combination of both physical and social risk within a geographical domain. The hazards-of-place model drew on the work of Blaikie *et al.* (1994) and Mileti (1999), who both identified risk as the level of exposure to a natural hazard event, as well as on a rich body of research investigating the influence of demographic factors, including socio-economic status, ethnicity, education, health and age (see Table 2.9). This dissertation adopts the hazards-of-place model, applying it to the examination of older adult populations residing in coastal hamlets of less than 15,000 people on the FNQ coast, vulnerable to tropical cyclones and storm surge.

### *2.7.2 Who are older adults?*

According to Wang and Yarnal (2012), people aged 65 years and over are regarded as older adults in industrialised countries, as this stage in a person's life usually marks the point when most individuals no longer actively contribute economically to society. However, the International Federation of Red Cross and Red Crescent Societies (IFRC 2007) referred to older people, particularly in developing countries, as those who are 60 years and over, with distinctions made as to whether a person was regarded as 'young old', 'old old' or the 'oldest old'<sup>14</sup>. The IFRC (2014) outlined categories considering individuals aged 60-69 years as 'young old', those aged 70-79 years as 'old old', while people aged 80+ years were regarded as the 'oldest old'.

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<sup>14</sup> These terms are also used in the medical health literature.

These classifications highlighted the importance of understanding that older adults are not a homogenous group, and as such, the terms have been adopted by other researchers, such as Ngo (2001), who outlined that in industrialised countries individuals aged 65-74 years were regarded as ‘young old’, those aged 75-84 years as ‘aged’, while the ‘oldest old’ were those 85+ years. An additional category was introduced, known as ‘frail’, which encapsulated all individuals over the age of 65 years with diminished physical or mental capacity. Consideration must also be given to the variations that also apply within each of these categories, and that the chronological age of a person is not an influencing factor of a person’s vulnerability in isolation. Past research has identified natural hazard risk factors, including health, marital status, ethnicity, cultural beliefs, health, gender, religious beliefs, socio-economic status, location and proximity to the hazard that must also be considered (see Table 2.9)<sup>15</sup>.

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<sup>15</sup> This dissertation acknowledges the vast numbers of factors that impact an individual’s natural hazard vulnerability, and as such, these have been included in figures and tables, but note must be given that those pertaining to older adults and their place of residence have been the focus for this dissertation.

Table 2.9 Previous research on factors that influence an individual's natural hazards vulnerability.

<i>Subject and Author</i>	<i>Subject and Author</i>
<i>Demographics - including age, health (including mobility/dexterity), education level, employment status, ethnicity, religious beliefs, socio-economic status</i>	<i>Physical Attributes of Hazard</i>
Bickerstaff 2004	Cutter 1996
Bryant 2005	James <i>et al.</i> 2007
Eisenman <i>et al.</i> 2007	
Grothmann & Reusswig 2006	<i>Individual/Personal Experiential Factors</i>
Hogan & Marandola 2007	Grothmann & Reusswig 2006
Horney <i>et al.</i> 2012	Li 2008
James <i>et al.</i> 2007	Slovic 1986
King & McGregor 2000	
Slovic 2000	<i>Socio-Situational Factors</i>
Wisner <i>et al.</i> 2003	Bickerstaff 2004
	Bryant 2005
	Paton 2003, 2007
	Sjoberg 2000
	Slovic 2000
<i>Cognitive Behaviour</i>	<i>Information, Communication and Education between government, Non-Government Organisations (NGOs) and community including trust in authorities</i>
Bandura 1989, 1998, 2001, 2002, 2004	Bickerstaff 2004
Benight & Harper 2002	Cvetkovich & Earle 1988
Connor & Norman 2005	James <i>et al.</i> 2007
Cova <i>et al.</i> 2009	Lidstone 1993
Cova <i>et al.</i> 2011	Mileti & Sorensen 1990
Elliott & Pais 2006	Morrissey & Reser 2003
Glanz & Bishop 2010	O'Connor <i>et al.</i> 1999
Horney <i>et al.</i> 2010	Pandey & Okazaki 2005
Paton 2003	Paton 2007
	Paton & Johnston 2001
	Slovic 1986



### 2.7.3 Why are the aged vulnerable?

Figures revealing the mortality rates of older adults during a natural hazard are most telling. Hurricane Katrina<sup>16</sup> claimed the lives of 1,836 people in 2005, 74% of whom were over the age of 60 years, while the European heat wave<sup>17</sup> in 2003 claimed approximately 70,000 lives, 70% of who were over the age of 70 years (Astrom *et al.* 2011; IFRC 2014; Wang & Yarnal 2012). In 2011, the Japanese tsunami and earthquake<sup>18</sup> took 15,884 lives, 77% of whom were older adults, and 46% of whom were over the age of 70 years (Khazai *et al.* 2011). Cherniak *et al.* (2007) reported that in 2005, more than 1000 older adults perished in 14 hurricanes globally<sup>19</sup>, while 50% of the death toll in 2004, attributed to the impact of Hurricane Charley<sup>20</sup> on southern and central Florida, were older people (due to the popularity of the region to retirees). In addition, of the 1104 victims of Australian bushfires<sup>21</sup> from the period of 1900 – 2008, 67% were over the age of 60 years, with records showing that older adult deaths increased to 30% of the total victim count between 1956 – 2008 (Haynes *et al.* 2008). This increase was primarily the result of the 1967 Hobart bushfire in which 58% of victims were over the age of 60 years (Haynes *et al.* 2008). As older adults are disproportionately affected during a natural hazard, it is vital to understand the factors contributing to their vulnerability.

Older adults have been identified as a specific portion of the population most at risk from the effects of a natural hazard (Ngo 2001). Research has identified those areas of

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<sup>16</sup> Hurricane Katrina crossed the Gulf Coast of the USA on 29 August 2005 as a Category 5. Much of the loss associated with this hurricane was the result of a storm surge and consequent levee failure (Burby 2006).

<sup>17</sup> The European heatwave in 2003 raised temperature 20 to 30% higher than the seasonal average extending from northern Spain to the Czech Republic and from Germany to Italy. Temperatures ranged from 30 to 40 degrees Celsius throughout July and for much of August (United Nations Environment Programme 2004).

<sup>18</sup> The Japanese earthquake magnitude 9 occurred at 14:46 Tokyo time on 11 March 2011, off the eastern coast of Japan's Honshu Island. The earthquake caused a 38 metre high tsunami, reaching the eastern coast of Honshu Island within two minutes of the quake, and travelling 10 kilometres inland (Norio *et al.* 2011).

<sup>19</sup> During 2005, five Atlantic Ocean hurricanes made landfall; Hurricanes Dennis, Katrina, Rita, Emily and Wilma causing extensive damage and 3,913 deaths (Cherniak *et al.* 2007).

<sup>20</sup> Hurricane Charley was the first of four hurricanes to impact Florida in 2004, making landfall over western Cuba on 13 August. It crossed the coast with sustained winds of 193 km/h (Cherniak *et al.* 2007).

<sup>21</sup> Bushfires rate amongst the fourth most hazardous form of disaster in Australia, after heatwaves, cyclones and flood, with predictions for longer bushfire seasons and more intense and frequent bushfires due to the influence of a changing climate (Haynes *et al.* 2008).

vulnerability as: physical limitations impeding mobility; diminished cognitive ability reducing the individual's ability to process warnings leading to a diminished capacity to adequately prepare or recover from an event; fewer economic resources to complete post-disaster repairs; and, post-disaster psychological stress that requires specialised social services (Cherry *et al.* 2010; Cutter & Finch 2008; Wang & Yarnal 2012). These factors generally place the aged at greater risk of harm than younger members of the population pre, during and post a natural hazard event.

#### 2.7.3.1 Physical limitations

Deteriorating physical capacity is one of the most discernible symptoms of ageing. Older people generally exhibit reduced mobility, impaired balance, a lessening of motor strength, diminished exercise tolerance and also limitations that present as difficulty in performing personal care (Cutter & Finch 2008; Fernandez *et al.* 2002; Huerta & Horton 1978; IFRC 2014; Kilijanek & Darbet 1979). Reduced physical capacity affecting mobility and dexterity impairs the ability to walk, travel away from the home, and perform simple daily tasks such as eating or even using the telephone (Fernandez *et al.* 2002). Degraded eyesight and/or hearing also make it difficult for an aged person to see or hear media hazard warnings, in addition to leaving them more disorientated in dark conditions than younger people (Wang & Yarnal 2012).

Physical disabilities, coupled with a pre-existing chronic illness, are intensified, leading to major disadvantages during the on-set of a natural hazard. Fernandez *et al.* (2002) highlighted that during sudden on-set disasters, such as earthquakes and floods, older adults are unable to quickly evacuate or take cover, leading to higher injury or disaster-related death rates amongst older citizens. Many who flee a sudden on-set disaster find themselves travelling for extended periods without adequate food, supplies, or shelter; this situation takes its toll on older adults and impairs their ability to reach humanitarian services (IFRC 2014). Those who choose to remain are often unprotected and isolated, without assistance or aid.

Diminished physical capacity reduces an older adult's ability to recover from a natural hazard event. Past research has stressed the importance of the need for physical strength and endurance during the recovery stage of a disaster to allow clean-up and repairs to property (Huerta & Horton 1978). This stage is often a lengthy process

performed under extreme conditions, bringing numerous challenges requiring physical strength and stamina, leaving many older adults unable to cope. As a consequence, morbidity and mortality are more likely in older adult populations during a natural hazard, with survivors experiencing a slower rate of recovery and reconstruction than the rest of the affected population (Cutter & Finch 2008).

#### 2.7.3.2 Diminished cognitive capacity

Declining cognitive capacity impairs an aged person's capacity to interpret and process hazard warnings. Cherry *et al.* (2009) defined cognition as mental processes that play a vital role in healthy ageing, determining how an individual perceives, pays attention to, remembers, comprehends and makes decisions about information. Hazard preparatory information is designed to deliver the information necessary to make informed decisions in relation to an impending natural hazard threat to members of a vulnerable community. Changes in a person's cognitive capacity may therefore, affect their ability to interpret, understand and act upon the information provided (Mayhorn 2005). The most severe form of cognitive loss is that of dementia from the onset of Alzheimer's Disease.

Following the 2011 Japanese earthquake and tsunami, Furukawa *et al.* (2012) reported that many older adult Alzheimer patients seeking medical assistance after the disasters, presented as significantly worse, both behaviourally and psychologically, than they had been previously. Furukawa *et al.*'s (2012) findings showed that older adults who had been evacuated to shelters with large numbers of people were reported as being in a worse condition than those who remained in their homes or with friends. According to Furukawa *et al.* (2012), the overcrowded conditions in the shelters, coupled with poor hygiene facilities, proved to be extremely stressful, exacerbating any cognitive condition. These findings confirmed Cutter and Finch's (2008) findings that diminished cognitive capacity was a contributor to psychological stress, often impairing recovery and increasing the need for social services. Fernandez *et al.* (2002) also reached these conclusions, stating that older adults have a stronger need for social support, usually from a spouse, friends or family, in order to mitigate against the effects of stress during a natural hazard, than younger members of the community. The need for strong social support networks, particularly during the recovery phase post event, was a factor Cherry

*et al.* (2009) concurred could also contribute to the skills and resources required for the older person to recover. These claims raise concerns when considered with the ABS (2013c) findings that as a person advances in age the likelihood of them living with a spouse or family member also diminishes.

#### 2.7.3.3 Chronic health issues

The probability of being affected by multiple chronic conditions increases with age. According to Fernandez *et al.* (2002), 30% of people aged between 65-74 years suffer some form of limitation due to a chronic condition, with this figure rising to over 50% of those aged over 75 years, and 85% when a person reaches 80+ years. Heart disease, hypertension, diabetes, cancer, dementia, arthritis and cataracts are all prevalent in those who are over 60 years of age (Cherry *et al.* 2009; Fernandez *et al.* 2002; IFRC 2014). For those who suffer from chronic conditions, the immediate crisis they face after a disaster often compounds the effects of the pre-existing condition, aggravated by the loss of health resources and services that allow them to maintain and manage their conditions (IFRC 2014).

Compromised health services are often a consequence of a natural hazard. Overwhelmed health facilities often place additional emotional stress on older adults dependent on regular care, with many older people often suffering health-related consequences as a direct result of the natural hazard (Fernandez *et al.* 2002). A severe snowstorm in New York in 1987 saw hospitals overwhelmed by the influx of older adults, particularly those with respiratory problems (Fernandez *et al.* 2002). The loss of electricity in the city meant those living independently could not operate nebulizers, oxygen therapy equipment and other forms of equipment required to maintain a healthy life, nor could they keep their homes warm. Emergency departments were required to operate beyond their usual capacity for extended periods of time to ensure patient survival, with many patients presenting in an acutely ill state.

Of course, this scenario plays out very differently in more remote or isolated areas. Taking only the FNQ example for the moment, remote, coastal hamlets are so called because of their lack of proximity to capital centres (more than 3 hours drive), and to larger regional townships. Often residents residing in these communities can travel

more than 50 kilometres to receive any form of extensive hospital or specialist care<sup>22</sup>, which is an impossible undertaking following the impact of a natural hazard. As such, this form of vulnerability is of particular concern to this study.

#### 2.7.3.4 Financial vulnerability

Older adults usually have fewer economic resources, impacting pre-disaster property preparation and post-disaster repairs and recovery. Fothergill and Peek (2004) stated that socio-economic status was a significant predictor of vulnerability during pre and post disaster stages. Masozera *et al.* (2007) identified older adults as amongst those who most traditionally experience low socio-economic status, with Fothergill and Peek (2004) adding that socio-economic status also played a role in how hazards are perceived, leading to high rates of loss and injury amongst those with lower socio-economic status. Fothergill and Peek inferred, therefore, that older adults are:

... more likely to perceive hazards as risky; less likely to prepare for hazards or buy insurance; less likely to respond to warnings; more likely to die, suffer injuries, and have proportionally higher material losses; have more psychological trauma; and face obstacles during the phases of response, recovery, and reconstruction (2004, p.103).

These findings are acknowledged throughout the literature, particularly referring to those on less flexible fixed incomes, such as pensions. Ngo (2001) and Wang and Yarnal (2012) both warned that although the material losses are often comparable across both older and younger sectors of a community, the loss could represent a greater relative loss to an older person, due to their limited available resources. This increased economic sensitivity can lead to those over 65 years suffering higher monetary losses than those suffered by younger members of a community.

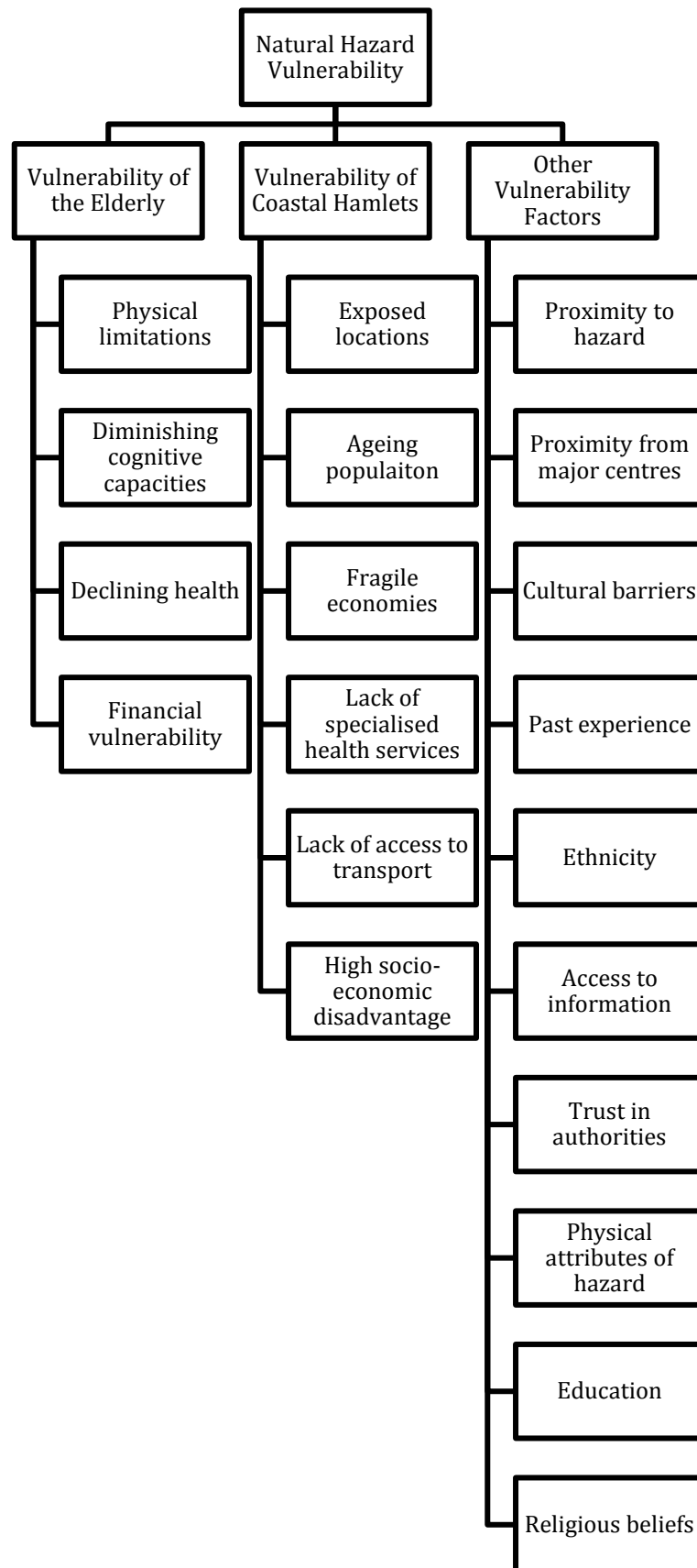
Fernandez *et al.* (2002) concurred, stating that very old people were most vulnerable to property damage because of their tendency not to insure, due to unsustainable premiums that cannot be met on a fixed low-income. Past studies have also warned that older

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<sup>22</sup> Although regional hospitals are located in the regional centres of Babinda and Innisfail, services are limited. Patients are often transported to Cairns Base Hospital in Cairns or the Townsville Base Hospital in Townsville for more intensive treatment and specialist care.

adults are more likely to underutilise disaster assistance from community disaster relief agencies, blaming a strong sense of independence and the general perception that monetary handouts and social work reflect an inability to cope, threatening their independence (Fernandez *et al.* 2002; Huerta & Horton 1978; Krongkant & Ahmad 2010; Mayhorn 2005; Ngo 2001). Referred to as welfare stigma, assistance from authorities can be seen to “...strike at the very values of independence and personal integrity which are strongly held by older adults” (Ngo, 2001, p.82).

Therefore, when older adults also experience poor pre-existing socio-economic conditions, recovery is slow, deepening the social and economic impacts of a natural hazard. Ageing Australian coastal hamlets face disquieting levels of vulnerability in relation to natural hazard resilience in the future. Figure 2.1 outlines the variables that contribute to natural hazard vulnerability, focusing on the vulnerabilities of older adults, the natural hazard vulnerability of coastal hamlets and other factors identified in Table 2.9, which also contribute to the vulnerabilities of both individuals and collectively as a community. As natural hazard management in Australia relies on citizens remaining self-reliant, questions must be raised as to the future capacity of these coastal centres to prepare and recover from predicted increases in intense natural hazards in the future.



**Figure 2.1 Factors that contribute to natural hazard vulnerability in exposed, ageing Australian coastal hamlets.**

## **2.8 Natural Hazard Disaster Management Approaches**

The field of natural hazard disaster management has evolved from the understanding that managing disasters requires social action in order to undertake purposeful actions before, during and after the occurrence of a hazard (de Guzman 2002).

Epistemologically, this assumes human societies and individuals have the capacity to recognise the risks associated with a disaster, understand what can cause a disaster, and what can lead to worsened effects of a disaster. These management principles then, in turn, lead to actions that mitigate or manage any adverse effects. According to de Guzman (2002), this implies that disasters can be prevented, that their impacts can be mitigated, and that intervention and planning can mean the difference between resilience and vulnerability.

The idea of implementing social action as a concept requires the acceptance that disaster management is a cycle, beginning with preparedness, followed by response, prevention, mitigation, relief, recovery and rehabilitation (de Guzman 2002). The development stage of this typology is prevention, mitigation and preparedness, allowing disaster management approaches to reinforce the importance of adequate planning and preparedness. Many approaches to disaster management exist within the literature, which have created numerous conceptual frameworks from which to manage and develop disaster management strategies (see Table 2.10).



Table 2.10 Approaches to disaster management.

Approach	Conceptual Framework
Sustainable Development Approach	Seeks to understand the relationship between disaster, its various phases, environmental degradation and sustainable development. An holistic approach promoting sustainable human development strategies aimed at enhancing the capacities of communities. This approach encourages self-reliance and self-sufficiency in managing disasters effectively.
Comprehensive Approach	Requires the development and implementation of strategies for different, yet complementing, aspects of disaster management, i.e. prevention and mitigation, preparedness response and recovery, within the context of sustainable development. It requires strategies and planning for risk assessment, preparedness, prevention, response and recovery. This is an authority approach that does not focus on individual self-reliance.
All Hazards Approach	The development and implementation of disaster management strategies for a full range of natural hazards. Seeks to set standard protocols for addressing similar problems arising from different hazards, such as warning, evacuation, medical services and community recovery. This approach is problematic in that specific disasters can require specific response and recovery measures, as well as prevention programs. This is an authority approach that does not focus on individual self-reliance.
Integrated Approach	Requires governments and NGOs, both private and community based, to work together in an integrated approach to disaster management. This approach promotes multi-sectoral and intersectoral coordination, aimed at reducing duplication and inefficiencies. This is an authority approach that does not focus on individual self-reliance.
Prepared Community Approach	Requires all approaches to disaster management at the local level, emphasising the important roles and responsibilities of members of the community in establishing disaster management systems. This approach ensures that a community and its individual residents are self-reliant and self-sufficient in times of disaster.

Approach	Conceptual Framework
Development Relief Approach	In contrast to traditional relief approaches, the development relief approach does not regard affected people as victims, instead it regards them as active people with capacities despite the effects of the hazard. This approach entails the analysis of capacities and vulnerabilities of the affected community, which in turn defines the nature of the assistance required and the manner in which it is provided. This requires the analysis to consider the demographic, social and economic makeup of the community and its infrastructure, in order to avoid providing inappropriate relief assistance in order to avoid dependence, increased vulnerability and further social crisis. This is an authority approach that does not focus on individual self-reliance.
All Agencies Approach	An approach that encourages many agencies to be involved to some extent in disaster management, although the context of specific agencies can vary, including risk management, environmental management, occupational health and safety, quality management and asset management. This is an authority approach that does not focus on individual self-reliance.
Resilience-Based Approach	Views disaster resilience as a shared responsibility between governments, communities, businesses, NGOs, individuals and households in relation to disaster management and preparedness. Believes that if all sectors of a community work collectively with a shared sense of responsibility, disaster management will be more effective than the individual effort of any one sector. Seeks to encourage individuals to be self-reliant and responsible for their own safety by responding to information and advice provided by authorities. This is the approach used in Australian emergency management.

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Source: Compiled using details from de Guzman, 2002; COAG, 2011.

## 2.9 Australian Federal System of Emergency Management<sup>7</sup>

Under Australia's Constitution exist three levels of political power comprising the federal government (with limited powers), eight state and territory governments, and 560 local governments (Harwood *et al.* 2014). Additional to these levels of government is the Council of Australian Governments (COAG), whose primary role is to facilitate policy of national significance that requires the coordination and cooperation of all levels of government (Harwood *et al.* 2014). As such, the members of COAG include the Prime Minister, six State Premiers, two Territory Chief Ministers and the President of the Australian Local Government Association. It is important to note that although Local Government in Australia has no constitutional status, deriving most of its powers only from state legislation, it can exercise considerable autonomy over some services, such as planning and development (Harwood *et al.* 2014) (see Figure 2.2).

Section 51 of the Australian Constitution outlines the powers conferred on the Federal Government by the States, which excludes specific powers for emergency management and disaster resilience (Harwood *et al.* 2014). This primarily leaves responsibility for the protection of life, property and the environment with the States and Territories, and includes the provision of emergency services (police, ambulance, fire, State Emergency Services (SES)<sup>23</sup>). The management of emergencies is also the responsibility of State and Territory governments, with agreements in place to share resources when needed, with State and Territory governments also calling on Federal assistance in the event of a significant natural hazard or adverse event<sup>24</sup> (Harwood *et al.* 2014).

Falling under the COAG umbrella are ministerial councils, established to address long-standing issues of national importance (Harwood *et al.* 2014). The council of significance to this dissertation is that of the Standing Council on Police and Emergency Management (SCPEM), which promotes a coordinated national response to emergency management issues, a framework for cooperation and shared strategic direction (Harwood *et al.* 2014).

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<sup>23</sup> The State Emergency Service (SES) comprises staff and volunteers who provide disaster response within local government jurisdictions.

<sup>24</sup> It is acknowledged that that COAG allocates responsibilities to carer agencies, such as local hospitals, Red Cross, NGOs, such as religious based organisations such as Auscare and Anglicare, as well as essential services. Each of these organisations also have individual disaster plans.

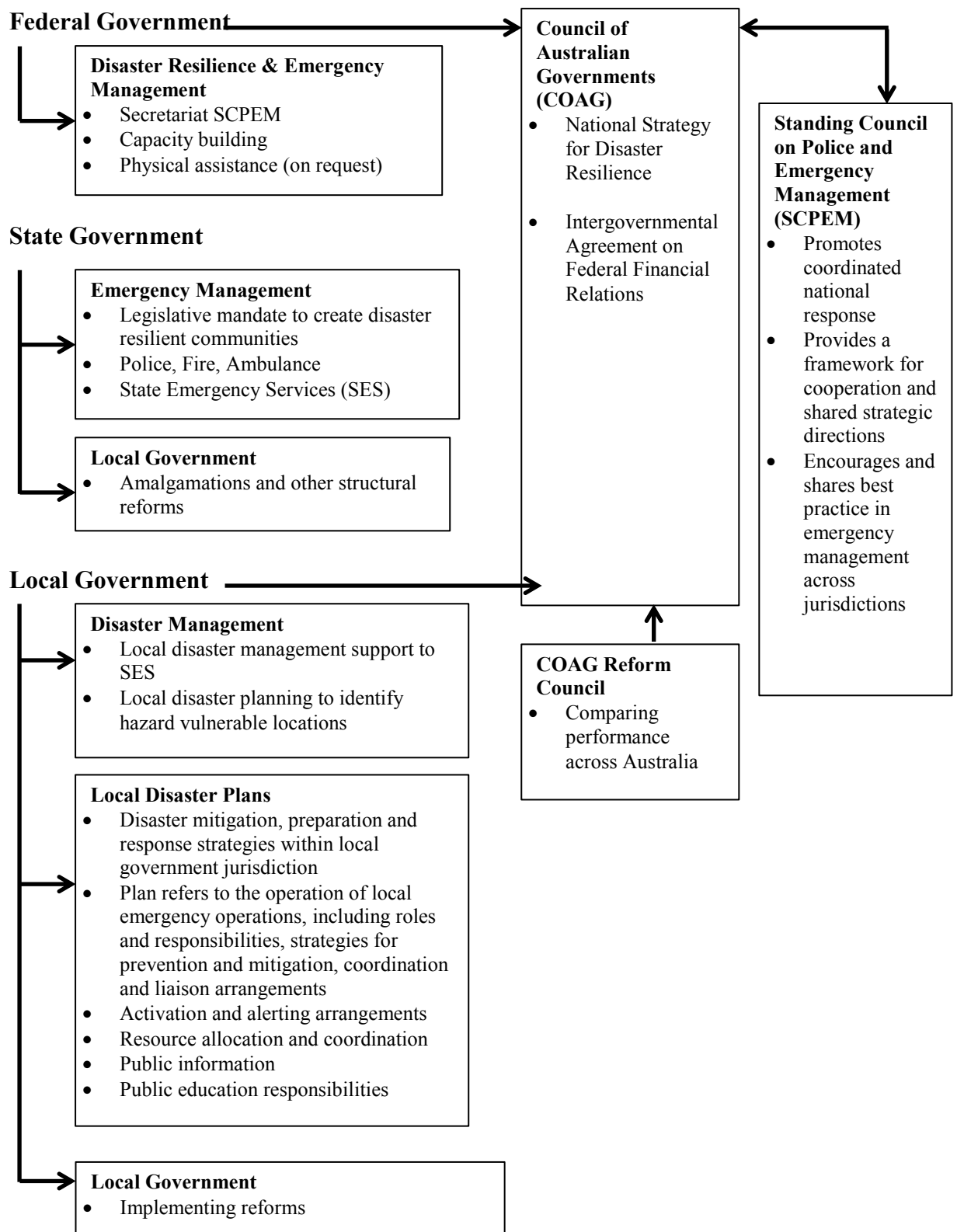


Figure 2.2 Responsibilities for emergency management in the Australian federal system.

Source: Harwood *et al.* (2014).

SCPEM leads emergency management in Australia by developing national policies and priorities and considers recommendations of national interest from commissions of inquiry set up to investigate the handling of natural hazard disaster responses (Harwood *et al.* 2014).

It is the Federal Government's role to support the States and Territories by providing support to assist with developing their emergency management capacities and the provision of physical assistance when a disaster overwhelms State or Territory capacities (Harwood *et al.* 2014).

In 2005 the UN set up a framework aimed at globally improving the resilience of local communities to natural hazards. Titled the *Hyogo Framework for Action* (HFA), this framework sought to provide a practical tool for saving lives and livelihoods (International Strategy for Disaster Reduction (ISDR) 2007). The HFA outlined the importance of understanding that disaster risk reduction had to be initiated at the local level, within households, schools, business and communities, and that disaster management had to be grounded in local knowledge and communicated in a fashion so as to engage all those at risk. This encouraged a bottom-up, rather than a top-down, approach to engage and empower communities to become self-reliant and more resilient (ISDR 2007). Australia, along with 167 other countries globally, adopted the framework in 2005, and as such, set about developing a natural hazard disaster strategy that fulfilled the HFA recommendations. The result for Australia was the release of the National Strategy for Disaster Resilience (NSDR) in 2011. The NSDR adopted a nationwide resilience-based approach to disaster management, aimed at providing guidance to governments, communities, businesses and individuals when planning for a natural hazard (COAG 2011). The strategy emphasised that individuals must take responsibility for their own disaster preparation, planning, prevention and recovery, reinforcing the importance of self-reliance by actioning an approach that is referred to in this dissertation as the 'self-help' approach.

## **2.10 'Self-Help' Approach to Disaster Management**

When natural hazards occur, the emergency services necessary to assist those in need are invariably stretched. Challenges exist within the vast spectrum of activities required pre,

during and post a natural hazard event, which can easily overwhelm the available emergency services and volunteers, in addition to affected individuals. The recognition of these inefficiencies has led to the concept of disaster resilient communities, advocating self-reliance, capacity building and adaptability to changes in social, cultural, environmental and economic conditions when faced with internal and external stresses (Convertito 2011).

The NSDR acknowledged that Australian communities varied in their exposure to disaster risk and composition, identifying the factors that directly influence resilience as remoteness, population density, mobility, socio-economic status, age profile, ethnicity and religion (COAG 2011). Concern about future predicted changes to climatic events were also acknowledged, along with concern regarding the availability of resources and expertise, and the potential for unrealistic expectations and unsustainable dependencies of individuals on authorities in time of need. These claims laid the foundation for the encouragement of communities to be empowered to share responsibility, emphasising that individuals and communities should be prepared to take responsibility for the risks they live with (COAG 2011). This neo-liberalist approach shifts responsibility from the State and places it squarely with the individual (Wild *et al.* 2016).

Hence, the focus was placed on greater community engagement as a means to understand the diversity of needs, strengths and vulnerabilities within communities. This process included recognising that not everyone in a community is impacted on equally, with the most vulnerable usually hardest hit and less resilient to extraneous shocks caused by a natural hazard. As such, each Australian State Disaster Authority produced and disseminated information encouraging residents to adequately prepare for, and mitigate against, a natural hazard. The affordability of on-line dissemination resulted in the preference for Internet- based information sites stressing the importance of individuals being self-reliant by offering instructions and checklists to be used by individuals and households to prepare themselves, their families and their properties for both the impact of a natural hazard, and the potential for long periods of time without services post event (see Table 2.11). It must be pointed out, however, that the search of Australian state and territory government disaster management websites was lengthy, confusing and frustrating, highlighting both a lack of consistency between these agencies when providing the public

with web-based preparatory information, and the problems facing individuals who attempt to seek information in order to implement 'self-help' procedures.

Table 2.11 Australian State and Territory government natural hazard information websites.

Organisation	Type of natural disaster	Website
Disaster Management Queensland	Cyclone Severe Storm Flood Tsunami Heatwave	'Prepare for cyclone, storm, flood and tsunami now!' <a href="http://www.emergency.qld.gov.au/emq/css/beprepared.asp">http://www.emergency.qld.gov.au/emq/css/beprepared.asp</a>
Victoria Emergency	Bushfire Flood	'Prepare and get ready' <a href="http://emergency.vic.gov.au/map#prepare-fire">http://emergency.vic.gov.au/map#prepare-fire</a>
Ministry for Police & Emergency Services New South Wales	All Hazards Approach (individual hazards not identified)	'Be Prepared' <a href="http://www.emergency.nsw.gov.au/beprepared">http://www.emergency.nsw.gov.au/beprepared</a>
South Australia Fire and Emergency Services Commission	All Hazards Approach (individual hazards not identified)	'Don't be scared, be prepared' <a href="http://www.safecom.sa.gov.au/site/emergency_management/disasters_and_you/before_a_disaster.jsp">http://www.safecom.sa.gov.au/site/emergency_management/disasters_and_you/before_a_disaster.jsp</a>
Department of Fire and Emergency Services Western Australia	Fire Cyclone Storm Flood Earthquake Tsunami	'Safety Information' <a href="http://www.dfes.wa.gov.au/safetyinformation/Pages/default.aspx">http://www.dfes.wa.gov.au/safetyinformation/Pages/default.aspx</a>
Tasmania	Bushfires	'Bushfire Ready Neighbourhoods' <a href="http://www.fire.tas.gov.au/Show?pageId=colBushfireReadyNeighbourhoods">http://www.fire.tas.gov.au/Show?pageId=colBushfireReadyNeighbourhoods</a>
Northern Territory	Cyclones Earthquakes Floods Heatwaves	'Public Safety Advice' <a href="http://www.pfes.nt.gov.au/Emergency-Service/Public-safety-advice/Cyclones.aspx">http://www.pfes.nt.gov.au/Emergency-Service/Public-safety-advice/Cyclones.aspx</a>
Australian Capital Territory Emergency Services Agency	Bushfire Storms Flood	'Community Information' <a href="http://esa.act.gov.au/community-information/">http://esa.act.gov.au/community-information/</a>



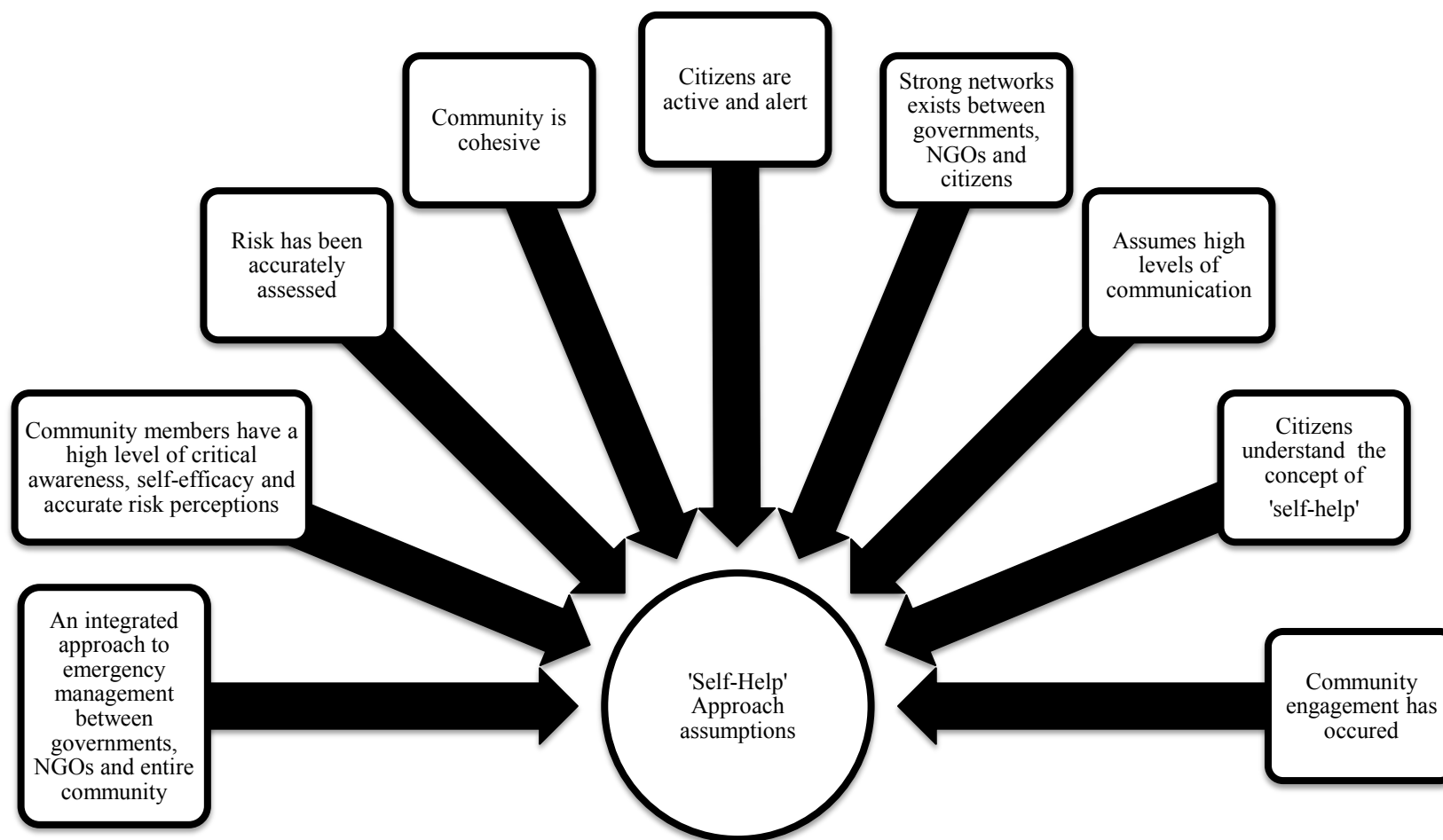
The NSDR (COAG 2011) described a disaster resilient community as one: whose citizens are fully aware of the risks that may affect them; which has access to adequate information to assist in their preparations and recovery; which has the capacity to prepare and be adequately adaptive when faced with a potential threat; and, one which has access to the necessary resources available to ensure preparation and recovery processes are undertaken effectively. The NDOA (COAG 2011) stated that residents and business owners should: work together with local leaders to build the capacity of their community by utilising personal and community strengths, networks and structures; have a strong disaster management volunteer base; develop strong relationships between all community stakeholders and emergency services, local authorities and other relevant organisations; and consistently work to increase the community's disaster resilience. Finally, it stated that land-planning schemes and building codes should be used to reduce community exposure to a hazard, and that disaster recovery services be made available to those who require them in a timely fashion. It summarises its expectations by stating, "...individuals and communities should be self-reliant and prepared to take responsibility for the risks they live with" (COAG 2011, p.10).

Emergency Management Australia (EMA 2014) advised that an integrated approach to disaster management meant that local voluntary organisations must work together with local government disaster managers to ensure the community is well prepared (COAG 2011). However, it was the role of the individual that EMA identified as key to this approach, stating that it is the individual's responsibility to: be aware and prepared for local hazards and their associated risks; to take appropriate action to minimise those risks; be actively involved in community-based voluntary organisations; and, to ensure that their local government has effective arrangements in place in case of a natural hazard emergency (COAG 2011). The final concept does seem to be an unfair burden for any individual community member; nevertheless, these are the expectations, according to the NSDR.

Summarising these expectations, Figure 2.3 provides a diagrammatic model of assumptions that must be made by local government disaster managers for the 'self-help' approach to be successful. These assumptions include: an integrated approach to disaster management exists between governments, NGOs and the community; risks and critical awareness have been accurately assessed; the community is cohesive, active and alert;

strong networks and levels of communication exist between all stakeholders; and that community engagement programs have been implemented to increase the capacity of the community to cope with and recover from a natural hazard. Further consideration must also be given to a number of influencing factors already outlined in Table 2.9, that have been identified in the literature as having an effect on an individual's, as well as a community's, capacity to fully understand the risk associated with a potential hazard (see Figure 2.4). These sentiments are also echoed by Wild *et al.* who summarised the argument by saying community resilience must co-exist with "... high levels of social capital, high-quality built environments, good access to culturally-relevant social services and low levels of socio-economic stratification." (2016, p.141).

As this research is concerned with the impact of ageing on coastal hamlets located in FNQ, Australia, consideration must also be given to the effects of ageing on local government disaster managers' expectations of community self-reliance. Located more than 3 hours drive from a capital city, with populations of less than 15,000 people, these centres usually lack adequate community and health services, road networks and public transport. Traditionally, these centres have low economic resilience exacerbated by the out-migration of younger citizens leaving in search of education and employment opportunities. These centres typically attract both retirees, seeking an improvement in their lifestyle, and those seeking cheaper housing, often disregarding the risks associated with relocating to an area with high natural hazard exposure. Collectively these characteristics impact on the resilience of a community, having a direct impact on the success of the self-help approach to natural hazard disaster management.



**Figure 2.3 Assumptions made by 'self-help' approach to disaster management.**  
Author's impression.

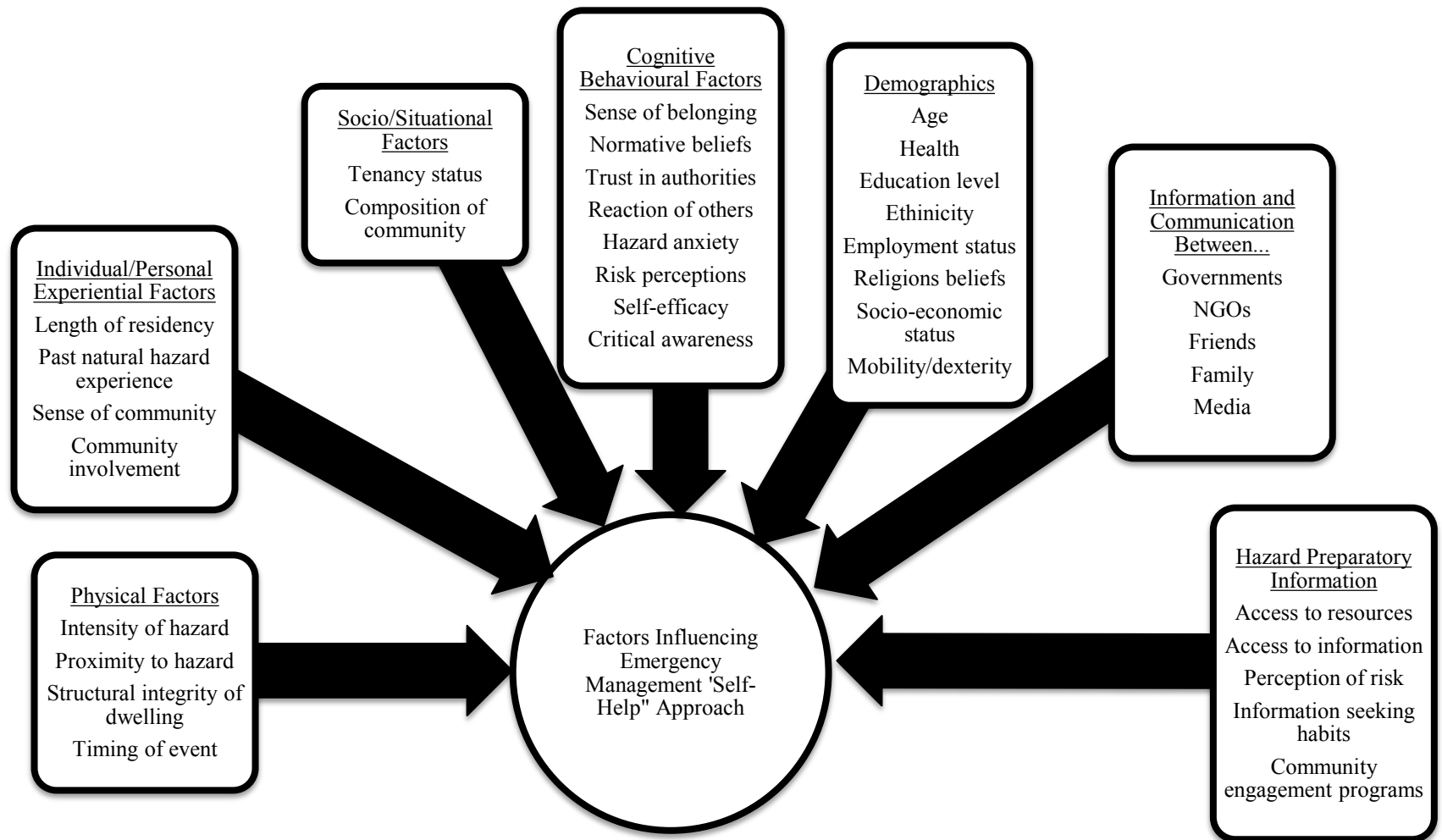
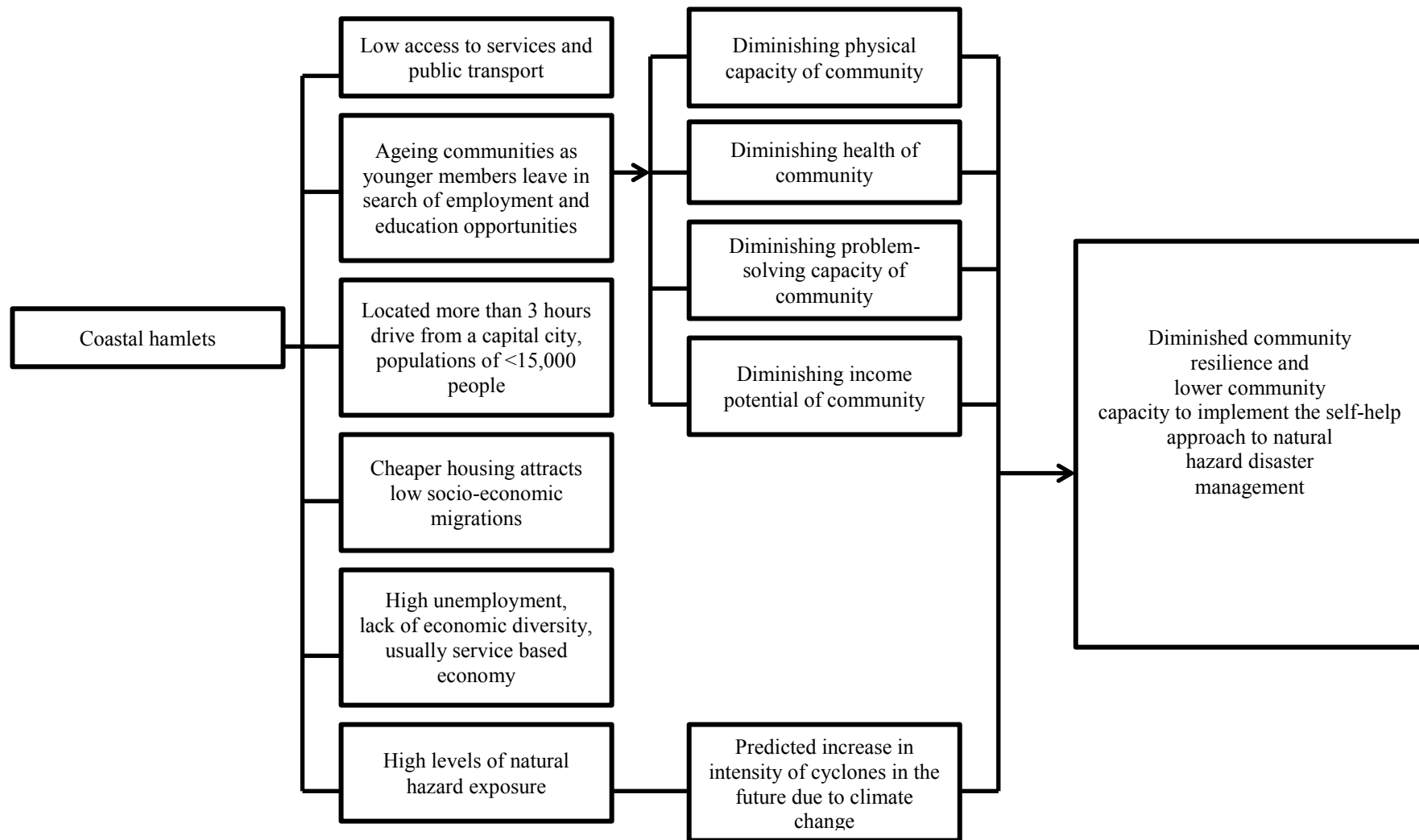


Figure 2.4 Assumed factors influencing disaster management 'self-help' approach.

Author's impression

Looking to the future, and taking into consideration the ageing population projections discussed earlier, many FNQ coastal hamlets may experience a significant growth in the number of citizens over the age of 65 years within 10 years. The ageing populations of these small coastal centres may therefore see a larger proportion of their population experiencing diminished mental, physical and economic capacity, threatening the ability of these communities to prepare and recover from future natural hazard events. Figure 2.5 shows diagrammatically the potential impact of diminished community capacity and resilience on the collective ability of coastal hamlet communities to remain self-reliant when faced with future natural hazard events. Such considerations must be considered if disaster management expectations of self-reliance are to be retained in the future. This sentiment is shared by Cornell (2015), who agreed that disaster management has, to date, focussed on the production and development of checklists presuming all citizens, including older adults, will utilise them to prepare for an emergency. However, little has been done to understand what could influence their decision to prepare. As such, the impact of a natural hazard on an ageing vulnerable remote community could have dire consequences on the fragile social, economic and environmental framework of these coastal hamlets. To fully comprehend these consequences, consideration must also be given to future political and economic governmental decisions regarding natural hazard resource allocations necessary for the improvement of the resilience of coastal hamlets whose populations could be predominantly aged.



**Figure 2.5 Features of coastal hamlets and the effect of an ageing population on natural hazard resilience.**

**Author's impression.**

## **2.11 The Role of Politics in Natural Hazard Disaster Management**

Natural hazards are exogenous shocks occurring in a political space, with level of government preparedness and response directly linked to the extent of suffering incurred to the impacted population (Cohen & Werker 2008). Analysis of the politics of disasters focuses on the interaction between social and political stakeholders and their institutions during the preparatory and recovery stages of extreme natural events, with outcomes often governed by pre-existing conditions (Pelling & Dill 2010). Guggenheim (2014) described disasters as inherently political events, as they pose questions about who is to be given control, how resources are to be distributed, who is responsible for action, who is to make the decisions regarding risks and how the affected are to be rebuilt. Olsen (2008) claimed that within minutes of the major impact of a natural hazard event, a disaster starts to become political, with politicisation increasing as disaster management moves through from response to recovery and reconstruction phases. Due to the complexity of disaster management, multilevel governance is vital to enhance the adaptive capacity of those most at risk (Olsen 2008).

Vincent (2008) provides a definition of adaptive capacity, expressing it as a “... vector of resources and assets that represents the asset base from which adaption actions and investments can be made” (p.12). Described as multidimensional, adaptive capacity is largely determined by examining complex inter-relationships between resources and resource distribution. The IPCC (2007) defined adaptive capacity as the ability to modify the exposure to risks of a natural hazard in order to absorb and recover post event, as well as the potential to exploit new opportunities that arise from the adaption. Thus, adaptive capacity is a component of vulnerability that can be defined as reducing vulnerability by modifying exposure using mitigation works. For example, engineering projects to allow floodplain development, beach nourishment, improved building practices in vulnerable locations, disaster relief or even government insurance subsidies, to name a few (Burby 2006; Vincent 2008). Burby (2006) warned, however, that despite the efforts of governments in more developed countries to increase the adaptive capacity of communities, this form of policy could instead create what he called the ‘safe development paradox’.

### *2.11.1 The “Safe Development Paradox”*

The 'safe development paradox' occurs when governments provide the resources to alter inherently hazardous areas in order to facilitate development (Burby 2006). New Orleans provides a clear example where federal policies paved the way for catastrophic outcomes. USA federal government funding provided the economic support to build levees intended to provide flood protection, whereby encouraging future development in hurricane and flood prone regions, while federally funded flood insurance subsidies were used to promote economic growth and development, unwittingly placing the citizens of New Orleans in highly vulnerable locations with devastating results (Burby 2006). Stevens *et al.* (2010) explained that local governments were encouraged to participate in what was known as the National Flood Insurance Program (NFIP), where eligibility depended on local governments adopting federal building standards, giving permission to build high-density housing, deemed flood-proof, in what was essentially unsafe flood-prone areas. The fear of losing the promised insurance and disaster relief subsidies meant local governments, despite being aware of the sub-standard building codes, were less inclined to enforce more stringent codes (Stevens *et al.* 2010). The reported reduction in the incentive of local governments to be "...more prudent in their actions" (2010, p.180) was referred to by Burby who quoted the House Bipartisan Natural hazards Task Force in 1994, which stated:

... If state and local governments believe that the federal government will meet their needs in every disaster, they have less incentive to spend scarce state and local resources on disaster preparedness, mitigation, response, and recovery ... [and] people are encouraged to take risks they think they will not have to pay for (2006, p.180).

The paradox was that the NFIP policies stimulated development in areas that otherwise would not have been considered viable for construction purposes, with the unintentional effect of contributing directly to the devastation of Hurricane Katrina (Burby 2006; Stevens *et al.* 2010).



### 2.11.2 Moral hazards and the “Local Government Paradox”

Federally funded disaster relief in more developed countries, usually offered to those who have suffered the most from a natural hazard, can also produce, what is known in the insurance industry, as a moral hazard (Burby 2006). From an insurance perspective, moral hazard refers to the reduction in the incentive of the insured to adequately avoid a risk simply because the party is insured (Burby 2006). This phenomenon was noted by Astill and Griggs (2014) while interviewing business owners in the Cairns suburb of Holloways Beach, Queensland, Australia. When asked about their cyclone preparations and preference in relation to cyclone preparatory information, business owners overwhelmingly responded “... I don’t worry about reading anything because insurance covers everything ... that’s why I have insurance” (Astill & Griggs 2014, p.45). This attitude is compared to the attitude of local governments promised disaster assistance, and/or, enhanced flood protection from federal policies following Hurricane Katrina as previously mentioned, producing, what Burby (2006) termed the “local government paradox”. The local government paradox occurs when local governments ignore the threats posed by hazards by allowing intensive development of hazardous areas in order to encourage economic growth in their region.

Examples of this paradox are not restricted to New Orleans. The devastating 2009 Black Saturday bushfires in Victoria<sup>25</sup> and the 2011 floods in Brisbane and the Lockyer Valley<sup>26</sup>, Queensland, Australia, were both the result of poor policy implementation. A Royal Commission into the 2009 Victorian bushfires found the loss of 174 lives (over 50% of whom were under the age of 12 years or over the age of 70 years) had been the result of a policy that had colloquially been called ‘stay or go’ (Teague *et al.* 2010). The Commission found that this policy had failed to allow for variations in fire intensities resulting from topographies, fuel loads and weather conditions. The policy

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<sup>25</sup> The 2009 Victorian bushfires occurred in January and February killing 173 people, destroying thousands of homes and burning over 400,000 hectares of land. More than 78 communities were devastated including Marysville, Kinglake, Kinglake West, Narbethong, Flowerdale and Strathewen (Victoria Country Fire Authority 2016).

<sup>26</sup> On Thursday 13, 2011 major flooding occurred in the Brisbane River catchment severely impacting the catchments of Lockyer Creek and Bremer River. Flooding caused the deaths of 33 people and the inundation of 29,000 properties (van den Honert & McAneney 2011).

also assumed that all individuals had in place a bushfire plan, as well as knowledge as to what to do when faced with the threat of bushfire (Teague *et al.* 2005).

Further findings included the acknowledgement that fire warnings had been too narrow, directing people to implement their fire plan, rather than giving them specific advice or directions. This resulted in people waiting for what the Commission called "... a range of triggers", before deciding a plan of action, often too late, exacerbated by a lack of community refuges and bushfire shelters contributing to a lack of alternatives for those who needed to evacuate (Teague *et al.* 2010). The conclusion from the Commission was that the policy message of 'stay or go' failed to stress that staying in areas prone to bushfire, particularly when weather conditions produced severe bushfire threats, such as those on Black Saturday, was a grave threat to a person's life (Teague *et al.* 2010).

Losses associated with the 2011 floods in Queensland were also a result of poor flood plain management, administered by both the State and local authorities. The floods resulted in 33 fatalities, 3 of whom remain missing, 78% of the State declared a disaster zone, more than 29,000 homes and businesses inundated, more than 2.5 million people affected, and a damage bill of more than \$5 billion (Queensland Floods Commission of Inquiry (QFCI) 2012). The findings of an independent inquiry following the disaster found that prior to the flooding, flood management had been the responsibility of local councils, overseen by State planning instruments (QFCI 2012).

This approach to flood management had led to differing standards throughout the State, along with varying flood mitigation practices, even in areas where the risk of flood was significant (McEwan 2012). The Inquiry found that local authorities had taken an *ad hoc* approach in relation to planning considerations in flood prone areas, which it noted could have been as a result of the vague guidance provided by the State planning system, exacerbated by Australia's river system and sub-basin catchments (Queensland Reconstruction Authority (QRA1) 2012); Macnaughton *et al.* 2012). As these systems and catchments did not correlate to local government boundaries, they presented challenges for flood plain management at the local government level. Problematic for each local council was that uniform flood management assessments recommended by the Queensland Reconstruction Authority (QRA2) (2012) failed to consider each area's unique demographic complexities, environment, economic base, urban structure and

societal perception of risk, thus leading to unequal levels of flood risk assessments across local government boundaries within a river basin (Grech 2011; QRA2 2012).

The recommendation by the Inquiry for state-wide mapping raised concerns from local authorities in relation to cost; as such an undertaking would require modelling that would be comparable to a Council's funding of an entire planning scheme (Venn 2011). In short, the economics of such a project was simply outside the funding capacity of local authorities, particularly smaller low-growth councils (Venn 2011). As both the State and the Inquiry fell short of promising new funds to enable such an undertaking, or to outline the specific flooding information required for safe development, guidelines remain open to interpretation and dependent upon locally available funds.

The consequences of Hurricane Katrina, Victoria's Black Saturday bushfires and the Brisbane and Lockyer Valley floods are examples of a vein of research that blames politics for causing a disaster. Political decisions, more precisely, those made prior to the occurrence of the disaster, are thought to be the real culprits (Guggenheim 2014). By placing politics centre stage and focusing on the role played by elected politicians, the various levels of governments and their far-reaching decisions, disasters become increasingly politicised (Guggenheim 2014). Moreover, it is the failure of these political actors to recognise the true risk in relation to a natural hazard that has seen research questioning whether authorities had assessed the risk of the hazard adequately and whether disaster management authorities acted in a timely fashion (Guggenheim 2014).

## **2.12 A Review of Research into Natural Hazard Planning for the Older Adults**

A review of the literature examining natural hazard planning focused on older adults has been mainly centred on incidents of heat-wave in Europe and Australia, as well as hurricanes occurring the USA in the wake of Hurricane Katrina. However, some research has also examined older adults during bushfires, tsunamis and earthquakes. Across the literature, the common theme is, that regardless of the nature of the natural hazard, authors recognise the vulnerability of older adults, agreeing that this sector of the population is at greater risk than other members of the community, a consensus that has largely come about from mortality and morbidity figures (Adams *et al.* 2011; Jia *et*

*al.* 2010; McCann 2011; Oven *et al.* 2012). A search of the present literature has revealed that, despite there being a recognition of the current problems facing local government disaster managers concerning older adult victims of natural hazards, research has yet to address the future challenges for authorities in relation to growing numbers of vulnerable older adults, particularly those in isolated locations. This dissertation seeks to make an initial contribution to the current deficiency in knowledge and understanding in this area.

Current issues are most prevalent in the literature from Japan, dubbed a ‘super-ageing society’ by Muramatsu and Akiyama (2011). Authors, such as Ikeda *et al.* (2008) and Muramatsu and Akiyama (2011), have focused their research on Japan’s ageing population and the consequences of the extreme vulnerability of Japan’s urban agglomeration, placing large numbers of people at risk from “... low-probability, high-consequence events” (Ikeda *et al.* 2008, p.268). Their research has sought solutions to the estimated 90% of ‘earth-quake related deaths’ having affected people over the age of 65 years (Muramatsu & Akiyama 2011).

Japanese research focuses predominantly on the growing issue of social isolation amongst older adults. According to Muramatsu and Akiyama (2011), modern urban environments in Japan have resulted in older adults becoming socially isolated with many having little or no contact with adult children or neighbours (Muramatsu & Akiyama, 2011). This research highlighted the importance of ensuring older adults develop, strengthen and maintain community-based support networks, particularly those with chronic conditions and physical and cognitive limitations. Findings conclude that hard-hit communities with embedded strengths of traditional social relationships with immediate family and neighbours have been instrumental in providing older adults with the necessary support to ensure survival and recovery (Muramatsu & Akiyama, 2011). The issue of social isolation is also an important consideration in relation to an ageing population in FNQ coastal hamlets.

Natural hazard research carried out in the USA has also focused on identifying the reasons why older adults are vulnerable. Post Hurricane Katrina research highlighted the many areas requiring review in relation to disaster management, including the need to recognise the vulnerability of minority sectors of a population (ethnic groups,

disabled, older adults). The literature regarded older adults as a minority, not only because of their susceptibility to mortality and morbidity during a natural hazard, but also because exposed coastal areas tended to attract retirees, with 19.4 % of Florida's population regarded as older adults in 2015 (United States Census Bureau 2016).

McCann (2011) highlighted the importance of disaster planning principles. These include: the value of recognising the area of disaster planning as a continuous process emphasising the need to revise and update procedures; anticipating future problems and formulating solutions to mitigate potential effects; implementing an effective and efficient information gathering procedure post-event to ensure help is directed to those who need it most; and, ensuring disaster planning is realistic, designed using factual information and not false assumptions.

Interestingly, research involving 547 ambulatory older adult patients was undertaken in Florida in 2008 to investigate how hurricane ready older adult were in the wake of Hurricane Wilma (McCann 2011). It was found that many older adult participants misunderstood hurricane watches and warnings, ignoring American Red Cross advice to stockpile supplies, with many residing in homes that provided inadequate protection from intense storms (McCann 2011). In addition, although 36% of those surveyed stated they were prepared to evacuate, most did not have a pre-determined evacuation plan in place. Most alarming, many of the participants admitted that they did not have adequate supplies of medications to sustain them during an emergency (McCann 2011). This research concluded that older adults had not been adequately considered in relation to community education programs and that more work needed to be focused on partnering with ageing service networks to improve the access to those who are most vulnerable. These findings are important considerations in regard to this dissertation.

As such, the literature had tended to focus on the causes of vulnerability in older adults. Authors such as Pekovic *et al.* (2007) outlined that the characteristics that identify a person as an older adult, such as decreasing sensory perception, chronic health conditions, impaired physical and cognitive ability, as well as social and economic limitations, impair an older adult's ability to plan, respond and recover from a natural hazard event. Moreover, those over the age of 85 years, particularly those living independently, tend to utilise most of their functional reserve to deal with decreasing

health and mobility, economic constraints and, in some cases, social isolation, on a normal day-to-day basis, just in order to survive. In these cases, the pressure associated with dealing with an event, such as a natural hazard, usually proves too stressful, adversely affecting their health (Pekovic *et al.* 2007).

Research in relation to the vulnerability of older adults to future anthropogenic changes in the climate has mainly focused on the effects of heat waves and health. Astrom *et al.* (2011) reported that 2000 fatalities were blamed on the 1987 and 1988 heat wave in Athens<sup>27</sup>, while 700 deaths occurred as a direct result of the 1995 heat wave in Chicago<sup>28</sup>, and a staggering 70,000 deaths as a consequence of the European heat wave<sup>14</sup> in 2003 with older adults disproportionately represented in the mortality statistics. The concern here also lies with the ageing global population and the future prevalence of chronic and degenerative disorders, which potentially will render large proportions of the population vulnerable (Astrom *et al.* 2011). Research in this area has also focused on the causes of vulnerability in older adult populations, with the literature recognising conditions, such as dementia, as having a negative impact on risk perceptions and protective behaviours, with vulnerability exacerbated by the tendency of older adults to reside independently. Findings in this area were similar to those identified earlier in Japan, stating independent living could potentially result in vulnerable people living in social isolation (Astrom *et al.* 2011).

A search of the Australian natural hazard literature found that much of the research into the vulnerability of the aged has been carried out in relation to heat waves and bushfires, predominantly in the area of public health. Here the literature has also focussed on the characteristics that categorise older adults as vulnerable (declining cognitive ability, reduced mobility and compromised health) (Bi *et al.* 2011; Hannan *et al.* 2011; Solangaarachchi *et al.* 2012; Williams *et al.* 2013). This research has highlighted many of the consequences of heat waves are preventable. As such, studies have focused on recommendations in relation to adaption of environments, designing public health campaigns to alter behaviour during periods of extreme heat, a review of urban planning procedures to ensure adequate shade and ventilation, and, the

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<sup>27</sup> During the 1987 and 1988 Greece heatwaves, temperatures were in excess of 40 degrees Celsius during July of both years (Giles & Balafoutis 1990).

<sup>28</sup> The 1995 Chicago heatwave experienced temperatures up to 42 degrees Celsius from 12 July to 16 July (Semenza 1996).

introduction of policy to encourage early warning systems and alerts (Astrom *et al.* 2011; Bi *et al.* 2011; Hannan *et al.* 2011).

Warning systems and community messages have also dominated the literature, particularly in regard to bushfire evacuation messages. The Royal Commission following the 2011 Victorian bushfires found that the disaster management message, “leave early or stay and defend”, failed to consider the implications of a frail, older adult deciding to stay and defend their property during a severe bush fire (Johnson *et al.* 2012). This type of disaster management campaign was found to place an older adult’s life at risk, for it assumed the person heeding the advice was physically and mentally robust (Johnson *et al.* 2012). Research into the vulnerability of older adults centred on campaigns that ignored previous research, warning that an older adult's diminished cognitive capacity could seriously overestimate their physical and mental ability, particularly when faced with a stressful situation, such as an impending natural hazard (Haynes *et al.* 2008; Johnson *et al.* 2012). These findings had already been reported in the 2008 report by Haynes *et al.* (2008) who stated that most older adults deaths reported in Australian bushfires between 1958 and 2008 had been of those who had heeded authority warnings and sheltered indoors, leaving their opportunity to evacuate too long to be effective.

Previous research on the impact of cyclones and storm surges on coastal hamlets in FNQ has largely focused on community vulnerability without prioritising older adults within the population (Anderson-Berry & King 2005), while other research has undertaken to evaluate the quality and use of hazard preparedness information (Astill & Griggs 2014; Morrissey & Reser 2003; Woods *et al.* 2014). Older adults were, however, the focus of a study by Goldstraw *et al.* (2012) investigating the hospitalisation of older people in Townsville, FNQ, following Cyclone Yasi in 2011. Goldstraw *et al.* (2012) reported that 400 older people had been admitted to hospital after they had been evacuated from their homes and nursing homes in Townsville. The reasons for these admissions included falls and fractures occurring as a result of attempting tasks that they were physically incapable of carrying out, the need for life saving equipment, such as oxygen concentrators requiring electricity to operate at home, the inability to manage incontinence due to a lack of water for toilets, the inability to access vital medications, anxiety and fear of being unable to access

assistance, as well as the inability to access specialist physical and mental health services. Goldstraw *et al.* (2012) also reported those with dementia had worsened in the months following the cyclone, with increased reporting of disorientation and challenging behaviour associated with the stress of residing in damaged homes and reduced services due to damage to infrastructure. Goldstraw *et al.*'s (2012) research provides this dissertation with local evidence of the impact of Cyclone Yasi on vulnerable aged citizens.

## **2.13 Conclusion**

A broad approach was taken in this literature review to develop an understanding of the issues future local government disaster managers face when charged with preparing ageing coastal hamlets in FNQ for the effects of a cyclone. As natural hazard disaster management is a complex, multidimensional undertaking, this chapter began by describing a natural hazard and the changes that are expected to the intensity of these phenomena due to anthropogenic climate change. The seriousness of these changes are most concerning in coastal areas due to the modern trend of seeking an improved lifestyle, particularly at the retirement stage of a person's life, with this review describing the migratory trends that draw so many to reside in exposed coastal hamlets. Focusing on coastal hamlets, the chapter then outlined demographic characteristics of these communities, focusing on the ageing nature of coastal hamlets, and global population ageing in general.

Contextualising the issues facing older adults residing in exposed communities, this chapter then outlined the problems with ageing-in-place in remote locations and the impact of ageing on physical, cognitive and financial abilities of older adults faced with natural hazard preparation and recovery. The chapter then investigated the literature regarding the tendency to continue to reside independently, despite a lack of social support. These issues are compounded during periods of extreme weather by disaster management's expectation that all citizens must be self-reliant, shifting responsibility from the government and placing it completely with the individual. This neo-liberalist approach largely ignores the vulnerabilities of older adults; particularly those living independently reliant on in-home care, highlighting the important role future political and governmental decisions will play regarding the resilience of these communities.



This chapter outlined how political decisions can in fact exacerbate the effects of a natural hazard, presenting international and national examples of previous decisions and their consequences, as well as defining and presenting an understanding of risk from both a societal and political perspective, and the role played by self-efficacy during both the preparatory and recovery stages of a natural hazard.

Finally, this chapter reviewed the literature focused on older adults during a natural hazard, finding that to date research has centred on identifying why older adults are vulnerable with a gap in the knowledge relating to the impact an ageing population will have on disaster management in the future. This is the knowledge gap addressed by this dissertation. This is of particular importance to the future resilience of remote locations, particularly in light of proposed changes in the intensities of tropical cyclones crossing the coastline of FNQ in the future. Before addressing the research conducted as part of this dissertation, the next task is to present the theoretical and conceptual frameworks which were used to frame and structure data collection and analysis.

### ***Synopsis of Chapter 2***

This chapter provided a detailed overview of the empirical literature pertinent to this dissertation. The next chapter explains the theoretical and conceptual frameworks adopted by this research in order to address the research questions.

## **Chapter 3      Theoretical and Conceptual Frameworks**

### **3.0    Introduction**

The previous chapter provided a review of the empirical literature relevant to the subject matter of this dissertation, but in order to understand the motivating factors determining an individual's intention, and consequential actions to prepare for the onset of a natural hazard, an examination of the theoretical literature surrounding the formation of risk perception and subsequent cognitive responses must be examined. As such, this chapter begins by providing an overview of the theoretical perceptions of risk beginning with an explanation of Beck's Risk Society Theory, followed by further explanations of the perspective of risk from a societal and political perspective, and an overview of the perception of risk from a climate change perspective.

The chapter then outlines Social Cognitive Theory (SCT), used in this dissertation to explain the importance of self-efficacy in the decision-making processes required to effectively prepare and recover from a natural hazard. As such, SCT formed the basis for the conceptual framework for this research as this model provides an understanding of the relationships between motivation and intention factors, which then influence whether a vulnerable person will convert intention into positive preparatory behaviour.

### **3.1    Theoretical Perspectives of Risk**

An understanding of the differences between the societal and the political perspective of risk is vital in order to both conceptualise risks and to formulate solutions for the consequences of risks, particularly in relation to disaster management. Etkin and Ho (2007) explained that the term 'risk' is a function of both a hazard and vulnerability, with the term being socially constructed, relying upon a value-dependent social process to determine which risks should be assessed. In a social context, understanding risk involves the consideration of people's beliefs, attitudes and judgements, and how these influences and risk factors are understood, imagined and interpreted (Bickerstaff 2004). In contrast, a political concept of risk takes a positivist perspective, with the gathering and interpreting of information based on scientific, technical or professional advice, undertaken specifically to design policies to resolve the perceived risk (Jasanoff 1998). As such the difference between the social and political concept of risk becomes a

conflict between the distinction of risks from the perspective of the positivist and the constructionist (Jasanoff 1998). From a disaster management perspective, Beck's Risk Society Theory provides a starting point in an attempt to understand why authorities have failed to control the risks they have created, leaving communities to face the consequences of policies that have contributed to the losses associated with a natural hazard (Elliott 2002).

### *3.1.1 Beck's Risk Society Theory*

Bulkeley (2001) suggested sociologist Ulrich Beck provided a theoretical understanding that contemporary environmental risks are an unavoidable result of the unintended consequences of modernity, describing society's systematic method of organising itself in response to the concept of risk introduced by modernisation itself. Criticising post World War II modernisation theories that postulated societies should free themselves of traditional thinking, moving instead towards modernity, embracing industrialisation, democratisation, bureaucratisation and secularisation (Mergel 2012), Beck's Risk Society Theory emerged from two distinct developments.

The first was the environmental movement and European environmental politics, as well as contemporary developments in sociological theory (Matten 2004). Beck's theory was first published in the 1980s following the passing of environmental legislation focusing on the effects of air, water and soil pollution; the unwanted by-product of production processes (Matten 2004). These regulations focused on physical pollutions that were easily measured, making them easy to regulate because the sources were easily identifiable. This regulatory approach tended to leave the industrialised economy unchanged, while reducing the undesired environmental harm by directly targeting polluters (Culver *et al.* 2011; Matten 2004). Although this approach was successful, the mid 1980s brought with it a realisation that governments were simply ignoring a range of environmental issues. For example, the depletion of the ozone layer in the southern hemisphere; brought the risks of climate change into the public arena, along with the issue of safety of industrialised food production. Beck argued that there had been neglect of those potentially harmful consequences, because of the difficulty associated with assigning the blame (Matten 2004).

Theoretically, Beck's work linked more closely to Giddens's (1990) concept of reflexive modernisation, defined by Giddens (1990) as the constant examination and reformation of social practices influenced by incoming information about those very practices. This is in contrast with classical modernisation concepts that regarded modernisation as the transformation of traditional societies to 'modern' societies through a course of enlightenment. As such, reflexive modernisation no longer 'modernises' traditional societies, rather it is the modern society itself that is the object of modernisation (Giddens 1990). As a consequence modern societies are confronted with certain unignorable consequences of their modern lifestyle, requiring rational solutions to ameliorate these problems.

The issue of natural hazard disaster management epitomises Beck's definition, for the losses from natural hazards are associated with policies placing people and infrastructure in harm's way (Sarewitz *et al.* 2003; Reser 2007). The externalities associated with increased coastal development, population growth, coastal migration, ageing populations and hazard management infrastructure have resulted in placing more vulnerable people in the path of naturally occurring hazards with untold consequences (Bulkeley 2001). The far-reaching effects of these predictions reflect Beck's suggestion that risks are inescapable and transcend spatial, social and temporal limits. But Beck also argued that societies possessed the ability to interpret and assess the level of risk, as well as having the ability to bring about changes to activities in order to reduce the level of risk (Beck 1992). Elliot (2002) stated that Beck's analysis of the risks associated with modernity provided a basis to understand both why mismanaged disaster management procedures could result in catastrophic consequences globally, and why risk management and monitoring increasingly influenced both the development of policies and the calculation of social action.

Early research by Slovic, Fischhoff and Lichtenstein in 1982 suggested that an understanding of risk perception would aid in risk analysis and societal decision-making (cited in Jasanoff 1998). They claimed that improving risk communication could provide a basis for understanding and anticipating public response to hazards (Jasanoff 1998). It was therefore assumed that a clearer understanding of risk would lead to a clearer perception of true risk, influencing environmental behaviour, heightening awareness, assisting in identifying potential problems and attributing blame, and would

provide a clearer, more appropriate course of action (Bord *et al.* 2000). However, an additional risk, according to Bickerstaff (2004), was that if the hazard information does not engage or validate with those it is targeting, had little resonance with people's experiences, or was challenged or questioned, it was likely to be ignored. Hulme (2009) concurred stating that the understanding of information relied upon how the issue was framed to the target audience.

### *3.1.2 Societal perception of risk*

While Beck's risk society discourse provides an understanding of society's method of organising itself in response to the concept of risk, the societal perspective of risk was described by Renn *et al.* (1992) as the influences of a community's principles, viewpoints, social influences and cultural identity on its evaluation of expected consequences relating to an activity or event. Bickerstaff (2004) defined risk perceptions as an individual's ideologies, viewpoints, judgements and feelings towards hazards, in conjunction with wider cultural and social attitudes, grounding them in everyday social and cultural experiences. To illustrate the point, Bickerstaff (2004) used air pollution as an example, stating that, as pollutants ignored boundaries and invaded personal spaces, public understanding of the impacts and potential risks of air pollution relied on information collected through the senses, in particular through vision and smell. Smoke fumes and soot provided a physical understanding of the effect of pollution on the physical environment, thereby raising doubts as to the safety of a person's surroundings (Bickerstaff 2004). These types of everyday experiences shape a person's perception of risk.

Bickerstaff (2004) also outlined the importance of understanding socially constructed knowledge, or substantive information, between individuals who identify with like-minded collectives (which in more recent times has been relayed using social networking sites). Bickerstaff (2004) stated this form of information sharing had, in many cases, created a public perception of powerlessness, particularly in the case of anticipated changes in the climate, due to the enormity of the issue. This sense of powerlessness had in turn created political and economic marginalisation, intensifying personal concerns about environmental issues and feelings of vulnerability and distrust in authorities (Bickerstaff, 2004). The meanings the public had placed on

environmental risk have therefore not only been shaped by socio-cultural experiences, but also by disillusionment and concern that authorities might not act in an efficient manner, leading to socio-political responses directed by concern-driven policy rather than evidence-based policy (Bickerstaff, 2003; Ball & Boehmer-Christensen 2006). As such, the societal perspective of hazard risk has arisen from subjective societal attitudes and values, socially constructed, which often convey the feeling of uncertainty, helplessness and a lack of faith in policy makers.

### *3.1.3 Political perception of risk*

The political concept of natural hazard risk has assumed an implicit understanding that assumes solutions can be sought using policies to manage risks associated with impacts. DiPiazza (2002) stated that political risk was defined as the risk facing authorities following a political change that altered the outcome and value of an economic action. In the case of a natural hazard, the event itself becomes the catalyst for political change, because these events raise questions as to whose responsibility it is to rebuild and how that is to be achieved (Guggenheim 2014). Traditionally, natural hazard disaster management has required authorities to draw on science as a foundation for future predictions (Jasanoff 1998). Blowers (1997) stated that science was the field that had been given the role of identifying risks associated with hazards, which in turn sets the agenda for hazard management priorities in the search for solutions. The concern has been that scientific knowledge, particularly in regard to changes in the intensities in natural hazards in the future, due to global climate change, remains unresolved, undetermined, constantly challenged and refutable (Blowers 1997)<sup>29</sup>.

Using the ‘precautionary principle’ as their reference, Godden and Peel (2010) highlighted that a lack of scientific certainty regarding future characteristics of natural hazards should not be sufficient reason for decisions to be made in regard to delaying regulatory action, particularly as the consequences of such an action could mean serious

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<sup>29</sup> Finnis *et al.* (2015) highlight that scientific knowledge of climate change takes into account the complex and uncertain nature of future climate predictabilities using academic conventions or peer review. In contrast, public understandings of climate change are influenced by media reporting, political debates, social interactions and personal experiences shaped by where one resides. The uncertainties and complexities of climate change are an integral part of on-going scientific investigation, which is often lost in communication of climate science in the media and political spheres, where discussion of uncertainty has been viewed by sceptics of climate change as undermining the legitimacy of IPCC knowledge claims (Finnis *et al.* 2015).

harm to both the environment and human health and wellbeing. Yet, as risks associated with natural hazards give rise to a subset of societal concerns, they pose a threat to political authority, for the political concept of risk has been formulated using scientific knowledge that has had little regard for societal or cultural concerns (Ball & Boehmer-Christiansen 2006). The political concept of risk, according to Bulkeley (2001), has been shaped solely by debate on economic costs and benefits alongside scientific considerations.

#### *3.1.4 Perception of risk from a global climate change perspective*

If Ball and Boehmer-Christiansen (2006) are correct, and political concepts of risk are formulated using scientific knowledge, what of the uncertainty surrounding the complex, and often conflicting, scientific discourse surrounding predicted anthropogenic climate change induced changes to natural hazards in the future? With science predicting increases in the intensities of future cyclones, such considerations are problematic for the complexities of describing perceptions of risk are mirrored by the difficulties facing both authorities and individuals in describing global climate change itself. Uncertainty, contradictory scientific discourse, and a lack of understanding face those trying to grapple with the concept of global climate change, which ultimately impact on both the societal and political concepts of risk. Bord *et al.* (2000) explained that the public's perception of climatic changes shifts to accord with weather fluctuations, media attention focusing on extreme weather events, and the often very public, conflicting opinions within the scientific community. This constant shifting of climate change attitudes lacks saliency. However, research has shown that individuals whose hazard awareness is such that they perceive a likelihood of being impacted by an adverse event, are those who are more likely to take steps to mitigate against such an event, usually supporting government initiatives to do likewise (O'Connor *et al.* 1999).

The role played by information and knowledge have been identified as an important factor in relation to perception of risk and behavioural responses (O'Connor *et al.* 1999). Information and knowledge have the potential to create a heightened sense of awareness, as well as a sense of obligation, by providing the tools necessary to enable both the individual and society to assess the real risk associated with any potential future natural hazard event associated with climate change (O'Connor *et al.* 1999).

However, Bord *et al.* (2000) warned that exposing the public to detailed and unclear scientific climate change knowledge was risky, for such information could serve to leave the individual in despair, particularly as uncertain policies only highlight the problems facing authorities. Knowing that governments do not have definitive knowledge or might not have adequate resources to deal with the future effects of global warming effectively might, Bord *et al.* (2000) warned, result in a rational response of benign neglect. The uncertain nature of changes in natural hazards due to climate change has meant that proactive behaviours to mitigate against the long-term effect of any impacts have been related specifically to perceptions of risk, along with general cognitive adaptations. It is here that this dissertation turns to Social Cognitive Theory (SCT) for an understanding of the role played by self-efficacy in forming an individual's perception of risk.

### **3.2 Social Cognitive Theory and the Importance of Self-Efficacy**

Social Cognitive Theory (SCT) was first suggested by Bandura, who argued that a person's ability to respond to environmental conditions was directly influenced by their cognitive interpretation of both internal and environmental feedback (Benight & Harper 2002). Bandura explained that such interpretations were essential in order to self-regulate behaviours directed towards positive outcomes, with people self-evaluating in order to modify their behaviour to meet the demands of particular environmental conditions, with the aim to achieving certain goals (Benight & Harper 2002). According to Bandura, it was the self-evaluation process that determined a person's coping self-efficacy, which played a primary role in developing a person's perception of risk regarding a potential risk, their self-control in relation to emotions, and the motivation to link intentions to prepare with actual preparedness behaviour (Benight & Harper 2002). SCT provides the overarching theoretical framework for this dissertation, as it emphasises the importance of an individual's perception of their ability, particularly when confronted with a potentially dangerous environmental event, and the influence that this could have on that person's ability to both develop and implement a plan to protect both themselves and their property.

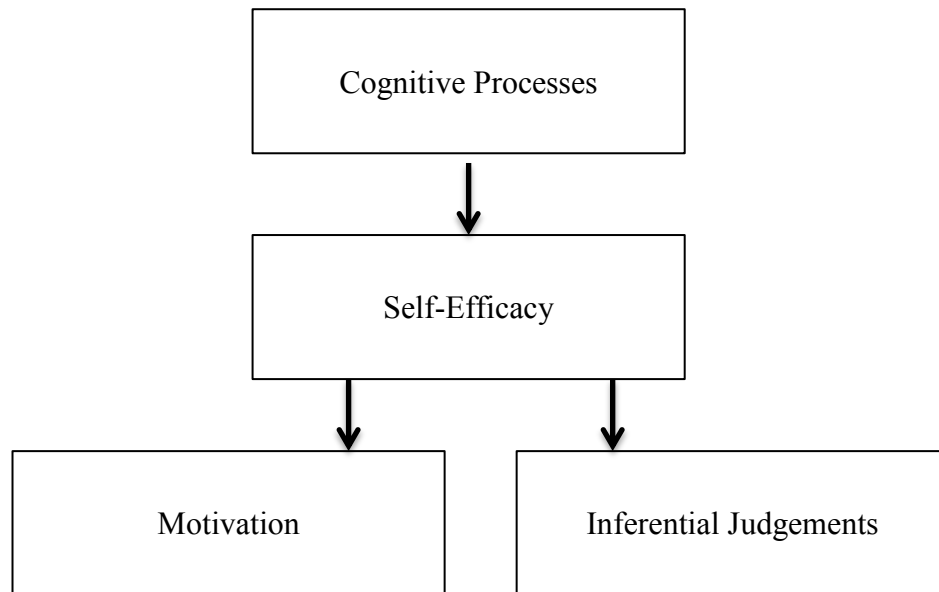
According to Luszczynska *et al.* (2005), perceived self-efficacy is a crucial element of SCT, and the prime factor influencing behaviour. Self-efficacy was explained as a



person's belief in their capabilities to perform specific actions that could lead to a positive outcome. Self-efficacy influences one's goals and outcome expectancies, which are, therefore, important predictors of behaviour (Luszczynska *et al.* 2005). Consequentially, a person's belief in their efficacy is central to their ability to manage, or to exercise control over, everything that affects their lives (Benight & Bandura 2004). Unless a person believes that their actions will produce the desired effect, there is little incentive to act or persevere when a potential event threatens. Belief in one's ability is regulated through cognitive, motivational, affective and decisional processes, guiding thought to either enhance or debilitate a person's judgement (Benight & Bandura, 2004). This, in turn, influences an individual's motivation, perception of personal risk, resilience, vital decision making and problem solving abilities, and ultimately their hazard preparatory behaviour and intentions (Benight & Bandura 2004; Paton, 2003).

Cognitive processes are influenced by efficacy beliefs, impacting on inferential judgements and motivation (Bandura 1997). The ability to predict an outcome requires inferential thinking, or problem-solving skills, in turn, requiring effective cognitive processing abilities, particularly when information concerning a natural hazard event is complex, uncertain and ambiguous. When threatened with a natural hazard a person must process warnings and information, rely on pre-existing knowledge in order to formulate options, foresee complex issues and recall and evaluate previous decisions. These tasks require a strong sense of self-efficacy in order to remain focused, for judgement failures could result in serious social and personal repercussions (Bandura 1997).

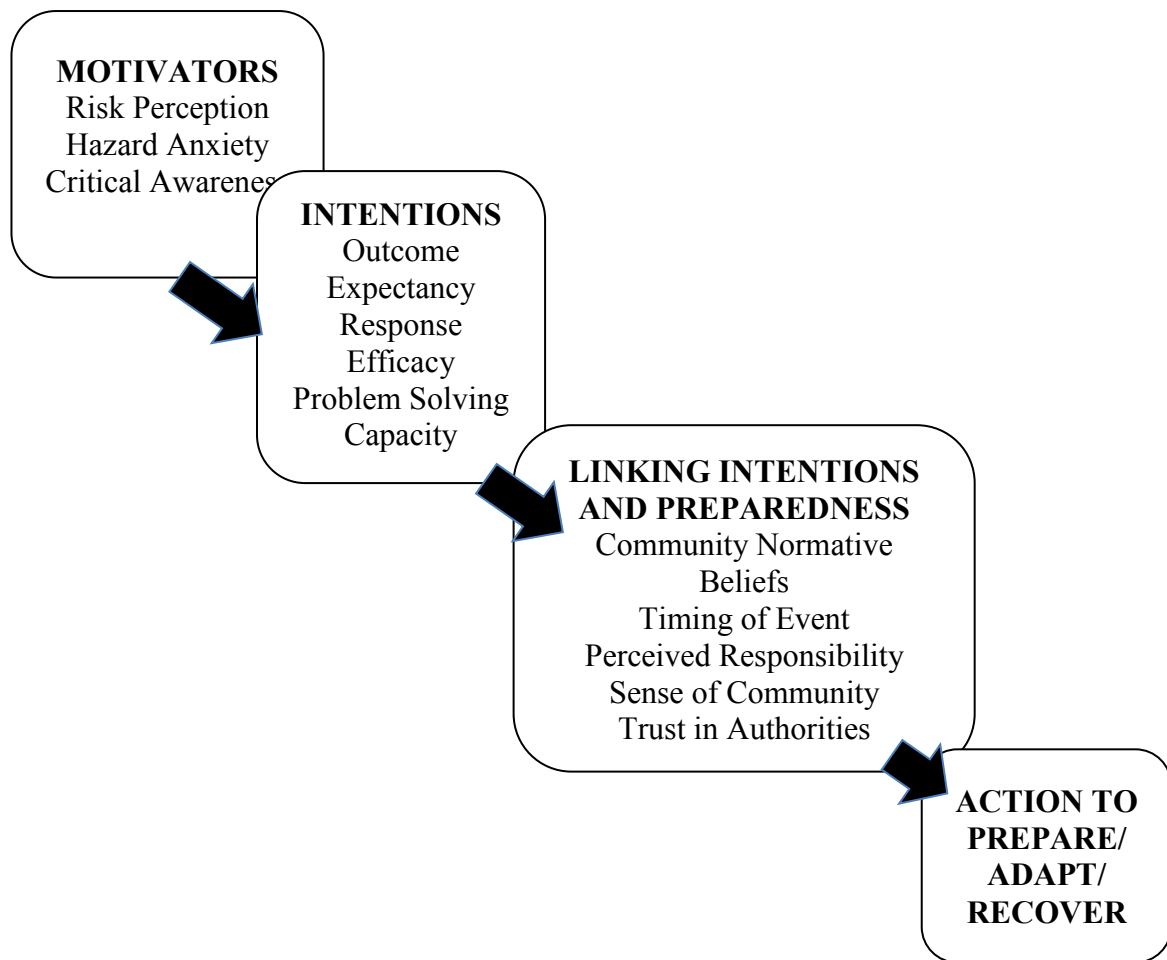
In addition, self-motivation and purposive action also require effective cognitive processes. Bandura (1997) explained that projected future states are brought into the present using forethought, by using the mental action of 'thought' to understand the future, thereby motivating and regulating behaviour. As motivation is cognitively generated, a person's actions are guided by their motivation and their beliefs about what they are, and are not, able to do, while trying to anticipate likely positive and negative outcomes resulting from their planned actions. In this way, self-efficacy plays a central role in controlling cognitive processes required for motivation (see Figure 3.1).



**Figure 3.1 Influence of cognitive processes on self-efficacy motivation and inferential judgements.**

**Source: Author's Impression**

Paton (2003) developed a SCT model recognising the motivation or precursor factors that encourage an individual to behave in a certain manner, which have the potential to lead to decisions to take actions to prepare or adapt for a future natural hazard (see Figure 3.2). Paton (2003) explained this process as comprising of three-phases: firstly, precursor variables that motivate; secondly variables that link motivation with intentions; and, finally, the relationship between intentions and actual preparation.



**Figure 3.2 Social Cognitive Model for natural hazard preparation and adaption.**

**Based on Paton's Social Cognitive Model (Paton 2003).  
Author's Impression**

Paton's (2003) model begins by highlighting the role played by factors such as critical awareness, risk perception and hazard anxiety in motivating an individual into thinking about preparing for a future natural hazard. Critical awareness describes the extent to which individuals, and those within their community, discuss and consider the likelihood of a natural event impacting on their environment. This is particularly important considering the rarity, unpredictability and uncontrollable characteristics of a natural hazard (Paton, 2003). An individual's awareness of these characteristics also influences their hazard anxiety, or fear. The destructive potential of a cyclone or a storm surge, for instance, means that for those most impacted, the outcomes are most likely to result in increased anxiety. The final motivator, risk perception, is a person's understanding of the threat posed by a potential hazard (Paton, 2003). As already

stated, there has been extensive research into the factors that influence risk perceptions (see Table 2.9) including socio-cultural factors (sense of place, sense of community, trust in authorities), location and proximity to the area of impact, demographic factors (age, gender, health, education, ethnicity, religion, socio-economic status), as well as hazard information, education and communication. It is the individual's understanding of these factors that motivates them into developing the intention to prepare. Once this has occurred, the person then moves to the next phase of the model.

The second phase of Paton's (2003) model described the variables that link motivation to the intention to prepare for a hazard. Outcome expectancy, response efficacy, problem solving ability and self-efficacy were identified as the variables that form the intention to prepare. Outcome expectancy describes an individual's perception of whether or not personal actions will lead to effective mitigation of the problem faced, and according to Paton (2003), is an action that precedes self-efficacy. Paton's (2003) model suggested that once a person is motivated to think about their potential vulnerability in relation to an impending hazard, they are, then, more likely to form judgements relating to whether their actions will assist in mitigating against the potential impact. If the outcome expectancy is favourable, the individual is then more likely to believe in their ability to undertake actions that will protect themselves, their family and property.

This then leads to self-efficacy. This point is particularly relevant to this research as the self-help approach to disaster management relies on those who are most likely to be affected by an impending natural hazard to have high levels of self-efficacy in order to successfully prepare and recover from the event (see Figure 2.1). As previously discussed, self-efficacy describes a person's belief in their ability to implement a plan that will mitigate against any potential danger, thereby having a direct influence on an individual's resilience (Benight & Bandura, 2004). This cognitive function is also vital when faced with an event that is both rare and perceived as uncontrollable, for this may require strategies that require a number of quality action plans and a considerable amount of effort and perseverance (Paton 2003). Recent research by Fay-Ramirez *et al.* (2015) supports Paton's views, adding that the greatest negative changes in the collective efficacy of affected communities occurs most often with vulnerable

individuals and groups, namely those experiencing high levels of unemployment, lower education and limited access to economic and social community resources.

The final two variables in this phase of the model, problem solving ability and response efficacy, are considered together, as the two are intrinsically linked. Paton (2003) described response efficacy as a person's perception of their ability to implement a plan to either adapt or mitigate potential threats depending upon the availability of time, the level of their skills, their physical ability, as well as social networks and availability of financial resources. Included in this list is the conflict that might exist between what authorities recommend weighed against other personal goals or needs. If a person feels that he or she does not possess these resources in sufficient quantity, their problem-solving ability could be severely restricted (Paton 2003).

The final stage of Paton's (2003) model is that of linking intentions with the actual act of preparing, that is, behaviour. It is here that the model identifies the influencing variables as the timing of the hazard, sense of community, perceived responsibility, trust in authorities and normative beliefs, with other authors adding that a person's attachment to a place or a community can also motivate intentions to act, as a catastrophic event could threaten to harm or destroy an individual's way of life (Sjoberg 2000; Bickerstaff 2004; Paton 2007; Slovic 2000; Bryant 2005).

Paton (2003) warned, however, that a person's perception as to whose responsibility it is to protect and/or rebuild a community could alter these intentions. If an individual perceives that it is the responsibility of others, for example local government disaster managers or emergency services, to implement action to protect the community, they might be less likely to convert intentions into action (Paton 2003). Paton and Jang (2016) more recently added that people are more willing to actually manage their risk if

they perceive their relationship with authorities to be fair and empowering, placing a high value on trustworthiness and those who act in the interest of the community<sup>30</sup>.

Yet, the unpredictable and infrequent nature of natural hazards can also influence an individual's (or authority's) intention to prepare. It is a reality that the longer the time interval between hazards, the less the urgency to adopt mitigation strategies at both an individual and authority level (Paton, 2003). Such reactions (or lack thereof) can also have an influence on normative beliefs within a community. Beliefs and perceptions within a community, formed from past experience, media reporting, interaction with and influence of others, for example, could reflect community normative beliefs, which have the potential to influence the conversion of intention to action on both an individual and a community scale (Paton, 2003).

This dissertation proposes that a person's hazard preparatory behaviour, particularly in remote communities, in the future, will be influenced by several other factors. These factors include, the physical consequences of ageing, consequences of residing in an ageing community, coastal migration trends, assumptions and authority expectations of self-reliance and the community's understanding of the self-help approach itself.

### **3.3 Conceptual Model**

Conceptually, this research adopts Paton's (2003) SCT as its conceptual framework as this model provides an understanding of the relationships between motivation and intention factors, which then influence whether a vulnerable person will convert intention into positive preparatory behaviour. Figure 3.3 outlines the conceptual framework for this dissertation, beginning with the characteristics of a coastal hamlet. Focusing on the ageing characteristic of these communities, the model highlights the

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<sup>30</sup> Paton's more recent work has focused on applying his SCT model to cultural contexts. Paton and Jang (2016) acknowledged that in countries with relatively individualistic orientations (for example, Australia and New Zealand), people tend to act consistently, independent of social-situation with the achieving of personal goals as their main objective. In these cases collective action reflects personal choices relating to collaboration and cooperation, rather than a cultural disposition. However, in collectivist countries, such as Taiwan, culturally embedded beliefs underpin collective and individual actions, reflecting shared purpose and activity, aligned with collective goals that emphasise social relations (Paton & Jang 2016). Thus, culture could influence how people interpret risk and make decisions about hazard preparedness. Most recent SCT models by Paton and Jang (2016) also incorporate variables such as spirituality, leadership, acceptance, family, coexistence with nature, place attachment, conflict management, community inclusivity and social support. These variables are identified as having an influence on outcome expectancy, community participation, collective efficacy, empowerment, trust, and intention.

impact the effect of ageing will have in the future, suggesting that growing numbers of people within these communities will be experiencing diminished physical, cognitive and financial ability, coupled with an increasing likelihood of developing age-related health issues. These impacts are shown to occur in conjunction with a predicted increase in cyclone intensity attributed to climate change, placing already vulnerable communities at greater risk.

The model continues by outlining the impact ageing and changes to cyclone activity could have on the overall adaptive capacity of the community. Diminished community resilience, a lower capacity to remain self-reliant in the face of future impacts from natural hazards and a diminished cognitive understanding of authority expectations related to natural hazard self-reliance could have a direct influence on the motivation, intention and action variables outlined in Paton's (2003) SCT. The model suggests that if coastal hamlets are to comprise of increasing numbers of older adults, the overall vulnerability of these communities will increase, thereby leading to negative changes in their collective efficacy, placing more reliance on authorities to both prepare and repair the townships should they find themselves in the path of more intense natural hazards in the future. Moreover, these communities will have a reduced ability to remain self-reliant, impacting disaster management strategies and policies. Therefore, this research seeks to identify the issues facing disaster management in relation to their reliance on all citizens having the capability and resources to remain self-reliant. This conceptual framework shows that the future demographic profile of remote communities threatens the *intention* factors of Paton's (2003) SCT, which could lead to a reduction in the future resilience and adaptive capacity of these townships. If an increasing number of citizens fail to adequately prepare for a disaster due to their diminishing physical, cognitive and financial ability, local government disaster managers could see entire communities portraying negative outcome expectancies, reduced response efficacies and diminishing problem-solving abilities, which could result in having a negative impact on each individual's self-efficacy, and therefore an entire community's collective efficacy.

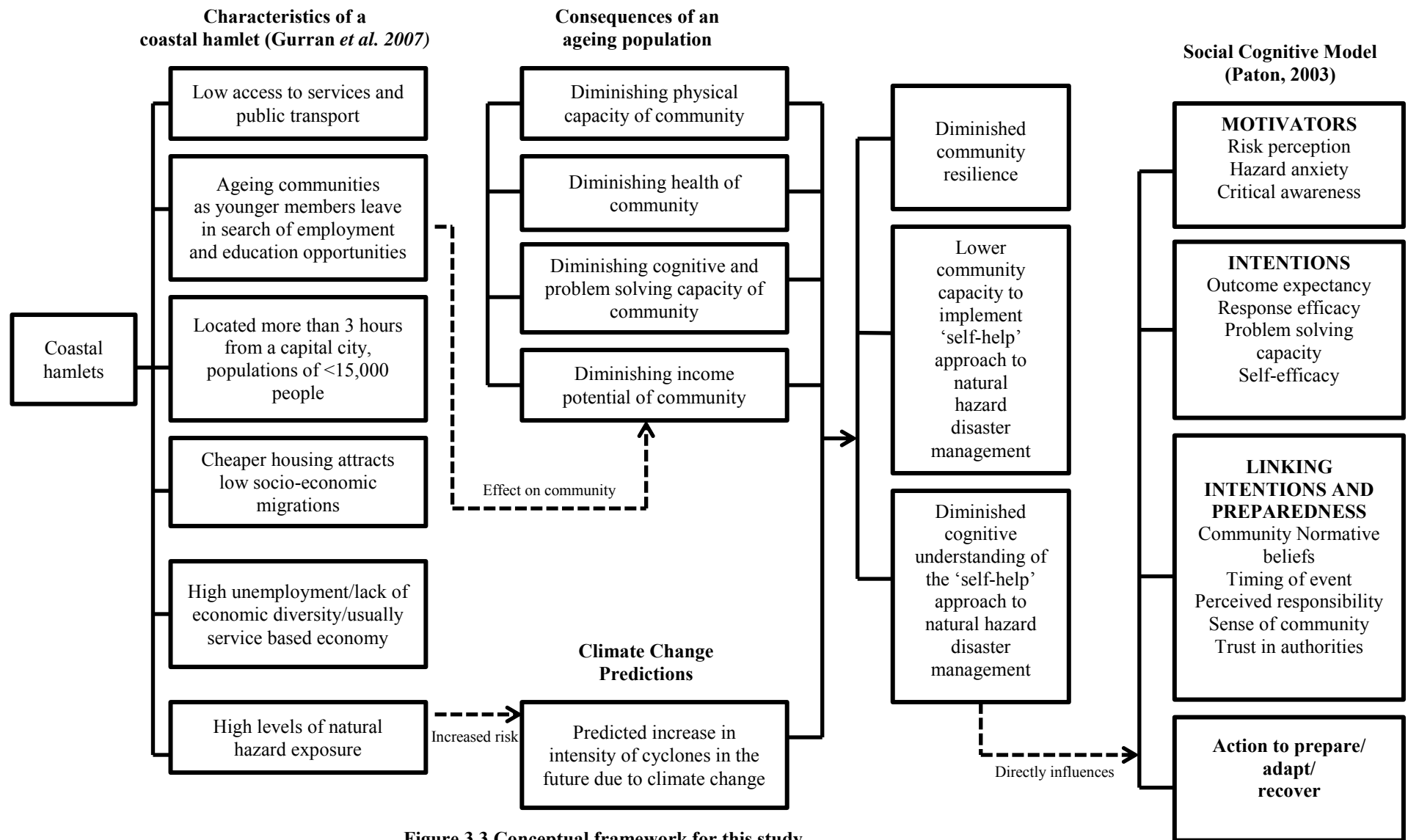


Figure 3.3 Conceptual framework for this study.

Source: Author's impression



### **3.4 Conclusion**

Chapter 3 outlined the theoretical concepts that guided this dissertation, both in the development of this study's conceptual and methodological frameworks. As this dissertation is concerned with the future impacts an ageing population will have on the ability of ageing remote communities to uphold disaster management's expectation of self-reliance, the chapter examined the theoretical evidence on the factors that motivate a person to undertake protective action when faced with the threat of a disaster. Beck's Risk Society Theory was introduced to highlight the differences between societal and political perceptions of risk, outlining that societal perceptions often involve people's beliefs, attitudes and judgements, while political perceptions are based on the interpretation of scientific and technical information or professional advice. These differences were then examined in relation to perceptions of risk relating to climate change, showing that the complexity and uncertainty that exists within the scientific community only tends to further confuse the general public, which can have a negative effect on both societal and political perceptions of risk.

The implications of this was then outlined using Paton's (2003) model of SCT, which emphasised the important role played by risk perception as a motivating factor, influencing a person's self-efficacy, a factor determining a person's intention to implement actions to prepare adequately for a natural hazard. Paton's (2003) SCT has been used as the conceptual framework for this dissertation, adapting it to show how the physical, cognitive and financial consequences of ageing have the potential to impact entire townships, whereby impacting the collective efficacy of these ageing remote communities. Let us now turn to the philosophies that have been used to determine this dissertation's methodology, as well as an overview of the research strategy employed by this dissertation to facilitate data collection.

#### ***Synopsis of Chapter 3***

Chapter 3 described the concepts that assisted in the development of the theoretical and conceptual frameworks adopted by this dissertation. The next chapter explains the methodology and research strategy adopted to carry out the research.

## **Chapter 4      Methodology and Research Strategy**

### **4.0    Introduction**

The previous chapter provided an understanding of the theoretical and conceptual frameworks used in this research. Attention is now turned to understanding this dissertation's methodology and the research strategy used to collect data. The chapter begins by providing an overview of the Humanistic Approach, focusing on phenomenology, the methodological framework used in this dissertation. As a mixed-methods approach was used to collect data for this study, the chapter provides an explanation of methodological pluralism and triangulation, outlining the negatives and positives of using a mixed-methods approach and the strengths and weaknesses of both qualitative and quantitative research approaches. A detailed understanding of mixed-methods is then provided, along with a detailed description of the ontological and epistemological viewpoints that situate this research's methodological philosophies.

Next, an overview of the use of focus groups within a phenomenology study is provided followed by the methodological processes used to collect data for this dissertation. As this research utilised both qualitative and quantitative processes, the chapter contains a detailed description of how each approach assisted in addressing the outcomes of this research. Next an explanation of the sampling method is provided, as well as outlining the sample design and sample size, followed by an outline of the questionnaire administration. The chapter then continues by outlining the relationship between this study's research questions, aims, research method, literature and survey instrument questions, regarded as vital in justifying why the use of methodological pluralism was regarded as important to this study's success. The pilot studies carried out to ensure that the methodology for this dissertation was sound follows, as well as information on the ethics approval process. Finally, the chapter concludes by outlining both the qualitative and quantitative data analysis methods used.

## 4.1 Methodological Theory

### 4.1.1 *A humanistic approach*

The review of the literature presented in Chapter 2 suggested that the issues surrounding the understanding of the impact of an ageing population on the future adaptive capacity of remote Far North Queensland coastal hamlets centred on understanding a person's relationship with nature, their geographical behaviour, and their feelings and ideas regarding space and place. These latter issues were the focus of humanistic geographers (Tuan, 1976). Humanistic geography examined geographical phenomena with the purpose of ultimately understanding humanity and its condition (Tuan, 1976). Gregory and Smith described this perspective as giving a central and active role to "... human awareness and human agency, human consciousness and human creativity" (1994, p.226), as well as an attempt to understand the meaning, value and significance of life events. In this manner, humanistic geography appears to have been greatly influenced by classical sociologist, Émile Durkheim, whose work involved the study of what he labelled "social facts" – phenomena that exist for themselves, not bound to the actions of individuals, but which have a coercive influence upon them (Allan 2005).

Ontologically, humanistic geography sought to place people at the centre of research by recognising that people are influenced by their emotions, perceptions and values, and that their actions are based on complex, ambiguous relationships between themselves and their environments (Tuan 1976)<sup>31</sup>. From an epistemological viewpoint, humanistic geography was criticised because it recognised the inevitable, and somewhat unavoidable subjectivity of the researcher studying human situations (Seamon & Lundberg, 2014). With this in mind,

...humanistic geography incorporated three philosophical approaches: idealism, existentialism and phenomenology, in an attempt to address this criticism (Seamon & Lundberg 2014).

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<sup>31</sup> Allen (2015) stated that the richness of the research provided to humanistic geography is best described in Pocock's (1981, cited in Allen 2015) series of humanities essays describing literature and painting, which explain how people experience the landscape. This focus on 'place' is also advocated by Daniels (1985, cited in Allen 2015).

Idealists<sup>32</sup> were described by Guelke (1974) as believing that in order to understand human actions one must first discover the thought that lay behind the human actions. Johnson and Sidaway (1979) explained that the thoughts that instigate human action are not necessarily based on logic and it is for this reason behaviour must be studied within its unique context, and that this context must be taken into account. To examine such a phenomenon in its unique context Guelke (1974) stated that a humanistic geographer did not need his or her own theories because what was being examined were the theories expressed in the actions of the subject. To do this, the researcher must undertake the method of *Verstehen*, dating back to the methodology of Max Weber, or an interpretive or participatory examination, to immerse the observer into the experiential context of the subject (Gregory & Smith 1994). This form of investigation is known as interpretative sociology.

The second philosophical approach was that of existentialism<sup>33</sup>, which was concerned with the experiences people gain in the world, insisting that philosophy must come from a person's own life, social situation and own individual experiences (Seamon & Sowers 2009). Both existentialism and phenomenology explored 'place' - an area of interest that has developed into what is now known as 'sense of place', described by Seamon and Sowers (2009) as the bond between a person and their environment. Scannell and Gifford (2010) described this as 'place attachment'<sup>34</sup>, and outlined that one form of bond is that of the emotional bond. 'Place attachment' as an emotional bond provides

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<sup>32</sup> Idealism was the name of a philosophical movement in Germany from the 1780s until the 1840s, with the most influential figures being Kant, Fichte, Schelling and Hegel (McQuillan 2016). Although there were differences between these figures, they all shared a commitment to idealism. Kant's transcendental idealism described the differences between appearances and things in themselves, with Fichte, Schelling and Hegel expanding Kant's view, stating that things in themselves are a contradiction in terms, because a thing must be an object of our consciousness if it is to be an object at all (McQuillan C 2016).

<sup>33</sup> Crowell (2015) explained that existentialism became identified with a cultural movement that flourished in Europe in the 1940s and 1950s, with the major philosophers identified as originating in Germany, France, Russia and Spain. These include Camus, Heidegger, Jaspers, Martin Buber, Wahl, Marcel, Gasset, de Unamuno, Berdyaev and Shestov. The precursors to this movement are thought to be nineteenth century philosophers, Kierkegaard and Nietzsche.

<sup>34</sup> Giuliani (2003) outlined that the first reference to bonds with places appeared in Fried's work in 1963 exploring the psychological effects of forced dislocation of people from West End, Boston, during a period of urban redevelopment. The study compared the results of interviews conducted prior to dislocation and two years after dislocation, revealing the distress the affected population felt was akin to the loss of a loved one, interrupting an individual's sense of community and individual identity (Giuliani 2003).

understanding of the distress and grief expressed by victims of natural hazards, who witness destruction and loss, and who are forced to relocate, either temporarily or permanently; views also expressed by Weber's suicide typology<sup>35</sup>.

The final philosophical approach was that of phenomenology<sup>36</sup>. Phenomenology was an attempt to discover how people felt, both consciously and unconsciously, about objects of the world, or phenomena (Cloeke *et al.* 1991). In effect, phenomenologists believed that all knowledge related to experience (Johnston & Sidaway 1979), and that each experience occurs within a 'place', with Savin-Baden and Major stating that, "... [what] needed to be examined was the way people lived in the world, rather than the world being seen as a separate entity" (2013, p.213). Simply put, phenomenology sought to define how an individual experienced a particular phenomenon, recognising that this was the individual's unique experience. In this way phenomenological researchers aimed to see a subject's world through the subject's perspective by immersing themselves into the lived experience and perspective of the subject (Butler-Kisber 2010).

The concept of place attachment was explored more deeply by phenomenologists, with Tuan (1974) exploring the relationship an individual has with geographic space (Giuliani 2003). As such, quoting Heidegger (1962, cited in Giuliani 2003), Giuliani described the phenomenological view as regarding attachment to place as a human experience based on a concept that defines "... man's experience as "being-in-the world", where world is understood as the complex relationships between man, other men and things." (2003, p.147). This approach rejected the notion of 'inside' and 'outside' (refer footnote 34), suggesting instead that "being-in-the-world" was a "state-of-mind", leading to alternative approaches of quantitative data collection that focused

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<sup>35</sup> Bartle (2007) explained that Weber extended Durkheim's sociological perspectives (that an individual's behaviour is influenced by external forces ('outside')) by saying to understand society one must also understand the meaning of an individual's behaviour (known as symbolic interactionism). Durkheim's suicide studies revealed how rates of suicide were influenced by different social characteristics, described as 'external' forces (Bartle 2007). In contrast, Weber's theory argued that the way in which an individual views society is 'internal' (or 'inside'). Modern sociology views both perspectives as operating simultaneously (Bartle 2007).

<sup>36</sup> According to Smith (2013), phenomenology was practiced in various guises for centuries, but became popular during the early 20th Century with the most prominent phenomenologists being Husserl, Heidegger, Sartre and Merleau-Ponty.

on the individual experience, as well as the psychological effects of residential stability (Giuliani 2003).

As this dissertation seeks to understand the cyclone experience of older adults residing in exposed coastal hamlets and the impact the effects of ageing will have on their future natural hazard adaptive capacities, the philosophies and methodological approaches of humanistic geography were applied, with the phenomenological approach used as a guide for this study's theoretical framework. This framework was chosen as it emphasises, prioritises and deeply explores the individual's unique real life experiences (Paton *et al.* 2004).

#### *4.1.2 Methodological pluralism and triangulation*

Humanistic geographers, such as Tuan (1976), claimed that an understanding of the human world can only be truly achieved by studying people's relationship with nature, their feelings of space and place, and by observing their geographical behaviour. Phenomenologists agreed, stating that research methods should view a problem through the eyes of the people who are being researched (Mercer & Powell 1872), with Buttimer (1974, cited in Johnston & Sidaway 1979) stating that research must be undertaken by encountering people and situations with an opened-mind, rather than by using analytic methods. Thus, phenomenological methodology emphasises the implementation of methods such as interviews, focus groups, logical inferences and participant observation, described by Seamon and Lundberg as "... methodologies of engagement" (2015, p.4), rather than statistical, quantitative techniques. Ironically this was the very aspect of humanistic geography that generated the most criticism from quantitative geographers, who claimed a lack of empirical data resulted in a lack of reliability and a tendency to generalise.

As humanistic geographers in the 1970s focused on inductive methodological techniques, drawing on the complexity of individual human situations and events, disregarding deductive theory and measurable data, they were accused of producing interpretive results that lacked accuracy and trustworthiness (Seamon & Lundberg 2015). Humanistic geographers defended their techniques, emphasising that despite the interpretative nature of their research, information had come from sources including field notes, focus groups, participant observation, photographs, archival documents and

other autobiographical descriptions. As such, the use of triangulation, a method allowing the researcher to draw on multiple modes of information gathering in order to gain a more comprehensive understanding of lived perspectives, was increasingly used to ensure accuracy, objectivity and trustworthiness (Seamon & Lundberg 2015). Triangulation, at this time, involved using multiple qualitative methods, however, more recent developments in the philosophy of science has directed triangulation into a more profound interaction of qualitative and quantitative analysis (Olsen 2004). This form of triangulation was described by Olsen as:

... mixing approaches to get two or three viewpoints upon the things being studied. The resulting dialectic of learning thrives on the contrasts between what seems self-evident in interviews, what seems to underlie the lay discourses, what appears to be generally true in surveys and what differences arise when comparing all these with official interpretations of the same thing ... triangulation plays an important role in good social research. (2004, p.4)

Methodological pluralism, or triangulation, provides the researcher with a variety of techniques in order to identify the different facets of a social phenomenon, which according to Olsen (2004), has been advocated by several authors (Carter 2003; Danermark 2002; Sayer 2000 cited in Olsen 2004). Epistemologically, Johnson and Onwuegbuzie (2004) criticised researchers who engage in the qualitative versus quantitative debate, saying that those who do so appear to confuse research methods with the logic of justification, tending to treat epistemology and method synonymously. Rather, Johnson and Onwuegbuzie (2004) stated that epistemology does not dictate specific data collection and analysis methods, a point supported by McKendrick (1999), who added, it only influences how methods can be used. Differences in epistemological beliefs should not, according to Johnson and Onwuegbuzie (2004), prevent a qualitative researcher using a survey instrument to collect data, a method more typically associated with quantitative research, and vice versa.

Table 4.1 outlines the methodological approach to mixed-methods used by positivists, humanists, realists, feminists and postmodernists, to demonstrate that epistemology does not dictate specific data collection and analysis methods, it only influences how

methods can be used. The central purpose of Table 4.1 is to demonstrate that a range of methods can be used within any research tradition, but, as the bold interface suggests, some methods are more suited than others to particular traditions.



Table 4.1 How epistemology informs, rather than precludes, methodological strategy.

Tradition	Objectives	Methods and Application			
		Survey/Questionnaire	Interview	Fieldwork	Non-reactive (examples)
Positivist	Establish empirical regularities which are assumed to be of general (universal) significance.	<b>Mathematical modelling of census data to provide an overview and trend projections.</b>	Content analysis of responses to a structured interview to establish why a phenomenon occurred.	Fieldwork survey in a relevant location to identify a more suitable alternative.	Comparative systematic analysis of personal documents outlining experiences of the phenomenon being examined.
Humanistic	Valorise human experience and seek to understand the meaning, values and human significance of events.	Questionnaire investigating behaviour, social attitudes and individual perceptions to understand personal context.	In-depth interview to explore the meaning of a specific phenomenon to the individual.	<b>Ethnographic, participant observation to share the emotions, experiences and significance of a particular phenomenon.</b>	Analysis of accounts, such as autobiographies, speeches, media articles, that situate the personal experience of the phenomenon being examined in a wider socio-political context.
Realist	Identify the structures, which generate outcomes via mechanisms (necessary causal powers) under specific contingent conditions.	Expansion method data modelling which, being attentive to context, enables the specifications to be isolated from the general experience.	<b>In-depth interview with key figures to uncover the underlying processes behind the phenomenon being examined.</b>	Participant observation within the circle of decision-makers to establish the processes which contribute to the phenomenon being examined.	Interpretation of official documents.

(Feminist) Standpoint Theory	Knowledge is socially constructed. Establish a successor science in which unprivileged knowledge (i.e. women's) is recognised and valorised.	Implementation of a survey, designed by women using familiar language to generate an overview of experiences that women collectively deem to be important.	<b>In-depth interview with the women to 'unpack' their rationalisations of the phenomenon being examined.</b>	Unobtrusive observation of processes involved in the phenomenon being examined.	Interpretation of experiences contained within letters on women's issues.
Post- Modernist	Establish that the <i>multiple</i> positioning of the author (or reader) has influenced the production of the narrative.	Log-linear modelling of data to estimate the significance of difference 'positions' of topic.	Focus group interview to share and rationalise the experiences among the group.	Unobtrusive access to participant's experiences via a third source.	<b>Unpack autobiographies, personal journals and/or letters that discuss the phenomenon being examined.</b>

Source: Compiled using details from McKendrick J (1999)

**Bold interface denotes methods that are more suited than others to particular traditions.**

McKendrick's (1999) central point is that information gathered from various sources makes important contributions to research outcomes, and that:

... a questionnaire survey that moves beyond functional explanations could estimate the wider significance of more 'personal' aspects of the process ... [even though] more intimate methods may still be necessary to explore personal contexts, ... a survey questionnaire [can] provide a broad overview and [an] introduction to the more personal, people-oriented aspects of [the subject matter] (1999, p.46).

This viewpoint is supported by Flowerdew (1995, cited in McKendrick 1999), who agreed that combining methods establishes both specificity and generality within one project. Johnson and Onwuegbuzie went as far as to state, "... many research questions and combinations of questions are best and most fully answered through mixed research solutions" (2004, p.18). But, Johnson and Onwuegbuzie (2004) warned that it is important to consider the characteristics of quantitative and qualitative research to gain an understanding of the strengths and weaknesses of each approach, so as to position the researcher to mix the strategies effectively (see Table 4.2 and Table 4.3). This viewpoint is supported by Andrew and Halcomb (2006) who concurred saying that the purpose of mixed-methods research is not to replace either qualitative or quantitative research, but rather to extract the strengths and diminish the weaknesses in both approaches within a single study.

Table 4.2 Strengths and weaknesses of quantitative research approaches.

Strengths	Weaknesses
1. Researcher can test and validate already constructed theories about how phenomena occur.	<b>1. The categories used may not reflect local constituencies' understandings.</b>
2. Researcher can test hypotheses that are constructed before the data are collected.	<b>2. The theories used may not reflect local constituencies' understandings.</b>
3. Able to generalise findings when the data have been collected from a random sample of sufficient size.	3. The researcher may not consider other phenomenon because of a focus on theory and hypothesis testing, rather than on theory and hypothesis generation (confirmation bias).
<b>4. Can generalise a research finding when it has been replicated on many different populations and subpopulations.</b>	<b>4. Knowledge produced may be too abstract and general for direct application to specific local situations, contexts and individuals.</b>
5. Useful for obtaining data that allow quantitative predictions to be made.	
6. The researcher may construct a situation that eliminates the confounding influence of many variables, allowing one to more credibly assess cause-and-effect relationships.	
<b>7. Data collection using some quantitative methods is relatively quick (e.g. telephone interviews).</b>	
<b>8. Provides precise, quantitative, numerical data.</b>	
<b>9. Data analysis is relatively less time consuming.</b>	
<b>10. The research results are relatively independent of the researcher (e.g. effect size, statistical significance).</b>	
<b>11. It may have higher credibility with many people in authority (e.g. policy makers).</b>	
12. It is useful for studying large numbers of people.	

Source: Compiled using details from Johnson and Onwuegbuzie (2004)  
**Bold interface denotes characteristics considered in this dissertation.**

Table 4.3 Strengths and weaknesses of qualitative research approaches.

Strengths	Weaknesses
<b>1. Data is based on participant's own categories of meaning allowing an exploration of how and why phenomena occur.</b>	<b>1. Knowledge produced may not generalise to other populations or settings (i.e. the findings may be unique to the particular study site).</b>
<b>2. Useful approach for studying limited numbers of cases in depth.</b>	<b>2. It is difficult to make quantitative predictions.</b>
3. Useful for describing complex phenomenon and to determine idiographic causation.	3. It is more difficult to test hypotheses and theories.
<b>4. Provides individual case information.</b>	<b>4. It may have lower credibility with some administrators and policy makers.</b>
<b>5. Can conduct cross-case comparisons and analysis.</b>	<b>5. It generally takes more time to collect the data compared to qualitative research.</b>
<b>6. Provides an understanding and description of people's personal experiences of phenomena.</b>	<b>6. Data analysis is time consuming.</b>
<b>7. The researcher identifies contextual and setting factors as they relate to the phenomenon of interest.</b>	<b>7. Results are more easily influenced by the researcher's personal biases and idiosyncrasies.</b>
8. The researcher can study dynamic processes by documenting sequential patterns and change.	
9. The researcher can use the primary qualitative method of 'grounded theory' to generate inductively a tentative but explanatory theory about a phenomenon.	
<b>10. Can determine how participants interpret constructs.</b>	
<b>11. Data are usually collected in naturalistic settings.</b>	
<b>12. Qualitative approaches are responsive to local situations, conditions and stakeholders' needs, as well as to changes that occur while conducting the study allowing the researcher to shift focus.</b>	
<b>13. Case study can be used to vividly demonstrate a phenomenon.</b>	

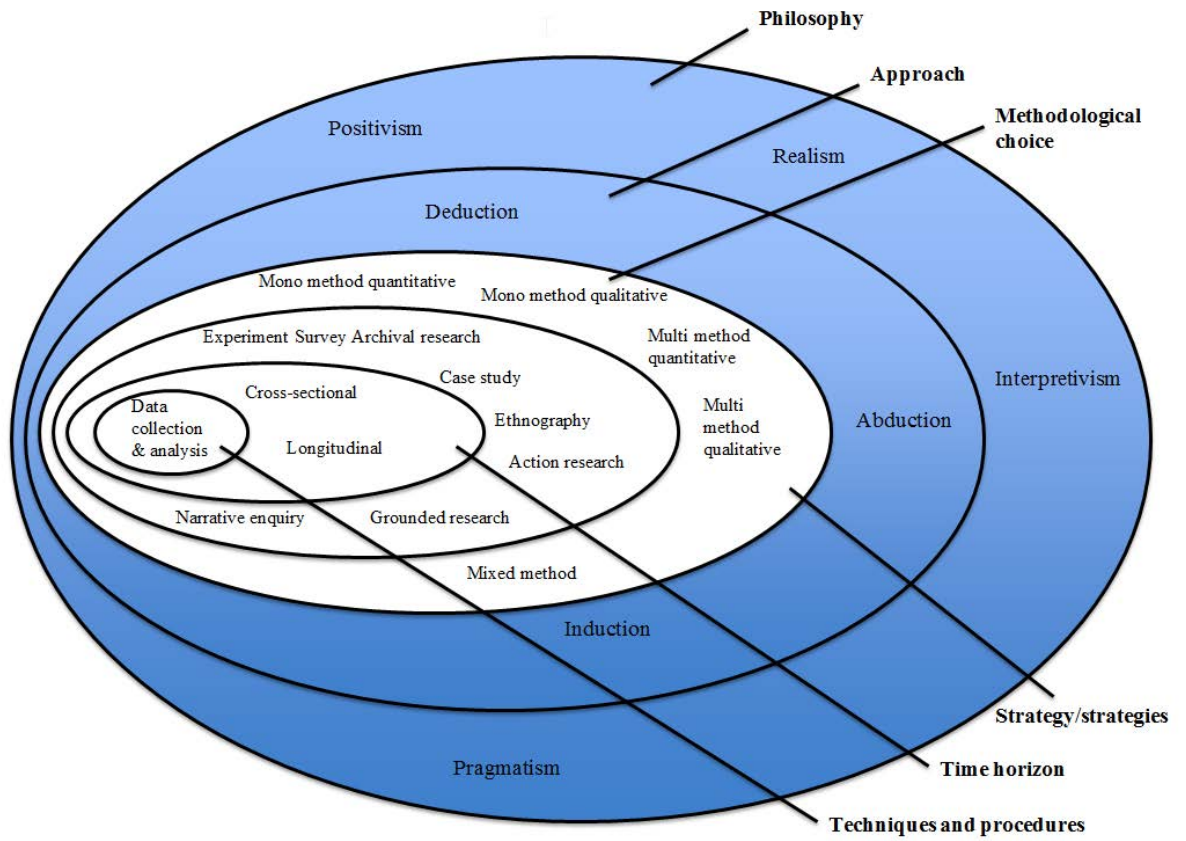
Source: Compiled using details from Johnson and Onwuegbuzie (2004)

**Bold interface denotes characteristics considered in this dissertation.**

## 4.2 Mixed-Methods Research

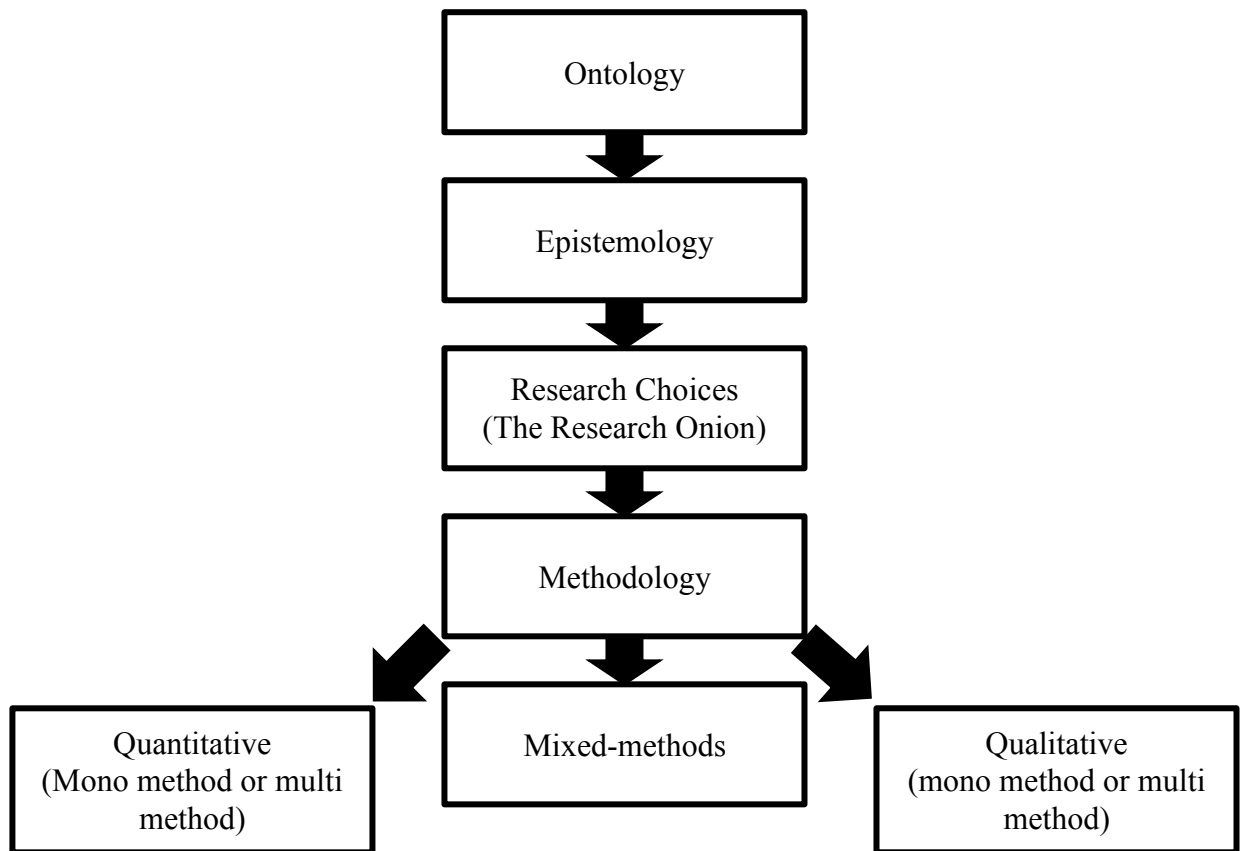
Mixed-methods research is defined by Leech and Onwuegbuzie (2008, p. 97-104) as representing research that involves the collection, analysis and interpretation of both qualitative and quantitative data in a single study or in a series of studies investigating the same underlying phenomenon. Creswell and Plano Clark (2007) elaborated that adding mixed-methods research is a research design with philosophical assumptions, as well as methods of inquiry. They continued by saying that as a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis of data and the mixture of qualitative and quantitative data in a single study. Its central premise is that the use of the quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone (Creswell & Plano Clark).

Thus, research must be carefully designed to address a question or a problem by first considering what data are needed, focussing on how to obtain that data (Saunders *et al.* 2012). Using a mixed-methods approach, data can be collected using a number of data collection techniques, including questionnaires, interviews and observations, as well as making use of secondary data. However, Saunders *et al.* (2012) warned that the selection of these techniques to obtain data, and the procedures to analyse these data, represents only the final decision about the overall research design. Using what Sanders *et al.* (2012) refer to as the *research onion*, data collection methods and analysis are determined by considering other design elements (the outer layer of the onion) (see Figure 4.1). It is therefore the researcher's ontological and epistemological viewpoints that inform the research choices (*the research onion*) that provide the context and boundaries within which data collection techniques and analysis procedures will be selected (see Figure 4.2).



**Figure 4.1 The research onion outlining research choices.**

**Source: Saunders *et al.* (2012)**



**Figure 4.2 The research problem.**

**Source: Author's impression.**

The outer layer of Figure 4.1 representing the research philosophy, or how the researcher views the world and takes into account his or her subjective views about the nature of realities, which inevitably show how a research question is understood and integrated into the research design (Saunders *et al.* 2012). Four philosophies are highlighted: positivism, realism, pragmatism and interpretivism. Positivism is defined as a philosophy that advocates the application of the scientific method to the study of social reality and beyond using highly structured measurable objective data (Bryman 2008). Realism, like positivism, is also a philosophical position associated with scientific enquiry advocating that reality exists independent of the senses, accessible through the researcher's tools and theoretical speculations (Bryman 2008; Saunders *et*



*al.* 2012)<sup>37</sup>. For researchers who adopt the philosophy of pragmatism, the focus is on the findings' practical implications. They argue that no single viewpoint is representative of the whole picture, recognising that there may be multiple viewpoints (Saunders *et al.* 2012). The final philosophy is that of interpretivism, whose focus is on the gathering of rich insights in the subjective meanings of social action. Such a position is concerned with the study of a social phenomenon within its natural environment; focusing research on people, rather than objects of the natural sciences, requiring the researcher to understand the social world of the subject and the meaning this gives to them from their point of view (Bryman 2008; Saunders *et al.* 2012)<sup>38</sup>. This dissertation adopts the philosophy of interpretivism.

The next layer of Saunders *et al.*'s (2012) model (see Figure 4.1) represents the research approach referred to as either induction, abduction or induction. According to Bryman (2008), deductive theoretical approaches represent the most common view of the nature of the relationship between theory and social research. Within this approach the researcher develops a hypothesis (or hypotheses) based on what is known about a particular domain and of theoretical considerations in relation to the domain. Deductive theory must be subjected to empirical scrutiny, with concepts embedded within the hypothesis that require interpretation that are translated into researchable entities. Thus, the researcher must deduce a hypothesis which must translate operationally in order to collect data in relation to the concepts used to create the hypothesis (Bryman 2008).

The theoretical approach of abduction is defined by Timmermans and Tavory (2012) as a creative inferential process whose aim is to produce new hypotheses and theories based, on what they regard as, surprising research evidence. The *surprise* is defined by Reichertz (2010) as the assembling or discovery of data based on an interpretation, such as the categorisation of features for which there may not be an appropriate explanation. As such, the *surprise* calls for further research to search for the new explanations, and typically, as no suitable explanation can be found, a new one must be formulated by means of a mental process (Reichertz 2010). Therefore, abduction is described as a

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<sup>37</sup> Saunders *et al.* (2012) explained that there are two forms of realism: direct realism, which argues that what is experienced through our senses provides an accurate representation, and critical realism, which argues that what is initially experienced through the senses is subsequently processed subjectively by the mind.

<sup>38</sup> Bryman (2008) explained that historically interpretivism evolved from Weber's notion of *Verstehen*, the hermeneutic-phenomenological tradition and symbolic interactionism.

cerebral process bringing together *things* that may never have been associated with one another in the past, which Reichertz refers to as a “... cognitive logic of discovery” (2010)<sup>39</sup>.

The final approach is that of induction where the researcher infers the implications of his or her findings for the theory that initiated the research, referring it back to the empirical body of existing literature and past research findings associated with the area of study (Bryman 2008). Such an approach usually begins with specific observations, which progress to broader generalisations based on specific case studies. By its nature, inductive reasoning tends to be open-ended and exploratory, focussing on learning from experience by observing patterns, resemblances and premises in order to either reach conclusions or to generate theories (Bryman 2008). This research adopted an inductive approach.

Following on from the approach layer of the Saunders *et al.*'s (2012) model is the methodological choice layer (see Figure 4.1). Here the researcher makes a choice whether to use a quantitative method (mono method quantitative design) or methods (multiple method quantitative design), a qualitative method (mono method qualitative design) or methods (multiple method qualitative design), or a mixture of the two (mixed-method design) (Saunders *et al.* 2012). *Mono method designs* use single data collection techniques, such as a questionnaire analysed statistically within a quantitative study, or data collected from in-depth interviews analysed as narratives within a qualitative study (Saunders *et al.* 2012). Alternatively, a researcher can use a *multi-methods approach*, whereby more than one quantitative data collection technique is used within a quantitative study, or alternatively, more than one qualitative data collection technique is used within a qualitative study. A *mixed-methods design* incorporates the use of both quantitative and qualitative data collection techniques and analysis procedures, either as a simple design, whereby the researcher could, for example, begin with collecting data from a focus group, which after analysis determines a breadth of possible factors, which inform a design of a questionnaire that might collect data on the relative frequencies of those factors (Saunders *et al.* 2012). Alternatively, the researcher could undertake a complex mixed-methods approach whereby qualitative analysis techniques are used to analyse quantitative data qualitatively, such as

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<sup>39</sup> Abductive theoretical approaches are associated with grounded theory methodology (Reichertz 2010).

statistically comparing the frequency of occurrence of concepts within in-depth interview transcripts between difference participant groups. This research adopted a simple mixed-methods approach.

Once the methodological choice has been determined the researcher then determines a research strategy. Here Figure 4.1 outlines the choices that need to be made to determine the data collection methods. Such choices include a narrative enquiry, grounded theory, action research, ethnography, case study, archival research, survey and/or experiment. Choices are determined based on how best to answer or address a research question based upon the methodological choice. As this research focused on the impact of ageing on coastal hamlets affected by successive cyclones in Far North Queensland using a mixed-methods approach, the research strategies adopted were the case study and the survey.

The final layer is that of the time horizon, in which two choices are provided. The first is longitudinal, in which research is undertaken over an extended period of time, while the second is described as cross-sectional, with research undertaken to answer a research question at a particular moment in time. As the latter was described by Saunders *et al.* (2012) as strategies most likely to be used for surveys and case studies, this time horizon was chosen for this research.

Therefore, this research applied a simultaneous, or concurrent, mixed-methods approach from a qualitative orientation in which qualitative and quantitative data were given equal priority and integrated during analysis (Morse, 2003; Creswell *et al.* 2003). Maxcy (2003) stated that the selection, mixing and application of different methods was a perfectly logical approach, with Morse (2003, p.130) describing and outlining several different simultaneous mixed-methods approaches, which vary depending on a researcher's underpinning philosophical beliefs.

Thus, it is imperative to state the paradigmatic viewpoint that drove this research's methodology. Ontologically, this research adopted an interpretivism perspective following the belief that reality is multiple and relative (Hudon & Ozanne 1998). Within this perspective, knowledge is socially constructed rather than objectively determined or perceived, requiring the researcher to understand the subjective meaning

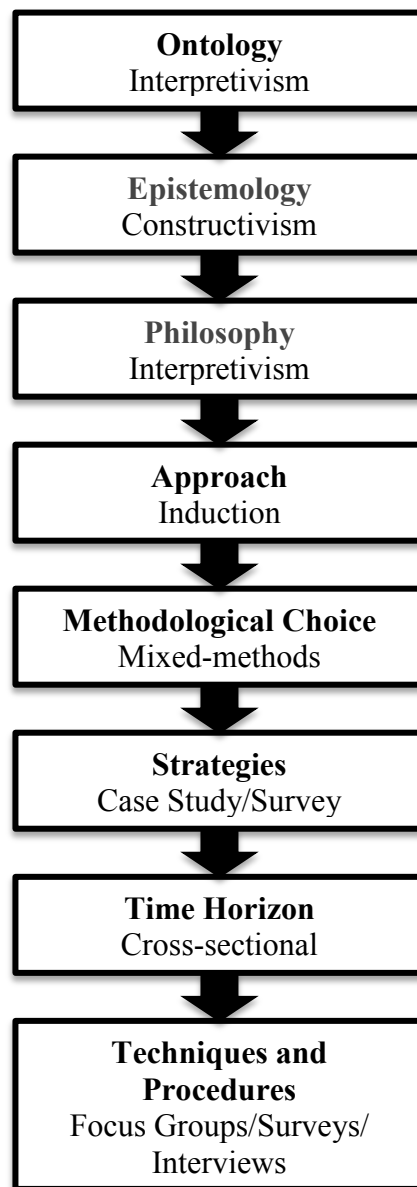
of social action (Bryman 2008; Carson *et al.* 2001). Interpretivists, according to Carson *et al.* 2001), avoid rigid structural frameworks (positivists) opting for a personal and flexible research structure receptive to capturing the meanings in human interaction so as to make sense of what is perceived as the participant's reality. This perspective allows the researcher to remain open to new knowledge, recognising that perceived reality can be complex, multiple and unpredictable (Hudson & Ozanne 1998).

Epistemologically, this research took a constructivist viewpoint, whereby knowledge is viewed as constructed and reliant upon human perception and social experience rather than discovered (Jonasson 1991). Constructivist's epistemology was first proposed as a response to criticism of the positivist approach that claimed there was one knowable truth (Jonassen 1991). Constructivists challenged the idea that knowledge could be obtained through objective measures, believing that information is subject to interpretation (Johnassen 1991)<sup>40</sup>. Historically, debates about the nature of knowledge can be traced back to Aristotle, with modern philosophers, such as Durkheim and Weber, adopting a constructivist approach to the development of theory related to socially constructed norms, beliefs and values, in which proponents attempt to understand the world of lived experience from the perspective of those who live within it (Andrews 2012). Andrews (2012) states that constructivism is concerned with how knowledge is constructed and understood, claiming that it is therefore an epistemological, rather than an ontological perspective. This research adopts this interpretation.

Thus, Figure 4.3 outlines this research's methodology with it showing that ontologically this research adopted an interpretivist viewpoint and that epistemologically the approach adopted was from a constructivist's perspective. Thus, using Saunders *et al.*'s (2012) model, the philosophy was that of interpretivism with the research applying inductive reasoning within a mixed-methods approach to collect data using the collection techniques of both case study and survey research within a cross-sectional timeframe.

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<sup>40</sup> Richardson (2003) divided constructivism into two categories: social constructivism, focusing on disciplines of knowledge, and psychological constructivism, which examined personal learning.



**Figure 4.3 Elements of this research's process.**

**Source: Author's impression.**

Thus, according to Morse's (2003, p.190) definition, this research is best conceptualised as simultaneous, qualitatively driven, "QUAL + quant" mixed-methods (in Morse's labelling convention, the driving approach is capitalised).

### **4.3 Phenomenology and the Use of Focus Groups**

The use of focus groups in phenomenological research has been questioned as being 'at odds' with the aims of the research methods (Bradbury-Jones *et al.* 2009). However, its rise in popularity within the health sciences has found that the use of focus groups can provide a greater understanding of the phenomenon being studied. Focus groups are

group interviews whose prime objective is the collection of data (Kevern & Webb 2001; McLafferty 2004). Krueger and Casey (2000) describe a focus group as a special type of group due to its purpose, size, composition, procedure and participant selection. As focus groups are typically formed to collect data on a specific topic or issue, this type of group setting is more specific than other types of group interviews, as the focus is on the interaction between participants (Bradbury-Jones *et al.* 2009).

Sim (1998) explained that the purpose of the focus group is to facilitate group processes, which typically assist participants explore and clarify their views in such a way that may not be possible in a one-on-one interview.<sup>41</sup> It has been described as a caring approach, allowing the opportunity for individual expression, group interaction and group ownership of both problems and solutions (Simms 1998). There are a number of broad advantages to the use of focus groups: the collection of data in a group setting makes them an economical method; they provide information on the dynamics of attitudes and opinions due to their interactive nature; views can be expressed spontaneously; as participants do not need to respond to every question, a focus group can be a 'safe' forum for the expression of views; and, participants can feel supported and empowered by the group setting (Sim 1998)<sup>42</sup>.

Using the examples of Halling and Leifer (1991, cited in Bradbury-Jones *et al.* 2009), they explained that focus groups are congruent to phenomenology for three reasons. First, this method supports the notion of collaboration and dialogue; an integral aim of phenomenological research. Second, the group approach applies to both descriptive and interpretive phenomenology<sup>43</sup>, and third, it stimulates discussion, allowing the introduction of new perspectives, and encourages verbal exchange. As this dissertation adopts a predominantly phenomenological approach, focus groups were selected as the

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<sup>41</sup> The earliest use of the focus group method was in the 1950s by sociologist Robert Merton and has been a prominent approach used in the collection of market research, health and social science research (Simm 1998).

<sup>42</sup> It is acknowledged that there is a dissenting view about the use of focus groups in phenomenology with critics arguing that the goal of phenomenological research is to seek the 'essences' of a phenomena, which requires an individual to describe their personal experiences in an 'uncontaminated' manner (Webb & Kevern 2001). However, the use of focus groups in phenomenological research has been advocated by others as providing the opportunity for interviewees to elaborate on and share issues raised within the group (Jasper 1996, Kookken *et al.* 2007).

<sup>43</sup> Descriptive phenomenology (introduced by Husserl) is applied when the researcher is required to describe the phenomenon being studied while bracketing their biases, while interpretive phenomenology (introduced by Heidegger) asks for meaning of the phenomenon with the researcher not bracketing their biases (Reiners 2012).

predominate method of data collection. This was complimented by one-on-one interviews if willing participants were either uncomfortable with participating in a group setting, or if the participant was hindered in any way, such as by a lack of transport or health. As one-on-one interviews are typically a phenomenological data collection method (Bradbury-jones 2009), it is felt further explanation is not required.

#### **4.4 Strengths and Weaknesses of Quantitative and Qualitative Research Approaches**

This dissertation considered Johnson and Onwuegbuzie's (2004) outline of the strengths and weaknesses of both quantitative and qualitative research approaches, with the most relevant points highlighted in bold interface (see Tables 3.3 and 3.4). Firstly, as participants for this study were aged 65 years or over, careful thought was paid to ensuring the participants would not tire too easily, as this would have jeopardised the outcomes of the research and potentially the quality of the collected data. To avoid this risk, a questionnaire was developed to accommodate the questions that could be easily answered using a 'yes' or 'no' answer, or in which the participants could simply tick boxes to indicate their response. This method was indicated as a strength of quantitative research (see Table 3.3, *Strengths* Numbers (Nos.) 7, 8 and 9), as well as a weakness of qualitative research (see Table 3.4, *Weaknesses* Nos. 5 and 6).

Secondly, additional consideration was given to ensuring that the outcomes of this research would reflect the experiences of those being studied. As ABS 2011 Census data had revealed the significant differences between weekly income, car ownership, Internet access, employment status, education and marriage status of the population in each of the coastal study sites (see Table 4.5), it was imperative to ensure data collection considered the unique nature of each community. Therefore, it was felt that although a quantitative survey could be used to collect such data effectively (see Table 3.3 *Strengths* Nos. 5 and 8), qualitative approaches, such as focus groups and personal interviews, were the most effective to understand the contextual and setting factors related to such data and how this influenced preparedness and recovery of those older adult residents, both as a collective and as individuals (see Table 3.4 *Strengths* Nos. 1, 2, 4, 5, 6, 7, 10, 11 and 12). It was considered that this type of analysis was not possible using only quantitative techniques (see Table 3.3 *Weaknesses* Nos. 1, 2 and 4).

Next, data showing the number of ‘sea-change’ migrants residing in coastal hamlets, level of past cyclone and storm surge experience and the number of older adults living alone in coastal hamlets were needed to enable generalisations to be made as to other coastal hamlets. This was, according to Table 3.3 (*Strengths* Nos. 4 and 5), a strength of quantitative research, but a weakness of qualitative research (see Table 3.4 *Weaknesses* Nos. 1 and 2). As an expected outcome of this dissertation was the provision of information to cyclone management authorities regarding the self-reliant capabilities of older adults in the future (Section 1.2), consideration had to also be given to Johnson and Onwuegbuzie’s (2004) profile warning that without the inclusion of quantitative data, such a target audience may question the credibility of the research (see Table 3.3 *Strengths* No. 11; Table 3.4 *Weaknesses* No. 4).

Finally, to assist in reducing researcher bias, identified as a weakness of qualitative research (see Table 3.4 *Weaknesses* No. 7), a quantitative survey was used to collect data that were relatively independent of the researcher. As this point had been identified as a strength of quantitative approaches (see Table 3.3 *Strengths* No. 10), issues that could be influenced by personal biases of the researcher, such as perception of risk and disaster management and disaster support awareness, were collected objectively using answers that required the participant to select a response requiring no interpretation by the researcher.

## **4.5 Outline of Quantitative and Qualitative Approaches Used in This Dissertation**

### *4.5.1 Quantitative survey instrument*

This dissertation engaged methodological pluralism by collecting both qualitative and quantitative data. Quantitative data collected from surveys was used to compare ABS data that applied to the community as a collective, with that collected from each participant aged 65 years or over. For instance, where the ABS data provided information such as the entire community’s access to the Internet, car ownership and employment status (all identified as factors that influence a participant’s perception of risk), research surveys allowed this information to be more focused on the 65 years and over cohort (Appendix A ). In addition, survey questions provided information that allowed both the individual’s response, as well as the tools required to develop a



community profile in relation to past cyclone experience, opinions, beliefs and perceptions in regards to risk, evacuation, level of insurance, preparation and disaster management awareness. The questionnaire also collected demographic data, as well as data on Internet access, car ownership and health. The use of a questionnaire was of particular importance when collecting data related to the health status of the participants, as this instrument allowed this formation to be provided in a private manner, which otherwise may not have been shared if it was requested during a more public focus group situation.

#### 4.5.2 *Qualitative approach*

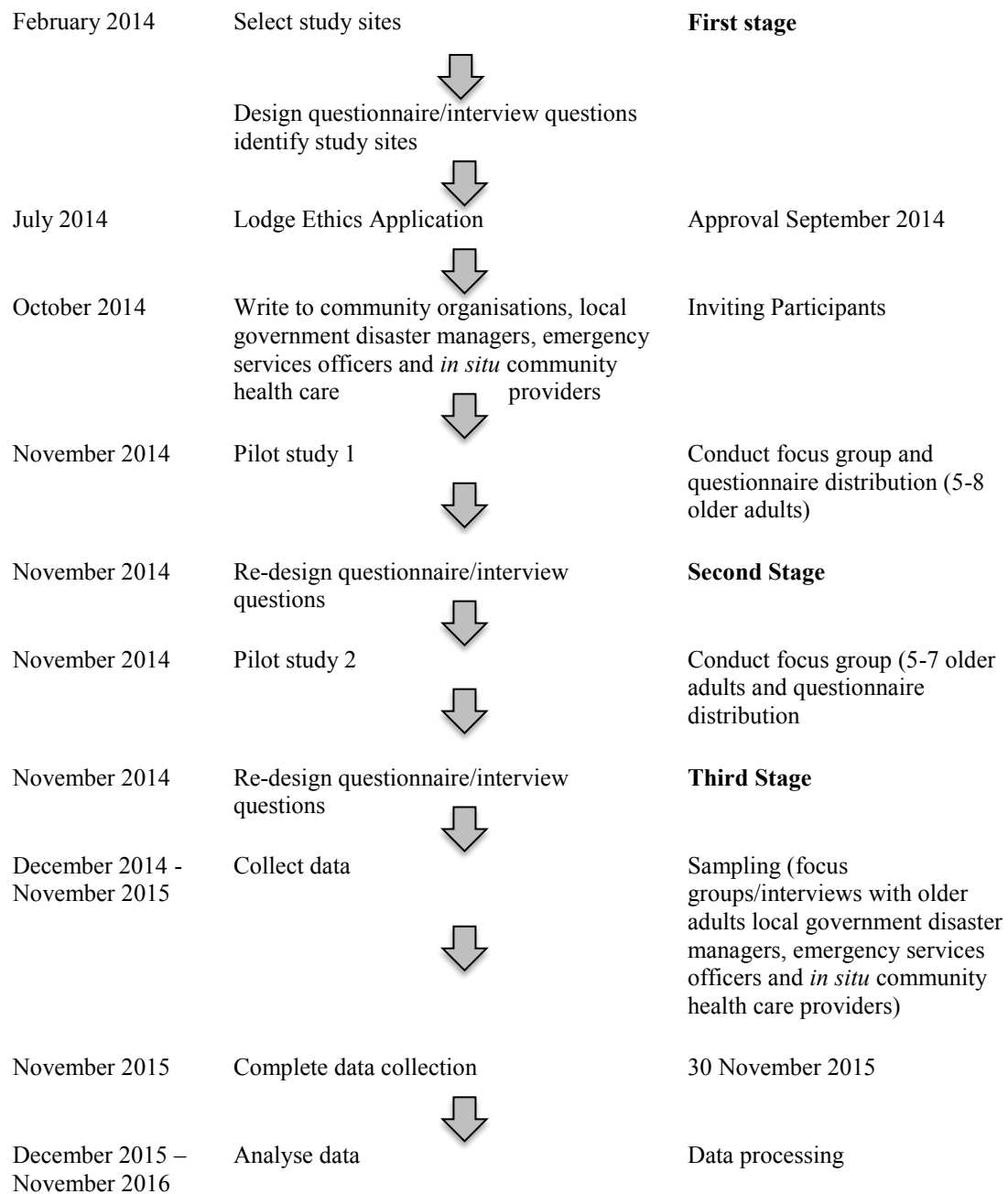
This study adopted a qualitative phenomenological approach, which gives a greater emphasis on the participant's words and experiences, allowing the researcher the opportunity to understand the participant's lived experience. Qualitative data were collected from focus groups and personal interviews with all four participant groups; older adults aged 65 years or more, local government disaster managers, emergency services officers, and *in situ* community health care providers. In regard to the older adults, the qualitative data allowed the researcher to compare each participants' judgements of their physical capacity to prepare for a cyclone, cognitive ability to cope with the threat of a cyclone, attitudes to evacuation and opinion on the assistance afforded older adults in relation to cyclone preparation. This approach also allowed the determination of the group response in relation to the effect of ageing on one's ability to prepare and recover from a cyclone, recall of procedures that may be in place to assist older adults with hazard preparation and recovery, recall of disaster management's expectations, the group's understanding and interpretation of the 'self-help' approach to disaster management, as well as to stimulate a group discussion in relation to unique programs or procedures that might exist in their communities that assist older adults during the onset and aftermath of a natural hazard.

Qualitative methods also provided information in relation to local government disaster managers and their hazard preparatory expectations of the ability of older adults, predictions regarding future problems associated with hazard preparation in ageing coastal hamlets, as well as identifying any programs that offered special assistance to older adults, particularly in relation to communication of hazard warnings, preparation,

evacuation and recovery. Finally, qualitative methods also allowed the researcher to explore the real-life experiences of emergency workers and *in situ* community health care providers charged with caring for older adults both during day-to-day situations, and in time of an emergency.

#### *4.5.3 Methodological pluralism*

Using a pluralistic methodological approach utilising both qualitative and quantitative instruments and methods allowed comparisons to be made between responses made on the more formal self-administered questionnaire completed before the focus group or interview, with those that could be influenced by either the group dynamic, or by an informal one-to-one discussion or interview (see Figure 4.4). This approach also provided the researcher with the ability to compare the responses collected from older adult participants, emergency workers and *in situ* community health care providers, with the official interpretations provided by local government disaster managers.



**Figure 4.4 Sampling technique used for the different phases of this dissertation.**

## 4.6 Sampling

The sampling for this research was an essential aspect of the study as it guided the data collection process. Non-probability sampling was used to select participants for this study. Onwuengbuzie and Collins (2007) stated that this method is traditionally associated with qualitative research and is the most frequently used in mixed-methods

research as it is an effective method to predict an outcome, add to a knowledge base, measure change and understand the complete phenomenon. Methodology for the sampling included deciding on the study sites (Chapter 4), lodging an Ethics Application, contacting community organisations whose members were aged 65 years or over, as well as local government disaster managers, emergency workers, and *in situ* community health care providers.

In order to decide on the sampling method, consideration was given to the objective of the study. As the goal of this study was to obtain an insight into the effect of ageing on one's ability to prepare and recover from a cyclone whilst residing in a remote ageing community, participants had to be purposefully selected. Onwuengbuzie and Collins (2007) advised that this method would maximise the understanding of the underlying phenomenon. Patton (1990) described this as selecting participants who are "information rich". To this end, local media were utilised<sup>44</sup> to promote the research, with interviews, including an invitation to older adult residents residing in remote areas affected by both Cyclone Larry and Cyclone Yasi to participate in the study by contacting the researcher via email or telephone. This form of sampling is known as convenience sampling as it involves selecting participants who are available and willing to participate. Convenience sampling was also undertaken by way of a letter of introduction to community groups and associations located in each of the selected coastal hamlets, whose member-base consisted of people aged 65 years or older (Appendix B). The letter requested the opportunity to speak to their members during a meeting, so as to provide the opportunity to explain the research, and to invite interested members to participate. In addition, snowball sampling was also undertaken asking participants to assist in recruiting other older adults who were not members of community groups. This was considered an important consideration for the study as it enabled individuals, who were not members of a community organisation, to also participate.

Finally, convenience sampling was also undertaken to invite local government disaster managers, emergency workers and *in situ* community health care providers to participate in the study. Once again, a letter of introduction outlining the research

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<sup>44</sup> The researcher participated in local talk-back radio interviews, newspaper editorial interviews, as well as appearing on local television news programs outlining the research and inviting interested people to participate in focus groups.

invited each of these participants to participate in either a face-to-face or a telephone interview (Appendix C).

#### **4.7 Sample Size**

The aim of the study was to collect data from between 50-60 participants, using a questionnaire, focus groups and personal interviews. Creswell (1998) recommended that an ideal sample size for phenomenological research was between five and 25 participants. As this research sought the views from four different groups (older adult citizens aged 65 years or more, local government disaster managers, emergency services officers and *in situ* community health care providers), it was decided that each participant group should consider Creswell's (1998) recommendation unless a group contained less than those numbers, which was indeed the case with the disaster manager participant group, which had a total number of four local government disaster managers within both LGAs.

Therefore, the sample for this study comprised individuals aged 65 years or over, local government disaster managers, emergency workers and *in situ* community health care providers located in Far North Queensland coastal hamlets identified as having a projected number of older adults over the age of 65 years by 2024 of approximately 30% of their total populations (refer Figure 5.10). The final sample size was 57 participants.

#### **4.8 Mixed-Method Sampling Design**

This dissertation utilised a multiple-methods design with a time orientation dimension that saw the quantitative and qualitative phases of the study occurring concurrently. The methods were independent of one another, that is, one was not reliant upon the other, with the qualitative and quantitative phases having an identical relationship, meaning that the same participants participated in both phases of the study. Onwuengbuzie and Collins (2007) stated that this form of sampling design is appropriate for allowing qualitative and quantitative data to be triangulated. This method is also supported by Creswell *et al.* (2003) who stated that by gathering both forms of data concurrently, it allows the researcher to compare both forms of data

allowing a comparison to be made between the themes identified by the qualitative data set, with the statistical results collected from the quantitative analysis.

It is important to note, however, that the quantitative survey instrument was only applied to older participants. Data collected from local government disaster managers, emergency workers and *in situ* community health care providers was collected using only qualitative interview methods. The reason for this was firstly, that undertaking timely interviews was paramount to ensure these participants participated, as it was feared the lengthy data collection methods might jeopardise their involvement in the research, and secondly, statistical type information was not required from these participants as the study focus was on older adults. Rather, as the information collected related to contextual and locational factors, as well as personal experiences and future predictions, it was felt that this information was best collected using qualitative methods (see Table 3.3 *Weaknesses* Number 5).

#### *4.8.1 Questionnaire administration*

A letter of introduction was posted to community clubs and organisations located in coastal hamlets within the region previously affected by Cyclone Larry and Cyclone Yasi (see Figure 5.4 and Figure 5.5) (Appendix C). The letter stated that the researcher was prepared to be a guest speaker at their club or organisation for the purpose of describing the study and extending a personal invitation to older adult members to participate in the research. It was assumed that a face-to-face introduction would encourage older adults to participate, which was found to be the case. Eager participants were told that they were to complete a questionnaire, followed by participation in either a focus group or a personal interview, depending on their preference, after which a mutually agreeable meeting time and venue was organised.

Before the commencement of each focus group session or interview the researcher outlined the legitimacy and purpose of the study, reassured participants that participation was voluntary, anonymous and ensured each participant was aged 65 years or older. Confirmation was also sought that each participant resided within a region previously affected by Cyclone Larry and Cyclone Yasi and reassured participants that their responses were confidential. Participants were then provided with an information sheet outlining the research and providing the contact details of the researcher and her

primary supervisor Appendix D). The questionnaire was then given to the participant for immediate completion.

Bryman (2008) stated that a self-administered questionnaire was an effective and inexpensive survey instrument, which was easy to distribute and a method that assisted in avoiding participant fatigue, a factor that was most important when working with older adults. He also confirmed that this method avoided interviewer bias and variability, while allowing the participants to complete the survey at their own pace. This research also adopted Babbie's (1999) and Gray's (2009) advice recommending that surveys be personally delivered and collected immediately upon completion so as to enhance return rates. As each survey took approximately 30 minutes to complete, the researcher remained on hand to answer any questions the participants may have had.

Data were collected from November 11, 2014 until March 26, 2015 using both face-to-face methods, as well as via the telephone (see Table 4.4). Focus groups and face-to-face interviews with older adult participants were conducted in community halls, with face-to-face interviews with emergency services officer, *in situ* community health care providers and local government disaster managers undertaken in their respective offices or meeting rooms. When older adult participants were unable to travel, interviews were also carried out using the telephone. Data collection times were restricted due to the Ethics Committee's stipulation that the researcher had to be accompanied at all times. To ensure these stipulations were upheld, the researcher's husband accompanied her, however, this meant data could only be collected during the periods of time that did not conflict with the researcher's husband's work commitments.

Table 4.4 Data collection dates.

<b>Date</b>	<b>Time</b>	<b>Location</b>	<b>Description</b>	<b>Method</b>	<b>No. Participants</b>
11/11/14	10 am	Innisfail	Seniors Focus Group	Face-to-face	4
11/11/14	1 pm	Innisfail	Seniors Focus Group	Face-to-face	4
8/1/15	10 am	Innisfail	Interview Cassowary Coast Council Local government disaster managers	Face-to-face	2
15/1/15	12.30 pm	Cairns	Interview Cairns Regional Council Local government disaster managers	Face-to-face	2
29/1/15	9 am	Babinda	Seniors Focus Group	Face-to-face	12
29/1/15	12 pm	Babinda	Interview Community Nurse	Face-to-face	1
3/2/15	7 pm	Babinda	Focus Group Babinda and Bramston Beach State Emergency Services Volunteers	Face-to-face	9
25/2/15	10.30 am	South Mission Beach	Interview Senior	Telephone	1
4/3/15	10 am	Innisfail	Focus Group <i>in situ</i> community health care providers	Face-to-face	6
10/3/15	10 am	Innisfail	Seniors Focus Group	Face-to-face	11
10/3/15	1.30 pm	Innisfail	Interview Ambulance Officer	Face-to-face	1
16/3/15	3 pm	Mena Creek	Interview Senior	Telephone	1
25/3/15	4 pm	Tully Heads	Interview Senior	Telephone	1
26/3/15	11 am	Kurrimine Beach	Interview Seniors	Telephone	2

The response rate for this study was extremely positive, despite the sample size being a relatively small self-selected sample. All those who participated were eager to do so. However, it must be noted, that not all of those who the researcher addressed as a guest



speaker were eager to be involved in the research. Most were not keen to recall their past cyclone experiences and politely declined the invitation to become participants.

The sample size of local government disaster managers, however, encapsulates the opinions of 100% of the local government disaster managers in the study site area (two local government disaster managers from Cairns Regional Council and two from Cassowary Coast Council). Additionally, the emergency services officers and *in situ* community health care providers who participated did so because of their concern for older adults in their region. It must be noted that data were collected from *all* those who requested a desire to be a part of this study.

## **4.9 Questionnaire**

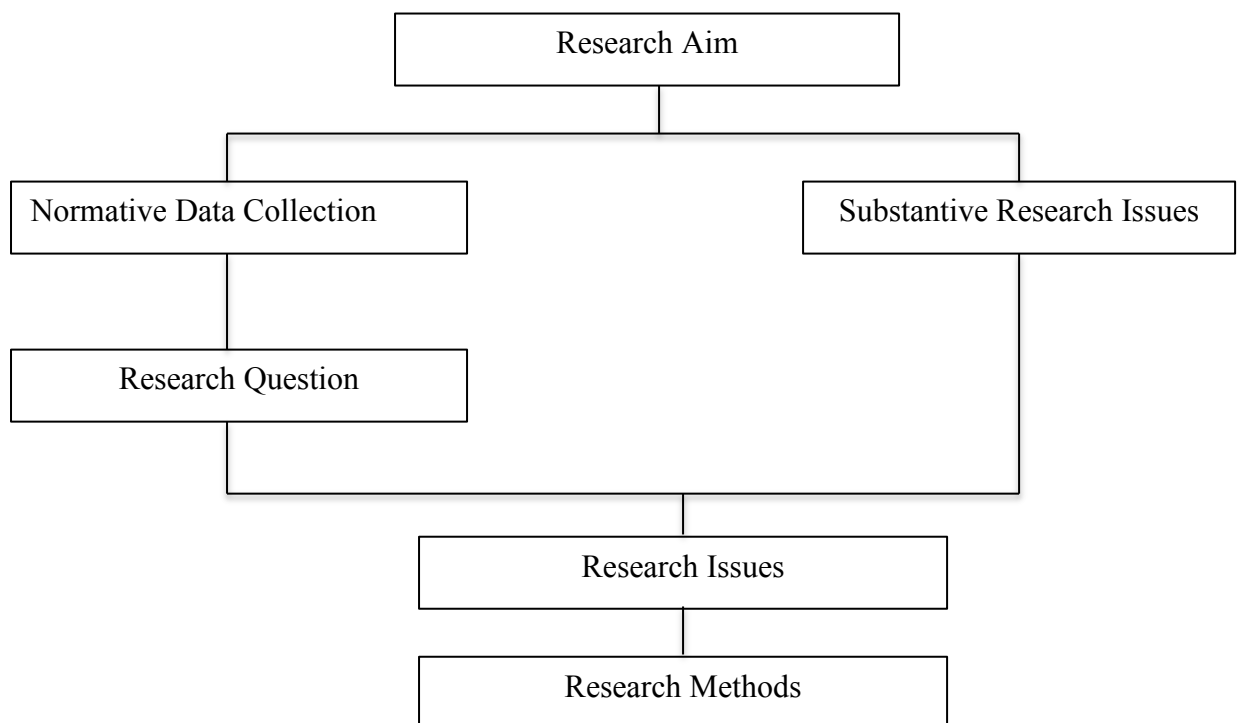
The careful design of the questionnaire used in this study was essential to the success of the research project, as it provided the personal information relating to each older adult participant in regards to their past natural hazard experience and preparatory habits, perception of risk, demographic information including health, as well as collecting information relating to their understanding of the ‘self-help’ approach to disaster management. Consequently, the questionnaire endured close scrutiny from respected researchers, followed by two pilot studies used to test the instrument, code book and code sheet (Appendix E). The thoroughness of this process ensured that the relevant information relating to the objectives of this research was collected.

### *4.9.1 Questionnaire design*

The questionnaire was designed to collect data from only the older adult participants in this study. The data related to their past hazard and evacuation experiences, cyclone and storm surge preparation habits, hazard risk perceptions, disaster management and disaster support awareness, as well as demographic information including the health of each participant and of those who resided with them.

In order to achieve that goal, research questions (Section 1.3) were designed to gather normative information about the participant’s past hazard experience, preparatory behaviour, perception of risk and of responsibility. The data collected were then used to understand substantive issues by identifying similarities and differences within the

context of the research topic. Figure 4.5 outlines the relationship between the research aim, normative data, research question and any substantive research issues that then inform the research issues and research methods. According to Adelman (2009), analysing information in this manner requires the researcher to seek out how attitudes and behaviours have come about, allowing an extension of knowledge beyond that of the literature review, providing substance to the analysis. Table 4.5 sets out the relevance of each method used (both qualitative and quantitative methods) by providing an insight into how each question has addressed the research aims and questions, supported by past literature references.



**Figure 4.5 Relationships between the research aim, questions, issues and methods.**

**Source: Author's Impression**

Table 4.5 Relationship between research question, aim, literature and questions.

Research Question	Aim Addressed by Research Question	Objective of Aim	Literature	Method	Question Numbers	Purpose
1. What is the disaster experience for older Far North Queensland residents?	<b>Aim 1.</b> To understand the impact of disaster policy, which advocates a self-help approach, on older adults residing in remote ageing coastal hamlets in Far North Queensland, Australia.	To determine if ageing characteristics impede natural hazard preparations of self and property, whereby reducing an individual's capacity to be self-reliant when faced with preparing for and recovering from a natural hazard.  As disaster management relies on individuals to be self-reliant, this could impact on disaster management's self-help approach to disaster management.	Anderson-Berry & King 2005, Astrom 2011, Cherry <i>et al.</i> 2009, Fernandez <i>et al.</i> 2002, McCann 2011, Hannan <i>et al.</i> 2011, Haynes <i>et al.</i> 2008, Johnson <i>et al.</i> 2012, Morrissey & Reser 2003, Ngo 2001, Williams <i>et al.</i> 2013, Woods <i>et al.</i> 2014.	Questionnaire - older adults  Focus Groups - older adults  Personal interviews – older adults and local government disaster managers, emergency services officers and <i>in situ</i> community health care providers.	<b>Questionnaire - Older adults:</b> <b>Qs 4-12</b> Preparation, evacuation behaviour and risk perceptions regarding safety and likely property damage <b>Qs 13-16</b> Disaster management procedures and disaster support awareness <b>Qs 41-56</b> Health and fitness levels of participants and other members of the household  <b>Focus Groups &amp; Interviews – Older adults:</b> <b>Qs i, ii, iii, v, vi, vii</b> Gather information on the capabilities now, in the past and predictions for the future, from participants in relations to preparing, evacuating and recovering from a natural hazard.  <b>Interview Local government disaster managers, emergency services officers and <i>in situ</i> community health care providers:</b> <b>Qs i, ii, iii, iv, v</b> To determine local government disaster managers' expectations in relation to older adults preparing and recovering from a natural hazard. To determine if local government disaster managers envisage any future problems with older adults preparing for natural hazards.	To investigate whether coastal hamlets, whose populations are projected to comprise of a significant proportion of people over the age of 65 years in the next 5 -10 years, have the ability to remain self-reliant in relation to preparing and recovering from future natural hazards.

Research Question	Aim Addressed by Research Question	Objective of Aim	Literature	Method	Question Numbers	Purpose
1. (cont.) What is the disaster experience for older Far North Queensland residents?	<b>Aim 2.</b> To gain an appreciation of the collective efficacies of older adults residing in cyclone-prone remote coastal hamlets.	<p>To determine if the factors identified in the literature as impeding an older adult's ability to prepare and recover from a natural hazard influence the current preparation and collective efficacies of communities with high number of older adults.</p> <p>To determine if the individuals are collectively concerned if increased loss of physical, mental and financial capacity associated with ageing will impede natural hazard preparatory and recovery efforts of their community in the future.</p>	Astrom <i>et al.</i> 2011, Cherry <i>et al.</i> 2010, Cutter & Finch 2008, Dorbek 1979, Fernandez <i>et al.</i> 2002, Huerta <i>et al.</i> 2012, Horton 1978, IFRC 2014, Kilijanek & Ngo, 2001, Mayhorn 2005. Wang & Tarnal 2012,	<p>Questionnaire - older adults</p> <p>Focus Groups - older adults</p> <p>Personal interviews – older adults</p> <p>Personal interviews – local government disaster managers, emergency services officers and <i>in situ</i> community health care providers.</p>	<p><b>Questionnaire - Older adults:</b> <b>Qs 25-27, 29, 31, 40</b> Demographics <b>Qs 1-3</b> Past hazard experience <b>Qs 4-12</b> Preparation and evacuation behaviour past and present <b>Qs 13-16</b> Risk perceptions regarding safety and likely property damage <b>Qs 41-56</b> Health and fitness levels of participants and other members of the household</p> <p><b>Focus Groups and Interviews - Older adults:</b> <b>Qs i, ii, iv, v</b> To determine the group's and individual's opinion on: Cyclone preparation, evacuation and recovery assistance given to older adults To determine the group response to the influence of ageing on the ability to prepare and recover from a cyclone and on coping with the stress of an impending natural hazard Does anyone assist them? What is the most difficult part of preparing? Cleaning up? Determine if preparation and clean-up is any more difficult now than when they first moved to the community? To determine if getting older alters how a person copes with the threat of a natural hazard.</p> <p><b>Interview - Local government disaster managers, Emergency Services Officers and <i>in situ</i> community health care providers:</b> <b>Qs i, ii, iv</b> Are older adults regarded as vulnerable? In what way? Will this change in the future?</p>	To enable generalisations to be made about coastal hamlets in regard to the characteristics identified in the literature regarding reduced physical, mental and financial capacities of older adult populations influencing their ability to prepare or recover from a natural hazard.

Research Question	Aim Addressed by Research Question	Objective of Aim	Literature	Method	Question Numbers	Purpose
1. (cont.) What is the disaster experience for older Far North Queensland residents?	<b>Aim 3.</b> To determine how older adults' collective efficacies affects their motivation and intentional behaviours in response to cyclone disasters.	To understand the changes that may have occurred in how individuals prepare and recover from a cyclone as a person ages.  Determine if individuals are concerned about future changes to their ability and how that will affect future community recovery.	Astrom <i>et al.</i> 2011, Cherry <i>et al.</i> 2010, Cutter & Finch 2008, Fernandez <i>et al.</i> 2002, IFRC 2014, Ngo, 2001, Wang & Tarnal 2012.	Questionnaire  Focus Group  Interview – older adults	<b>Questionnaire - Older adults:</b> <b>Qs 45-48, 53-56</b> Questions relating to preparation and evacuation difficulties.  <b>Focus Groups and Interviews - Older adults:</b> <b>Qs i, ii, iii, iv, v</b> Gather information on the capabilities of participants to prepare and recover from a natural hazard.	To understand changes in hazard preparation and recovery amongst older adult by comparing their actions in their younger years to those undertaken at their current age profile, and to project further changes in the future.
2. Do local government disaster managers, emergency services officers and <i>in situ</i> health carers think older independent-living adults in the community are prepared for cyclones?	<b>Aim 1.</b> To understand the impact of disaster policy, which advocates a self-help approach, on older adults residing in remote ageing coastal hamlets in Far North Queensland, Australia.	To determine if ageing characteristics impede natural hazard preparations of self and property, whereby reducing an individual's capacity to be self-reliant when faced with preparing for and recovering from a natural hazard.  As disaster management relies on individuals to be self-reliant, this could impact on disaster managements self-help approach to disaster management.	Goldstraw <i>et al.</i> 2012, Haynes <i>et al.</i> 2008, Johnson <i>et al.</i> 2012, Woods <i>et al.</i> 2014.	Questionnaire  Focus groups – older adults  Personal interviews – older adults, local government disaster managers, emergency services officers and <i>in situ</i> community health care providers.	<b>Questionnaire - Older adults:</b> <b>Qs 17-24</b> Question disaster management and disaster recovery awareness.  <b>Focus Groups and Interviews – Older adults:</b> <b>Qs iv, vi</b> To determine whether the group can identify or recall any special disaster management procedures or processes that are in place to assist older adults living independently.  <b>Interview - Local government disaster managers, emergency services officers and <i>in situ</i> community health care providers:</b> <b>Qs ii, v</b> To determine disaster management's expectations of older adults. To determine if local government disaster managers envisage any future problems with older adults preparing for natural hazards. To determine if there are any special procedures in place for older adults To determine how older adults are informed of special procedures and processes.	To compare local government disaster managers' expectations with the experiences of older adults.  To also allow generalisations to be made in relation to understanding the level of awareness of disaster management procedures and disaster relief relating to older adults in the community.

Research Question	Aim Addressed by Research Question	Objective of Aim	Literature	Method	Question Numbers	Purpose
3. What is the role of policy in disaster preparation and response in small regional communities?	<b>Aim 1.</b> To understand the impact of disaster policy, which advocates a self-help approach, on older adults residing in remote ageing coastal hamlets in Far North Queensland, Australia.	<p>To understand the impact of disaster management policy on ageing coastal hamlets.</p> <p>To determine if older adults are treated differently from younger members of the community in relation to assistance with preparation, evacuation and recovery.</p> <p>To determine if the communities have unique procedures in place to assist older adults with natural hazard preparation, evacuation and recovery.</p>	Handmer & Millman 2004, Reintveld <i>et al.</i> 2001, David & Bartlett 2008, Booth & Williams 2014, King <i>et al.</i> 2013, Ollerensham <i>et al.</i> 2014, Handmer & Choong 2006, Goldstraw <i>et al.</i> 2012, Haynes <i>et al.</i> 2008, Johnson <i>et al.</i> 2012, Woods <i>et al.</i> 2014.	<p>Questionnaire - older adults</p> <p>Focus Groups - older adults</p> <p>Personal interviews – older adults</p> <p>Personal interviews – local government disaster managers, emergency services officers and <i>in situ</i> community health care providers.</p>	<p><b>Questionnaire - Older adults:</b> <b>Q 24</b> To determine whom an aged person would turn to if they needed assistance. preparing or cleaning up after a cyclone <b>Q 10</b> To determine if older adults would evacuate to a family member or friend or neighbour's home.</p> <p><b>Focus Group and Interviews – Older adults: Qs iv, vi</b> To gather information regarding community assistance in relation to helping older citizens prepare and recover from a natural hazard, as well as assisting with their safety by ensuring they are located in a safe location during the event. To determine whom an aged would turn to if they needed assistance preparing or cleaning up after a cyclone. To determine if older adults would evacuate to a family member or friend or neighbour's home.</p> <p><b>Interview - Local government disaster managers, Emergency Services Officers and <i>in situ</i> community health care providers: Qs iii, v, vi</b> To determine if there are any special procedures in place for older adults, particularly those on their own living independently, or if there are any planned for the future. To determine if local government disaster managers consider older adults as more vulnerable than younger members of the community, and if it is regarded they require more assistance.</p>	<p>To enable generalisations to be made regarding local government disaster managers treatment of older adults' need in relation to preparation and recovery.</p> <p>To enable generalisations to be made about the response from the community in relation to assisting older adults prepare, evacuate and recover from a natural hazard.</p>

The self-completion questionnaire was designed using unbiased, unambiguous, succinct language, which Guthrie (2010) stated was key to good survey design. Consideration was also given to the participants in the study (older adults aged 65 years or over) with careful placement of open and closed questions and Likert scale questions arranged deliberately so as to avoid confusion and to minimise fatigue (Johnson & Christensen 2012). Additional consideration was also given to the research questions to ensure the collected data were relevant, and, after analysis, enabled the research objectives to be met (Menter *et al.* 2011). Finally, Parfitt (2005) stated that survey data should be classified into three areas. These include data that classifies people, such as demographic data, data that relate to the behaviour of the participants, and data that relates to attitudes, opinions and beliefs.

Using these principles, the questionnaire was divided into six sections and placed in an order that Bryman (2008) recommended, beginning with the questions that were interesting, salient and relevant to the research. Section one began by asking participants about their past cyclone and storm surge experiences using both quantitative and qualitative methods. By asking participants if they had experienced a cyclone or storm surge, or any other form of natural hazard, and then asking them to list the names of the cyclone, the type of natural hazard and the year of occurrence, allowed one method to compensate for any weaknesses in the other, while allowing method autonomy by having each operate side-by-side, a safeguard that Gray (2009) stated ensured the quality of the data. This design displayed the extent of participants' past hazard experiences.

The second section of the questionnaire collected data on participants' cyclone and storm surge preparatory habits and evacuation experiences. This information was a combination of behavioural and experiential data. Questions focused on if and when participants had evacuated their property in the past, where participants had sheltered, if they had followed the advice of disaster authorities and prepared a cyclone emergency kit. The questionnaire also asked participants to list what the kit contained, if they had an evacuation plan in place for future events, where a copy of that plan was kept and where they would shelter in the future. In addition, participants were also asked about their cyclone preparatory habits and whether this preparation was necessary for all cyclones or only those that will be the most intense. This section consisted of mainly

quantitative responses, with the participant required to tick boxes to indicate the action taken in preparing themselves and their properties for a cyclone, as well as ticking the items contained in their emergency kit from a prepared list recommended by Disaster Management Queensland (2014). Provision was also given for qualitative responses to allow participants to provide extra details of their preparatory and evacuation habits and intentions.

The third section of the questionnaire investigated the participants' perception of risk using Likert scales. Questions focused on the participant's opinion and beliefs as to their level of concern about the threat of future cyclones and storm surges, the likelihood of damage to their homes from cyclones and storm surges and their level of concern in regard to the onset of cyclone season. The scales used provided the options of *very concerned*, *concerned*, *a little concerned*, *not concerned at all* and *I do not know*. It was felt that it was important to provide options such as these to ensure the questionnaire itself did not create biased responses by only providing options that emphasised concern (Parfitt 2005).

Section four asked participant's opinion-based questions regarding disaster management procedures that are currently in place, as well as investigating their level of awareness related to disaster support processes and programs. The latter allowed the researcher to build a community profile that displayed the level of community awareness of disaster support processes amongst older adults in each coastal hamlet. The questions asked participants of their knowledge of the 'self-help' approach to disaster management, enquiring as to their understanding of authorities' expectations of what they should/need to do, who they call on to assist with preparation and recovery actions, and whether they believed that disaster preparation and recovery was their responsibility or that of the three tiers of government. The latter question also provided space for qualitative responses asking participants to write what they felt the respective levels of government should do in relation to prevention and recovery.

The fifth section of the questionnaire collected demographic data. These data were collected using quantitative techniques whereby the participant ticked the relevant response in regards to gender, age, residential tenancy status, pet ownership, household composition, communication devices, Internet access, level of insurance, year of



residency, proximity to friends and family and employment status. These questions were designed by following ABS demographic, socio-cultural and socio-economic categories.

Finally, section six collected data in relation to the health of the participant and those who resided with them. These questions required the participant to select responses from a list of chronic illnesses outlined by the Australian Institute of Health and Welfare (AIHW 2014) as those most relevant to people over the age of 65 years, as well as providing spaces for them to add qualitative responses if their condition was not on the standard list. Section six also asked whether regular medication was required, if the condition prevented the sufferer from performing everyday tasks, including tasks that required both physical and cognitive functions, if they required *in situ* care and if these conditions meant that the sufferer required outside assistance to prepare, recover or evacuate during the onset of a cyclone or storm surge. Demographic and health-related information was deliberately placed at the end of the survey because, as stated by Johnson and Christensen (2012), questionnaires should be designed using a funnel technique, whereby broad, interesting and general questions should appear at the beginning, followed by more sensitive and less interesting items appearing at the end.

#### **4.10 Focus Groups and Personal Interviews**

The collection of data for this dissertation required the researcher to undertake various focus group and personal interviews. A focus group is a qualitative approach to collecting data in which the attitudes, opinions or perceptions of participants are explored through what Kumar (1999) described as a free and open discussion between the members of a group and the facilitator, or researcher. Conradson (2005) extended that description to highlight that members of focus groups have been chosen and assembled by the researcher to discuss the topic that is the subject of the research. The focus group approach was chosen as focus group discussions are useful for gaining an insight into participants' views and understandings of an issue, how those insights relate to other issues, how views differ within a group setting, as well as understanding the differences in opinion between what people say and do (Conradson, 2005).

Data were collected from focus groups involving four different participant groups. The first group consisted of older independent-living residents of remote Far North Queensland coastal hamlets aged 65 years or older. The second group comprised of Local government disaster managers located in either Cairns Regional Council or Cassowary Coast Regional Council responsible for the natural hazard management of the selected study sites. Emergency Services Officers, including Ambulance Officers and State Emergency Services volunteers, located within the study sites were the third focus group, with *in situ* community health care providers, including nurses and social workers, making up the fourth and final group of participants.

Older adult participants were given the choice between participating in a focus group or a personal interview. Personal interviews, unlike focus groups, provided this research with personal and individual viewpoints. Despite this contrast, it was felt that rather than not including people who clearly did not want to be a part of a focus group, data collected from personal interviews provided the opportunity to understand the opinions, attitudes, perceptions and beliefs of individuals who may not have strong community ties, who may display a weaker ‘sense of place’ and connectedness, did not feel comfortable contributing in a group setting or perhaps could have felt their opinions would be overshadowed by more vocal group members. Regardless of their choice, the questions asked were identical for both qualitative approaches. Again, questions endured close scrutiny from respected researchers, followed by two pilot studies used to test the responses to ensure the responses from the participants related to the objectives of the research.

#### *4.10.1 Participants aged 65 years or over*

The careful design of the focus group and interview questions used in this dissertation was essential to the success of the project, as it enabled a comparison to be made between the opinions of older adult participants relating to the effects of ageing on one’s ability to prepare and recover from a cyclone, and on the assistance afforded older adults during these periods (Appendix F).. In addition, the questions also allowed a comparison to be made in relation to attitudes towards evacuation, and their recall of procedures or processes to assist older adults, as well as their recall of local government disaster managers’ expectations of self-reliance during an event.

Research questions were designed to gather more in-depth normative information about changes in participants' cyclone preparation and recovery ability, as well as their capacity to cope with stress when a warning had been issued, their understanding of emergency warnings and their ability to follow advice. Questions also gathered information on participants' feelings towards leaving their home, their experiences in an evacuation centre, any assistance that they have required in the past to prepare, evacuate and recover from an event, community assistance initiatives, changes in their physical and mental capacities, their understanding of local government disaster managers' expectations, their ability to fulfil those expectations, their sense of community and what it means to be able to remain living independently in the place of their choice. Research questions and their aims were used to develop focus group and interview questions to ensure the outcomes of this research would be met (see Table 4.5).

#### *4.10.2 Local government disaster managers, emergency services officers and in situ community health care providers*

Focus group and interview questions were also developed for local government disaster managers, emergency services officers (ambulance and SES), and *in situ* community health care providers (see Table 5.3) (Appendix G). These questions enabled the researcher to determine if differences existed between disaster management expectations and the real-life experiences of the officers who care for the older adults both on a day-to-day basis and during times of an emergency. The questions also assisted the researcher in determining if local government disaster managers, emergency services officers and *in situ* community health care providers regarded older adults as requiring extra assistance and whether they foresee any future issues relating to the ageing population of exposed coastal hamlets.

### **4.11 Pilot Studies**

To ensure the integrity of the questionnaire and the focus group questions, pilot studies were conducted in Innisfail to allow the researcher to foresee any areas of misunderstanding, errors and biases. Pilot studies are advocated by social scientists and are regarded as a vital step in the research process (Bryman 2008; Thomas 2004). The pilot studies also allowed the testing of the code sheet and the codebook. The pilot studies began by visiting the Innisfail Senior Citizens Club as a guest speaker. The

presentation provided an opportunity to explain the nature of the study, the reasons for conducting the study and the importance of collecting information from senior citizens in their community. As such, two focus group sessions resulted, and were conducted the following week. Both focus group sessions consisted of four participants and were held at the Innisfail Community Hub, a local community centre providing ample parking, disability access, kitchen and toilet facilities, air-conditioning and comfortable seating, as well as a quiet environment to allow the conversations to be recorded. As the participants were older adults each of these considerations were vital to ensure the safety and comfort of the participants.

Analysis of the pilot studies highlighted the need to add responder options to four questionnaire questions: ‘Unsure’ to questions eighteen and thirty two; ‘I will not evacuate’ to question forty-seven; and, the option of ‘Family’ to question five. In addition, analysis of focus group responses highlighted the need for a question asking why the participant had chosen their community as their place of residence to allow the researcher to determine if the community was chosen as a retirement sea-change destination, was their birthplace, or if the location was chosen to be close to friends, family or employment opportunities. An additional question was also added to ask the participant which township they resided in, as the pilot studies indicated that some participants had travelled from nearby centres to be a part of the Innisfail focus groups. If this information had not been included, the researcher could have mistaken their responses as those of a resident of Innisfail itself.

Finally, an additional question was included to ask participants if they accessed in-home assistance, such as Meals-on-Wheels<sup>45</sup>, community health nurses or domestic assistance. This information was vital, for these services could be severely disrupted during the recovery stages of a cyclone or storm surge. The pilot studies confirmed the questionnaire format, layout and language was sufficient to ensure the instrument and focus group questions were effective.

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<sup>45</sup> Meals-on-Wheels is a home delivered service providing meals to people who are older adults, ill or disabled and confined to their home.

## 4.12 Ethics

Ethics approval was required to enable the researcher to distribute questionnaires and to conduct focus groups and interviews in the selected study sites. The ethics approval process consisted of two stages: the completion of the *Application for Research or Teaching Involving Human Participants*; and meeting the Ethics Committee's *Conditions of Approval Notice*.

### 4.12.1 Applying for Ethics Approval

The ethics application process outlined on the James Cook University (JCU) website was carefully followed to facilitate in completing the *Application for Research or Teaching Involving Human Participants*. The completed documents along with a JCU Information Sheet, JCU Informed Consent Form, the questionnaire and the focus group and interview questions were sent to the College of Marine and Environmental Sciences Ethics Advisor for checking, which, after preliminary approval, were then forwarded to the JCU Human Ethics and Grants Administrator who was charged with checking the application and forwarding it to the Human Research Ethics Committee (HREC) for approval.

### 4.12.2 Ethics Approval

At the meeting of the HREC on 27 August, 2014 it was decided to defer approval for this study until the next meeting of the HREC as there were a number of issues that the Committee felt needed to be addressed. These requests included re-categorising the study as a Category 3, providing the research experience of the researcher, clarifying if the participants were to be screened for mental or emotional health issues, clarifying which type of natural hazard/s would be the focus of this study, and identifying which supervisors will be overseeing the qualitative and quantitative aspects of the analysis. In addition, the HREC wanted: clarification as to the basis upon which focus groups would be formed; information sheets included a statement which informed participants that confidentiality could not be guaranteed in focus groups; and copies of the letters of support from aged-care facilities and local government disaster managers.

The most significant request from the HREC was a request that asked the researcher how she would address possible issues of distress in participants. To address this issue the researcher designed a handout that outlined the website addresses and contact telephone numbers of local disaster coordination centres (usually local Councils) and community support centres. This list provided contact details in relation to up-to-date weather information, cyclone and storm surge preparation advice, State Emergency Service contacts and counselling contacts. A statement was also added to the JCU Information Sheet and the cover page of the questionnaire advising that this handout was available upon request.

The concerns of the HREC were addressed and the application was resubmitted on 9 September, 2014 in preparation for their next meeting, which was held on 10 October 2014. Following that meeting the Committee requested that the information on the handout be included in the Information Sheet, rather than producing a separate document (Appendix D). In addition the Committee requested that the term ‘natural hazard’ be deleted from the Information Sheet and Consent Form and replaced with the term ‘cyclone and storm surge’, as it was felt that the participants would associate with this term more closely than they would the term ‘natural hazard’. The Committee requested that these forms be returned as soon as possible for consideration. The forms were returned on 2 October, 2014 and notification of full approval was received on 10 October 2014, issuing Ethics Approval Number H5818 (Appendix H).

#### **4.13 Data Analysis**

As this research was conducted using mixed-methods, quantitative and qualitative data were analysed using appropriate methods according to the collection method.

##### *4.13.1 Quantitative data collection process*

As this research relied upon comparing data collected from older adults aged 65 years or over residing at various study sites, it was vital to identify the residential location of each participant. Consequently, each questionnaire was marked with a three-letter identification code followed by a sequential number to indicate the order in which the surveys were collected (see Table 4.6). This code was recorded onto a spreadsheet, which was destroyed at the completion of the research.

Table 4.6 Study site codes used on questionnaires.

Study site	Code
Babinda	BAB
Bramston Beach	BSB
East Russell	ERU
Innisfail	INN
Kurrimine Beach	KUB
Mena Creek	MCR
Miriwinni	MIR
South Mission Beach	SMB
The Coconuts	COC
Tully Heads	TUH

Quantitative responses were manually coded and entered into Microsoft Excel, with the results transferred into tables for presentation, providing this research with an overview of the demographic profile, past cyclone and storm surge experience, cyclone preparation and evacuation history, disaster management and disaster support awareness, individual perception of risk, as well as the health and fitness of the sample population.

#### *4.13.2 Qualitative data collection process*

Qualitative data, collected during focus groups and interviews with senior citizens, local government disaster managers and community health care professionals were analysed using a thematic approach in order to identify the major issues and topics that emerged from the data. 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 & Ezzy, 2005). Data were then manually coded with key themes and sub-themes highlighted, grouped and labelled in order to better understand the similarities and variations in the cyclone disaster experience.

Three key steps were followed in the manual thematic coding process. First, in regard to data collected from senior citizens, transcripts were closely examined for the participants' explanations of how they viewed and approached cyclone disasters,

specifically their coping strategies, informal and formal support networks, and their expectations about the future. Data collected from local government disaster managers were examined to fully understand their expectations of the ability of the independent living older adults pre-and post a natural hazard, while the data from emergency workers and community health care professionals provided an insight into real-life coping capacity of those older adults in their care.

Second, common and contrasting concepts were identified, highlighted and grouped. In this theme development process, the researcher 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 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 the thematic structures. Qualitative results are presented using headings to identify major identified themes, with participants' responses tabulated using sub-themes to categorise responses.

#### **4.14 Conclusion**

This chapter outlined the methodological theory used in the research design for this dissertation. The humanistic approach to human geography was discussed, focusing on the qualitative phenomenological approach to undertaking research in which the lived experience of the participant is central to the success of research outcomes. Such an approach was described by Butler-Kisber (2010) as recognising that to understand the participant's perspective, the researcher must immerse his or her self into the lived experience and perspective of the participant. As such, this approach guided this study's theoretical framework because of its focus on the real-life experiences of those being studied. The chapter described methodological pluralism and the use of a mixed-method approach, explaining the benefits of such an approach in providing research outcomes that move beyond functional explanations into a wider more personal exploration of one's phenomenological experiences. An explanation was also provided to explain the use of focus groups for the data collection for this dissertation, describing the importance of a group setting for the stimulation of discussion and development of perspectives essential to the phenomenological approach to data collection.



The chapter then explained that the data for this research were collected using both quantitative and qualitative methods. Quantitative data were collected using a self-administered questionnaire completed by participants who were residents of Far North Queensland coastal hamlets, aged 65 years or older. On the completion of the questionnaire, participants then participated in either a focus group or a personal interview, from which qualitative responses were recorded and later transcribed. Focus groups and interviews were also conducted to collect data from local government disaster managers and community health providers. These data were also recorded and later transcribed. This research was conducted following approval to progress by the JCU Human Research Ethics Committee. Analysis of data from questionnaires was achieved using simple descriptive statistics, while qualitative responses were analysed using a thematic approach, with responses presented using major themes that emerged from the data, and presented in tables outlining responses that are further categorised into sub-themes. The aims of this research were successfully met using the methods outlined in this chapter. The following chapter provides a description of the study sites.

#### ***Synopsis of Chapter 4***

This chapter outlined the methodology and research strategy adopted by this dissertation. Chapter 5 now follows explaining the characteristics of the study sites and describing the coastal hamlets of Far North Queensland.

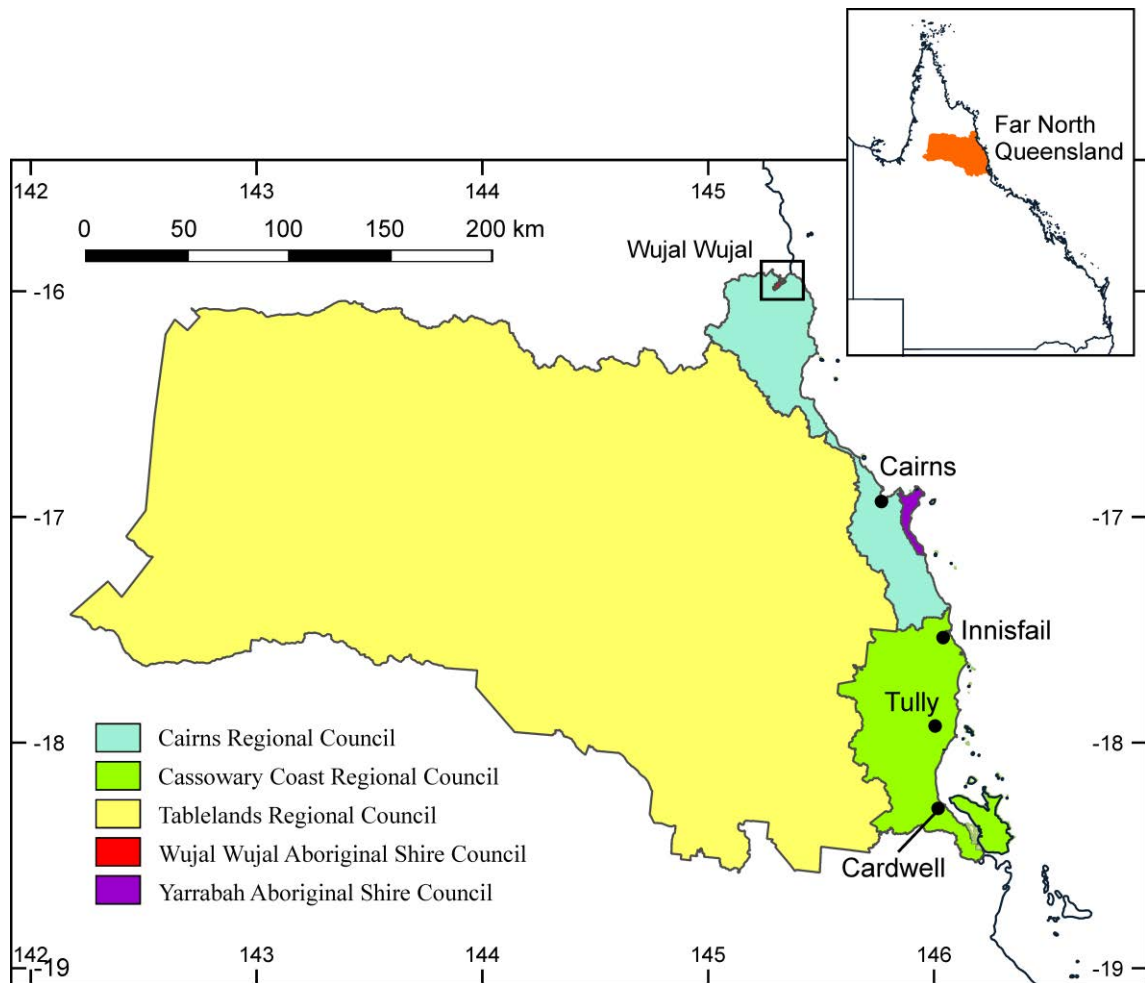
## **Chapter 5      Characteristics of Study Sites – Coastal Hamlets in Far North Queensland**

### **5.0 Introduction**

Now that the methodological and research strategy have been determined, Chapter 5 defines the study sites, which it does using four criteria. Firstly, each study site had to be located in Far North Queensland, a region vulnerable to the effects of tropical cyclones and storm surges. Secondly, each site had to fulfil Gurran *et al.*'s (2007) description of a coastal hamlet; thirdly, each site had to have a projected population reflecting approximately 30% of the population will be over the age of 65 years by 2024; and finally, each study site had to have been impacted by Cyclone Larry (2006) and Cyclone Yasi (2011). The chapter begins by providing a definition of Far North Queensland, a brief overview of its settlement history, as well as current population statistics and future population projections. The chapter continues by identifying the coastal hamlets in Far North Queensland and identifying those with rapidly ageing populations. Next the chapter explains the characteristics of a tropical cyclone and storm surge, and recaps the impact of Cyclone Larry, in 2006, and Cyclone Yasi, in 2011, on the region of Far North Queensland located from Babinda in the north, to Tully Heads in the south. Finally, the chapter concludes by identifying the hamlets chosen as study sites for this dissertation.

### **5.1 Defining Far North Queensland**

For the purposes of this dissertation, Far North Queensland is defined as the region located in the north of Queensland Australia encompassing the Local Government Areas of Cairns Regional Council, Tablelands Regional Council, Cassowary Coast Regional Council, Yarrabah Aboriginal Council and Wujal Wujal Aboriginal Council, as per the 2009 – 2031 Far North Queensland Regional Plan (FNQRP) (QG 2009) (see Figure 5.1). At the time of the Plan's publication, the population of the region was 220,687 people, making it the fastest growing region in the State, with population projections estimating approximately 350,000 will reside in the FNQ by 2031 (QG 2009).



**Figure 5.1 Location of Far North Queensland and Queensland Local Government Areas (LGA).**

**Source: Queensland Government (2016)**

## **5.2 Population of Study Sites**

### *5.2.1 Brief history of European settlement in Far North Queensland*

The most significant early settlement of Far North Queensland began during the 19th and 20th centuries in conjunction with the development of ports along the Queensland coastline. The arrival of the British Steam Navigation Company's regular steamer services in 1881 encouraged industries, exploiting both the natural resources of the region, and developing agricultural production, providing the ability to export cattle products, timber and sugar (Harrison 2010). The region also supported beche-de-mer and timber getting, with the discovery of gold in the Palmer River, in 1869, resulting in

the colonisation of large areas of Cape York Peninsula and an influx of Chinese migrants (Loos 2008; Cummings 2012). Population expansions followed between 1870 and 1876 as a result of the discovery of rich reserves of tin, copper and other base metals, along with a prosperous pearling industry in the Torres Strait (Cummings 2012; Ganter 2010).

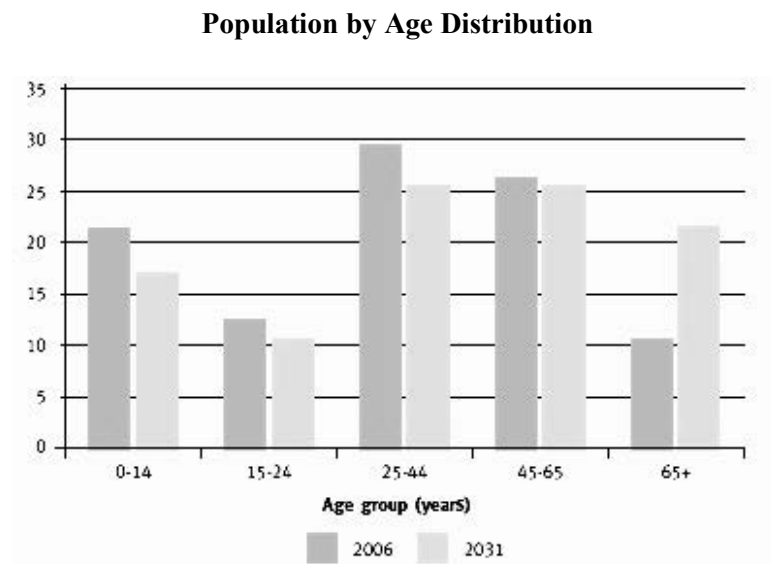
With the humid tropical climate favouring crops such as sugar cane, cotton, tobacco, coffee and bananas, the early 1900s saw the emergence of plantation farming, along with the immigration of Pacific Island labour, which ceased in 1904 following Federal legislation prohibiting the recruitment of Pacific Islanders (Cummings 2012; Griggs 1997; Griggs 2010). Other significant population migrations were those of the Italians into Queensland's sugar cane districts in the late 1800s (Dewhurst 2014). By 1925, approximately 44% of Far North Queensland sugarcane farms were owned by Italian farmers, with a second wave of Italian migrants arriving in 1955 to take up positions as sugar cane and tobacco farming labourers (Bohnet & Pert 2010).

Set against a tourism backdrop, the city of Cairns grew rapidly after 1970, encouraged by tourism focussing on the surrounding area (Cumming 2012). Employment opportunities attributed to infrastructure projects, such as the Barron Gorge Hydroelectric Power Station and Copperlode Dam, also encouraged further growth into the area. Listings of the Great Barrier Reef and the Wet Tropic as World Heritage Areas in 1981 and 1988 respectively, were regarded as catalysts for the tourism industry and the growth of Cairns and surrounding areas (Bohnet & Pert 2010). Cummings (2012) reflected that recent population growth of Far North Queensland, was due to the growth of tourism and the attraction of lifestyle factors, along with improved communication and transport links with southern Australia and overseas. Far North Queensland coastal populations have continued to rise steadily, attributed to expanding business and industry opportunities, as well as lifestyle factors attracting 'sea-change' migrants from the southern regions of Australia (Bohnet & Pert 2010).

### 5.2.2 *Population predictions for Far North Queensland*

The attraction of Far North Queensland to amenity migrants is supported by the FNQRD (2009) whose figures predict that by 2031, the FNQ region's population will show a slight decrease in the number of the people aged between 0 and 14 years, 15 to

24 years, 25 to 44 years, and 45 to 65 years<sup>46</sup>. In contrast, predictions show a substantial increase in the number of people aged over 65 years (see Figure 5.2).



**Figure 5.2 Age distribution of population in FNQ 2006 and 2031.**

**Source: QG (2009)**

### 5.3 Identifying Far North Queensland Hamlets

This dissertation uses Gurran *et al.*'s (2008) definition of a coastal hamlet. There are three reasons for this choice. Firstly, Gurran *et al.* (2008) were members of the National Sea Change Taskforce, a national body established in 2004 to represent the interests of coastal councils faced with rapid population and tourism growth. Their findings were used to drive local government policy decisions relating to the future resilience of these communities in the face of a changing climate.

The key objective of the taskforce was to:

... develop innovative and best practice strategic planning for coastal amenity areas, to preserve local character and sense of place, integrate coastal management and conservation objectives with economic

<sup>46</sup> It is acknowledged that the substantial increase in the population of older adults is mostly attributed to the existing, *in situ* baby boomer cohort ageing in place and moving into the 65+ cohort over the next 20 years.

development, build social capital, and ensure community ownership and participation in key growth decisions. (Gurran *et al.* 2008, p.8).

Secondly, when establishing the criteria for the profiles of ‘sea-change’ communities, Gurran *et al.* (2008) recognised and considered that the growth associated with ‘sea-change’ migration of Australian coastal hamlets had serious implications in relation to natural hazard exposure. The report understood that the increasing numbers of people, coastal infrastructure and industries, was of serious concern, particularly considering the implications of future climate change. And finally, Gurran *et al.* (2008) also recognised that dispersed coastal populations consist usually of older people, residing in single-road access locations, whose services (water, waste management, upkeep of roads) are usually overstretched and whose fragile economies precariously rely on tourism, hospitality, tourist-reliant retail and agriculture. The Taskforce acknowledged that the very features that identified the classification of a ‘sea-change’ community, plus the exposed locations of these communities, could mean that the outcomes for these communities could be devastating.

As previously outlined (see Table 2.6), Gurran *et al.* (2008) identified coastal hamlets as remote coastal hamlets with ageing populations of less than 15,000 people, surrounded by protected areas, located more than three hours drive from a capital city, and which are vulnerable to extreme climatic events. Referring to Figure 5.1, identifying the location of Far North Queensland, and using Gurran *et al.*’s (2008) criteria for a coastal hamlet, 19 coastal hamlets were identified (see Table 5.1).

Table 5.1 Population of coastal hamlets in Far North Queensland.

Coastal Hamlet	Population (2011)
Cooktown	2339
Cape Tribulation	330
Wonga Beach	994
Newell	328
Cooya Beach	544
Port Douglas	3205
Oak Beach	207
Mowbray (Wangetti)	331
Babinda	1068
Bramston Beach	154
Flying Fish Point	419
Innisfail	9222
Mourilyan Harbour	317
Cowley Beach	220
Kurrimine Beach	605
Bingil Bay	369
South Mission Beach	778
Wongaling Beach	1064
Tully Heads	438

Source: ABS (2014)

#### 5.4 Identifying Projected Ageing Far Northern Queensland Coastal Hamlets

ABS (2014) figures were used to predict which of the Far North Queensland coastal hamlet populations could expect increases to more than 30% in the number of people over the age of 65 years by 2024 (see Table 5.2). To do this, current data showing the numbers of people in the age categories between 55-59 years, 60-65 years, and over 65 years were used. Data identifying the number of people aged 60-65 years were added to current data showing the number of people over the age of 65, in order to predict the estimated number of people in each hamlet who will be over the age of 65 years in 2019. Then, census data showing the number of people aged 55-59 years was added to

the predicted number of people aged over 65 years in 2019, to estimate the number of people who would be over 65 years of age by 2024. The limitation with these predictions is the impossibility of predicting the number of deaths that would occur during those periods, as well as the inability to estimate the number of people aged 65 years and over who will in the future move into, or out of, each hamlet. However, it was decided that a linear extrapolation method was the best available for this research.

Using the ABS 2011 Census to predict the populations of people aged  $\geq 65$  years by 2024 revealed that Bramston Beach was the most significant study site in terms of an ageing population. Statistics showed that this site had a  $\geq 65$  years cohort of 35.71% in 2011, which is predicted to grow to 52.71% in 2019 and then to 63.71% in 2024 (see Figure 5.3). Equally as significant is that of the population predictions of Port Douglas and Tully Heads, whose populations 65 years and over in 2011 were 37.90% and 28.31%, respectively, which is predicted to rise by 2024 to 52.30 % for Port Douglas and 50.21% for Tully Heads.

As this dissertation was also interested in understanding the interpretation of the 'self-help' approach by local government disaster managers, it was also important to identify if each hamlet had a police station, volunteer-based State Emergency Service (SES), as well as local government disaster centres. SES groups were found in Cooktown, Wonga Beach, Port Douglas, Innisfail and Tully Heads, while police stations were located in Cooktown, Port Douglas, Wongaling Beach and Innisfail. Local government disaster centres were located only in the centres of Cooktown, Innisfail and Port Douglas. As natural hazard disaster management is coordinated and administered through local government agencies, it was also important to identify which Councils had jurisdiction that covered each of the sixteen identified coastal hamlets listed in Table 5.3.

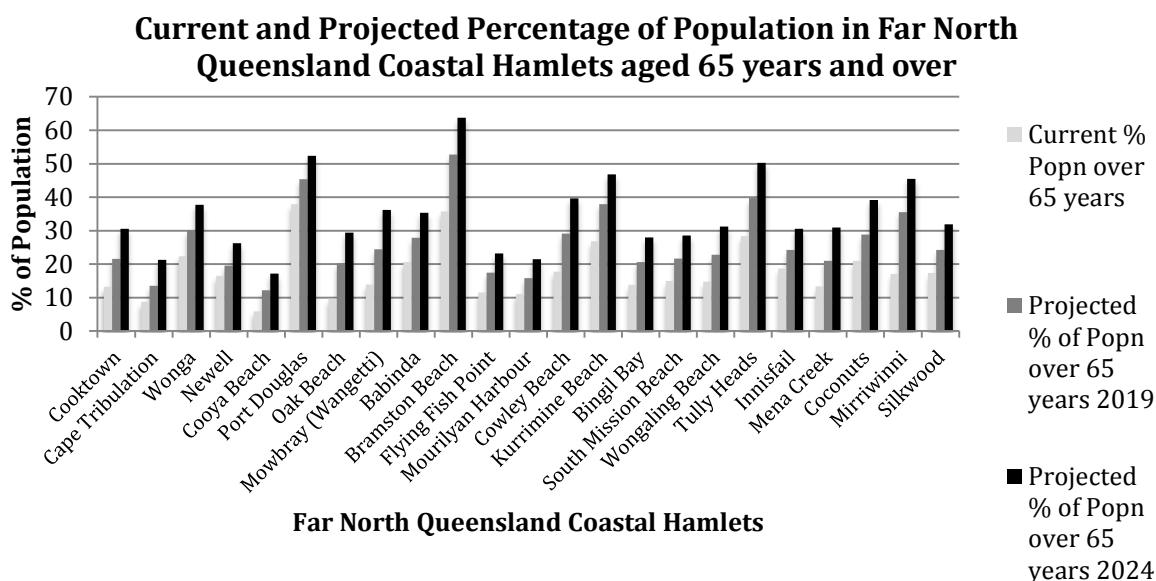


Table 5.2 Population projections of coastal hamlets located in Far North Queensland.

Location	Current (2011) Figures							Projected Figures 2019		Projected Figures 2024	
	Total	No. 55-59	% of	No. 60-64	% of	No. 65	% 65	No. 65	% of Popn 65	No. 65	% 65
	Popn	Yrs	Popn	Yrs	Popn	Yrs+	Yrs+	Yrs+	Yrs+	Yrs+	Yrs+
Cooktown	2339	211	9.0	196	8.4	308	13.2	504	21.6	715	30.6
Cape Tribulation	330	26	7.8	16	4.8	29	8.7	45	13.5	71	21.3
Wonga Beach	994	75	7.6	78	7.8	222	22.3	300	30.1	375	37.7
Newell	328	22	6.7	10	3.1	54	16.5	64	19.6	86	26.3
Cooya Beach	544	27	5.0	34	6.3	32	5.9	66	12.2	93	17.2
Port Douglas	3205	221	6.9	241	7.5	1215	37.9	1456	45.4	1677	52.3
Oak Beach	207	19	9.2	22	10.5	20	9.7	42	20.2	61	29.4
Mowbray (Wangetti)	331	39	11.8	35	10.5	46	13.9	81	24.4	120	36.2
Babinda	1068	80	7.5	77	7.2	220	20.6	297	27.8	377	35.3
Bramston Beach	154	17	11.0	26	17.0	55	35.7	81	52.7	98	63.70
Flying Fish Point	419	24	5.7	25	6.0	48	11.5	73	17.5	97	23.2
Mourilyan Harbour	317	33	5.6	15	4.8	35	11.0	50	15.8	83	21.4

Cowley Beach	220	23	10.5	25	11.4	39	17.7	64	29.1	87	39.6
Kurrimine Beach	605	54	8.9	67	11.1	162	26.8	229	37.9	283	46.8
Bingil Bay	369	27	7.3	25	6.8	51	13.8	76	20.6	103	27.9
South Mission Beach	778	54	6.9	52	6.7	116	14.9	168	21.6	222	28.5
Wongaling Beach	1064	91	8.5	85	8.0	157	14.8	242	22.8	333	31.3
Tully Heads	438	46	10.5	50	11.4	125	28.3	175	39.7	221	50.2
Innisfail	9222	585	6.3	508	5.5	1720	18.7	2228	24.2	2813	30.5
Mena Creek	528	52	9.8	41	7.8	70	13.3	111	21.0	163	30.9
The Coconuts	281	29	10.3	32	11.4	49	21.0	81	28.8	110	39.1
Mirriwinni	484	48	9.9	43	8.9	82	17.0	172	35.5	220	45.5
Silkwood	712	55	7.7	49	6.9	123	17.3	172	24.2	227	31.9

Source: ABS 2011 Census



**Figure 5.3 Current and projected percentage of population aged 65 years and over residing in Far North Queensland Hamlets.**

Source: ABS Census 2011

**Table 5.3 Far North Queensland coastal hamlets with local government Disaster Centres, State Emergency Services and Police Stations.**

Location	LGA
Cooktown* <sup>+</sup> ^	Cook Shire
Wonga <sup>+</sup>	Douglas Shire
Port Douglas* <sup>+</sup> ^	Douglas Shire
Mowbray (Wangetti)	Douglas Shire
Cowley Beach	Douglas Shire
Kurrimine Beach	Cassowary Coast
Wongaling Beach <sup>^</sup>	Cassowary Coast
Tully Heads	Cassowary Coast
Cardwell <sup>+</sup> ^	Cassowary Coast
Innisfail* <sup>+</sup> ^	Cassowary Coast
Bramston Beach <sup>^</sup>	Cairns Regional Council
Babinda <sup>^</sup>	Cairns Regional Council

<sup>+</sup> SES, <sup>^</sup> Police Station, \*Local Government Disaster Centre

Source: ABS Census 2011

## 5.5 Natural Hazard Vulnerability of Far North Queensland

The Far North Queensland coast was selected due to its long history of losses from tropical cyclones and associated storm surges and flooding (Callaghan 2011). Located in an active tropical cyclone-prone region, records show that 66 cyclones have crossed the coast and impacted communities from Cape York Peninsula to Proserpine between 1890 and 2014 (Callaghan 2011). In Australia, tropical cyclones are categorised between 1 and 5, with a Category 1 system rated as the least severe, and a Category 5 rated as the most severe (see Table 5.4). Tropical cyclones typically occur during the monsoon season, between November and April, and vary greatly in their intensity, destructiveness and speed (Anderson-Berry 2003). Historical records dating from 1890 show cyclones have been responsible for over 500 deaths and billions of dollars worth of property loss and damage in Queensland (BOM 2014b).

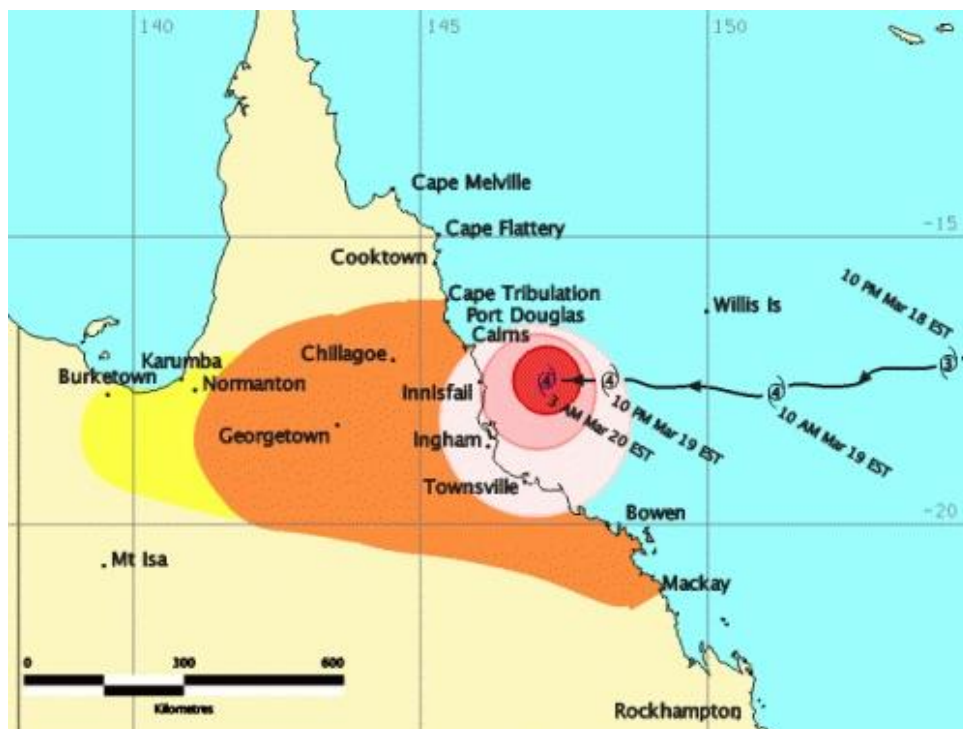
Table 5.4 Tropical Cyclone Category System Australia.

Cyclone Category	Windspeed	Damage
Category 1 <i>Tropical Cyclone</i>	Winds 90-125 km/h ( <i>Gusts</i> )	Negligible house damage. Damage to some crops, trees and caravans. Water-craft may drag moorings.
Category 2 <i>Tropical Cyclone</i>	Winds 126-164 km/h ( <i>Destructive</i> )	Minor house damage. Significant damage to signs, trees and caravans. Heavy damage to some crops. Risk of power failure. Small water craft may break moorings.
Category 3 <i>Severe Tropical Cyclone</i>	Winds 165-224 km/h ( <i>Very Destructive</i> )	Some roof and structural damage. Some caravans destroyed. Power failures likely.
Category 4 <i>Severe Tropical Cyclone</i>	Winds 225-279 km/h ( <i>Very Destructive</i> )	Significant roofing loss and structural damage. Many caravans destroyed and blown away. Dangerous airborne debris. Widespread power failures.
Category 5 <i>Severe Tropical System</i>	Winds >280 km/h ( <i>Very Destructive</i> )	Extremely dangerous with widespread destruction.

Source: Australian Bureau of Meteorology (2014a)

Since European settlement, populations have increased in size steadily along the far northern coastline of Queensland, thereby placing increasing numbers of people and large amounts of infrastructure in the direct path of tropical cyclones. Risk Frontiers (2012) reported that while cyclone-related deaths have decreased over time due to improvements in warning systems and building standards, 91.3% of the total losses to buildings in Queensland attributed to natural hazards have occurred since 1950 because of the placement of urban centres along exposed coastlines.

The damage sustained in Innisfail by Cyclone Larry in 2006, and then in Cardwell by Cyclone Yasi in 2011, support this claim (see Plates 5.1 and Figure 5.4). Severe Category 4 Tropical Cyclone Larry crossed the Far North Queensland coast on 20 March, 2006, near Innisfail (BOMc 2014). Although no lives were lost and no serious injuries were reported, the area between Babinda and Tully experienced losses to infrastructure and crops which were estimated to cost up to half a billion dollars (BOMc 2014). The damage estimates for the Innisfail area alone exceeded \$500,000,000, with more than 10,000 homes damaged, roads cut and rail access disrupted for several days (BOMc 2014).



**Figure 5.4 Impact zone for Cyclone Larry 2006.**

Source: Rooke (2013)

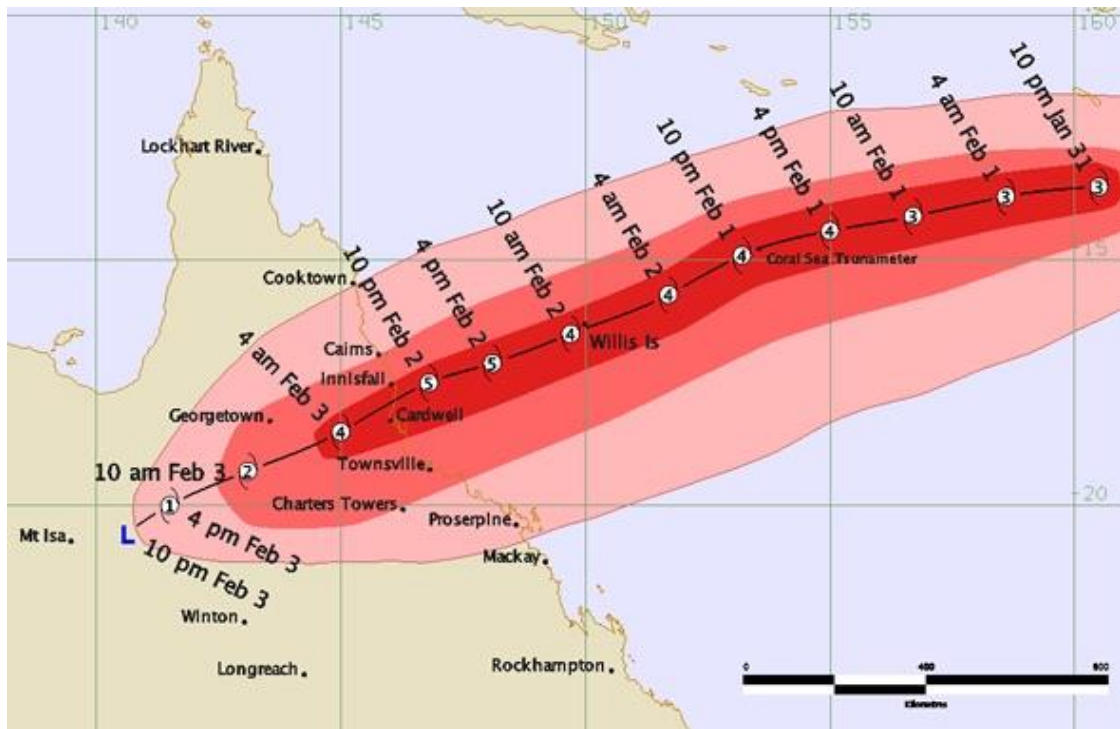


**Plate 5.1 Innisfail home destroyed by Cyclone Larry 2006.**

**Source: Sydney Morning Herald, viewed 14 August 2014 at <http://www.smh.com.au/environment/weather/homes-to-tumble-like-a-house-of-cards-20110202-1ad92.html>**

On February 3, 2011, severe Category 5 Tropical Cyclone Yasi, the most powerful cyclone to have affected the Queensland coast since records commenced, made landfall near Mission Beach, some 46 kilometres north of Cardwell (BOMd 2014) (see Plate 5.2). It was estimated that the wind gusts were approximately 285 km/h, causing major damage to buildings, vegetation and crops particularly in the areas of Tully and Cardwell. Cyclone Yasi also produced a 5.4 metre storm surge at Tully Heads, Cardwell and Port Hinchinbrook, causing major damage to 338 dwellings and businesses, vital transport links, Port Hinchinbrook marina, luxury watercraft and Council infrastructure (see Figure 5.5). It is estimated that the damage bill was approximately \$3.6 billion, making it the most costly in Australia's history (Kamenev 2011).





**Figure 5.5 Impact Zone for Cyclone Yasi 2011.**

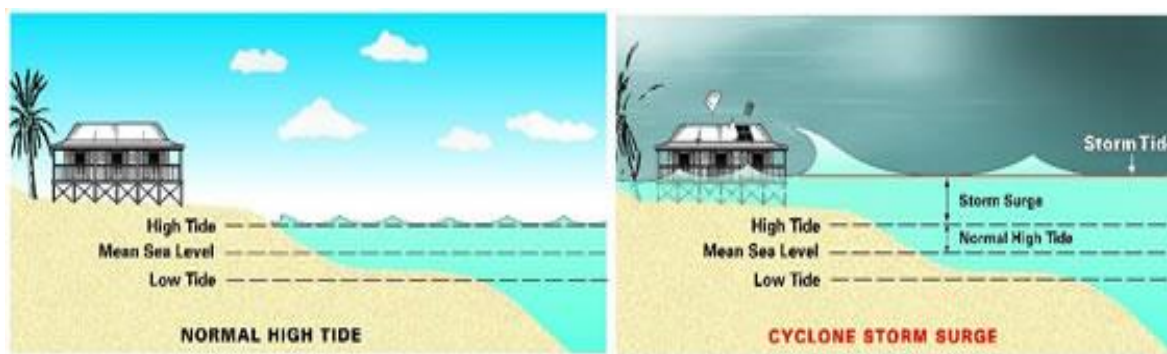
Source: Australian Bureau of Meteorology (2011d)



**Plate 5.2 Damage sustained to Cardwell by Cyclone Yasi and its associated storm surge 2011.**

Source: Daily Telegraph (2011).

Storm surges are described by the BOMa (2014) as potentially the most destructive phenomenon associated with tropical cyclones, posing a significant threat to the Far North Queensland coastline. A cyclone-induced storm surge is described as an elevation of the surface of the ocean, typically between 2-5 metres higher than a normal astronomical tide, with the potential to be some 60 – 80 kilometres across (BOMa 2014). If a surge occurs in conjunction with a high astronomical tide, inundation of low-lying coastlines can be extensive, causing widespread destruction and posing an extreme danger to those who have not evacuated (see Figure 5.6).



**Figure 5.6 Storm surge.**

**Source: BOM (2016)**

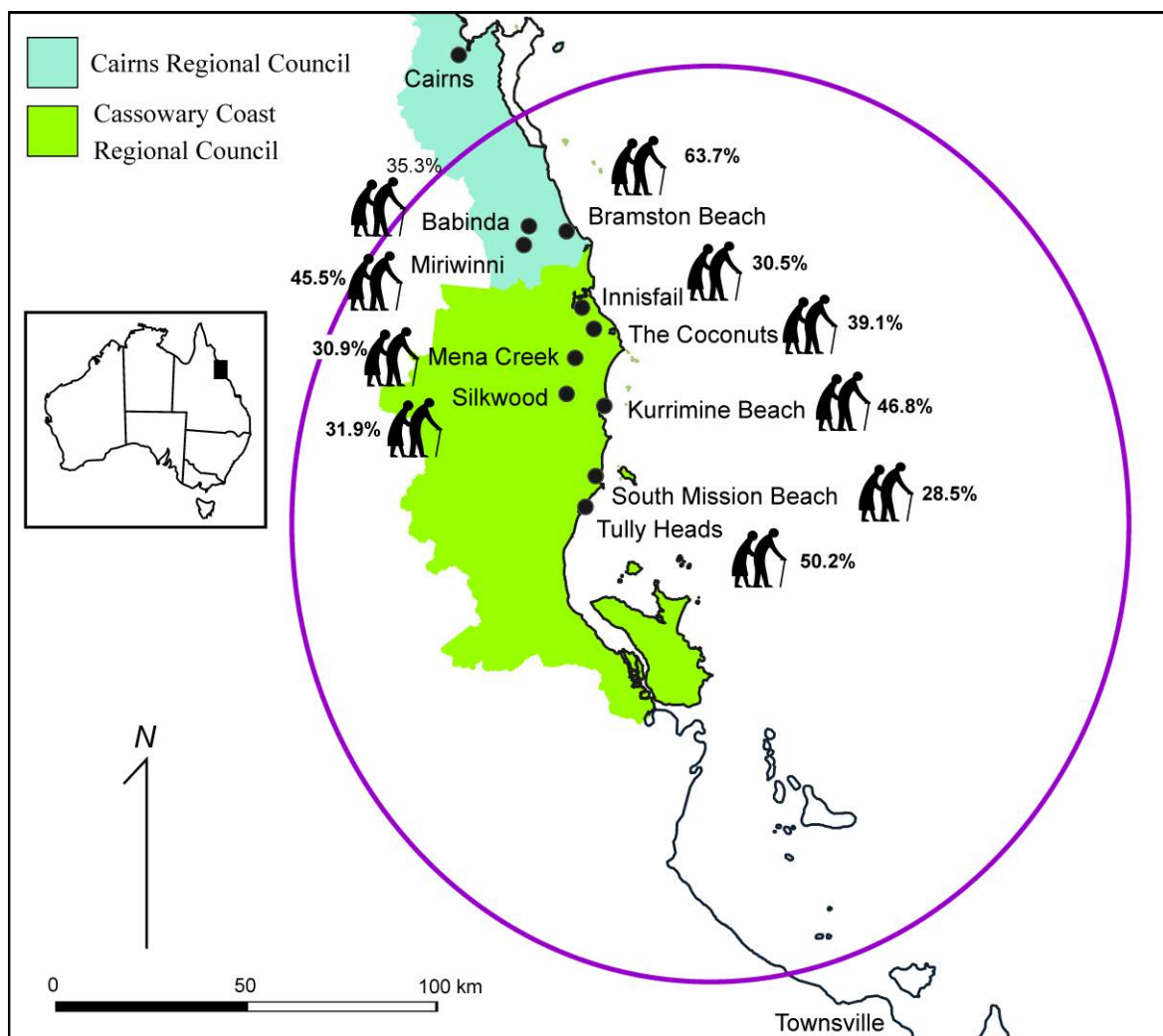
Far North Queensland coastal hamlets are located in Local Government Areas vulnerable to extreme damage and loss from a cyclone related storm surge. The recognition and acknowledgement of this threat has resulted in local Councils producing Storm Tide Evacuation Maps available to their residents, highlighting the potential for inundation on their individual properties. The publication of these maps signifies the recognition of local disaster management authorities of the potential threat posed by cyclones and storm surges in coastal hamlets.

As both Cyclone Larry and Cyclone Yasi impacted approximately the same region within a five year period, the study sites chosen for this dissertation are those located in Far North Queensland (as per Figure 5.1), located between Cairns and Tully Heads. These include Babinda, Innisfail and South Mission Beach, including the surrounding more remote communities of Tully Heads, Kurrimine Beach, Bramston Beach, The Coconuts, Mirriwinni, Silkwood and Mena Creek. Figure 5.7 identifies the study sites



for this research, indicating the percentage of the population predicted to be over the age of 65 years by 2024, with the impact zones of both Cyclone Larry and Cyclone Yasi identified by the circle.

It is also important to note that the Study sites chosen for this research have been experiencing economic hardship since being impacted by both Cyclone Larry (2006) and Cyclone Yasi (2011), with many older adults now residing without the support of family or friends due to an out-migration of younger people in the wake of the agricultural losses caused by successive cyclones and the consequent loss of enterprise upon which the region relied.



**Figure 5.7 Study sites for this dissertation indicating the % of population predicted to be over the age of 65 years by 2024, and the impact zone of Cyclone Larry, in 2006, and Cyclone Yasi, in 2011.**

**Author's Impression**

## **5.6 Demographic Features of Each Study Site**

The demographic features of each study site, as of the time of the 2011 Census, are outlined in Table 5.5, including population, gender, marital status, highest level of education, weekly median income, housing tenancy status, motor vehicle ownership and access to the Internet. These elements are important factors in determining an individual's resilience to extraneous forces (refer Table 2.8), as well as factors that could determine an individual's ability to understand and implement the 'self-help' approach to disaster management (see Figure 2.4).

The data in Table 5.5 indicate the study sites with the most disadvantage. The centres with oldest median population were Bramston Beach (56 years), Kurrimine Beach (54 years) and Tully Heads (55 years), with The Coconuts (10.4%), Kurrimine Beach (11.1%) and Tully Heads (10.4%), all showing a high number of people classified as widowed. The study sites with the highest numbers of people obtaining an education standard less than Year 8 was identified as Bramston Beach (6.6%), Kurrimine Beach (9.7%) and Innisfail (9.5%), while the lowest median weekly household income level (\$566/week) and highest unemployment rate (15.8%) occurred in Bramston Beach, closely followed by Babinda (\$719/week and 10.3%). The highest percentage of citizens renting a dwelling was in South Mission Beach (35.7%), The Coconuts (34.2%) and Innisfail (40.9%), while 12.1% of people in Babinda, 12.9% in Innisfail and 9.9% of those residing in The Coconuts did not own a motor vehicle. Finally, the highest number of households without access to the Internet occurred in Mirriwinni (181), South Mission Beach (239) and Innisfail (1156). These factors have been identified as reducing an individual's resilience and adaptive capacity when faced with a natural hazard.

Table 5.5 Demographic profile of study sites.

2011 ABS Census Data		Babinda	Mena Creek	The Coconuts	Mirriwinni	Bramston Beach	South Mission Beach	Silkwood	Kurrimine Beach	Tully Heads	Innisfail
<b>Demographics</b>	Total Population	1068	530	281	484	154	778	712	605	436	9222
	Males	526	268	138	260	71	391	379	321	245	4630
	Females	542	262	143	224	83	387	333	284	193	4592
	Median Age	43	47	51	46	56	41	44	54	55	40
<b>Marital Status</b>	% Married	45.1	51.1	60.2	57.7	60.8	55.4	53.7	58.2	54.8	45.3
	% Divorced/Separated	13.1	16.0	3.0	0.0	4.2	12.5	11.1	3.1	6.7	12.6
	% Widowed	9.2	3.3	10.4	0.0	5.6	3.4	7.0	11.1	10.4	7.7
	% Never Married	32.5	29.6	24.7	32.9	9.8	28.7	28.2	8.2	7.2	34.4
<b>Education</b>	% Highest Education Level <Yr8	6.6	5.0	6.4	6.6	9.7	2.3	3.9	9.7	3.6	9.5
	% Highest Education Level Yr 10	11.4	12.0	14.2	14.2	27.3	10.4	14.6	30.7	29.5	22.0
	%.Completed Yr 12	11.4	12.0	12.4	10.3	24.6	17.0	10.1	21.8	20.8	24.9
	% with Tertiary Qualitification	21.6	19.0	20.9	19.8	29.2	25.4	22.6	28.2	31.1	25.9
<b>Income</b>	Median H/Hold Weekly Income (\$)	719	912	845	962	566	1282	952	716	757	836
<b>Employment</b>	% Full-Time Employment	54.5	59.0	54.3	62.0	42.1	65.6	61.0	60.5	66.5	54.6
	% Part-Time Employment	27.7	28.1	31.9	29.9	33.3	23.8	30.3	26.6	22.9	30.3
	% Unemployed	10.3	6.1	9.4	4.7	15.8	4.7	4.8	5.1	6.1	8.1

2011 ABS Census Data 183a		Babinda	Mena Creek	The Coconuts	Mirriwinni	Bramston Beach	South Mission Beach	Silkwood	Kurrimine Beach	Tully Heads	Innisfail
<b>Tenancy Status</b>	% Owns Property	37.8	44.2	46.8	46.5	59.2	32.5	45.3	52.1	54.1	33.7
	% Owns Property with Mortgage	24.6	34.2	14.4	25.9	15.5	28.7	26.0	17.8	23.5	21.3
	% Renting	33.7	18.1	34.2	21.6	25.4	35.3	21.3	26.3	16.9	40.9
<b>Motor Vehicle Status</b> <b>(% of households)</b>	% Without Motor Vehicle	12.1	1.1	9.9	4.9	0.0	2.1	1.6	2.7	2.2	12.9
	% With 1 Motor Vehicle	43.5	8.5	30.6	24.3	48.5	40.1	30.0	40.2	42.6	39.8
	% With 2 Motor Vehicles	28.7	16.7	44.1	41.1	42.6	42.9	42.8	42.9	37.7	31.1
	% With 3 or More Motor Vehicles	12.1	8.1	12.6	27.0	8.8	11.5	22.6	10.7	13.1	12.0
<b>Internet Access</b>	No. H/holds with Internet	231	132	79	50	44	40	77	173	128	2160
	No. H/holds without Internet	159	60	29	181	23	239	169	80	49	1156
	No. H/holds Internet Status not stated	24	5	0	0	0	10	13	8	7	155

Source: ABS (2011)

## 5.7 Conclusion

This chapter began by defining the area known as Far North Queensland, followed briefly by an outline of early European settlement in the region. The regions more recent population growth was also reviewed, along with identifying the area's coastal hamlets. The chapter provided an understanding as to the vulnerability of these hamlets, focusing on the ageing population and the vulnerability each has to the effects of tropical cyclones and/or storm surges. Next the natural hazard history of the region was explained, with a focus on the most recent impacts from Cyclone Larry (2006) and Cyclone Yasi (2011), with an explanation that the coastal hamlets and surrounds within this region were the focus for this dissertation.

Examining four criteria identified the study sites for this dissertation. Firstly, each site had to be located in Far North Queensland, a region identified as vulnerable to cyclones and storm surges. Secondly, each site had to be classified as a coastal hamlet as per the description given by Gurran *et al.* (2007). Next, each hamlet had to have population projections that showed approximately 30% of their population by 2024 would be aged 65 years or more. Finally, each hamlet had to be located in the region that had been impacted by both Cyclone Larry (2006) and Cyclone Yasi (2011).

Using these criteria, the chapter concludes by identifying the ten coastal hamlets used as the study sites for this dissertation: Innisfail, Babinda, Mena Creek, Bramston Beach, Kurrimine Beach, Silkwood, Mirriwinni, The Coconuts, South Mission Beach and Tully Heads. Of the ten hamlets chosen, Bramston Beach was identified as the hamlet with the highest predicted percentage of their population over the age of 65 years by 2024 (63.71%), the highest median age, the lowest education level and weekly household income, and the highest unemployment figures, indicators that could signify community vulnerability and low adaptive capacity. The next chapter focuses on the results of the self-administered questionnaire completed by the older adult participants.

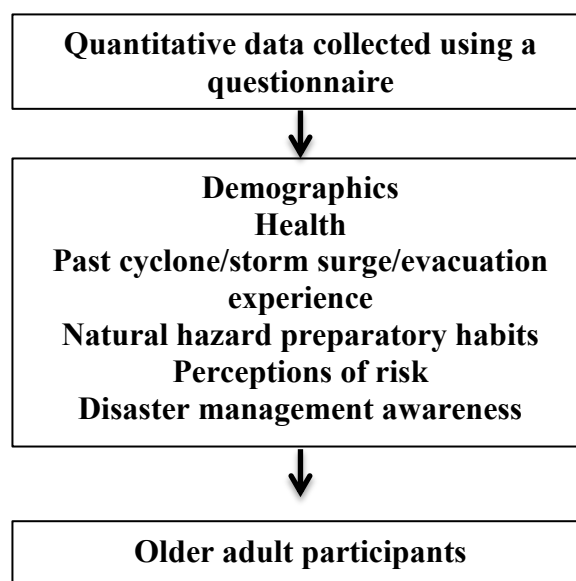
### *Synopsis of Chapter 5*

Chapter 5 provided an understanding of the study sites in Far North Queensland, Australia. What follows is the first of four results chapters, beginning with the simple descriptive statistics collected from the older adult participants using the self-administered questionnaire.

## **Chapter 6      Results from Self-Administered Questionnaire**

### **6.0 Introduction**

As Chapter 5 has described the study sites selected for this research, the focus now shifts to the presentation of results, beginning with the quantitative results collected from the brief questionnaire. The use of a questionnaire as a data collection instrument was only applied to the older adult participants, who, after completing the questionnaire, then proceeded to participate in either a focus group or a personal interview. The aim of the questionnaire was to collect data relating to past natural hazard experiences, preparation and evacuation experiences, emergency management and disaster support awareness, perceptions of risk and demographics (see Figure 6.1). Using the questionnaire as a tool to collect these data allowed the time required for the focus groups and interviews to be reduced, whereby reducing both the possibility of fatigue and confusion associated with long interview times.



**Figure 6.1 Outline of Chapter 6.**

At this juncture, it must be noted that these data are presented as simple descriptive statistics only, providing a snap-shot of the older adult study sample. As the quantitative data collected from the questionnaire represented only 1.3 % of the total population (approximately 3000 people), they are therefore not intended to be

representative of the entire population, the validity of any statistical analysis of such a small group, and low sampling fraction, would have produced results that would be questioned in light of the non-probability sampling methodology. Therefore, simple descriptive statistics have been deemed an acceptable format to present an overview of the older adult sample.

## **6.1 Demographic Profile of the Older Adult Sample**

Table 6.1 illustrates that 36 community-dwelling older adults (17 females and 19 males) completed the self-administered questionnaire. All were over 65 years of age, with just over half (56%) aged 80 or more years of age, with the same number (56%) classifying themselves as single<sup>47</sup> or divorced, with 44% stating they were married at the time of data collection (although only 42% said they resided with their spouse). Others indicated that they resided alone (44%), with relatives (11%) or in a retirement village (3%). The responses from most of the older adult participants showed that they resided in a detached house (94%) with 75% owning the dwelling outright, while 14% had a mortgage and 6% rented their premises. Most participants had resided in the area for more than 30 years (58%), 11% between 11 and 30 years, with 22% residing in the area for less than 10 years.

Most participants signified that they were reliant on the aged pension (89%), with 6% receiving a part pension, 3% identifying as a self-funded retiree and 3% still employed. Amongst the 36 older adult participants, responses showed that only 55.6% had home and contents insurance, 11% had building insurance only, and 5.6% had insurance cover only for the loss of their contents. These figures are consistent with the statistics that showed 6% of participants resided in rental accommodation (see Table 6.1). Of those who responded to the insurance question, 13.9% of participants indicated they were not insured, with the same number preferring to leave the question unanswered. Finally, Table 6.1 shows that all older adults owned both a television and a radio, with most also having access to a land-line telephone (91.7%), with 61.1% also stating they had a mobile phone, with only 55.6% having access to the Internet.

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<sup>47</sup> Please note this classification includes those who were ‘never married’ and ‘widowed’

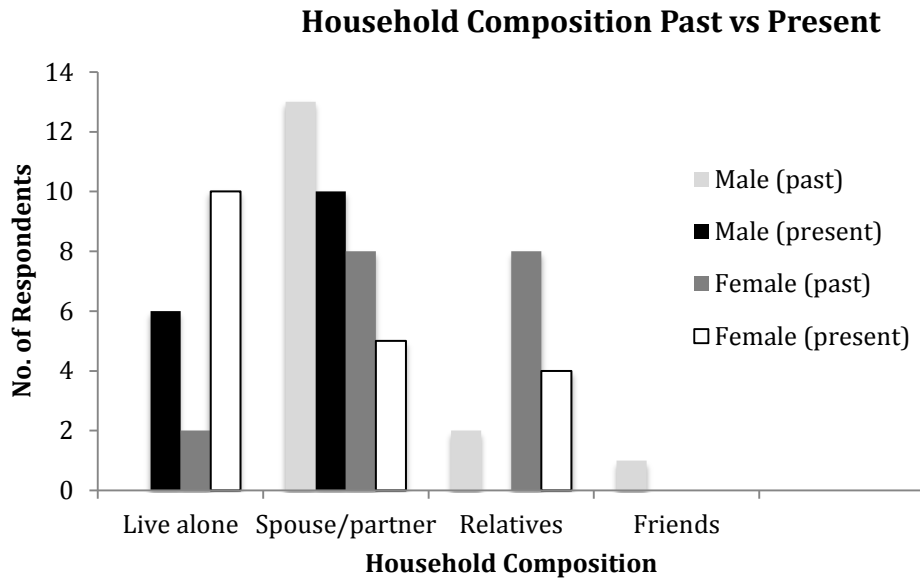
As Table 6.1 shows, most of the older adult participants had resided in the area for more than 10 years (69%), data were also collected on any changes in household composition over the period of their residency. Figure 6.2 shows most of the older adult male participants resided with a partner or relatives when first moving to the region, with those figures changing to reveal that some now reside alone. In contrast, the older adult female participants had lived alone, with partners or with other relatives when they first arrived in the region, with data showing that at the time of data collection, more of the female participants now resided alone than with spouses and relatives, and that more older adult female participants resided alone than older adult male participants. These figures are indicative of ABS (2013) statistics confirming age expectancy figures that indicate females outliving their male counterparts.



Table 6.1 Socio-demographic characteristics (N=36).

	Characteristic	<i>n</i>	%
Gender	Female	17	47.0
	Male	19	53.0
Age (years)	65-79	16	44.0
	80-94	20	56.0
Marital status	Single/divorced	20	56.0
	Married	16	44.0
Living situation	Lives with spouse	15	42.0
	Lives with relatives	4	11.0
	Lives alone	16	44.0
	Lives in retirement village	1	3.0
Type of dwelling	Detached house	34	94.0
	Duplex	2	6.0
Tenancy status	Own dwelling	27	75.0
	Mortgage	5	14.0
	Rent or lease	2	6.0
	Other	2	6.0
Length of residency	≤ 10 years	8	22.0
	11 – 30 years	4	11.0
	> 30 years	21	58.0
	Unsure/unanswered	3	9.0
Employment status	Employed part-time	1	3.0
	Self-funded retiree	1	3.0
	Aged pensioner	32	89.0
	Part aged pension/self-funded	2	6.0
Access to insurance	Building insurance only	4	11.0
	Contents insurance only	2	5.6
	Building and contents insurance	20	55.6
	Not insured	5	13.9
	Unanswered	5	13.9
Access to communication devices	Television	36	100.0
	Radio	36	100.0
	Land-line telephone	33	91.7
	Mobile telephone	22	61.1
	Internet	20	55.6

Source: Questionnaire



**Figure 6.2 Changes in household composition over time N=36.**

**Source: Questionnaire**

Table 6.2 shows the data collected to investigate the likelihood of older adults residing in close proximity to friends and family, as well as older adults' responses when asked if they could rely on friends and family for assistance during times of an emergency. Although participants indicated friends and relatives were in close proximity, 13 participants signified that they could not rely on these people for assistance, with one person preferring to leave the question unanswered. The responses showed that only 61% felt they could rely on friends and family for assistance during times of an emergency<sup>48</sup>.

<sup>48</sup> This question did not indicate a range of distances in relation to proximity, therefore it is not clear if participants felt they lived too far from reliable friends and/or relatives.

Table 6.2 Participants' proximity from friends and relatives.

Types of Participants	Response	<i>n</i>	Percentage (%)
Participants with friends and family in close proximity ( <i>Please note: participants could select more than one response</i> )	Adult children/in-laws	13	
	Siblings	5	
	Other family members	13	
	Close friends	16	
No. of participants who felt they could rely on friends and family	Yes	22	61.0
	No	6	16.7
	Unsure	7	19.4
	Unanswered	1	2.7

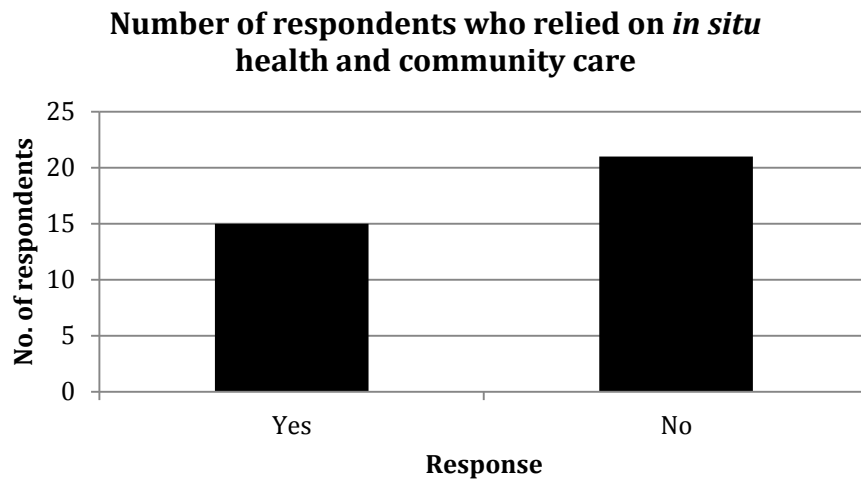
Source: Questionnaire

Further to the information above, investigation was undertaken to determine how many older adult participants were reliant on *in situ* health and community care. Figure 6.3 shows 15 participants relied on *in situ* care, while Figure 6.4 shows the services most relied upon were respite, followed by home duties<sup>49</sup>, Meals-on-Wheels<sup>50</sup> and BlueCare<sup>51</sup>.

<sup>49</sup> Home duties include housework, gardening, shopping, cooking and laundry services.

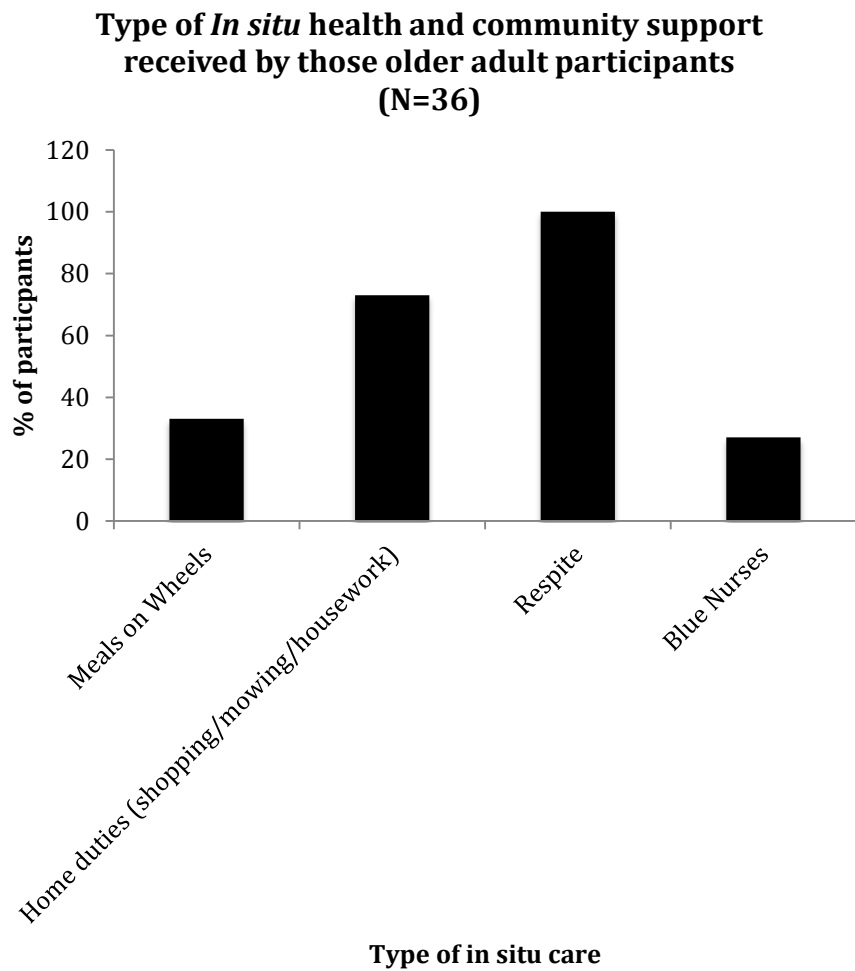
<sup>50</sup> Meals-on-Wheels is a service delivering home-cooked meals to independent-living people such as older adults, those with a disability or chronic illness.

<sup>51</sup> BlueCare is an *in situ* home-based nursing services providing care for independent-living people such as older adults, those with a disability or chronic illness.



**Figure 6.3** Number of participants who relied on in situ health and community care.

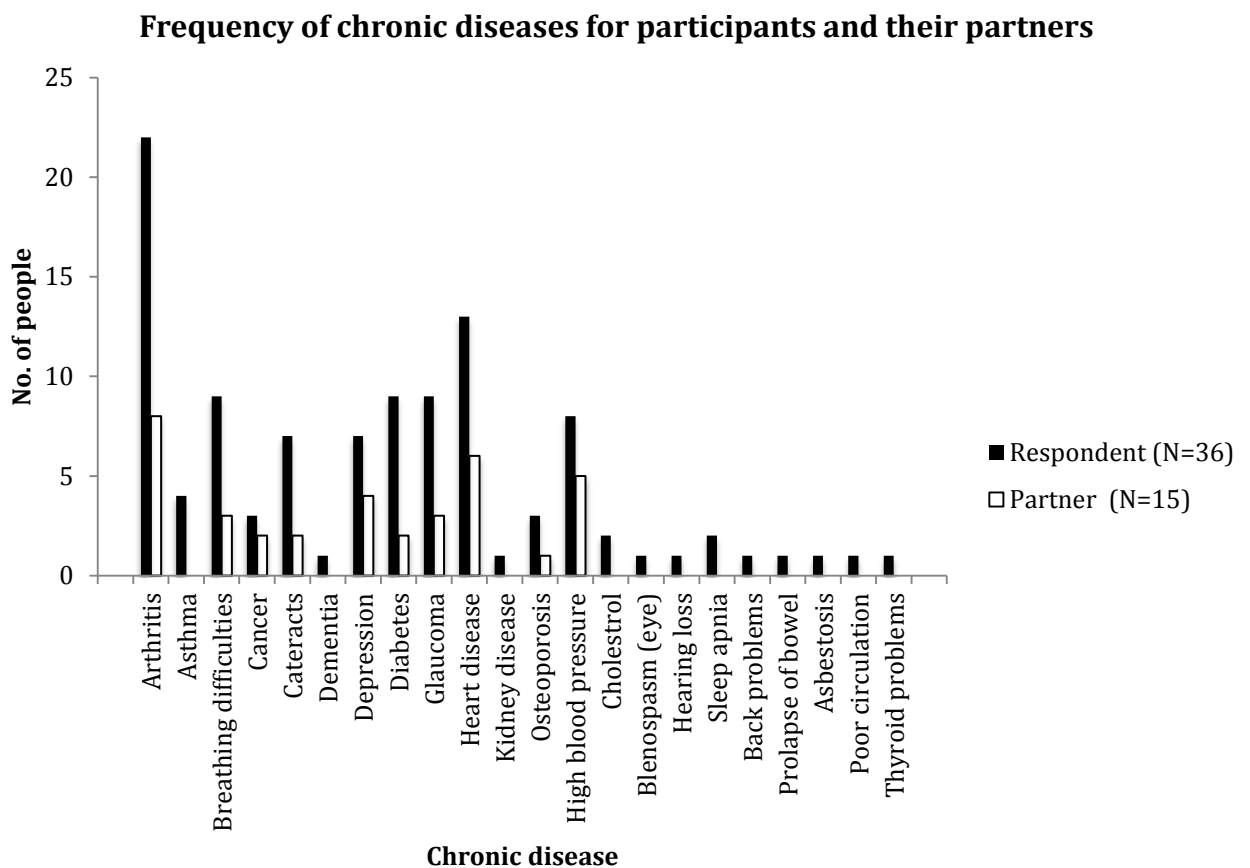
Source: Questionnaire



**Figure 6.4** Types of in situ health and community care received by participants.

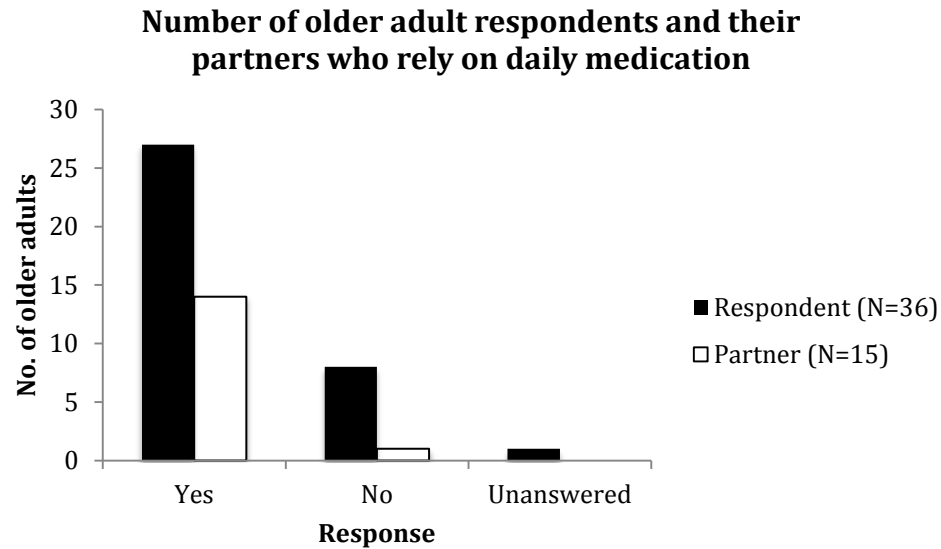
Source: Questionnaire

The final demographics section of the questionnaire asked questions relating to the health of the older adult participants and their partners. Figure 6.5 shows the number of chronic conditions participants and their partners were living with. The most common amongst both participants and their partners were arthritis, heart disease, high blood pressure, glaucoma, diabetes and depression. As such, participants were asked if they, or their partners, relied on daily medications (see Figure 6.6). Data show that most participants and their partners were reliant on daily medications. As many older people are reliant on medications, cyclone preparations must include the addition of a stockpile of medication, particularly in regions that are liable to be isolated for an extended period of time. This was also a finding by McCann (2011) in the USA in the wake of Hurricane Wilma, who also found that many who evacuated had not taken adequate supplies of medication with them.



**Figure 6.5 Frequency of chronic diseases amongst participants and their partners.**

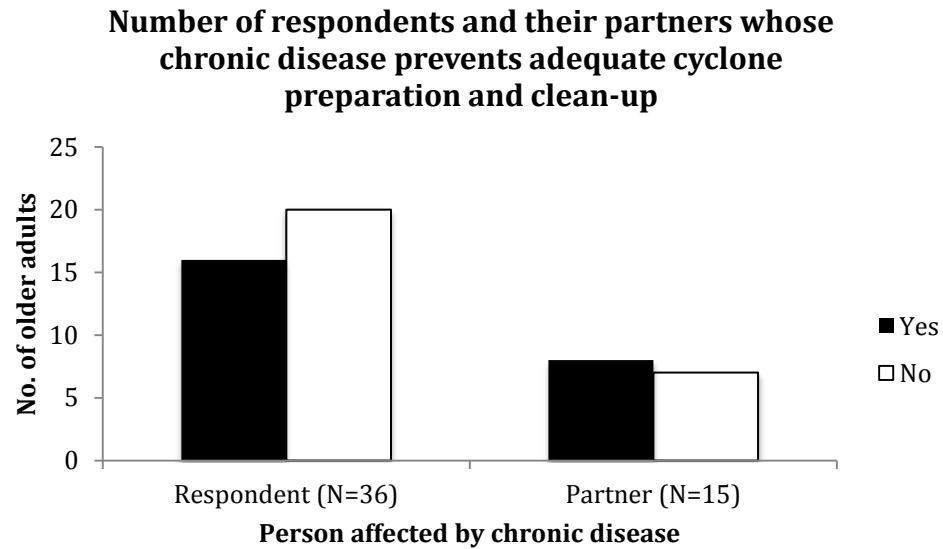
**Source: Questionnaire**



**Figure 6.6 Number of participants and their partners reliant on daily medication.**

**Source: Questionnaire**

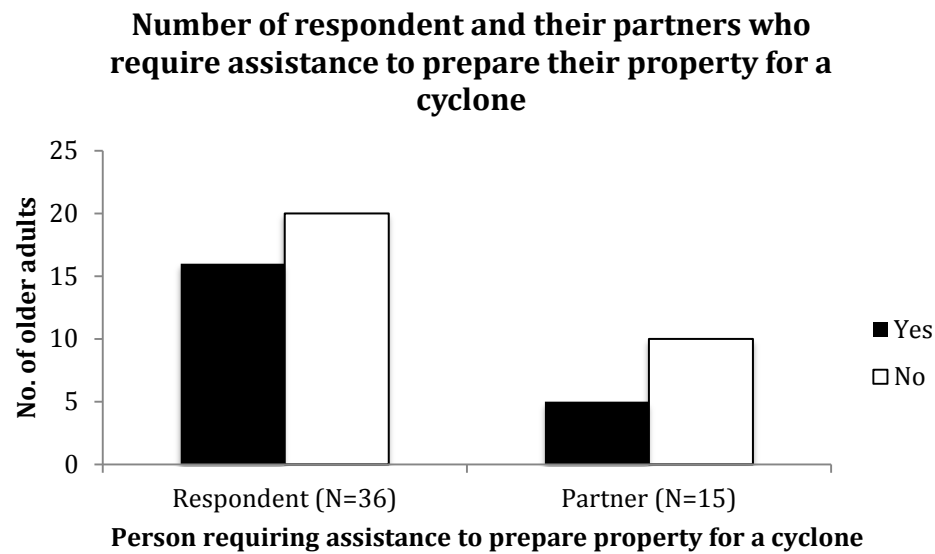
Further to these figures is the impact chronic conditions can have on cyclone preparatory and clean-up activities. Figure 6.7 shows the number of older adult participants and their partners who disclosed that chronic illness prevents them from adequately preparing for, and cleaning up after, a cyclone. These figures show that chronic illness had impacted almost half of the older adult participants' cyclone preparation and recovery activities. These findings concur with past research confirming that the debilitating effects of chronic disease amongst the older adults impact their natural hazard capabilities (Fernandez *et al.* 2002; Cherry *et al.* 2009; IFRC 2007).



**Figure 6.7 Number of participants and their partners whose chronic diseases prevents adequate cyclone preparation and clean-up.**

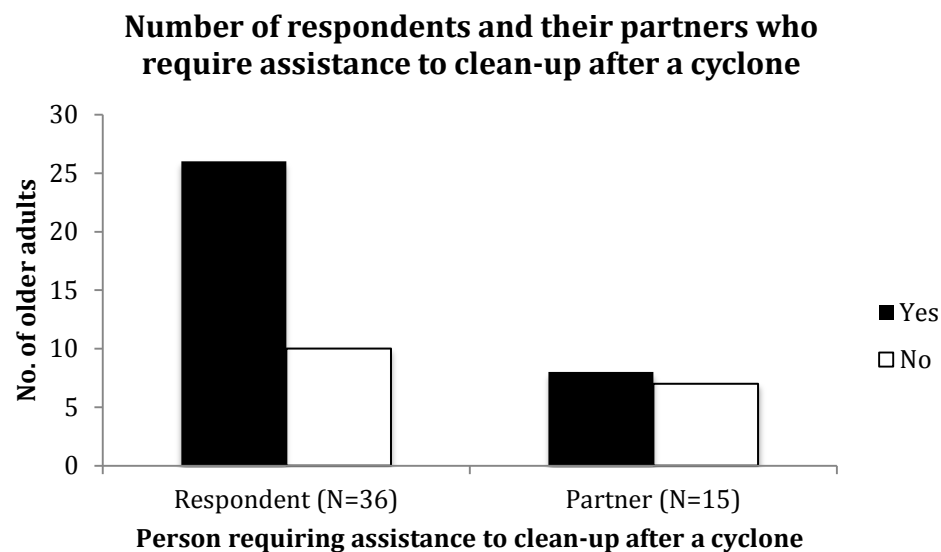
**Source: Questionnaire**

As such, these participants needed to rely on the assistance of others. However, Figures 6.8 and 6.9 show that participants relied more heavily on assistance to clean up their property, than they do to prepare it. These results were expected, as many of the participants were long-time residents, and therefore victims of both Cyclone Larry (2006) and Cyclone Yasi (2011).



**Figure 6.8** Number of participants and their partners who require assistance to prepare their properties for a cyclone.

Source: Questionnaire



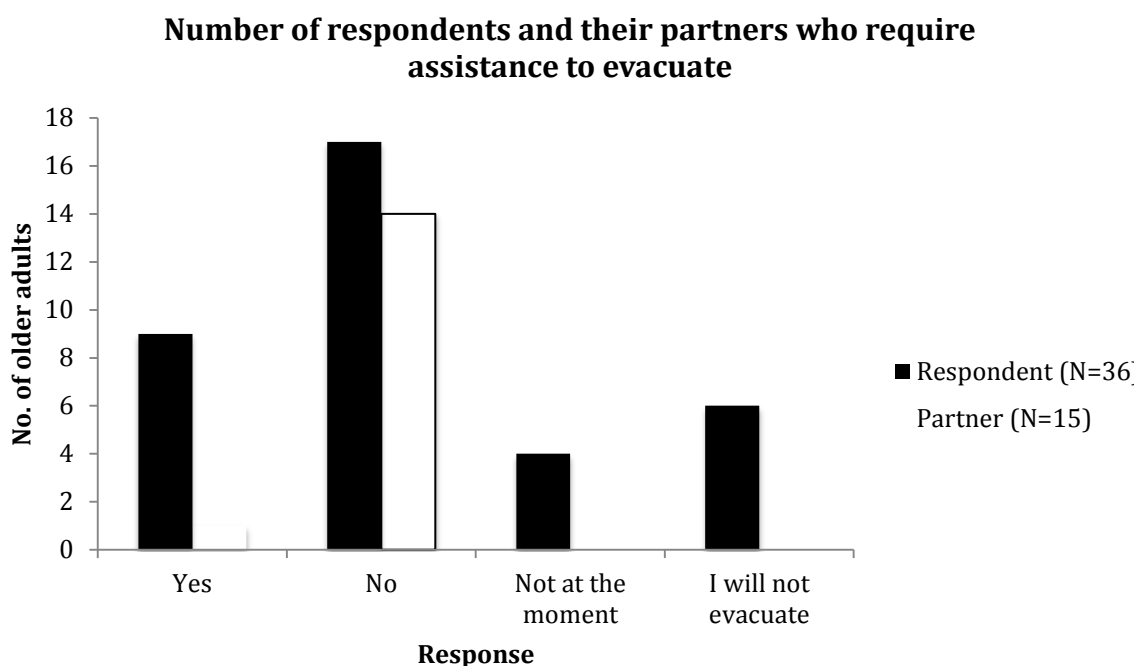
**Figure 6.9** Number of participants and their partners who require assistances to clean-up.

Source: Questionnaire

Participants were also asked about the level of assistance they may require, should they need to be evacuated, as well as whether they would require special care while they are away from home sheltering from a cyclone. Figure 6.10 shows that most participants

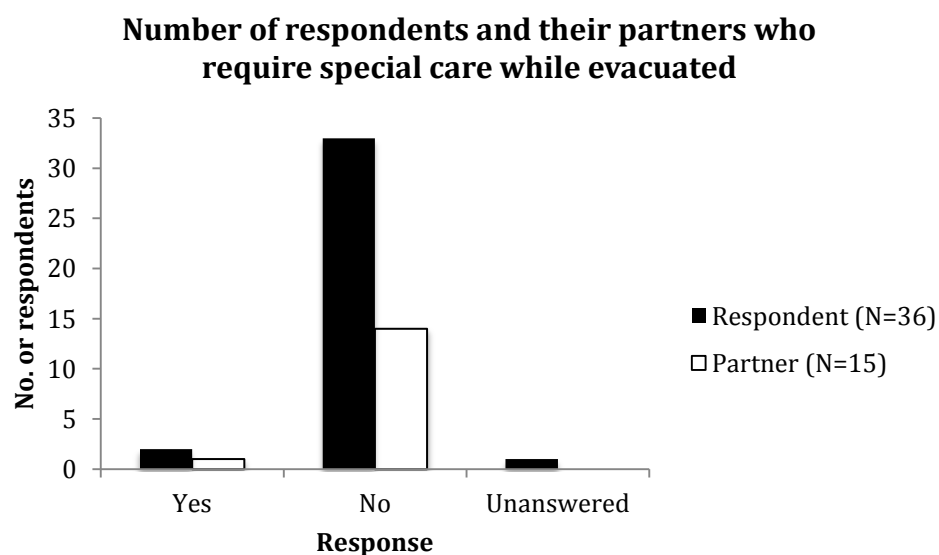


felt confident they and their partners would not need assistance to evacuate, with Figure 6.11 confirming that most would not need any form of special care.



**Figure 6.10** Number of participants and their partners requiring assistance to evacuate.

Source: Questionnaire



**Figure 6.11** Number of participants and their partners requiring special care while evacuated.

Source: Questionnaire

## 6.2 Past Cyclone and Storm Surge Experience

As many of the older adult participants were long-term residents of the region, it was expected that many would have had past experience with both storm surge and cyclones. Results confirmed these expectations, with Table 6.3 confirming 95% of participants had experienced a cyclone, with Figure 6.12 showing that 17 participants recalled experiencing one cyclone, nine recalled two to three cyclones, six people specified experiencing between four to five cyclones and two participants experiencing six or more cyclones.

Table 6.3 Number of cyclones experienced by older adult participants.

Response	<i>n</i>	Percentage (%)
Yes	34	94.0%
No	2	6.0%

Source: Questionnaire

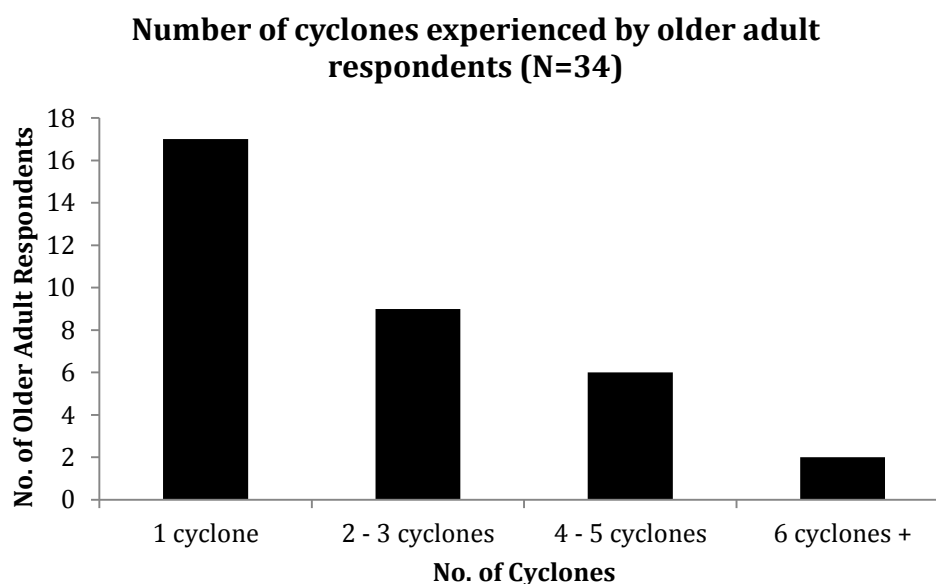


Figure 6.12 Number of cyclones experienced by older adult participants.

Source: Questionnaire

Participants were also asked if they had experienced a storm surge, and if so, to indicate how many. Table 6.4 shows that only 11 % of participants had recalled experiencing a cyclone-induced storm surge, with Figure 6.13 confirming those participants had only experienced one storm surge. These figures were consistent with recent cyclone history indicating that the most recent storm surge incident had been the result of Cyclone Yasi in 2011 (see Section 4.5).

Table 6.4 Number of participants who had experienced a storm surge.

<b>Response</b>	<b><i>n</i></b>	<b>Percentage (% )</b>
Yes	4	11.0
No	32	89.0

Source: Questionnaire

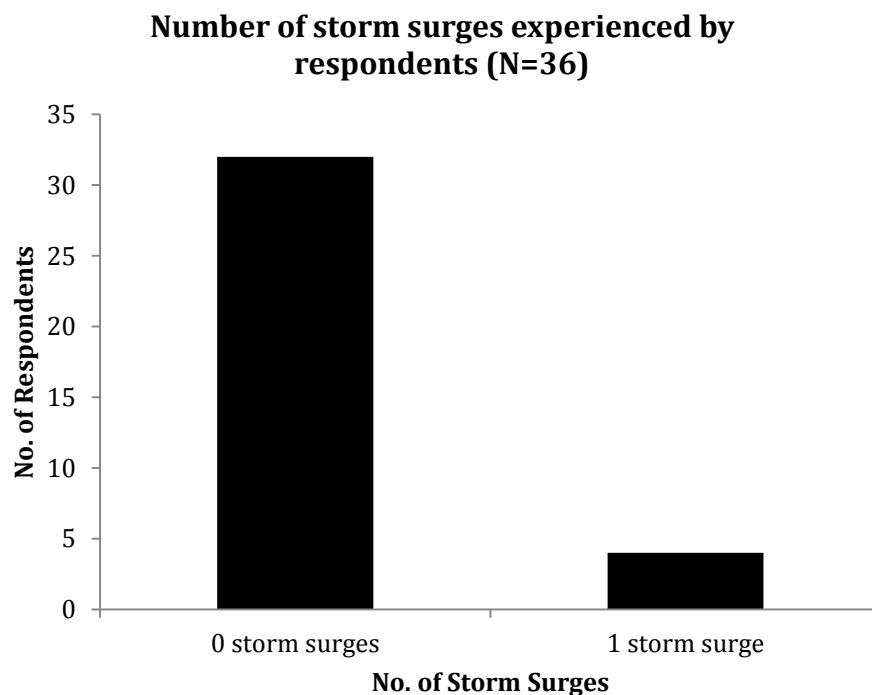


Figure 6.13 Number of storm surges experienced by participants.

Source: Questionnaire

Finally, the older adult participants were asked if they had experienced any other form of natural hazard other than a cyclone or storm surge. Forty-two % of the older adult participants indicated that they had, with 100 % of those participants stating that natural hazard event was flooding (see Table 6.5).

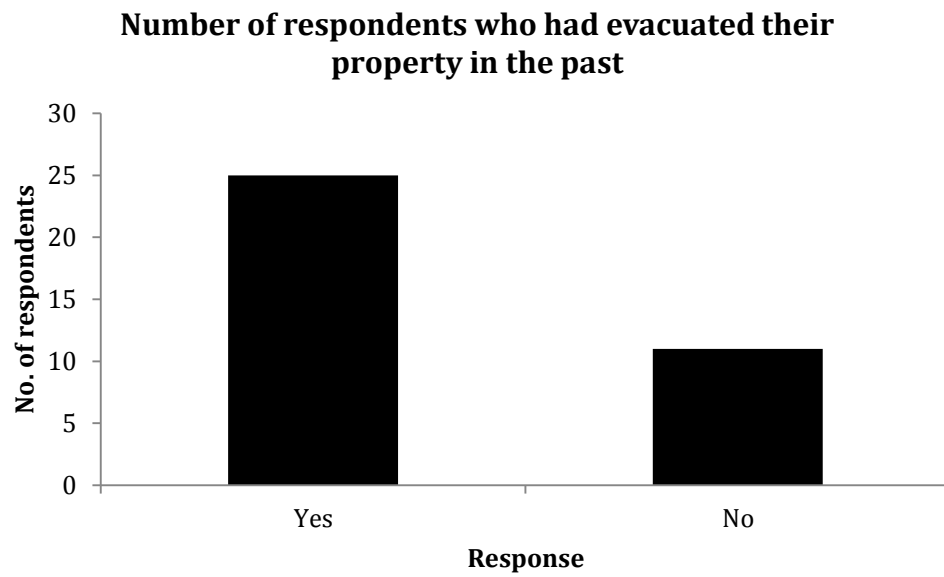
Table 6.5 Number of participants who had experienced a natural hazard other than a cyclone or storm surge.

<b>Response</b>	<b>No. of participants (N=36)</b>	<b>Percentage (%)</b>	<b>Type of natural hazard</b>
Yes	15	42.0	Flood
No	11	19.7	

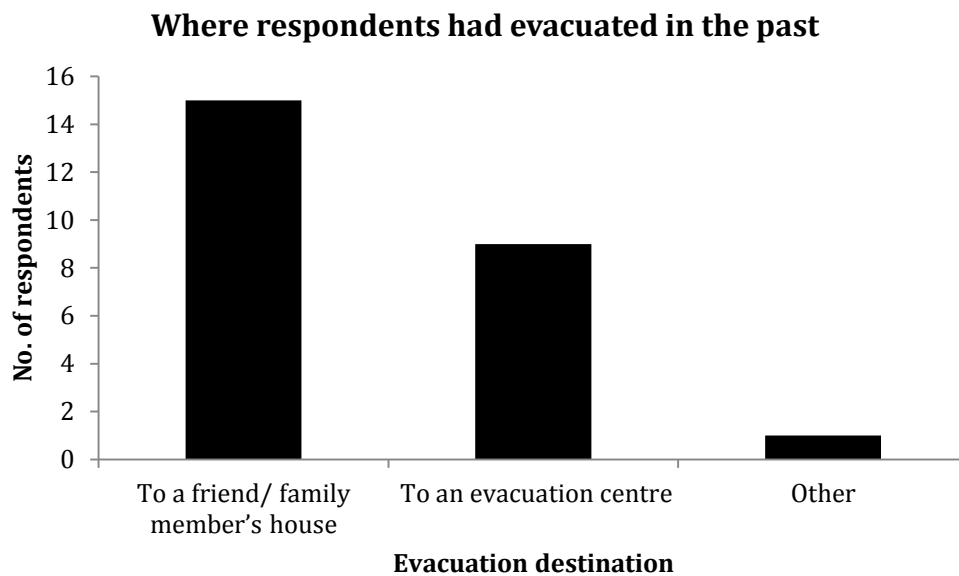
Source: Questionnaire

### 6.3 Preparation and Evacuation

In order to understand the cyclone preparatory habits and evacuation history of the older adult participants, they were asked several questions relating to emergency management's recommendations promoting self-reliance. The questionnaire asked if they had ever evacuated their property (see Figure 6.14), with many confirming that they had in fact taken refuge in a building other than their own home. Figure 6.15 confirmed that 15 people had taken refuge in the homes of friends or family in the past, as well as nine seeking shelter in an evacuation centre.



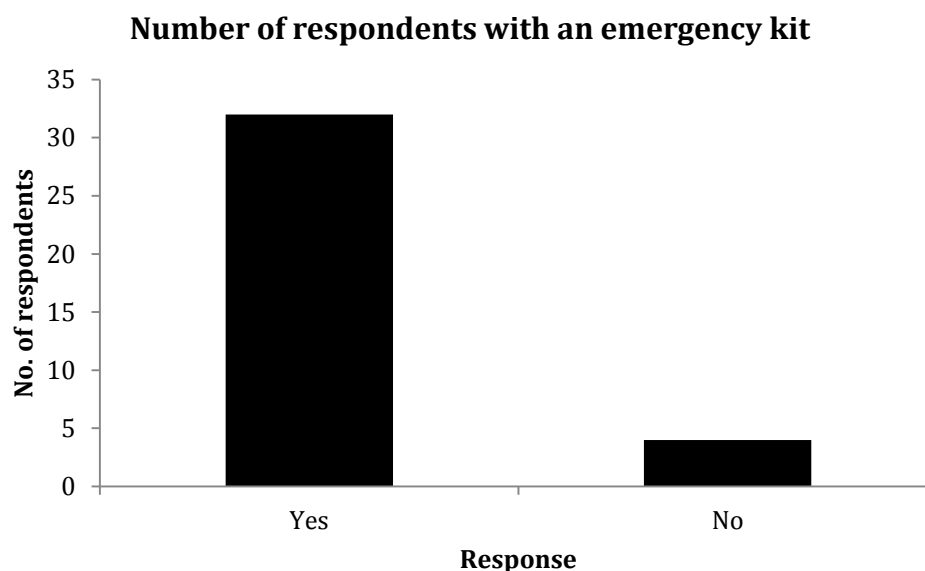
**Figure 6.14** Number of participants who had evacuated their properties in the past.  
Source: Questionnaire



**Figure 6.15** Where participants had evacuated to in the past  
Source: Questionnaire

Next the questionnaire investigated whether participants had followed emergency management's recommendations by asking about whether participants had prepared an emergency kit. Figure 6.16 shows that most participants indicated that they did have an

emergency kit, however, of the 21 items recommended by emergency management authorities<sup>52</sup>, data showed that only one male and one female had a complete kit, with one male and two females stating they did not have any of the recommended items (see Figure 6.17).

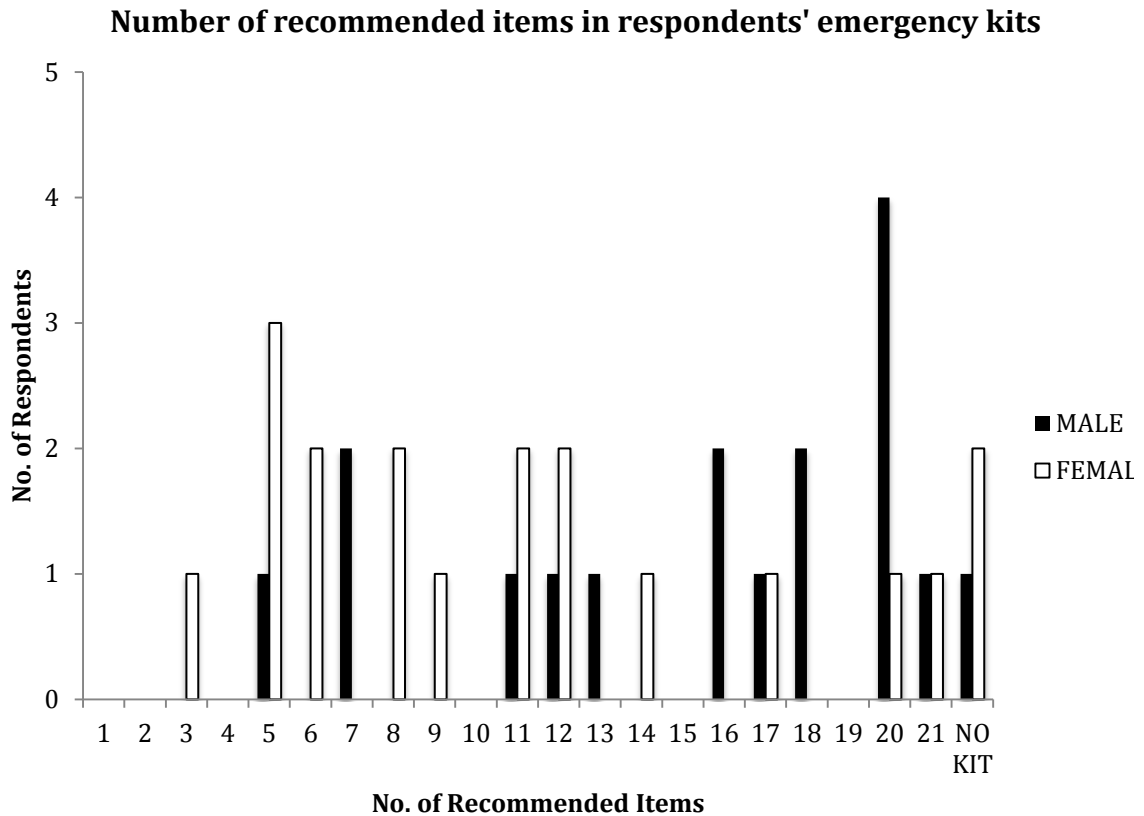


**Figure 6.16 Number of participants with an emergency kit.**

**Source: Questionnaire**

Male  
Female

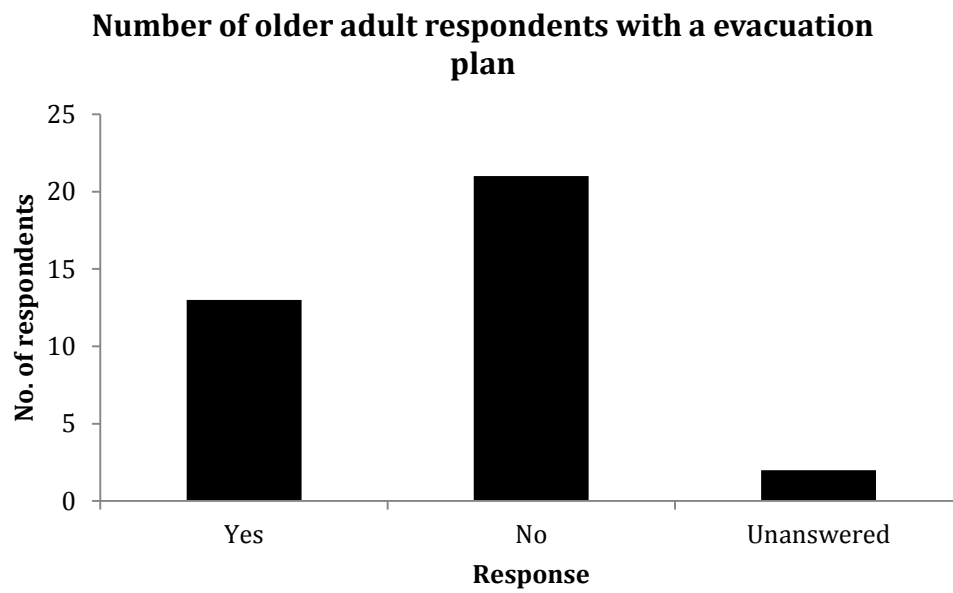
<sup>52</sup> Emergency management authorities recommend an emergency kit should contain the following: non-perishable food, bottled water, first aid kit and manual, torch and spare batteries, toilet paper, matches, eating and cooking utensils, toiletries (toothpaste, soap), personal hygiene items, first aid kit, personal documents, tape for windows, battery powered radio, clothing and sturdy shoes, medications, waterproof bags, can opener, portable stove and emergency telephone numbers (EMQ 2014) .



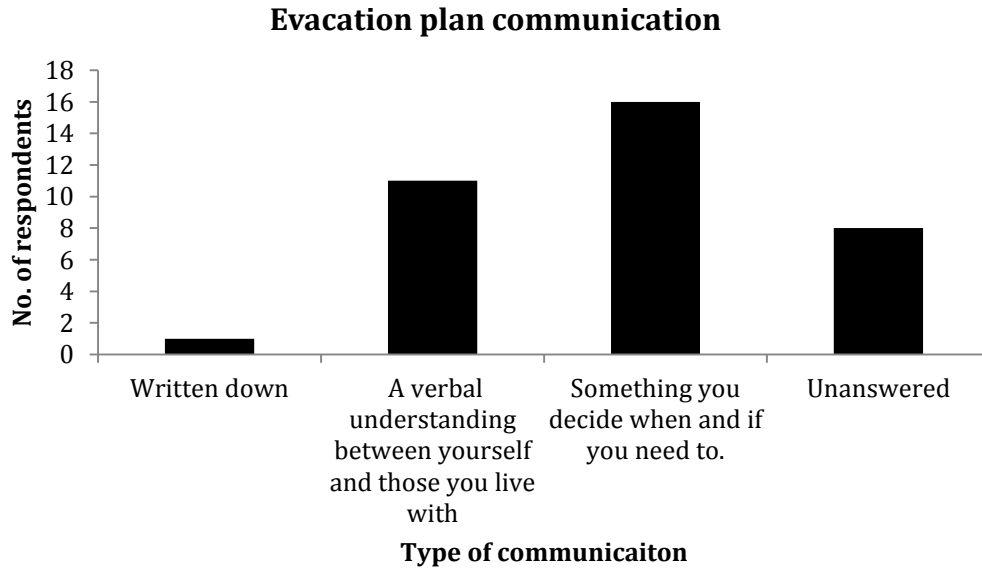
**Figure 6.17 Number of recommended items in participants' emergency kits.**

**Source: Questionnaire**

Emergency management authorities also recommend that all citizens should have an evacuation plan, which should be written down, and which should rely on sheltering in the homes of friends and relatives, rather than in an evacuation shelter. Data showed that most of the older adult participants did not have an evacuation plan (see Figure 6.18), with responses indicating that the decision to evacuate was something they made if and when they were required to (see Figure 6.19). Figure 6.20 reveals that most had in the past evacuated to an evacuation shelter. This result was also expected, as the destruction following Cyclone Larry (2006) and Cyclone Yasi (2011) had seen large numbers of people taken to public evacuation centres following the wide-spread destruction of domestic homes.

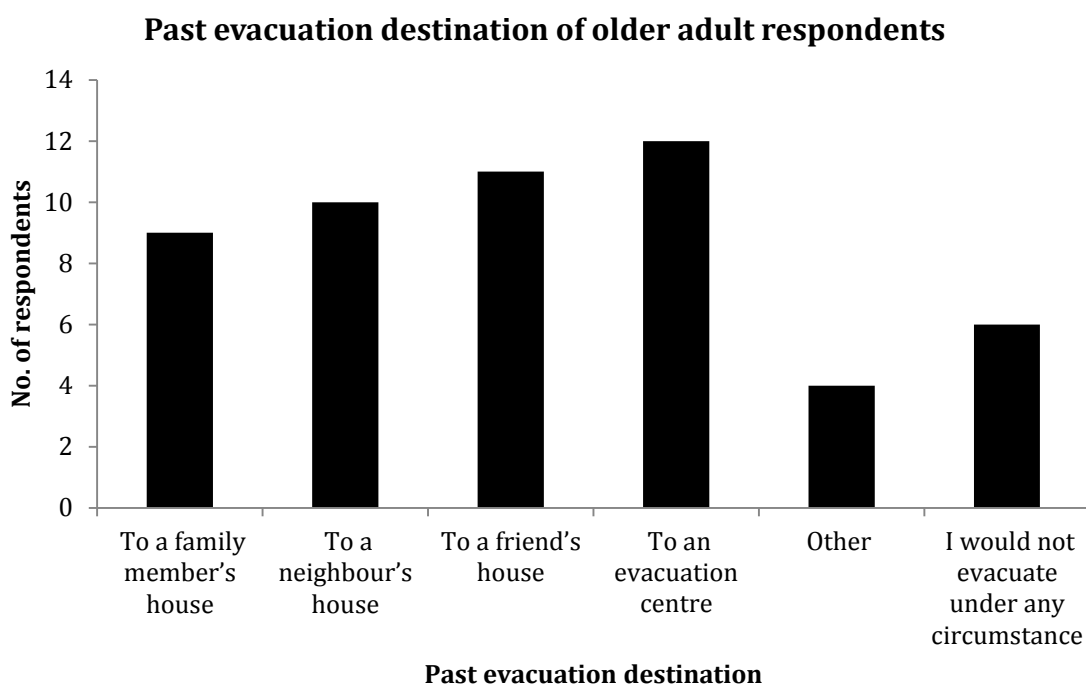


**Figure 6.18** Number of older adult participants with an evacuation plan.  
Source: Questionnaire



**Figure 6.19** Evacuation plan communication.  
Source: Questionnaire



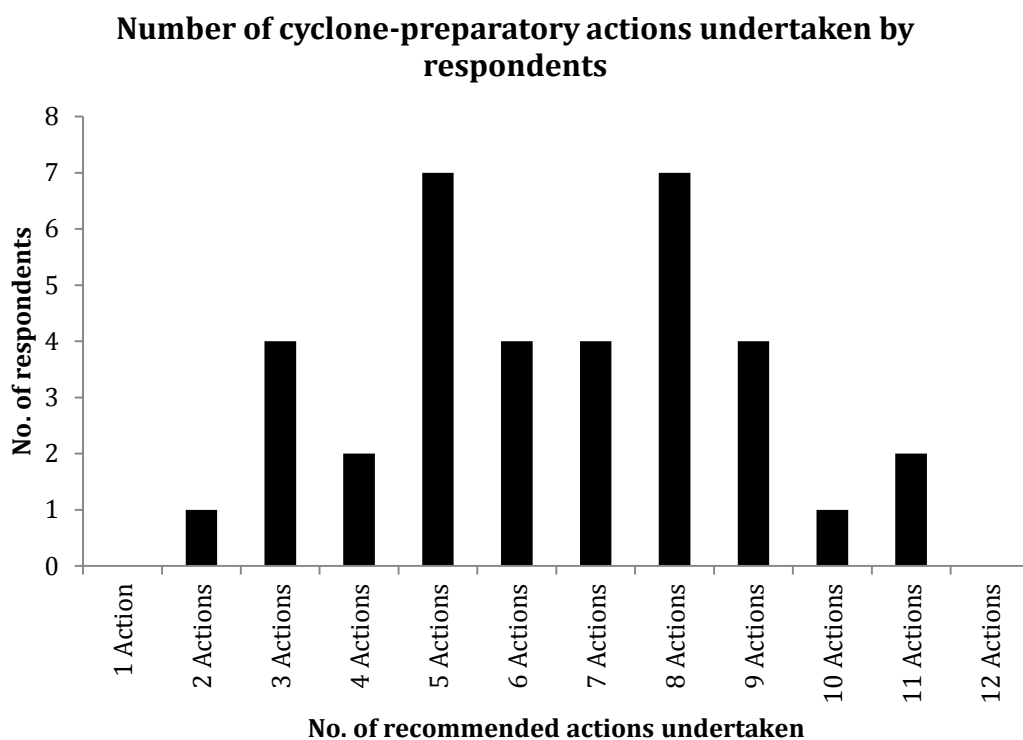


**Figure 6.20 Past evacuation destination.**

Source: Questionnaire

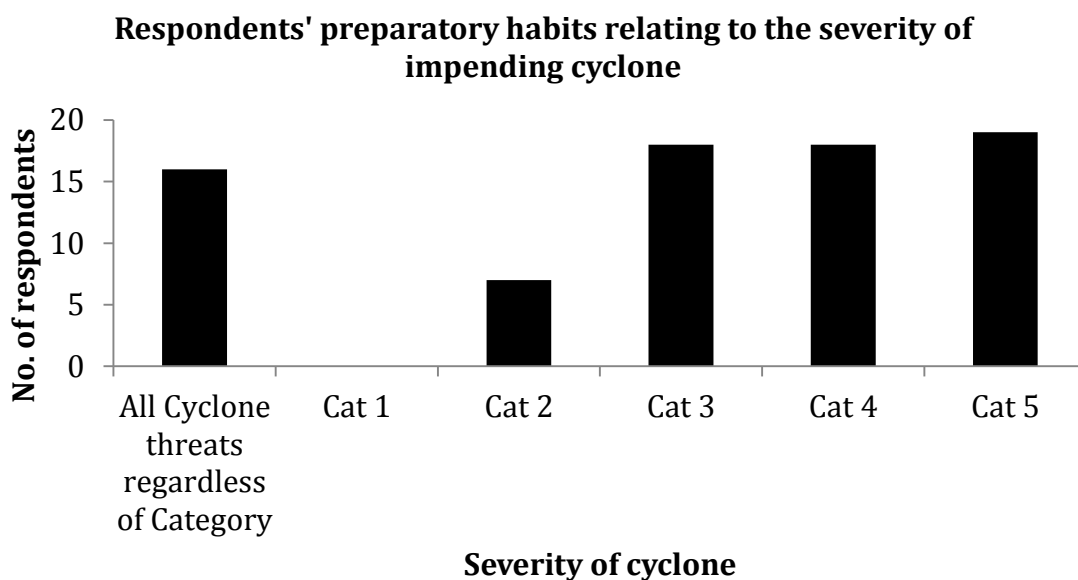
In Australia, emergency management authorities (EMQ 2014) recommend twelve actions be undertaken to ensure properties are as secure as possible before the impact of a cyclone<sup>53</sup>. Data showed that of these twelve actions, most participants admitted to completing between five and eight actions, with no participant stating he/she followed all twelve recommendations (see Figure 6.21). In addition, results showed that these actions were not typically completed if the threat was a Category 1 cyclone, however as the intensity of the cyclone increased, so did the likelihood of more thorough preparatory actions (see Figure 6.22).

<sup>53</sup> EMQ (2014) recommends the following actions to ensure property is as secure as possible: (1) trim trees and branches away from house; (2) check walls, roof and eaves are secure; (3) fit shutters, metal screens or board to windows; (4) clear property of loose items; (5) ensure generator is in working order; (6) park car under solid shelter; (7) turn off power; (8) clean gutters; (9) disconnect gas; (10) fill car and fuel cans with fuel; (11) ensure valuables are secure and lock doors and windows.



**Figure 6.21** Number of recommended cyclone preparatory actions undertaken by participants.

Source: Questionnaire



**Figure 6.22** Participants' preparatory habits relating to the severity of the impending cyclone.

Source: Questionnaire

## 6.4 Risk Perception

To determine the older adult participants' perceptions of risk, the questionnaire asked questions about their level of concern regarding the threat of cyclone and storm surge on their community, the possibility of damage to their homes by both cyclones and storm surges, as well as their concern regarding the on-set of cyclone season.

Participants were asked to choose responses that best described their level of concern. Response choices were as follows: *Very concerned*, *Concerned*, *A little concerned*, *Not concerned*, and *Unsure*. The following tables compare the responses to these questions with the older adults' gender, age, living status, past evacuation experience, cyclone and storm surge experiences, as well as their past experiences with other forms of natural hazards other than cyclones and storm surges.

Comparing gender with changes in the older adult participants' perceived level of concern showed that older male participants were most likely to be either *concerned* (37%) or *a little concerned* (37%) with the threat of a cyclone or storm surge, while older female participants were more likely to be *a little concerned* (47%) (see Table 6.6). Similarly, male and female older adult participants were likely to also be *a little concerned* about the damage to their homes caused by a cyclone (37% and 53% respectively). The on-set of cyclone season also appeared to create more unease for older female participants than older male participants (42% of females compared to 21% of males), with the data showing older male participants were more likely to regard the on-set of cyclone season as *a little concerned* (52%).

Table 6.6 Older adult participants' perceived level of concern according to gender.

	Level of concern regarding threat of cyclone and/or storm surge (%)		Level of concern regarding home damage caused by cyclone (%)		Level of concern regarding home damage caused by storm surge (%)		Level of concern regarding on-set of cyclone season (%)	
Level of concern	Male (N=19)	Female (N=17)	Male (N=19)	Female (N=17)	Male (N=19)	Female (N=17)	Male (N=19)	Female (N=17)
Very concerned	16.0	24.0	10.0	12.0	16.0	6.0	11.0	0.0
Concerned	37.0	18.0	32.0	29.0	37.0	53.0	21.0	42.0
A little concerned	37.0	47.0	53.0	53.0	21.0	12.0	52.0	35.0
Not concerned	10.0	11.0	5.0	6.0	5.0	29.0	16.0	23.0
Unsure	0.0	0.0	0.0	0.0	21.0	0.0	0.0	0.0

Source: Questionnaire

Comparing the responses with the older adult participants' age revealed that those aged between 65 and 79 years of age were more likely to be *very concerned* (38%) or *concerned* (25%) about the threat of a cyclone or storm surge, with 50% aged over the age of 80 years stating they were only *a little concerned* (see Table 6.7). These results were also reflected in the responses of the older adults in regards to the level of concern they had regarding the potential for damage caused to their homes by cyclones, with 56% of those between 65 and 79 years of age stating they were *concerned*, while 55% of participants over the age of 80 years stating they were *a little concerned*. Perceptions altered though when asked about the potential for their home to be damaged by a storm surge, with those over the age of 80 years most likely to be *very concerned* (35%), and those aged between 65 and 79 years mostly *concerned* (56%). When asked of their perception of risk regarding the on-set of cyclone season, older adult participants between 65 and 79 years of age were mostly *a little concerned* (44%), with half of the participants who were over the age of 80 years mostly stating they were *concerned* (50%).

Table 6.7 Older adult participants' perceived level of concern according to age.

Level of Concern	65-79 years old (N=16) %	80-94 years old (N=20) %
Level of concern regarding threat of a cyclone and/or storm surge		
Very concerned	38.0	5.0
Concerned	25.0	30.0
A little concerned	31.0	50.0
Not concerned	6.0	15.0
Unsure		
Level of concern regarding home damage caused by a cyclone		
Very concerned	25.0	5.0
Concerned	56.0	30.0
A little concerned	19.0	55.0
Not concerned		10.0
Unsure		
Level of concern regarding home damage caused by a storm surge		
Very concerned	19.0	35.0
Concerned	56.0	15.0
A little concerned	19.0	35.0
Not concerned	6.0	15.0
Unsure		
Level of concern regarding on-set of cyclone season		
Very concerned	13.0	10.0
Concerned	37.0	50.0
A little concerned	44.0	35.0
Not concerned	6.0	5.0
Unsure		

Source: Questionnaire

When responses were compared with the older adults' living status, results showed that those who claimed they were *very concerned* about the threat of a cyclone or storm surge were more likely to reside with a spouse or a partner (33%) (see Table 6.8). However, both the participants who resided alone and those with a spouse or partner mostly indicated they were *a little concerned* about the damage from a cyclone (56% and 47% respectively), with equal numbers of sole-living participants *concerned* or *a little concerned* (31% respectively) about storm surge damage, while those with a spouse stating they were mostly *concerned* (40%). In comparison, 100% of participants residing with relatives were *concerned* about damage from both cyclones and storm surges. Regarding the on-set of cyclone season, most participants stating they were mostly only *a little concerned*, regardless of their living status (50% of sole living participants, 47% of participants who reside with a spouse or partner, 100% of participants who reside with a relative and 100% of participants residing in a retirement village).

Table 6.8 Older adult participants' perceived level of concern according to living status.

Level of concern	Participant lives alone (N=16) %	Participant lives with spouse/partner (N=15) %	Participant lives with relatives (N=4) %	Participant lives in retirement village (N=1) %
Level of concern regarding threat of a cyclone and/or storm surge				
Very concerned	13.0	33.0		
Concerned	13.0	20.0	100.0	100.0
A little concerned	56.0	47.0		
Not concerned	18.0			
Unsure				
Level of concern regarding home damage caused by a cyclone				
Very concerned	19.0	26.0		
Concerned	25.0	20.0	100.0	100.0
A little concerned	56.0	47.0		
Not concerned		7.0		
Unsure				
Level of concern regarding home damage caused by a storm surge				
Very concerned		20.0		
Concerned	31.0	40.0	100.0	
A little concerned	31.0	26.0		
Not concerned	25.0	14.0		100.0
Unsure	13.0			
Level of concern regarding on-set of cyclone season				
Very concerned	19.0	6.0		
Concerned	13.0	33.0		
A little concerned	50.0	47.0	100.0	100.0
Not concerned	18.0	14.0		
Unsure				

Source: Questionnaire



Table 6.9 compared the responses according to the older adults' past evacuation experiences. This comparison shows that participants were mostly only *a little concerned* of the threat of a cyclone or storm surge, regardless of their evacuation history. These results altered, however, when asked about their perception of risk regarding damage to their homes by a cyclone and/or storm surge. In this case, those without an evacuation history were more likely to be *very concerned* about damage caused by a cyclone (45%) and *a little concerned* about the damage caused by a storm surge (55%), while those with an evacuation history were more likely to state they were *concerned* about both cyclone and storm surge damage (52% and 44%, respectively). In regards to the on-set of cyclone season, those with past evacuation experience were most likely to be *a little concerned* (44%), compared to those without evacuation experience mostly stating they were *very concerned* (60%).

Table 6.9 Older adult participants' perceived level of concern according to past evacuation experience.

Level of concern	Participant has evacuation experience (N=25) %	Participant has no evacuation experience (N=11) %
Level of concern regarding threat of a cyclone and/or storm surge		
Very concerned	28.0	36.0
Concerned	32.0	18.0
A little concerned	40.0	45.0
Not concerned		
Unsure		
Level of concern regarding home damage caused by a cyclone		
Very concerned		45.0
Concerned	52.0	18.0
A little concerned	44.0	36.0
Not concerned	4.0	
Unsure		
Level of concern regarding home damage caused by a storm surge		
Very concerned	4.0	9.0
Concerned	44.0	18.0
A little concerned	20.0	55.0
Not concerned	24.0	18.0
Unsure	8.0	
Level of concern regarding on-set of cyclone season		
Very concerned	20.0	60.0
Concerned	24.0	20.0
A little concerned	44.0	20.0
Not concerned	12.0	
Unsure		

Source: Questionnaire

Having a past experience with a storm surge appeared to influence the older adult participants' perceived risk in relation to the threat of a cyclone or storm surge (50% of participants were *concerned*), damage to their homes caused by a cyclone (50% of

participants were *concerned*) and storm surge (75% of participants were *concerned*), as well as the on-set of cyclone season (75% were *concerned*) (see Table 6.10). In comparison, those without past storm surge experience mostly showed they were only *a little concerned* of the threat of a cyclone or storm surge (44%), cyclone damage (53%), storm surge damage (31%) and the on-set of cyclone season (50%), with 31% stated they were *concerned*. These results concur with Astill and Griggs (2014), who found past hazard experience heightened the risk perceptions of those located in vulnerable locations while examining the disaster information seeking habits of beachside communities in FNQ. Similar results were also recorded by Anderson-Berry and King (2005) after investigating the natural hazard community vulnerability in FNQ.

Table 6.10 Older adult participants' perceived level of concern according to past storm surge experience.

Level of concern	Participant has storm surge experience (N=4) %	Participant has no storm surge experience (N=32) %
<u>Level of concern regarding threat of cyclone and/or storm surge</u>		
Very concerned	25.0	19.0
Concerned	50.0	25.0
A little concerned	25.0	44.0
Not concerned		12.0
Unsure		
<u>Level of concern regarding home damage caused by cyclone</u>		
Very concerned	25.0	16.0
Concerned	50.0	25.0
A little concerned	25.0	53.0
Not concerned		6.0
Unsure		
<u>Level of concern regarding home damage caused by storm surge</u>		
Very concerned	6.0	
Concerned	75.0	
A little concerned	31.0	
Not concerned	25.0	
Unsure	31.0	
	19.0	
	13.0	
<u>Level of concern regarding on-set of cyclone season</u>		
Very concerned	6.0	
Concerned	75.0	
A little concerned	25.0	
Not concerned	25.0	
Unsure	50.0	
	19.0	

Source: Questionnaire

Comparing the results to the older adult participants' past cyclone experience showed that most older adult participants with past cyclone experience specified that they were *a little concerned* about the threat of a cyclone or storm surge (38%), damage to their property by a cyclone (50%) and about the on-set of cyclone season (44%), with 35% *concerned* about the damage from a storm surge (see Table 6.11). Amongst those without cyclone experience, participants were equally divided between being *concerned* or *a little concerned* about the threat of a cyclone or storm surge and by the on-set of cyclone season (50% and 50% respectively), while all participants without cyclone experience were only *a little concerned* about the potential for damage caused by a cyclone (100%), with 50% of these participants indicating they were *concerned* about the damage that a storm surge could cause, while the other 50% were *unsure*.

Table 6.11 Older adult participants' perceived level of concern according to past cyclone experience.

Level of concern	Participant has cyclone experience (N=34) %	Participant has no cyclone experience (N=2) %
Level of concern regarding threat of cyclone and/or storm surge		
Very concerned	24.0	
Concerned	26.0	50.0
A little concerned	38.0	50.0
Not concerned	12.0	
Unsure		
Level of concern regarding home damage caused by cyclone		
Very concerned	12.0	
Concerned	33.0	
A little concerned	50.0	100.00
Not concerned	5.0	
Unsure		
Level of concern regarding home damage caused by storm surge		
Very concerned	5.0	
Concerned	35.0	50.0
A little concerned	32.0	
Not concerned	18.0	
Unsure	10.0	50.0
Level of concern regarding on-set of cyclone season		
Very concerned	6.0	
Concerned	32.0	50.0
A little concerned	44.0	50.0
Not concerned	18.0	
Unsure		

Source: Questionnaire

The final section examining risk perceptions examined the responses in relation to the older adult participants' past experiences with other natural hazards, other than cyclones and storm surges, which Table 6.5 highlighted as being flood. In this case 72% of those without previous experience were *concerned* about the threat of a cyclone or storm surge compared to 47% of those participants who communicated that they did have experience with other forms of disasters. Participants without previous experience with other disasters mostly claimed they were *concerned* about the damage that could be caused by a cyclone (55%), compared to 40% of those with experience indicating they were a little concerned. While perceptions of risk regarding the potential damage caused by a storm surge was a *concern* for 46% of those without previous disaster experience, compared to 5% of those with past experience. Finally, regarding the on-set of cyclone season, 36% of those without previous disaster experience were *concerned*, compared to 60% of those with past disaster experience.

Table 6.12 Older adult participants' perceived level of concern according to past natural hazard experience other than cyclones or storm surges.

Level of concern	Participant has natural hazard experience other than a cyclone and/or storm surge (N=15) %	Participant has no natural hazard experience other than a cyclone and/or storm surge (N=11) %
Level of concern regarding threat of cyclone and/or storm surge		
Very concerned	33.0	18.0
Concerned	47.0	72.0
A little concerned	20.0	10.0
Not concerned		
Unsure		
Level of concern regarding home damage caused by cyclone		
Very concerned	27.0	18.0
Concerned	33.0	55.0
A little concerned	40.0	27.0
Not concerned		
Unsure		
Level of concern regarding home damage caused by storm surge		
Very concerned	13.0	
Concerned	53.0	46.0
A little concerned	27.0	36.0
Not concerned		
Unsure	7.0	18.0
Level of concern regarding on-set of cyclone season		
Very concerned	7.0	10.0
Concerned	60.0	36.0
A little concerned	33.0	27.0
Not concerned		27.0
Unsure		

Source: Questionnaire



## 6.5 Emergency Management and Disaster Support Awareness

The final section of the questionnaire asked older adult participants questions to determine their knowledge and understanding of emergency management policy expectations, as well as their disaster support awareness. Participants were firstly asked if they knew of the ‘self-help’ approach to emergency management. Figure 6.23 shows that participants were mostly unaware of such an approach, however, Figure 6.24 reveals that most understood what a ‘self-help’ approach would entail.

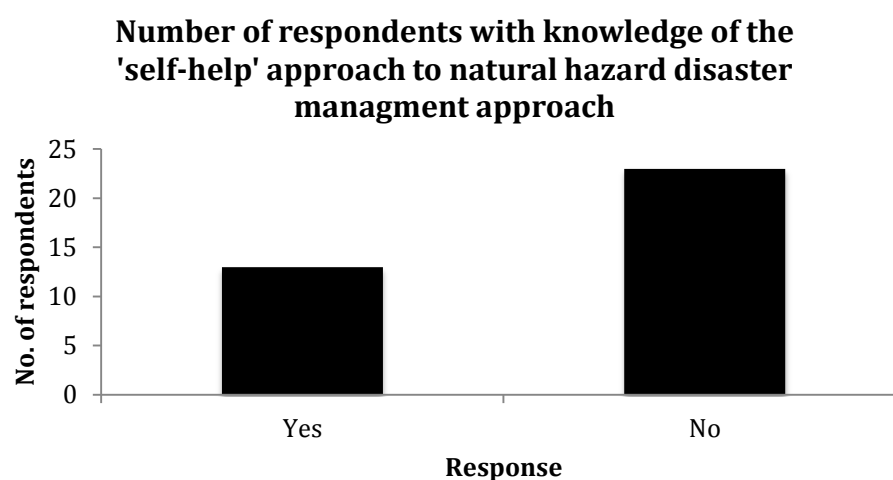


Figure 6.23 Level of knowledge amongst older adult participants regarding the ‘self-help’ approach to natural hazard disaster emergency management.

Source: Questionnaire

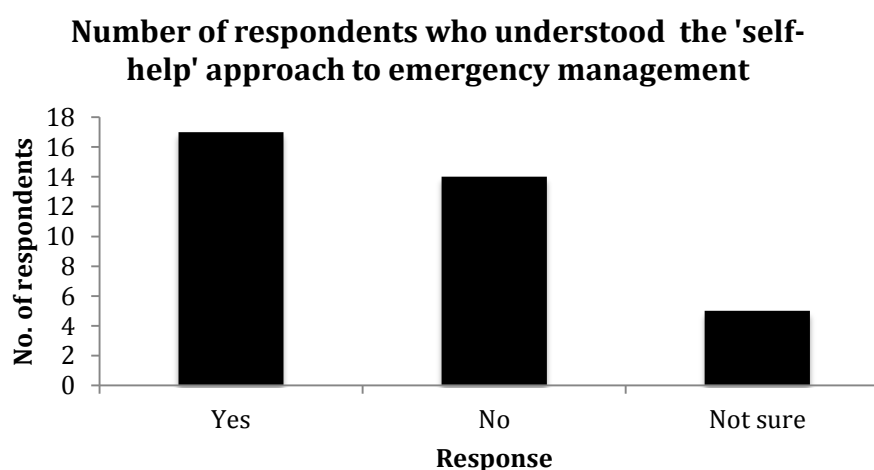
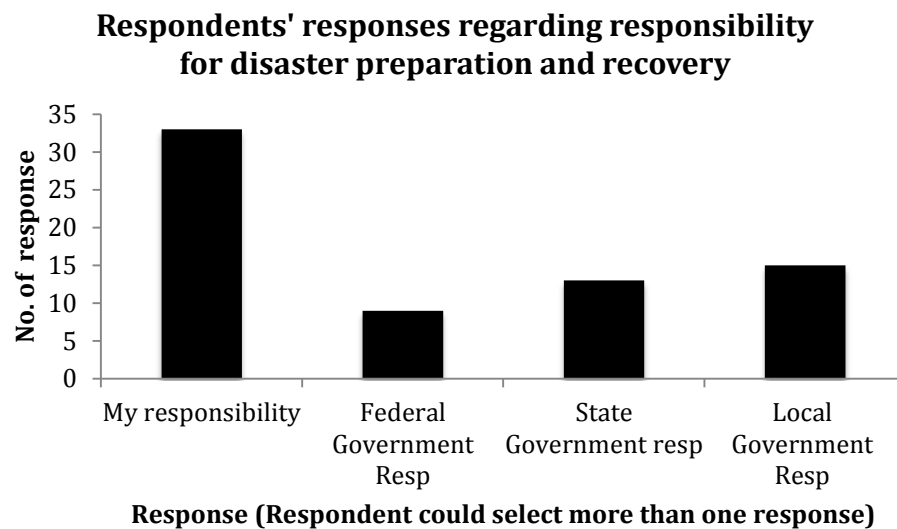


Figure 6.24 Level of understanding of ‘self-help’ approach to emergency management.

Source: Questionnaire

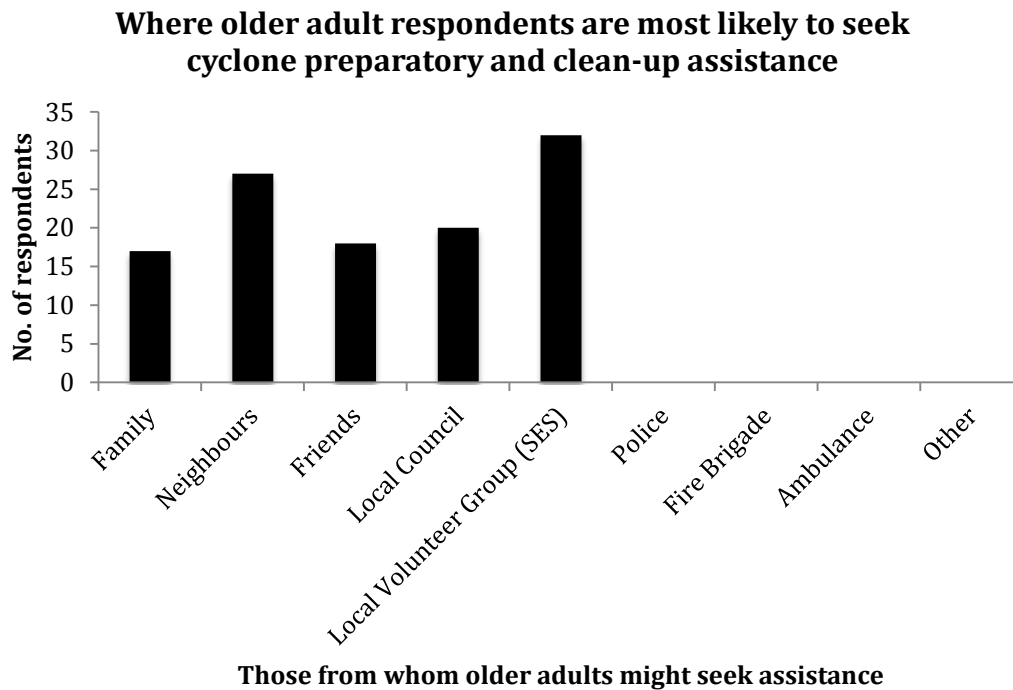
Participants were also asked whether disaster preparation and recovery was the responsibility of themselves, the federal, state or local government. Figure 6.25 shows that overwhelmingly the older adult participants understood that disaster preparation and recovery was the responsibility of the individual, but responses also indicated that participants also regarded preparation and recovery tasks as also the responsibility of governments, with many emphasising the importance of local government assistance.



**Figure 6.25 Older adult participants' responses regarding area of responsibility for cyclone preparation and recovery.**

Source: Questionnaire

Finally, older adult participants were asked who they would seek assistance from regarding cyclone preparation and clean-up. Figure 6.26 shows the most common response was that they would call on volunteer groups for assistance, followed by neighbours, the local council, friends, and lastly, family. No participant indicated that they would seek assistance from the police, ambulance or fire brigade.



**Figure 6.26 Where older adult participants are most likely to seek cyclone preparation and clean-up assistance.**

**Source: Questionnaire**

Summarising, data showed that OA female participants were more concerned than OA male participants about the threat of a cyclone and storm surge, as well as about the potential for damage to their homes caused by a cyclone. In contrast, the OA male participants were more concerned than the OA female participants about damage to their homes from a storm surge, as well as about the onset of cyclone season.

Examining these results in relation to age, data showed that OA between the age of 65 and 79 years were more concerned about the threat of a cyclone or storm surge, as well as the damage a cyclone and/or a storm surge could cause their home than the OA participants aged between 80 and 94 years. However, the later were more concerned about the on-set of cyclone season.

Data also showed that those who were most concerned had both cyclone and storm surge experience, as well as other natural hazard experience (such as flood), mostly lived with a partner, but had never evacuated their properties during past events.

## 6.6 Conclusion

Chapter 6 provided details of the data collected using a questionnaire designed to ask older adult participants of their cyclone experiences and habits, perceptions of risk, demographics and health. The presentation of these simple descriptive statistics provided a snap shot of the sample population in which 17 females and 19 males participated. The data revealed that over half of the older adult participants were both over the age of 80 years and classified as single, having resided in their homes for more than 30 years. Most were reliant on the aged pension as their single source of income (89%) with just over half (56%) stating that they insured both their building and contents. Data revealed that the health of many of the older adult participants was compromised, with arthritis, heart disease, high blood pressure, glaucoma, diabetes and depression the most common amongst participants and their partners, with some reliant on *in situ* health and community care to remain able to reside independently in their own homes. As such, almost all participants stated that they required assistance to either prepare or clean-up their properties in the event of a cyclone.

As all older adult participants were experienced in dealing with the effects of a cyclone, almost all stated they had evacuated their homes in the past, and that they had mostly taken refuge in the homes of friends and/or family. This experience was also reflected in their responses to questions asking about their cyclone preparatory habits, with almost all saying they had an emergency kit prepared, and they undertook authority recommended actions to prepare their homes. Despite this, data revealed that often only a small number of recommended actions were implemented, and that emergency kits mostly contained very few of the items recommended by emergency management authorities.

Using the variables of gender, age, living status, as well as past evacuation, cyclone and storm surge experience, this chapter showed that older adult female participants were most likely to be *very concerned* about the threat of a cyclone and/or storm surge, while older adult male participants were most likely to be *very concerned* about the damage that could be caused. In contrast, older adult participants aged between 65 and 79 years were most likely to be *very concerned* about the threat of a cyclone and/or storm surge, with those aged between 80 and 94 years most likely to be *very concerned* about the

damage that could be caused. Interestingly, this chapter also showed that those with spouses were most likely to be *very concerned* about the threat of cyclone, whereas those who were single appeared to be *very concerned* about the on-set of cyclone season. Amongst those with evacuation experience, their highest level of concern was regarding the threat of a cyclone and/or storm surge, with those who had experienced a cyclone and/or storm surge in the past were *very concerned* about the potential for future damage to their homes.

Chapter 6 concluded by revealing most participants had not heard of the ‘self-help’ approach to emergency management, despite indicating that they had a good understanding of what it entailed, with many indicating that they realised that disaster preparation and recovery was predominantly the responsibility of the individual. These results were in contrast to their responses that indicated that if they required assistance, most would seek help from local volunteer groups, such as the SES, with data showing most would not seek help from family. Let us now move to a detailed discussion of the qualitative data, starting with the personal trauma of cyclones from the perspective of the older adult.

### ***Synopsis of Chapter 6***

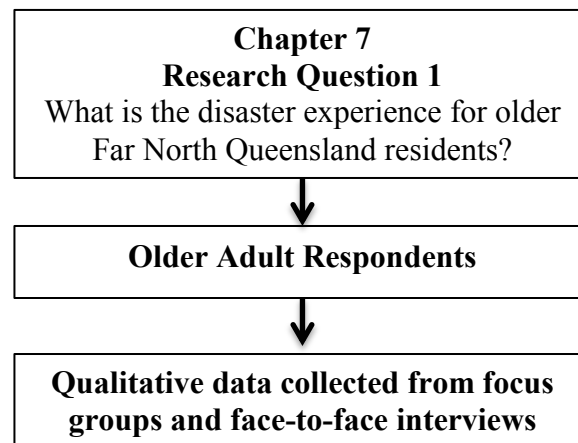
Chapter 6 presented the quantitative data collected from the older adults using a self-administered questionnaire. Next is the second of the four chapters presenting the results of this research, and is the first of the three papers outlining the qualitative results collected from the older adult participants during the focus groups and face-to-face interviews.

## Chapter 7      “The trauma of the cyclone has changed us forever”: Self-Reliance, Vulnerability and Resilience Amongst Older Australians in Cyclone-Prone Areas

Chapter No.	Details of publication on which chapter is based	Nature and context of the intellectual input of each author, including the candidate
7	Astill S & Miller E 2016, ‘“The trauma of the cyclone has changed us forever”: Self-reliance, vulnerability and resilience amongst older Australians in cyclone-prone areas’, <i>Ageing &amp; Society</i> (Impact Factor 1.827). Accepted awaiting publication 8 September 2016.	Astill S - Chief investigator, significant contribution to the planning of the study, data collection and analysis, literature review and writing manuscript  Miller E - Assisted with the data analysis, preparation and evaluation of the manuscript (as adjunct supervisor).

### 7.0 Introduction

After having presented the descriptive statistics, this chapter focuses on the rich narrative data collected during the focus groups and face-to-face interviews with the older adult participants who completed the self-administered questionnaire for the quantitative component of the study. These data were collected immediately after the completion of the questionnaire, and focus on the cyclone experience amongst older adult residents residing in remote coastal hamlets in FNQ previously impacted by Cyclone Larry (2006) and Cyclone Yasi (2011). Chapter 7 directly addresses this dissertation’s first research question: What is the disaster experience for older FNQ residents? (See Figure 7.1)



**Figure 7.1 Outline of Chapter 7.**

It is important to remember the expectation of EMA in regards to natural hazard resilience, with authorities relying on those in harm's way being self-reliant, aware and prepared for not only extreme weather, but also the possibility and probability of extended periods of time without essential services, including electricity, water and telephone, and access to food and medical support. It is also important to acknowledge that the study sites chosen for this research have been experiencing hardship during the recovery period following the impact of two catastrophic cyclones, with many older adults now experiencing social isolation after the loss of family and friends who relocated in search of employment. Thus, Chapter 7 provides a critical insight into understanding the impact an ageing population will have on the future resilience of cyclone-prone communities, and the potential impact this will have on local government disaster managers' expectations in the future.

## **7.1 Article 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, older adults 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 Social Cognitive Theory (SCT)

by outlining the findings from focus groups, personal interviews and questionnaires involving participants aged 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. Participants 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.

#### *7.1.1 Keywords*

Ageing population, cyclones, natural hazard, self-reliance, resilience, coastal hamlets

## **7.2 Article 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 hazards (Intergovernmental Panel Climate Change (IPCC) 2007). In Australia, for example, the current estimated lifetime exposure to natural hazards is 1 in 6, with these storms, cyclones, floods and bushfires costing A\$1 billion annually (McFarlane 2005; Geoscience Australia 2015). Planning for and managing the coastal impact of climate change is a critical challenge for Australia, as all major cities are coastal and 80% of Australians live within 50 kilometers of the coast (Hugo 2003). Coastal hamlets 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 hamlets due to coastal migration and increasing urbanisation of vulnerable coastal areas increases the risk of harm to people and properties (Knutson *et al.* 2010; Pielke *et al.* 2005; Berwick 2007). 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 *et al.* 2008), where increasing numbers of people (especially older people) relocate and resettle in high amenity coastal areas (Bohnet & Pert 2010). Making a 'sea change' is a popular trend amongst older 'baby boomer' retirees, who are changing the demographic profile of coastal hamlets whose populations are, and will continue to be, older than that of the national average (Berwick 2007; Drozdowski 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 4000 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 (QG) 2009, p.8).

Unfortunately, the combination of population ageing and climate change is creating a new threat for many non-metropolitan Australian coastal hamlets: 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 new-comers (Gurran *et al.* 2007). This means that when disaster strikes these coastal hamlets, 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 hazard due to physical limitations, diminished cognitive ability and fewer economic resources required to complete post-disaster repairs (Cutter & Finch 2008; Ngo 2001; Wang & Yarnel 2012; Cherry *et al.* 2010).

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 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 (Brunkard,

Namulanda & Ratard 2008; IFRC 2007; Åström, Bertil, & Joacim, 2011; Khazai, Daniell & 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 & Akiyama 2011). Physically, Wang & 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 older adults 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 & 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 hazard (Cutter & 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 (ABSa 2011; Kelly 2015). Critically, although most of these older adults typically cope well with day-to-day situations, the experience of a natural hazard 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 & Rehner 2012). Research in the USA has identified retiree migration into a high amenity hurricane prone coastline has led to an increasing number of older people now 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 adequate stock-piles 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 focussed specifically on older people, although Astill and Griggs (2014) did note the high proportion of older adults 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 into 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 (Kelly 2015; Holloway *et al.* 2015; Taylor & Donoghue 2015; Australia Treasury 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% in 1991 to 26% in 2011 (ABSb 2009). During a natural hazard, 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 (COAG 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” (COAG 2011, p.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 & Allen 2013, p.148).

In Australia, the National Disaster Strategy (NDS) (COAG 2011) adopted a nation-wide 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 (COAG 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 NDS 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 NDS 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.

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, 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 & Harper 2002). SCT endeavours to explain how individuals access certain behaviours and how those behaviours are influenced by environmental factors. According to Benight & 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 & 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.

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 (2009) 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 behavior research. This is evident in recent hurricane literature emphasising the importance of 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 (McCann 2001; Elliott & Pais 2006; Horney *et al.* 2012).

Thus, this paper explores the disaster resilience of older adults residing in Australia's FNQ coastal hamlets and whether these individuals can fulfil emergency managements' 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 (Australian Bureau of Meteorology (BOMa) 2014). 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 – 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 socioeconomic disadvantage (Gurran, Blakeley & Squires 2007). The social vulnerability typifying these centres has the potential to create community vulnerability in relation to natural hazard 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 of emergency management. Thus, with relatively little known about older adults' cyclone experience in smaller coastal hamlets, this paper utilises a SCT approach to address this knowledge gap.

### **7.3 Article Method**

As the purpose of this research was to understand the real-life cyclone disaster experience of older adults, an exploratory qualitative phenomenological research approach was chosen (Liamputtong & Ezzy 2005). The theoretical framework guiding this study was phenomenology<sup>54</sup>, 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, p.178).

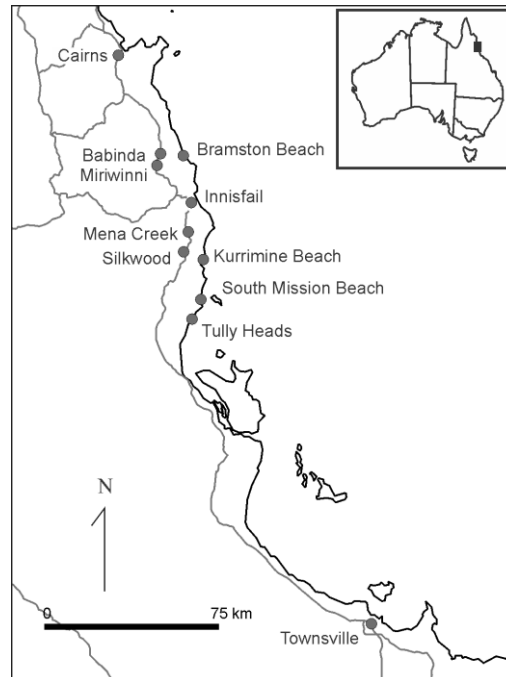
#### *7.3.1 Case study communities*

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<sup>54</sup> Refer to Section 4.3

Figure 7.2 illustrates the case study site, Australia's FNQ coast located between Cairns (population of 156,169) and Townsville (population 174,462) (ABSc 2011; ABSd 2011). The study site encapsulates two Local Government Areas (LGAs) (Cairns Regional Council and Cassowary Coast 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 (1) 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 (Callaghan 2011) and (2) within the next decade, ABSa (2011) 2011 census data suggests that approximately 30% 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 (BOMa 2014; Callaghan 2011). In the last decade, FNQ has experienced two major cyclones, Cyclone Larry (Severe Category 4) in 2006 (half a billion dollars of damage; BOMb 2014) and Cyclone Yasi (Severe Category 5) in 2011 (almost four billion dollars of damage) (BOMc 2014; Kamenev 2011). Despite there being no fatalities, both caused major damage to over 10,000 homes and businesses, vegetation, crops, vital transport links and infrastructure, 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).



**Figure 7.2 Study sites, Far North Queensland.**

### *7.3.2 Participants*

As Table 7.1 illustrates, 36 older, community-dwelling Australians adults (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 10 years. Participants reported a range of chronic health conditions, with the most common 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 the Internet at home (n=20).



Table 7.1 Socio-demographic characteristics.

Characteristic		N=36	(%)
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

Characteristic		N=36	(%)
	Osteoporosis	3	9
Requires regular medication	Yes	27	75
Requires in-home assistance	Yes	15	42
Type of assistance required	Meals-on-Wheels	5	14
	Housework/lawns/shopping	11	31
	Respite	15	42
	BlueCare	4	11
Communication devices	Television	36	100
	Radio	36	100
	Mobile phone	22	61
	Internet	20	56

Source: Questionnaire

### 7.3.3 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 questionnaire contained a number of open-ended questions asking about their cyclone disaster experience, specifically pre, during and post 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 adults were purposely recruited through non-probability snowballing techniques, including presentations about the research at local community meetings, for example, 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 programs, or responding to printed advertisements in

community health newsletters. A mixed-methods approach was utilised, with all 36 older adults 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 4 to 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 participant 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.

#### *7.3.4 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 & Ezzy 2005). Data were manually coded, with key themes and sub-themes highlighted, grouped and labelled in order to better understand the similarities and variations in the cyclone disaster experience for older regional Queenslanders (see Table 7.2). 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 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.

### **7.4 Article 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 hazards. 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.

#### *7.4.1 Theme 1: The cyclone experience for older regional residents*

Despite previous cyclone experience and preparations revealing a well-prepared community, these older adults expressed serious concerns in relation to their future coping capacity. Indicative quotes in Table 7.2, below, are grouped into three key categories: lack of social support, fear of evacuating, and fear from past experiences. For some, retiring to coastal hamlets 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 1600 kilometres away), rather than local businesses, leaving local contractors unable to even submit a quote for repairs. The demise of 95% 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 older adults 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). These results concur with Figure 6.3 and Figure 6.4, which indicate that level of reliance these older adult participants had on *in situ* care providers

Table 7.2 The cyclone experience of older regional residents.

Theme	Indicative quotes
Lack of social support following post Cyclone Larry/Cyclone Yasi out-migration	<p>I wouldn't know who to turn 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).</p> <p>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).</p>
Fear of evacuating	<p>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).</p> <p>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).</p> <p>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, The Coconut, 84 years).</p> <p>Wife: You could have another heart attack (female, The Coconuts, 81 years).</p>

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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 of them were old, had to go into the bush to relieve themselves for 2 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 2 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).

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Source: Interviews

As part of cyclone preparations, authorities expect all residents to have an evacuation plan in place<sup>55</sup>, 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 and 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<sup>56</sup>. After being refused entry into the evacuation centre, followed by police roadblocks preventing their return to their home, one older adult 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 older adults.

#### *7.4.2 Theme 2: Realising one's limitations*

Cyclone preparation and recovery is a difficult process for all affected residents, regardless of age, but these older adults 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 7.3) are categorized into physical, social and personal limitations.

Older male participants, in particular, were acutely aware of their increasing physical limitations, particularly their declining stamina, explaining how they were no longer

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<sup>55</sup> See Section 6.4

<sup>56</sup> These recollections were supported by Figure 6.14, which indicated that many of the older adult participants had past evacuation experience, yet the quantitative results neglected to allow the older adults to express their concerns around the process of evacuation.

steady up a ladder or able to sandbag their property efficiently; one older man admitted that he was ashamed that he could no longer protect his wife or property. Older adult participants 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 the older female participants, 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<sup>57</sup>.

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 council's increasing reliance on that for communication was discrimination), to the emotional and psychological toll of the disaster. Approximately a fifth (n=7) described how both the experience of the cyclone, and coping with the aftermath, were experiences that they 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.

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<sup>57</sup> These responses were supported by quantitative data in Figure 6.26, showing that older adult participants were least likely to seek assistance from family members when preparing and recovering from a cyclone or storm surge, preferring instead to call on volunteer organisations, neighbours and local government officials.



Table 7.3 Realising one's limitations.

Theme	Indicative quotes
Physical limitations	<p>As you get older your stamina really decreases. I find after lugging sandbags I'm absolutely knackered. Even cutting up logs with a chainsaw – there is a lot of energy needed. I am just not steady enough anymore (male, Innisfail, 79 years).</p> <p>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).</p> <p>We can't check the house anymore. We can only clean up around it. I know that in 5 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).</p>
Social support limitations	<p>Everyone is doing the same thing to their own place. You can't ask them to help (female, Babinda, 92 years).</p> <p>I will be OK while [my husband] is alive, but I don't know how I will be when something happens to him (female, The Coconuts, 81 years).</p> <p>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).</p>

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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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Source: Interviews

#### 7.4.3 *Theme 3: Reflecting on the aftermath*

Older adults described how cyclone recovery in smaller coastal hamlets (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 7.4 illustrate this, categorised into isolation, bureaucratic limitations and long-term economic impact.

While rationally older adults 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 policymakers 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 for 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 chainsaw permit. Finally, the long-term economic impact on the region was also a matter of deep concern for the older adult participants who resided in Innisfail, in particular, who blamed the impact and flow-on effect of two major cyclones for the closure of many local businesses, particularly those reliant on the agricultural and building industries, as well as the out-migration of those left unemployed by the closures.

Table 7.4 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 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 <sup>58</sup> . They knocked on doors to make sure everyone had eaten. Then there were the two young fellas who came in with a chainsaw 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 chainsaw 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 chainsaw licence! (male, Innisfail, 76 years)

<sup>58</sup> A ute is an Australian colloquial term for a vehicle, usually with the capacity to carry two or three passengers, with a table-top tray at the rear, designed to carry large loads.

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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 2-3 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)

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Source: Interviews

#### 7.4.4 *Theme 4: Challenges of being/remaining self-reliant*

Disaster management's expectation that all citizens must be self-reliant was not something these residents disputed; in fact, overwhelmingly all agreed that people had to be responsible for themselves and their own properties<sup>59</sup>. However, as the quotes in Table 7.5 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<sup>60</sup>.

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. The assistance of neighbours, family, friends, and where possible, the Army, SES 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<sup>61</sup>, 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, stock-pile 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

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<sup>59</sup> Figure 6.24 supports these claims.

<sup>60</sup> These responses are supported by quantitative results that indicated the level of assistance older adult participants claimed they required to prepare and clean-up their properties (see Figure 6.8 and Figure 6.9).

<sup>61</sup> Pre-cyclone clean-up services used to be provided by local councils in November/December each year, at the beginning of the cyclone season. Councils now offer free disposal for a period of time at their local waste depots encouraging residents to remove excess vegetation and debris from around their properties.

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.

Table 7.5 Challenges of being or remaining self-reliant.

Theme	Indicative quotes
The physical effect of ageing	<p>I can't climb on the roof anymore (male, Kurrimine Beach, 72 years).</p> <p>I can't manage anything that is very physical anymore (male, Mena Creek, 84 years).</p>
Dependence on assistance from authorities	<p>The thing that worries me the most is that if the Army are not available because they have the machinery and the man power 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).</p> <p>I don't know how I will cope if Meals-on-Wheels<sup>62</sup> and the BlueCare<sup>63</sup> can't get to me. I just have to hope that doesn't happen (female, South Mission Beach, 66 years).</p>
Restrictive nature of regulations	<p>We can't get the stuff onto 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).</p>
Loss of vital services	<p>I had to drag all [the trees] out. We used to get a [pre-cyclone] clean up, but not anymore. 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).</p>

<sup>62</sup> Meals-on-Wheels is a service delivering home-cooked meals to independent-living people, such as older adults, those with a disability or chronic illness.

<sup>63</sup> BlueCare is an *in situ* home-based nursing service providing care for independent-living people, such as older adults, those with a disability or chronic illness.



Limited financial ability	<p>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).</p> <p>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).</p>
Reconsidering ageing-in-place of their choice	<p>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).</p> <p>The community is one reason why we have stayed. The environment is the other reason. It is beautiful here (<i>participant suddenly stopped as he was too emotional to continue</i>). 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).</p>

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Source: Interviews

## 7.5 Article Discussion

This paper sought to explore the cyclone experience of older adults 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 adults were concerned with their reduced ability to recover from future intense cyclones if the future meant facing these events without sufficient levels of physical, psychological, financial and medical support. These findings, of course, must be examined within the limitations of this research: these older adults volunteered to participate because they wanted to discuss their cyclone experiences 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 - 2015 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 SCT it is clear that self-efficacy was a critical component enabling people to fulfil emergency management's expectation of self-reliance<sup>64</sup>. 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 (for example, reduced stamina and physical endurance, limited financial capacity, increasing dependence on medical and community support, reduced support from family and friends). These findings concurred with previous research highlighting the vulnerability of older adults in relation to natural hazard vulnerability (Cutter & Finch 2008; Fernandez *et al.* 2002; Cherry *et al.* 2009, Mayhorn 2005; Furukawa *et al.* 2012; Masozera *et al.* 2007; Wang & Yarnel 2012). In fact, no participant made any positive ageing comments. However, critically, despite the participants' high levels of hazard awareness and past cyclone

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<sup>64</sup> A more comprehensive discussion of the data presented and their relationship to SCT is discussed in Section 10.1, which includes data collected from emergency services officers, *in situ* health care providers and local government disaster managers.

experiences, particularly following their recent challenges faced during Cyclone Larry (2006) and Cyclone Yasi (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. These findings were consistent with previous research highlighting how the financial vulnerability of older adults impacts their ability to both adequately prepare and carry out post-disaster repairs to their properties (Fothergill & Peek 2004; Masozera *et al.* 2007).

Overwhelmingly participants 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<sup>65</sup>, a situation, Burby (2006) and Paton (2003) both warned could lead to a reduction in the incentive to be adequately prepared 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 adequately prepare 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 experiences 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 Australian emergency management's disaster strategy (COAG 2011).

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<sup>65</sup> Please note older adult participants did not refer to relying on businesses and/or individuals for assistance.

## 7.6 Article Policy Implications

Most of the older adult participants were long-term residents of FNQ, and were therefore experienced with coping and recovering from intense cyclones<sup>66</sup>. 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 adults doubting their ability to remain self-reliant. These claims have serious implications for Australian emergency management, whose policies emphasise the importance of all individuals and communities remaining self-reliant (COAG 2011). This research highlights the NDS'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 participants 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<sup>67</sup>. Participants 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 (2007), 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 fully recover from the impact of a natural hazard. Although past research recognises that those within a vulnerable community with strong social networks have the ability to draw on shared resources upon which to remain self-reliant (Cottrell 2016), it is also important to recognise that social networks within communities affected by successive natural hazards could have in fact diminished. The loss of those members of the community who others may have once relied upon, potentially erodes previous support networks, leaving those who remain without the same levels of past physical and emotional support, placing a heavier reliance on disaster authorities and volunteers.

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<sup>66</sup> Refer Table 6.3, Table 6.4, Table 6.5 and Figure 6.11

<sup>67</sup> Figure 6.24 supports these responses, showing that many of the older adult participants regarded natural hazard preparedness and recovery a shared responsibility between themselves and all levels of government.

Of greatest concern to the participants 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 adequately prepare 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 1500 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 adults 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 of the older adult participants 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 emergency management, 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, the results presented in this article have policy implications in regards to the long-term economic support of regional towns reliant on primary industries following a natural hazard. The older adult participants felt that the outmigration 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 causing businesses that supported the agricultural and building industries to close their doors, leaving their communities with an economic down-turn that was still prevalent at the time of data collection. Yet these outcomes were not new nor were they unique to the study sites examined. The World Disaster Report (2001) identified that typically, recovery efforts that focus on rebuilding assets usually result in financial incentives allocated to large companies located outside the affected region, resulting 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 Hillman (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 research also supports recent research by David 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 hazard 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 better understand 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 hamlets 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 hazard. 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 outmigration 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 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.

## **7.7 Chapter Conclusion**

Chapter 7 explored the real-life cyclone experience through the voices of the older adults who participated in this research. The chapter began with the first paper written by the researcher, which provided an overview of past literature relevant to this chapter's scope. Next the chapter outlined the results under the themes of: the cyclone experience, realizing one's limitations, reflecting on the aftermath and the challenges of being and remaining self-reliant. Next it outlined a detailed discussion relating the results of this research to past research concluding that increasingly older adults are facing futures without the support of family, which in turn increased their reliance on support services. These outcomes have significance for disaster managers within communities of high numbers of independent-living older adults. As such, SCT provided a sound theoretical framework upon which to determine the impact of ageing, increased social isolation, decreasing availability of services and decreases social support by highlighting the impact these variables could have on both an individual's self-efficacy, as well as the collective efficacy of the entire ageing community. This chapter concluded that such outcomes could negatively impact the self-reliance capabilities of older adults residing in vulnerable coastal hamlets, leading to an increased demand for disaster authority support. The thesis now turns its attention to the views of local government disaster managers, *in situ* health and community health care providers and emergency services officers.

### ***Synopsis of Chapter 7***

This chapter presented qualitative data from the older adult participants related to their past cyclone experiences. Next, Chapter 8 presents the third results chapter, providing further qualitative data collected from emergency services officers, *in situ* health and community health care providers and older adults regarding their views on the ability of older adults to remain self-reliant when faced with future cyclones and compares it to the expectations of local government disaster managers.

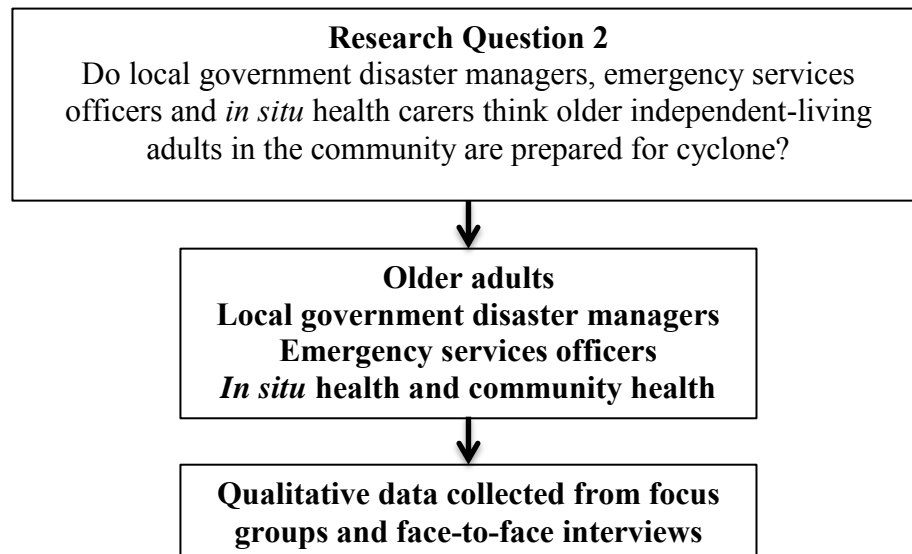


## Chapter 8      “We expect older adults to be able to prepare and recover from a cyclone as well as younger members of this community”

Chapter No.	Details of publication on which chapter is based	Nature and context of the intellectual input of each author, including the candidate
8	Astill S & Miller E (revise and resubmit, re-submitted 12 June 2016). '“We expect the older adults to be able to prepare and recover from a cyclone as well as younger members of this community” : Disaster management’s expectations of older adults residing in ageing, remote hamlets on Australia’s cyclone-prone coastline'. <i>Disaster Medicine and Public Health Preparedness</i> , (Impact Factor 0.923) Under review.	Astill S - Chief investigator, significant contribution to the planning of the study, data collection and analysis, literature review and writing manuscript.  Miller E - Assisted with the data analysis, preparation and evaluation of the manuscript (as adjunct supervisor).

### 8.0 Introduction

The previous chapter projected the experiences of older adults, to further investigate the extent to which older adult residents feel they are able to remain self-reliant during the onset of future natural hazards. This chapter explores the viewpoints of local policy makers, as well as those from emergency services officers and *in situ* community health care providers. This chapter addresses this dissertation’s second research question: Do local government disaster managers, emergency services officers and *in situ* health and community health care providers think older independent-living adults in the community are prepared for cyclones? (See Figure 8.1)



**Figure 8.1 Outline of Chapter 8.**

This chapter acknowledges that, despite the expectation of self-reliance by local government disaster managers and the stoicism of older adults influencing their decisions to remain residing independently, the reality is that many older adults reliant on *in situ* care could be facing serious consequences should these services cease because of the impact of a cyclone. To understand fully the impact of ageing on those living in more remote areas, the viewpoints of emergency services officers, such as ambulance officers and State Emergency Services officers, were deemed important, as well as the experiences of *in situ* community nurses and social workers who assist older adults on a daily basis. These opinions and experiences are compared with those of local government disaster managers located in the two LGAs in which the study sites are situated.

The conflict between what is expected and what actually happens is the theme of this chapter, providing an insight into the effect of successive natural hazards on older adults in remote Australian communities by outlining the experiences of emergency services officers and community health providers charged with caring for independent-living older adult residents, as well as the views and expectations of local government disaster managers. It provides critical insight into the inability of many older adults in remote FNQ communities to remain self-reliant, the dependence these people will have on the

assistance of emergency services in the future and the dire consequences this will have on the future resilience of their communities in the future.

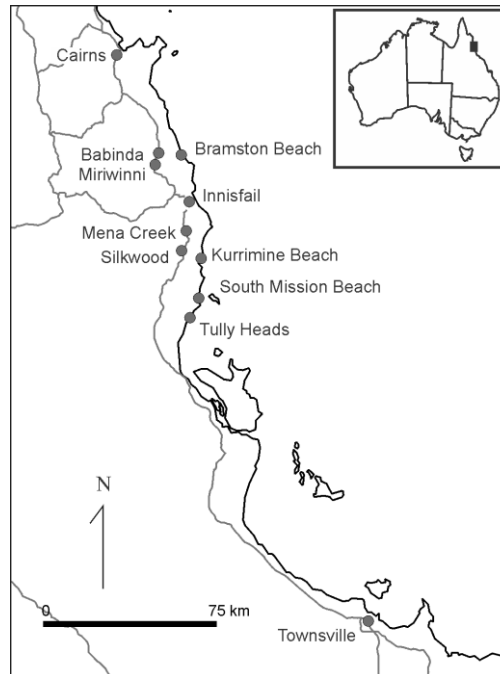
## **8.1 Article Abstract**

To investigate the extent to which older adults feel they can remain ‘self-reliant’ during future natural hazards and to compare the findings with the viewpoints of local policymakers and with those charged with caring for the older adults, both day-to-day and in times of crisis. This study used an array of non-probability snowballing techniques to seek the participation of senior citizens over the age of 65 years, emergency services officers, *in situ* community health care providers and local government disaster managers located in ageing, remote, coastal Australian communities vulnerable to cyclones and storm surges. All participants participated in either a face-to-face or telephone interview, or a focus group, with senior citizens also completing a self-administered questionnaire. This research found a discrepancy between local government disaster managers’ expectations and the experiences of both the older adults and those who care for them, as well as a lack of understanding in regard to the term ‘self-reliant’. These results highlight the inability of older adults in ageing, remote, coastal Australian communities to remain ‘self-reliant’ in the future, impacting on both disaster management policies, and the future capacity of these communities to remain resilient in the future.

## **8.2 Article Introduction**

The far northern coastline of the state of Queensland, Australia has been recognised as a cyclone ‘hot-spot’ by the Intergovernmental Panel for Climate Change (BOMa 2014). In March 2006, severe tropical Cyclone Larry crossed the tropical Far North Queensland (FNQ) coast near Innisfail and caused half a billion dollars in damages (BOMb 2014). Five years later, severe tropical Cyclone Yasi, the most powerful and costly cyclone to have affected the Queensland coast since records commenced (BOMc 2014), impacted the same region. Causing A\$3.6 billion in damage (Kamenev *et al.* 2011), Cyclone Yasi affected numerous small coastal hamlets located many kilometres from the larger regional centres of Townsville and Cairns and over 2000 kilometres from the State capital, Brisbane (see Figure 8.2). Typically these coastal hamlets in FNQ are characterised by smaller, ageing populations, a lack of adequate health

services and public transport, as well as high socio-economic disadvantage (Gurran *et al.* 2007).



**Figure 8.2 Study sites, Far North Queensland, Australia.**

As climate change scientists warn of significant increases in natural hazards, several national and international frameworks have been developed to help identify and mitigate the risks local communities face from natural hazards (IPPC 2007). For example, the United Nations developed the *Hyogo Framework for Action* (2005), a practical tool designed to foster community resilience. Drawing on the HFA, Australia developed a nationwide resilience-based approach to disaster management (the National Strategy for Disaster Resilience, (NSDR), which provides guidance to governments, communities and individuals when planning for a natural hazard (COAG 2011). The NSDR acknowledges that during a disaster, emergency services to assist those in need are invariably stretched, as the vast spectrum of activities required pre, during and post an event can easily overwhelm the available emergency services and volunteers, as well as the affected individuals. The recognition of these challenges led to an emphasis on the importance of individuals taking responsibility for their own disaster preparation, planning, prevention and recovery, reinforcing the importance of self-reliance by actioning a self-help approach to emergency management. This approach shifted

responsibility from the State and placed it squarely with the individual, assuming that all citizens were not only fully aware of the risks they might face, but that they also had the capacity to mitigate against those risks by being adaptive, resourceful and capable of undertaking physical, cognitive and financial decisions and actions during all stages of the 'disaster cycle' (pre-disaster preparation, impact and reconstruction).

Unfortunately, adopting this self-help approach to emergency management is a challenging undertaking for many more vulnerable community members, including those with a disability, chronic illness and older adults (Owens 2011; Ngo 2001; McCann 2011; Owen *et al.* 2012; Adams *et al.* 2011; Tatsuki 2012). To date, although research has highlighted the importance of identifying and supporting the most at-risk community members during a disaster (Chandra *et al.* 2013), very little work has explored whether at-risk populations might have the capacity to become and remain self-reliant in the face of more frequent and intense natural hazards. One potentially vulnerable population is the elderly and, like most nations, Australia has an ageing population. By 2031, it is predicted that the proportion of older Australians aged over 65 years will almost double, to almost 25 per cent of the total population (ABS 2013). While most of these older community-dwelling adults will usually be quite self-reliant, a disaster may push them over their coping threshold.

The government policy and personal preference of most people to 'age in place' in their own homes for as long as possible means the number of community-dwelling frail older people, and the need for in-home community-based health services, will only increase (Kelly 2015; Holloway *et al.* 2015; Taylor & Donoghue 2015). Problematically, these health services can be seriously disrupted during the onset of a natural hazard, with Woods *et al.* (2014) reporting that vital in-home care services (home-based nursing and a service delivering meals to the home) were seriously disrupted after Cyclone Yasi because of flooding, communication loss and inaccessible transport links. Thus, while 'self-reliance' is an expectation of policy makers and disaster managers, an older adult's ability to remain self-reliant depends directly on support from family, friends and in-home care organisations, who collectively enable older adults to 'age-in-place', as well as enabling them to prepare, cope and recover from a disaster (Wiles *et al.* 2011).

Given population ageing and predictions that both the frequency and intensity of natural hazards will increase, this qualitative research explores the disaster experience and expectations of older adults (65 years and older) living independently in their own homes in regional coastal hamlets in cyclone-prone Far North Queensland, Australia. As well as investigating the extent to which older adults felt they could remain ‘self-reliant’ during future natural hazards, it explores the views of local government disaster managers and those who assist the older adults both on a day-to-day basis and during times of an emergency (*in situ* health and community care providers and emergency services officers).

### **8.3 Article Method**

The theoretical framework guiding this research was phenomenology (refer to Section 3.3), which emphasises, prioritises and deeply explores the individual’s real-life experience by understanding that the participant is the knower, while the researcher fulfils the role of recorder of information, while engaging with the participant’s reality to provide an honest and trustworthy account of that lived experience (Paton *et al.* 2004).

#### *8.3.1 Case study communities*

The research area for this study encapsulated the region located between Cairns and Townsville on Australia’s Far North Queensland coast (see Figure 8.2), with a focus on the communities of Babinda, Innisfail, South Mission Beach, Bramston Beach, Kurrimine Beach, Tully Heads, Mena Creek, Mirriwinni and Silkwood. This region was chosen because of its long history of losses from tropical cyclones (Callaghan 2011), including the most recent losses associated with Cyclone Larry (2006) and Cyclone Yasi (2011), from which the region was still recovering at the time of data collection. In addition, census population projections suggest that by 2025, 30% of the population within the case study site will consist of people over the age of 65 years (ABS 2013).

### 8.3.2 *Participants and procedure*

The James Cook University Ethics Committee approved the research project, with data collected from November 2014 to April 2015. An array of non-probability snowballing techniques (including personal contacts, presentations to local community groups, interviews on local radio and television news programs, advertisements in community health newsletters, formal letters and telephone calls to organisations) were utilised to raise community awareness about the research and recruit participants, who were encouraged to approach, email or phone the researcher to participate.

The study sought participation from older adult participants (OA) aged 65 years or older (N=36, seventeen male and nineteen female), emergency services officers (ESO; N=10, nine State Emergency Services offices and one ambulance officer), *in situ* community health care providers (CHC; N=7, six social workers and one community nurse) and local government disaster managers (DM; N=4, two officers from Cairns Regional Council and two from Cassowary Coast Council) (see Table 8.1). All participants consented verbally and in writing, followed by participation in structured in-depth interviews (both face-to-face and over the telephone) or focus groups, held in community halls. As mobility or limited transport was an issue for some seniors, a personal telephone interview was offered to enable participation. Older adults also completed a 56-question self-administered, paper-based questionnaire on demographic characteristics, past cyclone experience and preparatory habits, and access to support and risk perceptions. Focus groups and interviews ran for an average of one hour, ranging from 35 to 110 minutes, and were directed by a question guide asking open-ended questions about their past cyclone experiences and their opinions of, in the case of the seniors, their future cyclone coping capacity, or, in the case of all other participants, their opinions on the future coping capacity of older people residing in remote communities. All were digitally recorded and then transcribed verbatim by the first author.

The most relevant data to this paper related to changes in household composition over time<sup>68</sup>, an overview of the health of the older adult participants and their partners<sup>69</sup>, as

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<sup>68</sup> See Figure 6.1

<sup>69</sup> See Figure 6.4

well as the number of seniors reliant on *in situ* health and community services<sup>70</sup>. Amongst the older adult participants, results showed that all of the male participants lived with a partner when first moving to the region, today, 30 per cent now resided alone. This figure grew to approximately 50 per cent for the female older adult participants. Amongst those with chronic conditions, many suffered from arthritis (almost 50% of males; more than 70% of females), diabetes (over 40% of males), glaucoma (over 40% of females), heart disease (over 30% of females; almost 30% of males and their spouses), with approximately 40 % of male recipients also suffering from depression (see Table 8.1). Data also provided an insight into those dependent on *in situ* care, with all participants aged 85 years or more admitting they were reliant on some form of in-home care.

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<sup>70</sup> See Figure 6.2 and Figure 6.3



Table 8.1

Characteristic		(N=36) %
Gender	Female	47
	Male	53
Age (Years)	65-79	44 (Male 53%; Female 37%)
	80-94	56 (Male 47%; Female 63%)
Household composition	Lives with spouse/partner	42 (Male 56%; Female 26%)
	Lives with relatives	11 (Male 0%; Female 21%)
	Lives alone	44 (Male 35%; Female 53%)
	Live in retirement village	3 (Male 5%; Female 0%)
Chronic conditions	Male participants (Spouse or partner)+	Arthritis 47 (24)
		Asthma 12 (0)
		Breathing difficulties 29 (6)
		Cancer 18 (12)
		Cataracts 18 (0)
		Depression 29 (18)
		Diabetes 41 (12)
		Glaucoma 6 (6)
		Heart disease 29 (29)
		Kidney disease 6 (0)
	Female participants (Spouse or partner)+	Arthritis 74 (21)
		Asthma 11 (0)
		Breathing difficulties 21 (11)
		Cataracts 21 (11)
		Dementia 5 (0)
		Depression 11 (5)
		Diabetes 11 (0)
		Glaucoma 42 (11)
		Heart disease 37 (5)
		Osteoporosis 16 (5)
Requires regular medication	Yes	75
Requires in-home care	Yes	42

	Characteristic	(N=36) %
Type of care required	Meals-on-Wheels*	14
	Respite**	42
	Home duties***	31
	BlueCare ****	11

#### Socio-demographic characteristics of older adult participants.

\* Meals-on-Wheels is a volunteer organisation providing a home delivered meal service to the older adults and disabled.

\*\* Respite is a service providing social interactions and a meal to those who would be otherwise housebound.

\*\*\* Home duties include assistance with grocery shopping, housework and gardening.

\*\*\*\* BlueCare in an in-home nursing service.

+ No. of respondents with a spouse or partner = 16

Source: Questionnaire

### 8.3.3 Analysis

A thematic analysis<sup>71</sup> was conducted to enable the researcher to identify the major issues and topics that emerged from the data. This process involved an iterative and inductive process of data immersion and interpretation, requiring transcripts to be read and re-read so as to identify common categories and themes (Liamputtong & Ezzy 2005). Data was manually coded, highlighting themes and sub themes, which were grouped and labelled, to better understand similarities and differences in the disaster experience for all three participant groups. Firstly, transcripts were examined for participants' explanations, definitions and experiences, specifically those associated with self-reliance and the future challenges facing older people and local government disaster managers. Second, common and contrasting concepts were identified and grouped into common experiences (the majority voice) and more aberrant experiences (minority voice) (Creswell 2008). Finally, the themes were reviewed, categorised and labelled repeatedly until the process reached data saturation and no new themes emerged. The results purposely include extracts of raw data (specific quotes) to enable the reader to understand and evaluate our thematic structures.

<sup>71</sup> Outlined in Section 4.13

## 8.4 Article Results

The thematic analysis identified differences between local government disaster managers' expectations of the capacity of older adults to be self-reliant during all stages of a cyclone event and the opinions and experiences of older adults residing in remote coastal hamlets, as well as the experiences of emergency officers and *in situ* community health care providers who assist the older adults both on a day-to-day basis and during times of an emergency. Three key themes were drawn from the data and are presented below: expectations of self-reliance, identifying and locating vulnerable older adults and future challenges.

### 8.4.1 Theme 1: Fulfilling disaster authorities' expectations of self-reliance

As the quotes in Table 8.2 illustrate, there was a significant discrepancy between DMs expectations of older adults' self-reliance and the experience of those on the ground. Responses from DMs consistently repeated the position of NSDR (COAG 2011) that all individuals, regardless of their age or physical ability, must ensure they are self-reliant and prepared to take responsibility for the risks they live with. DMs concurred that all residents must identify their own vulnerabilities, putting in place plans that mitigate the future risks and able to evacuate to a safe sheltering place (preferably with family) rather than relying on cyclone shelters. All the DMs interviewed stated that the responsibility of the older adults laid with either the families or friends of older adults within their communities, or with the *in situ* care organisations who provide in-home support to many on a daily basis. However, ESOs were overwhelmingly shocked of such an expectation, denying that the responsibility of the older adults within the community was the responsibility of their respective *in situ* care organisations, stating that not only were they unable to tend to their clients during a cyclone, but that they too had to shelter with their families and cope with any loss that they might experience personally. They also pointed out that a severe cyclone usually results in limited access, hindering any form of ability to provide care, and that most importantly many older adults did not use their service, therefore the whereabouts of these people are unknown to their organisations.

OAs were also concerned about their ability to cope with the physical strength required to adequately prepare a home for the impact of a cyclone and to clean up and rebuild.

They admitted they required assistance to carry out these tasks, without which they would have consider leaving their homes, a realisation that greatly upset many of the participants. Nearly one third (40%) had not heard of, and did not know, what the ‘self-help’ approach to emergency management meant for them<sup>72</sup>. CHCs explained that many older adults were increasingly reliant on their services, due to diminishing social networks and reduced family support, with ESOs confirming that in the aftermath of a cyclone, disruption to services could, and did, have a very negative impact on the health and wellbeing of many of the older adults within their communities<sup>73</sup>. Similarly, ESOs explained that older frail people were most at risk during emergencies, especially during the preparation and clean-up phases when many attempted clean-up activities beyond their physical capabilities, often resulting in illness, injury and exhaustion.

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<sup>72</sup> These comments were supported by responses collected using the questionnaire (see Figure 6.23 and Figure 6.24).

<sup>73</sup> These comments were confirmed by Figure 6.26, in which many of the older adult participants identified that they would be most likely to seek assistance from local volunteer groups (such as the SES), rather than relying on family and friends when faced with cyclone preparations and recovery activities.

Table 8.2 Self-reliance and the ‘self-help’ approach to emergency management.

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**Local government disaster managers (DM)**

We expect all residents, regardless of who they are, to have an evacuation plan, an emergency kit, stockpiles of food and water and to take measures to ensure their property is properly secured (DM1).

We expect seniors to be as able to prepare or recover as younger members of this community (DM2).

In order to be resilient, you cannot just rely on authorities, you need to be able to rely on family (DM3).

Organisations, such as Meals-on-Wheels and BlueCare, look after the older adults in a cyclone. The older adults are their clients, so yes, it is their responsibility to care for those people (DM1).

Meals-on-Wheels and BlueCare know who are vulnerable. They are in frequent contact, so they are better placed to care for these people than the Council. They have the capacity to keep lists, we don’t. They are responsible for their clients, after all, that what they are paid to do (DM3).

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**Older adult participants (OA)**

No-one can be truly prepared for a cyclone, old or not. But being older makes it harder (male, Tully Heads, 70 years).

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).

Without assistance we would have to consider leaving the area (male, Kurrimine Beach, 72 years).

We can't check the house anymore. We can only clean up around it. 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 Townsville, doing their own stuff (female, South Mission Beach, 66 years).

What, they expect us to look after ourselves? How? How come no-one has ever told us that? (male, Innisfail, 72 years).

No, I haven't heard of the 'self-help' approach, but I assume it means we have to take care of ourselves. Isn't that what we do? But the clean-up is too much. No-one can do it by themselves. That's why we need the Army (female, Innisfail, 76 years).

The money the government gives us is a real help. I couldn't cope without that (female, South Mission Beach, 66 years).

What worries me is that I might not be able to get medical help. That's the biggest worry (male, The Coconuts, 86 years).

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**Emergency Services Officers (ESO)**

Many independent living older adults merely exist—some are barely coping. But coping on a day-to-day basis is very different to coping with a cyclone (EO1).

They [seniors] think they are as fit and healthy as they were last time there was a cyclone. Many climb ladders and fall, using chainsaws, falling onto something, things falling onto them, exacerbation of diabetes and cardiac issues (EO2).

How can the older adults take care of themselves in a cyclone? Many of them can't even take care of themselves on a daily basis (ESO1).

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***In situ* community health care providers (CHC)**

Emergency management thinks that we call on everyone during a cyclone. That's a faulty assumption. We don't call on our clients because we have to ensure our own families are safe. And how can we ensure all the older adults are safe? We don't know where all the older adults and vulnerable are. If they haven't seen us then we wouldn't know where they are (CHC3).

How can we care for the older adults during a cyclone? We have to take shelter with our own family. And after it's over, the roads are blocked and trees are down. How are we supposed to get through? I know the Council *thinks* we do – but we don't (CHC 4).

Not everyone can afford to pay for our help. Those that do regard themselves as independent and self-reliant. It has nothing to do with being able to cope, it is just whether they can afford to pay for others to come in and do all the things they no longer can do (CHC3).

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Source: Interviews

#### 8.4.2 Theme 2: *Identifying and locating the vulnerable older adults*

Despite disaster co-ordination and response being the responsibility of local government, all DMs stated that identifying those most at risk was not their task. As the quotes in Table 8.3 illustrate, all concurred that DMs could identify the areas which were at risk from storm surges, but that it was not possible to identify who resided in those areas, nor was it possible to know if those residents were older adults, disabled or in need of any form of assistance. DMs all concurred that they did not regard older adults as a vulnerable group (despite their failing physical, cognitive and financial capacities) because they felt that they could rely on help from family, friends and neighbours, who were viewed as having a moral responsibility to care and ‘look out’ for older community members during disasters. DMs also felt that, due to past disaster experiences, often older adults were better equipped to deal with cyclones than younger residents. These views contrasted with those of both CHCs and ESOs who viewed older adults, particularly those with disabilities, failing health and advanced years, as a vulnerable group. As previously stated, their major concern was that the location of many older adults in need of assistance was unknown, with no-one aware of any person or organisation responsible for checking on the wellbeing of the most vulnerable after a cyclone. This also concerned the OAs, with all stating (regardless of the township they resided in) that there were no organisations or programs in existence that assisted the older adults, disabled or vulnerable in their communities to deal with impacts of a cyclone.



Table 8.3 Identifying and locating vulnerable older adults.

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**Local government disaster managers (DM)**

If the older adults are physically, mentally and financially vulnerable but have family and friends, then they are not at risk. We regard all residents the same, in fact I think the older adults are less vulnerable because they are better prepared because of their past experiences (DM2).

We don't regard the older adults as a generically vulnerable group. It depends on disability level and many factors. We don't consider them as a group that needs special consideration (DM 1).

We don't have a database identifying the vulnerable. Our Evacuation Plan estimates the number of higher risk residents, but this does not identify who are older adults, disabled or in need of assistance. We have no idea of the level of capacity (DM2).

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**Emergency Services Officers (ESO)**

[The older adults] are always vulnerable but they are more vulnerable in time of crisis. Their entire body system is not as resilient – they have had time to develop chronic conditions, that complicate what is happening– they have a pre-disposed condition with an overlay of stress, separation anxiety, fear and cognitively they do not completely understand what is happening – not all – but some (ESO1).

Those who are disabled, ill, very older adults, older adults person caring for an ill partner, some who have hearing and sight difficulties, someone without a car – they are all vulnerable (ESO2).

We sort of know where some are – and only because I also work in aged care. If I didn't we wouldn't know where they are. We don't have a list or a database of vulnerable people (ESO3).

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***In situ* community health care providers (CHC)**

There are so many people who are left on their own with no support. There is no real community hub. It is different for those with Home and Community Care – we know who they are, but there are so many people that we just hope the SES, Police and hospital are able to identify and help. We are not able to care for the older adults during a cyclone. The hospital here only has one spare bed – so in effect, even the hospital can only care for one person (CHC1).

As far as I know there isn't even anyone who checks on them. That is the responsibility of whoever is in charge of cyclone recovery. And there are always so many that need help. So if their life is a mess before a cyclone, how are they supposed to prepare and recover after a cyclone? They don't have the capacity (CHC2).

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**Older adult participants (OA)**

There is no group who looks in on us – in rural communities you have to look after yourself (male, Mena Creek, 84 years).

No, I have never heard of any organisation that has ever looked in on the older adults to see if they are prepared for a cyclone. There isn't any that look in on us after a cyclone either (male, Innisfail, 82 years).

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Source: Interviews

#### 8.4.3 Theme 3: *Future challenges for disaster management authorities*

From their perspective, DMs all concurred that the most pressing issue in relation to an ageing population was the issue of evacuation. Reduced mobility, along with declining sense of community and reduced social networks (due to outmigration after Cyclone Larry and Cyclone Yasi) meant DMs feared the older adults will become increasingly reliant on the support of authorities – support that was not necessarily available. This was also a concern for one OA who stated, “... they told us to evacuate to the Shire Hall, but when I got there I couldn’t climb the steps .... By the time I got to the top they said they were full and turned us away. We had to stay the night in the car ...” (male, The Coconuts, 86 years). Looking to the future, OAs acknowledged that mobility and a loss of physical ability were their major challenges in relation to evacuation, along with preparing their properties and then coping with the immense job of cleaning up once the cyclone had passed.

ESOs expressed their concern about a lack of resources and that an ageing population would see an increase in demand for their assistance. They were concerned that DMs did not classify the older adults as a high priority, and advocated for the formation of a register that listed the older adults who reside on their own as a strategy to ensure those who are most vulnerable are identified and checked on during a disaster. CHCs consistently reiterated concerns about the impact of societal changes and budget cuts on service-delivery to older adults; for example, the expectation that all residents have and use the Internet has reduced the production of printed hazard information material, yet most older people they knew were not computer-literate. As the quotes in Table 8.4 illustrate, CHCs were also concerned about the impact two major cyclonic events in the last five years had on their communities, explaining how many residents were increasingly fearful of the annual onset of cyclone season and the negative impact that an increase in intensities and frequencies of cyclones could have on the region. These comments were confirmed by data collected using the questionnaire revealing 53% of older male participants and 42% of older female participants indicated that they were either *concerned* or *very concerned* about the threat of a cyclone or storm surge<sup>74</sup>.

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<sup>74</sup> See Table 6.6

Table 8.4 Future challenges for Local Government disaster managers.

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**Local government disaster managers (DM)**

Evacuation in particular will be difficult as the population ages. I expect that they will still be able to prepare in the lead up to the cyclone season (such as shopping, stock piling food, tidying), but the evacuation is going to be the problem as mobility diminishes and as they have reduced ability to drive (DM1).

Having a sense of community plays a huge role in the ability for a community to recover. This is problematic here with so many older adults living in isolation (DM2)

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**Emergency Service Officers (ESO)**

The Ambulance service will find it particularly difficult. We just don't have the resources to cope with the increasing numbers on a day-to-day basis, which is considerably more troubling in the event of a natural hazard (ESO1).

As the population ages we will have a greater problem. I think the older adults living on their own should be on a list and that the SES should be checking on them after a cyclone. I think this should be given a high priority (ESO3).

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***In situ* community health care providers (CHC)**

If the government or service providers continue to cut emergency management resources by reducing the production of pamphlets and disaster funding and people coming in to assist with clean up, then they have to remember these people [the older adults] here don't have access to any of that. Transport is a big issue. These people don't drive – so those who are home and who want to go to an evacuation centre, can't because there's no transport, there's no funding for transport – most areas are lucky to get even one bus run a day. Most of the area has no public transport at all (CHC3).

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The older adults dealt with [Cyclone] Larry quite well. Then a few years later, when you are still fighting with insurance companies, along comes [Cyclone] Yasi and then it blew off again. It was a secondary trauma. These poor people have still not gotten over it (CHC2).

Our town has changed after two cyclones. Extended families have moved on. Businesses have closed down so people had no choice but to leave to look for work. But many of the older adults stayed. They wanted to stay because they loved their homes, their friends and they had their memories. No one believed after [Cyclone] Larry that it would happen again so soon. And unfortunately, when populations fall, so do the services. If there is another one, then towns like ours may no longer exist (CHC1).

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### **Older adult participants (OA)**

As you get older your stamina really decreases. I find now that I can't lug sandbags four or five at a time to block my door like I used to be able to. Even doing two at a time I find that I'm absolutely knackered. Even cutting up logs with a chainsaw needs a lot of energy (male, Innisfail, 79 years).

They told us to evacuate to the Shire Hall, but when I got there I couldn't climb the steps. No-one helped us. By the time I got to the top they said they were full and turned us away. We had to stay the night in the car because the police wouldn't let us back. They blocked the road. We had no choice (male, The Coconuts, 86 years).

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Source: Interviews

## 8.5 Article Discussion

This research provides an insight into the effects of successive natural hazards on older adults residing in Australian coastal hamlets, as well as the views and expectations of local policymakers (local government disaster managers), emergency services officers and *in situ* community health care providers. Despite government policies emphasising a ‘self-help’, ‘self-reliant’ approach to disaster management, these results illustrate that older adults are concerned with their ability to remain self-reliant without a guarantee from local policymakers that physical assistance, medical support, community care and disaster funding would be made available in the future. Those who care for them also shared their concerns.

Yet, Australian disaster managers continue to expect all individuals to be self-reliant, relying on communities to work together to manage the risks that confront them. DMs echoed the NDSR, which clearly states:

People [must] work together [using] personal and community strengths, and existing community networks and structures; a resilient community is enabled by strong social networks that offer support to individuals and families in a time of crisis (COAG 2011, p.5).

All the DMs interviewed for this study supposed that the vast majority of citizens within their communities were able to be reliant upon their personal social networks for support during a crisis. This research found such presumptions were not the case, especially when investigating ageing coastal hamlets recovering from successive severe tropical cyclones, the aftermath of which resulted in an out-migration of many who had not returned. Figure 8.3 represents the effects of an ageing population on the resilience and community capacity of vulnerable coastal areas, and their ability to withstand the effects of a catastrophic natural hazard. It is clear from this diagram that the diminishing health and financial capacity of individuals within smaller populations compromises the overall health and financial capacity of the entire community, leading to diminished community capacity impacting on, not only the ability to prepare and recover from intense hazards, but also the community’s inability to remain self-reliant. Hence, the NSDR (2011) expectations of a shared responsibility fall short. Past

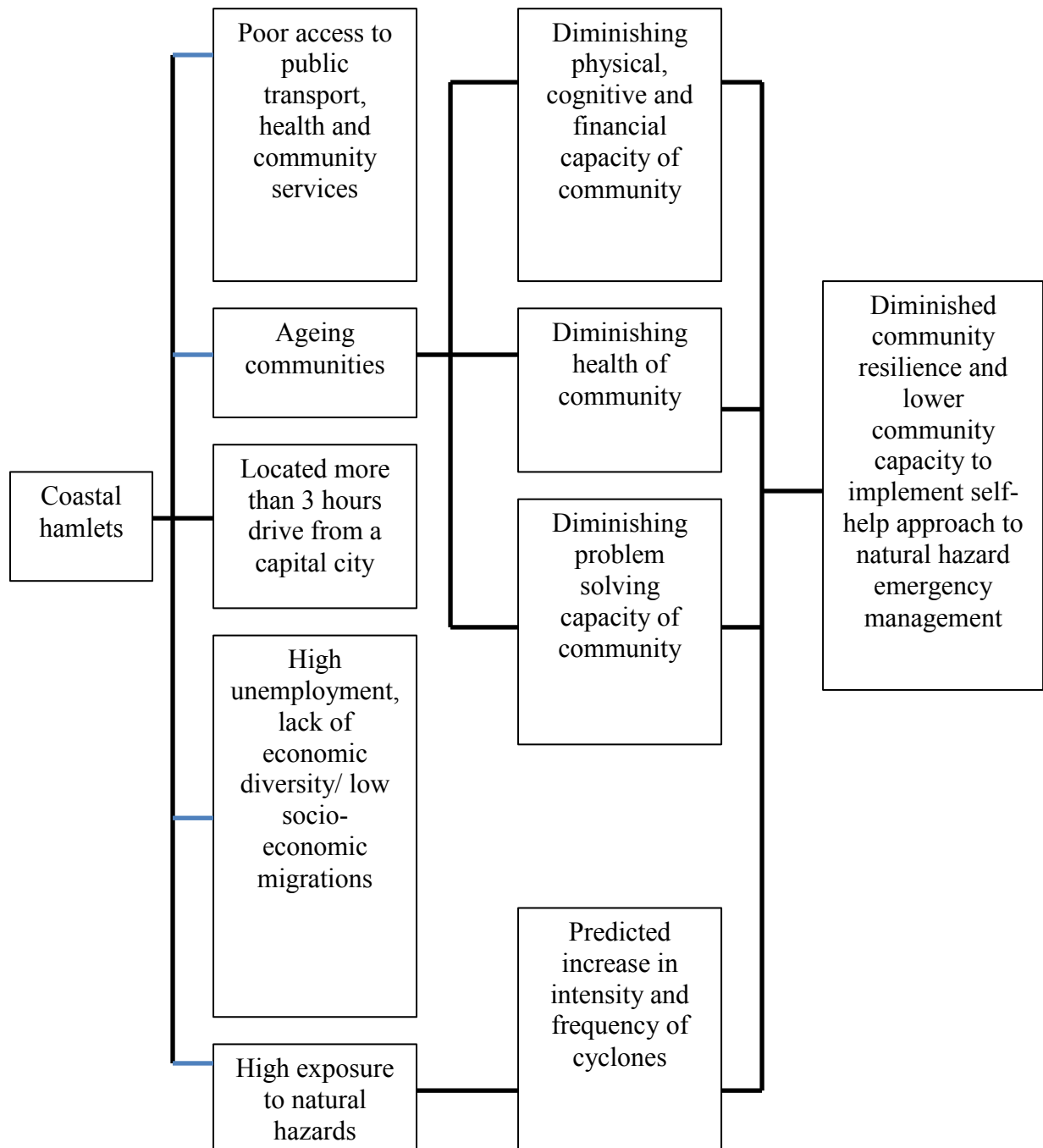
literature also reiterates the importance of utilising social networks as a form of social capital, which research regards as vital to disaster resilience. Cottrell writes:

... social networks are an important part of social capital, which is seen to contribute to disaster resilience .... Social networks [also] contribute to disaster recovery ... family, friends and neighbours are important for basic support, in terms of somewhere to stay should the need arise, emotional support, cleaning up and food ... local organisations [such as] support agencies, churches, schools and businesses ... are important providing ... support, cleaning up, food, finances and counselling ... larger organisation, such as large NGOs and government agencies ... are also critical in terms of providing mechanisms for accessing financial and counselling support ... these networks reflect the level of social capital embedded in the community (2016, pp. 115-135).

Therefore, this research questions whether smaller communities, particularly those affected by repeated successive natural hazards, have the capacity to sustain social networks they once may have relied upon, raising concerns that the adaptive capacities and future resiliencies of such communities could be compromised. Such concerns are problematic for local government DMs reliant on all citizens remaining self-reliant, particularly as DMs stated that they did not regard older adults as a vulnerable sector of the community.<sup>75</sup>

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<sup>75</sup> King (2016) added that the loss of young members of smaller communities also has the potential to reduce the mean household incomes, standards of living and educational levels below national levels, as well as create a need for skilled professionals required to maintain adequate health and community services.



**Figure 8.3 Features of coastal hamlets and the effect of an ageing population on natural hazard community resilience and the capacity to remain self-reliant.**

**Source: Questionnaire**

The importance of regarding the older adults as amongst the most vulnerable during the pre-and post stages of a cyclone is well documented in the literature (Owens 2011; Ngo 2001; McCann 2011; Oven *et al.* 2012; Adams *et al.* 2011; Tatsuki 2012). Statistics revealing the mortality rates of the older adults following recent natural hazards show



that the older adults have been disproportionately affected in the past<sup>76</sup>. The reasons for this have been explained as reduced mobility impeding evacuation; degraded eyesight and hearing making it difficult to see or hear warnings; increased likelihood of chronic health conditions requiring regular medical attention; diminished cognitive ability reducing the individual's capacity to process warnings; fewer economic resources required to complete post-disaster repairs; post-disaster psychological stress that require specialist social services; and reduced social networks leading to social isolation (Wang & Yarnel 2012; Cutter *et al.* 2008; Cherry *et al.* 2010; Muramatsu & Akiyama 2011; Fernandez *et al.* 2002). The opinions of ESOs and CHCs interviewed for this study confirm these findings, with many outlining the high dependency many older people in their region have on *in situ* health and community care. It therefore follows that if older adults require *in situ* support to live day-to-day, then there is a reasonable chance that they will be unable to care for themselves if these services are disrupted following a natural hazard, nor would they have the capacity to prepare for, or clean-up after, a catastrophic event without support and assistance. CHCs and ESOs stated that situations such as the impact of a natural hazard tend to adversely affect the health of older adults, particularly those with chronic conditions. Research by Pekovic *et al.* (2007) confirms these statements, stating that older adults, particularly independent-living adults over the age of 85 years, tend to utilise most of their functional reserve to deal with decreasing health and mobility, economic constraints and, in some cases, social isolation, on a normal day-to-day basis, just to cope with day-to-day life. As such, the pressure associated with dealing with an event, such as a natural disaster, usually proves too stressful, adversely affecting their health.

Of most concern was the issue of interpretation. This research found that there was a lack of understanding as to authority expectations. Each DM concurred that being “self-reliant” meant all citizens must be equally aware of the risks they face and must have the capacity to undertake actions to reduce those risks. Yet, according to the CHCs, the older adults in their communities regarded themselves as “self-reliant” if they had the financial capacity to afford community care organisations to visit their homes daily to assist them with chores, medical care and personal hygiene. The term ‘self-reliant’ and ‘self-help’ confused the older adult participants when placed in the

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<sup>76</sup> Older adult (over 60 years) mortality rate: 2003 European heat wave = 55,300; 2005 Hurricane Katrina = 1359; 2011 Japan tsunami and earthquake = 12, 230.

context of cyclone preparation and recovery, with many stating that they had no knowledge of authority expectations<sup>77</sup>. Most of the older participants, however, persistently repeated that they would feel more confidence in their ability to be self-reliant if they were assured that government policies could guarantee government-initiated financial assistance and reassurances that organisations (such as the Army) would be made available to assist in the future. These responses contradict the literature, which claimed that older adults were more likely to underutilise disaster assistance and funding from authorities due to personal pride and independence. Krongkant and Ahmad (2010) and Mayhorn (2005) both claimed older adults were more likely to underutilise disaster assistance offered by disaster response agencies because of a strong sense of independence and a general perception that monetary handouts reflected an inability to cope, which threatened their independence. The responses from the CHCs agreed with the findings of both Krongkant and Ahmad (2010) and Mayhorn (2005), confirming that the older adults they cared for were reluctant to ask family and friends for assistance due to personal pride and a fear of appearing unable to remain independent, despite the older adult participants in this research who stating that such assistance was vital if they were to remain self-reliant during any future natural hazard event.

However, stoicism such as this has been highlighted in the literature as prevalent amongst the older adults in rural settings (Davis & Bartlett 2008), which has also been blamed for the many injuries older people often sustain during the clean-up phase of a cyclone when they attempt activities beyond their physical capabilities. These concerns were also highlighted during the Royal Commission into the 2009 Victorian bushfires, which criticised disaster authorities' campaigns whose message was "leave early or stay and defend", stating that such campaigns placed an older person's life at risk as it assumed the person heeding the advice was physically and mentally robust (Johnson *et al.* 2011). As such, the Commission blamed the campaign designers for ignoring previous research warning that older adults' diminished cognitive capacity could seriously over-estimate their physical and mental capacities, especially during times of high stress (Johnson *et al.* 2013; Haynes *et al.* 2008).

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<sup>77</sup> See Figure 6.22 and Figure 6.23

Given government policies that are encouraging older people to age-in-place, ESOs were particularly concerned about the potential vulnerabilities of older adults during disasters. Older people themselves acknowledged that their age meant preparing for, coping with, and recovering from disasters was getting increasingly difficult; as one explained “ ... 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 heavy, so he [husband] has to do all the lifting ... I can’t ask the kids because they are in Townsville”.

Clearly, much more research needs to be conducted to explore what contributes to an older person’s decision to remain residing in remote, exposed coastal hamlets, for such decisions need to consider the issues associated with limited services, natural hazard risk and safety, as well as addressing the importance of social networks and an understanding of disaster authorities’ expectations. However, past research confirms that older Australians are more likely to age-in-place preferring the familiarity of one’s local community and home (Han & Corcoran 2014). Cornell *et al.* (2012) added that older adults depend on the familiarity, functionality and safety of their homes as a source of support when facing declining physical, mental and financial capacity, yet the issues associated with natural hazard resilience means that such decisions could place an older person in a critical situation.

Therefore, disaster planners must consider strategies that both identify the whereabouts of those who are most vulnerable and address the risks associated with the increasing number of older adults residing in vulnerable communities. Finally, disaster planning should encompass strategies that assist affected communities to economically recover from the impacts of future hazards: the forced outmigration of those who were charged with caring for the older adults within the community following the impact of previous natural hazard events<sup>78</sup>, has dire consequences on both the individuals left behind and the community as a whole.

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<sup>78</sup> The impact of, and the reasons for, the out-migration from the study sites following Cyclone Larry and Cyclone Yasi are discussed in more detail in Chapter 9.

## **8.6 Article Limitations of This Research**

The participants in this study volunteered to participate because they were concerned about the consequences of ageing on one's ability to prepare and recover from a cyclone, thus the views of those who were not concerned were not offered or included. The data collection was restricted to study sites recently impacted by two cyclones during the 2014-2015 cyclone season, while the Far North Queensland coastline was under cyclone watch, thereby creating a heightened sense of awareness. Data was not collected from unaffected areas.

## **8.7 Article Conclusion**

This study was a phenomenological qualitative analysis that provided an insight into the real-life cyclone experience of older adults residing in remote, ageing coastal hamlets previously affected by cyclones in Australia. Using the data collected from focus groups and interviews involving older adults over the age of 65 years, local government disaster managers, emergency services officers and *in situ* community health care providers, this research illustrates that: the locations of vulnerable citizens is not known; confusion exists over the definition of 'self-reliant'; the older adults are not regarded as vulnerable, despite their reliance on *in situ* care providers; there is confusion as to who is responsible for caring for vulnerable older adults during a cyclone; many older adults live in isolation, unknown to authorities; and, the diminishing populations in these centres have resulted in further cuts in government services, including health care and public transport. These findings highlight the inability of many older adults in remote regional FNQ to be 'self-reliant' during a natural hazard event, a factor that may have dire consequences for these communities in the future.

## **8.8 Chapter Conclusion**

Chapter 8 investigated the extent to which older adults could remain 'self-reliant' during future natural hazards while continuing to reside in vulnerable coastal hamlets by comparing the viewpoints of local policymakers with those charged with caring for older adults, both day-to-day and in times of crisis. The chapter began with the second article written by the researcher in which a review of the relevant literature was presented. The chapter then continued with the views of the participants examining

three central themes: fulfil disaster authority's expectations of natural hazard self-reliance, identifying and locating vulnerable older adults, and future challenges for disaster management authorities. The chapter then provided a detailed discussion of the findings in relation to past research concluding that there was a discrepancy between disaster policy expectations and the experiences of both the older adult participants and the experiences of those who care for them. It was also found that the term 'self-reliant' is both poorly defined in disaster management policy, and misunderstood by the older adult participants, and that DMs do not regard older adults as needing specific assistance, a claim refuted by the CHCs and ESOs interviewed for this dissertation. Next the political implications of ageing-in-place in coastal hamlets impacted by successive cyclones, along with the participants' views on the impact past post-disaster policies have had on their communities are investigated.

### ***Synopsis of Chapter 8***

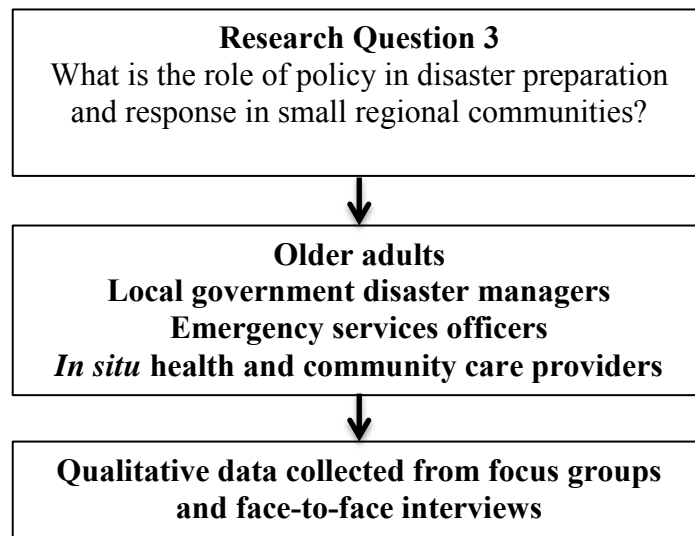
Chapter 8 presented the differences between local government disaster managers' expectations regarding the self-reliance of older adults during a natural disaster and the real-life experiences of those who care for them. The next chapter is the final of the results chapters in which the impact of past post-disaster policies on regional communities with fragile economies, the political implications of ageing-in-place in smaller communities, as well as inconsistencies in disaster management practices and policies is examined using qualitative data collected from all participant groups.

## Chapter 9      Ageing in Remote and Cyclone-Prone Communities: Geography, Policy and Disaster Relief

Chapter No.	Details of publication on which chapter is based	Nature and context of the intellectual input of each author, including the candidate
9	Astill S (revise and resubmit, resubmitted 19 September 2016). 'Ageing in remote and cyclone-prone communities: geography, policy and disaster relief', <i>Geographical Research</i> (Impact Factor 1.353) Accepted for publication 9 November 2016.	Astill S - Chief investigator, significant contribution to the planning of the study, data collection and analysis, literature review and writing manuscript

### 9.0 Introduction

To date the views of the OA participants, as well as ESOs, CHCs and the local government DMs have been presented. Chapter 9 now expands on the outcomes of this research by providing an insight into the political implications of ageing in remote cyclone-prone communities in FNQ, focusing on the vulnerabilities associated with past political decisions impacting the future adaptive capacity and resilience of remote communities. As such, this chapter addresses this dissertation's third and final research question: What is the role of policy in disaster preparation and response in small regional communities?



**Figure 9.1 Outline of Chapter 9.**

This chapter recognises, that despite the important role played by disaster relief in the aftermath of a natural hazard, such decisions can have the potential to have a negative long-term impact on fragile economies. Past post-disaster decisions have resulted in negative externalities for the communities outlined in this dissertation, with such consequences being an out-migration of those seeking employment, a loss of health and community services and an overrepresentation of social disadvantage. This chapter explores the impact such outcomes will have on disaster management practices in the future.

In addition, this chapter also examines the inconsistencies in disaster management practices between two neighbouring LGAs and the unrealistic reliance placed on *in situ* community care organisations during periods of extreme weather. Finally, this chapter reports on the finding of the reluctance of older female adults, in particular, to accept assistance, providing an insight into the cultural implications of policies that encourage older adults to age-in-place, and the risks these pose for those residing in remote locations vulnerable to natural hazards.

As the participants of this study blamed past post-disaster political decisions for the economic decline of their communities, this chapter provides an understanding of the long-term impact of well-intentioned post-disaster political decisions on fragile remote

communities, the future response challenges facing local government disaster managers in relation to older adults and how ageing communities are increasingly reliant on the assistance of disaster authorities, highlighting a conflict between federal policy expectations and reality.

## **9.1 Article Abstract**

Focussing on the experience of independent-living older adults, this study explored how those in regional Australian coastal hamlets have coped with repeated natural hazards. Using an exploratory, mixed-method, and phenomenological approach, an array of non-probability snowballing techniques was used to seek participation from residents aged 65 years or more, and from emergency services officers, local government disaster managers, and *in situ* community health care providers located in regional communities affected by Cyclone Larry (2006) and Cyclone Yasi (2011). The research found that post-disaster political decisions have had a negative long-term impact on local economies, causing out-migration by those seeking employment, and resulting in many older adult residents facing a future without family support. As government policies encourage ageing-in-place by providing subsidised *in situ* care, increasingly older adults are remaining in exposed vulnerable locations, reliant on authorities for their survival, both day-to-day and during an emergency. Findings also uncovered inconsistent disaster management policies between neighbouring local government councils and an unrealistic reliance on *in situ* care organisations by local government disaster managers during the preparation and recovery stages of a natural hazard. These results highlight the need for those charged with emergency management to reassess both the future natural hazard adaptive capacities of ageing regional communities and policy responses to such challenges.

### *9.1.1 Keywords*

Ageing populations, disaster relief, economic recovery, *in situ* care, cyclone

## **9.2 Article Introduction**

Past research claims that within minutes of a natural hazard event impacting human settlements, the event becomes politicised, as emergency management authorities set off



on a journey of response, recovery and reconstruction (Olsen, 2000). The political process, however, begins well before the impact of a natural hazard. Multilevel government decisions also drive individual and community preparedness and adaptive capacity through resource allocation, community engagement and access to disaster information, with the outcomes often governed by pre-existing conditions (Pelling & Dill, 2010).

The Intergovernmental Panel on Climate Change (IPCC) described adaptive capacity as the capacity to modify the exposure to risks of a natural hazard in order to absorb and recover after an event, and the ability to exploit new opportunities that arise from the adaption (IPCC, 2007). Thus, adaptive capacity is a component of vulnerability that can be defined as reducing vulnerability by modifying exposure by using, for example, improved building practices in vulnerable locations, disaster relief, or even government insurance subsidies (Burby, 2006; Vincent, 2008). However, the political decisions made following a disaster, or multiple disasters, also have the potential to influence the adaptive capacity of affected communities, particularly smaller regional communities where economies rely on agriculture.

Handmer and Hillman (2004) identified that economic recovery depends on scale, both of the hazard event and of the economy of the affected area prior to a disaster. They recognised that the larger and more diverse the economy, the smaller the impact following a disastrous event. Such recognition highlights the importance of recovery spending that supports local townships and regions, particularly those with fragile economies, ensuring livelihoods and services continue to support local residents. Yet, post-disaster aid funds are not usually recirculated significantly in rural and regional areas affected by natural hazards, with the 2001 *World Disaster Report* identifying that the focus on rebuilding assets usually benefits large companies located outside affected areas, thereby disadvantaging local enterprises (Handmer & Hillman, 2004; Reintveld *et al.*, 2001). Moreover, when an agricultural region has been affected by a natural hazard, recovery can take many years, resulting in the downstream effects that suppress agricultural income distribution, force businesses to close, and push people to move in pursuit of employment (Handmer & Hillman, 2004).

Such scenarios result in a reduction in population and an over-representation of disadvantaged people among those who remain, many of whom possess the least number of resources and a limited capacity to relocate. Reductions in the availability of government-funded services often follow, affecting health-care, transport and social services, resulting in townships that have ageing populations experiencing social isolation and the loss of family and support networks (Davis & Bartlett, 2008). These outcomes are particularly problematic for regional coastal Australian townships, since, as Gurran, Hamlin and Norman (2007) point out, most of these communities are located more than three hour's drive from a capital city, do not have a diverse economic base, and are susceptible to the effects of tropical cyclones and storm surges. Moreover, as reported by the Australian Bureau Statistics (2015), the life expectancy of women in Australia remains higher than that of men (84.3 years for females compared to 80.1 years for males). On this basis, there is every possibility that many smaller regional coastal townships will in the future have a higher proportion of older adult women over the age of 80 years residing alone.

Expectations about Australian emergency management cyclone preparation and recovery, and about how the older adults are cared for in community are worth further, joint consideration. In Australia, those responsible for emergency management policies advocate that disaster management is a responsibility shared among authorities, communities and individuals. Many such policies shift responsibility away from governments and onto individuals thus requiring citizens to have the capacity to mitigate against any risk they face (Booth & Williams, 2014; King *et al.*, 2013; McLennan & Handmer, 2012). Yet, these policies coincide with others that encourage the older adults to age-in-place in their own home, supported by *in situ* government-subsidised community and health care services (Holloway *et al.*, 2015; Kelly, 2015; Taylor & Donoghue, 2015). Such services are often limited in regional areas, and the very older adults rely heavily on them to survive day-to-day; that reliance is both disrupted and made more pronounced following a natural hazard.

Thus, focussing on the experience of more vulnerable older adults, the overarching aim of this research was to explore how regional Australian coastal hamlets have coped with repeated natural hazards in the past decade. The paper focuses on two research questions:

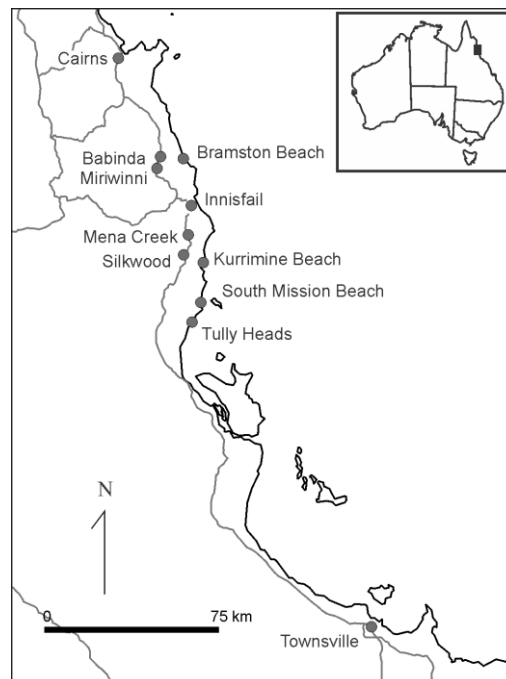
1. What are the downstream effects of post-disaster decisions on regional centres?, and
2. In the future could these decisions affect natural hazard adaptive capacities among those living and ageing in regional townships located on Australia's cyclone-prone coastline?

### **9.3 Article Method**

Using an exploratory qualitative phenomenological research approach, this research sought to understand the real-life disaster experience of older adults living in regional coastal hamlets. This theoretical framework was chosen as it enables researchers to explore and emphasise a person's lived experiences (Jasper, 1994).

#### *9.3.1 Study sites*

The study sites for this research were the Far North Queensland settlements of Babinda, Innisfail and Mission Beach, along with the smaller centres of Mena Creek, Miriwinni, Bramston Beach, Tully Heads, Kurrimine Beach and Silkwood (Figure 9.2). These townships are all located in an active tropical cyclone region, and their populations have experienced significant losses in the last decade from two severe tropical cyclones (Green Cross, 2014), and ABS (2011) 2011 Census data suggest that within the next decade more than 30% of their populations will be over the age of 65.



**Figure 9.2 Study sites.**

### 9.3.2 *Participants and procedure*

Following ethics approval from the James Cook University Ethics Committee, data were collected between November 2014 and April 2015, using an array of non-probability snowballing techniques, such as radio and television interviews, presentations to local community groups, advertisements in community health newsletters, formal letters, and telephone calls to local community organisations in order to raise community awareness about and engagement in the study. Participants were encouraged to approach the first author by telephone or email.

The study attracted participation from older adult participants aged 65 years or older (N=36, 17 males and 19 females); emergency services officers (N=10, nine emergency officers and one ambulance officer); *in situ* community health care providers (N=7, six social workers and one community nurse); and local government disaster managers (DM: N=4, two officers from Cairns Regional Council (CRC) and two from Cassowary Coast Regional Council (CCRC)).

All participants participated in structured in-depth face-to-face or telephone interviews or in focus groups held in community centres and halls. Older adult participants also completed a self-administered questionnaire, which aided in the collection of data relating to demographic characteristics, including health and reliance on *in situ* health and community care (see Table 9.1). Interviews using open-ended questions were used to guide focus groups and interviews, which lasted about an hour each; all were digitally recorded and transcribed verbatim by the first author.

Table 9.1 Socio-demographic characteristics of older adult participants.

Gender (N=36) %			
Male 53		Female 47	
Age			
65-79 years		44 (Male 53%; Female 37%)	
80-94 years		56 (Male 47%; Female 63%)	
Household Composition			
Lives with spouse/partner		42 (Male 56%; Female 26%)	
Lives with relatives		11 (Male 0%; Female 21%)	
Lives alone		44 (Male 35%; Female 53%)	
Live in retirement village		3 (Male 5%; Female 0%)	
Chronic Conditions			
Male Participants % (Spouse %+)		Female Participants % (Spouse %+)	
Arthritis 47 (24)		Arthritis 74 (21)	
Asthma 12 (0)		Asthma 11 (0)	
Asthma 12 (0)		Breathing Difficulties 21 (11)	
Cancer 18 (12)		Cataracts 21 (11)	
Cataracts 18 (0)		Dementia 5 (0)	
Depression 29 (18)		Depression 11 (5)	
Diabetes 41 (12)		Diabetes 11 (0)	
Glaucoma 6 (6)		Glaucoma 42 (11)	
Heart Disease 29 (29)		Heart Disease 37 (5)	
Kidney Disease 6 (0)		Osteoporosis 16 (5)	
Length of Residency			
≤ 10 years 22%	11-30 years 11%	> 30 years 58%	Unsure/unanswered 9%
Requires Regular Medication		Yes 75%	
Requires in-Home Care		Yes 42%	
Type of <i>in situ</i> Care Required			
		Meals-on-Wheels* 14%	
		Respite** 42%	
		Home Duties*** 31%	
		BlueCare **** 11%	

\* Meals-on-Wheels is a volunteer organisation providing a home delivered meal service to the older adults and the disabled.

\*\* Respite is a service providing social interactions and a meal to those who would be otherwise housebound.

\*\*\* Home duties include assistance with grocery shopping, housework and gardening.

\*\*\*\* BlueCare in an in-home nursing service.

+ No. of respondents with a spouse or partner = 16

Source: Questionnaire

### 9.3.3 Analysis

A thematic analysis was conducted to identify major issues from within the data, which involved an iterative and inductive process of data immersion and interpretation—reading and re-reading transcripts to identify common and recurring themes. Data were manually coded, a process that required grouping and labelling themes and sub-themes to better understand the post-cyclone experiences of all participants and groups. First, transcripts and notes were examined for responses relating to participants' explanations, definitions and experiences associated with reliance on disaster relief, economic effects of past cyclones on local economies, long-term consequences of past political disaster decisions on local communities, and information on *in situ* care reliance of older adults. Second, common and contrasting concepts were identified and grouped, and finally the themes were reviewed, categorised, and labelled repeatedly until the process reached data saturation and no more themes emerged. The results purposely include extracts of raw data (specific quotes) to enable the reader to understand and evaluate thematic structures.

## 9.4 Article Results

Thematic analysis identified the challenges facing the residents and business owners of townships affected by past political decisions following the impact of Cyclone Larry (2006) and Cyclone Yasi (2011). Two key themes emerged from the data; the slow death of a region and response challenges.

### 9.4.1 Theme 1: The slow death of a region

In what follows, insights from interviews have been presented under a series of sub-themes: the impact of past decisions; declining economic viability; loss of social support; and loss of services (see Table 9.2). Following Cyclone Larry (2006) and Cyclone Yasi (2011), post-disaster decisions made by personnel working in all three tiers of government and by those in insurance companies were of major concern to all participants, with many blaming these decisions for the region's economic downturn<sup>79</sup>.

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<sup>79</sup> It is acknowledged that the economic downturn experienced in FNQ was the result of the culmination of natural hazard losses, the global financial crisis, and the decline of the sugar industry, as well as the end of the mining boom. It is stressed that the views in this chapter are those of the participants of this research.

Many older adult participants highlighted decisions made by insurance companies to use the services of contractors from the State capital, Brisbane. These decisions, they said, ignored local businesses and tradespeople, and had prevented local businesses from quoting for prospective work. According to participants, contracts were awarded to businesses from areas over 1,500 kilometres away from the affected area, undercutting local businesses, leaving local proprietors without sufficient work to remain viable, and unable to regain lost ground. Consequently, participants stated that many local businesses had folded between 2011, when Cyclone Yasi occurred, and 2014-2015, when interviews were conducted.

Participants were also concerned that political decisions assisted commercially zoned agricultural properties, as well as uninsured residents. One older adult participant accused government authorities of assisting his neighbour, whose property was zoned commercial, despite the owner not using the property for commercial interests, while he was unable to gain any assistance. Similarly, a Cairns Regional Council Disaster Manager spoke of political decisions to rebuild homes for the uninsured, while insured citizens continued to fight insurance companies, resulting in many questioning the viability of retaining insurance.

All participants blamed the downstream effect of these decisions for the constant and persistent decline in their local economy, focussing on the losses in both the building and the banana industries, both of which were vital to the region's economy. There was also concern that the outmigration of those affected by the cyclones had not resulted in the influx of a replacement population, affecting real estate values, and further depressing a fragile local economy.

Of most concern to the older adult participants and *in situ* community health care providers was the loss of social support and services for the older adults, many of whom now rely on the assistance of others for their care described by emergency service officers and *in situ* community health care providers as 'day-to-day survival'. However, continued State government revenue losses were a concern to the latter, who felt the consequence would be reduced community support for the older adults, jeopardising their ability to remain independent.



State government decisions to reduce funding and resources to local disaster management authorities were also a concern for local government disaster managers, who worried about their ability to fulfil their roles during both the preparatory and recovery stages of a disaster. All local government disaster managers were concerned that reduced funding and resources could result in fewer community awareness campaigns and a reduced capacity to assist in post-cyclone recovery activities. These concerns were shared by the *in situ* community health care providers whose services were affected by funding cuts, with carers now concerned about the coping capacity of the older adults, both during ordinary times and during emergencies. From a community perspective, one emergency service officers described the loss of the bus service from the coastal hamlet of Bramston Beach, leaving those without transport to rely on others to assist them; this was particularly troubling in terms of evacuation.

Table 9.2 The slow death of a region.

Sub Theme	Indicative Quotes
Impact of past decisions	<p>Older adult participants (OA)</p> <p>The town [Innisfail] was hit very badly after Cyclone Larry because insurance companies didn't use local builders or tradies [to rebuild] (male, Innisfail, 72 years).</p> <p>We had to fight to even get the chance to quote on a job, and then the job went to a southern contractor from Brisbane, 1500 kilometres from here (male, Innisfail, 67 years).</p> <p>The economic slump after [Cyclone] Yasi is here still. After the two cyclones everyone got new rooves, new sheds and their houses fixed, using Brisbane contractors and supplies, so no there is no need for anyone to get anything fixed or replaced. Our building industry is slowly disappearing (male Innisfail, 67 years).</p> <p>After Cyclone Larry our neighbour got government assistance to clean-up because he has a farm. His property was zoned commercial, so he got help, even though he doesn't farm anything! And the Army went to Innisfail to help clean up the town, and we got nothing. No-one even checked on us (male, Mena Creek, 72 years).</p> <p>Community health carer (CHC)</p> <p>If you had insurance then you couldn't get access to government funds, yet their neighbours, who weren't insured, got their houses built for nothing, while you were still fighting the insurance company. So many now wonder why they bother to be insured (CHC1).</p>

Sub Theme	Indicative Quotes
Declining economic viability	<p>Older adult participants (OA)</p> <p>There has been a big difference in business since [Cyclone] Larry and [Cyclone] Yasi. After Larry business stagnated. Then we got Yasi and we continued to stagnate ... and it is still at the same level (male Innisfail, 67 years).</p> <p>The banana industry was decimated – twice! So we have lost even our backpacker workforce too [which the region relied on to pick the bananas]. It has changed the whole industry and the town (male, Innisfail, 77 years).</p> <p>I had a real estate agency. So many homes were uninhabitable or just simply gone after Yasi ... there wasn't a house in the district that wasn't damaged. Then we couldn't sell anything. No one wanted to buy here after that. We just had to close the doors (male, Tully Heads, 70 years).</p> <p>Half the population left because there wasn't any work. Remember we rely on the banana industry and that was flattened. You can't be without work and survive (male, Innisfail, 70 years).</p>
Loss of social support	<p>Community health carer (CHC)</p> <p>Since the cyclones, and with the sugar mill closing down, some people have had their extended family move away. But now they don't have that support (CHC2).</p> <p>Emergency services officer (ESO)</p> <p>Many of the aged in this town now need services because their families either have to travel long distances to work, or have moved away to work (ESO3).</p>

Sub Theme	Indicative Quotes
Loss of services	<p>Emergency services officer (ESO)</p> <p>We don't even have a bus service in Bramston Beach anymore. If you don't have a car, you can't even do your weekly shopping, let alone evacuate when there's a cyclone (ESO4).</p> <p><i>In situ</i> community health care providers (CHC)</p> <p>My budget has been cut so much that I now only have the funds to be employed one day a fortnight. In that one day I am expected to do all the administration necessary to meet the needs of the older adults in this area. My fear is that this reduced community support will mean the older adults will no longer be able to be independent (CHC2).</p> <p>Whilst all these community services are squeezed and restricted, people are going to be able to cope less and less and it will only get worse (CHC1).</p> <p>Local government disaster managers (DM)</p> <p>Council leads the recovery, but we don't have the required level of cash or resources, and the bucket of cash keeps getting smaller and smaller (DM1).</p> <p>We no longer have the budget for a blanket community awareness campaign. The State government has slashed spending so that eliminates our ability to be able to do anything in a wider public forum (DM2).</p>

Source: Interviews

#### 9.4.2 *Theme 2: Response challenges*

##### 9.4.2.1 Inconsistent local government disaster management policies.

Despite Cairns Regional Council and Cassowary Coast Regional Council being neighbouring municipalities, inconsistencies in disaster management and awareness programs highlighted during interviews were concerning (see Table 9.3). Boundaries between the two local governments divided the cyclone affected area between Innisfail and Babinda, with some participants describing the differing policies that affected them, their neighbours, and other family members, with others describing problems in relation to residing in one local government area (LGA), while having a business in the other. Inconsistencies existed in relation to the Vulnerable Persons' Register, community awareness program deliveries and evacuation centre policies. Cairns Regional Council officers explained that their council was the only one in Queensland to maintain such a Register, but warned that the criteria for it were limiting. Officers explained that a person could apply to be placed on the register if they lived alone; had no access to transport; had no social support network; were not cared for by a community health care provider; and did *not* have a medical condition that required attention. They added that the existence of the Register was not promoted, as they did not want large numbers of people registering, with number on the list at the time totalling as few as 100 from a catchment of 1,687 square kilometres with a population of 154,820 (CRC, 2016). Cassowary Coast Regional Council, in contrast, did not keep such a register.

Comparable differences existed between the community awareness programs conducted by each local government council. In essence, the programs conducted by Cairns Regional Council were described as targeted, whereas those carried out by Cassowary Coast Regional Council were deliberately broad. Cassowary Coast Regional Council staff preferred to attend large community events where information was handed to the public, claiming that they felt this was the most efficient way to reach a larger number of people. In contrast, Cairns Regional Council officers have focused on smaller community groups whom they felt were more vulnerable and among whom counted the vision impaired, the deaf and new migrants. However, it was pointed out that those with a physical disability must belong to a disability organisation before assistance could be offered. According to one officer, Cairns Regional Council's new focus was to be upon

tourists who travel to the region during cyclone season, on the grounds that the Council had just received funding from the local tourism promotion organisation, Tourism Tropical North Queensland.

The final area in which each council's disaster management policies differed relates to evacuation centre policies. Local government disaster managers from Cairns Regional Council advised that access to cyclone shelters was limited only to those residents whose homes lie in the storm surge zone, and that all who attempted entry must prove they reside in these vulnerable areas. In contrast, those working in the Cassowary Coast Regional Council said that it was their Council's policy to allow admittance to any resident who felt they did not have shelter that is adequate in a storm, without the need of proof of residency. Differences were also noted in number of available shelters. Cairns Regional Council local government disaster managers stated that they have one single shelter (for a catchment of 1,687 square kilometres; population 154,820), while Cassowary Coast Regional Council officers stated that they have two—for a catchment of 4,700 square kilometres and population 30,000 (CRC, 2016; CCRC, 2016).

Table 9.3 Inconsistent local government disaster management policies.

Vulnerable Person Register	
Cairns Regional Council	Cassowary Coast Council
<p>Yes we do have a vulnerable person register. We are the only council in the state that runs this sort of register. But there are stipulations. Basically they call us to have themselves placed on it, but they have to live alone, have no friends or relatives they can depend on, no transport and not be cared for by a service provider. But if they have a medical condition that requires attention, we cannot take them because we can't provide that. If they meet these requirements we can pick them up and take them to the nearest cyclone shelter (DM1).</p> <p>It is not advertised that we have this. People find out about it by word of mouth. We don't promote it because we don't want a lot of people on it. We have about 100 people on it from the entire region (DM2).</p>	<p>No register available</p>

Community Aware Programs	
Cairns Regional Council	Cassowary Coast Council
<p>We have a lot of services for the vision impaired and the deaf, but these resources can only be given out if the person has already registered with organisations for the impairment. We also make contact with migrant community groups (DM1).</p> <p>We have taken a targeted approach, focusing on specific community groups, whereas Cassowary Coast Council has a broad community approach to awareness where they target big community events, handing out information, radios and zip lock bags for documents. We told them they are setting up precedence by doing that and that we couldn't do it because we have too many people. I'm glad we haven't done that. I agree with the value of it, but you can't guarantee the funding for it (DM2).</p> <p>We can only do what we have funding for. For instance, Tourism Tropical North Queensland (TTNQ) has given us funding for programs to target tourists, so we now have a new focus – tourists who happen to travel here in cyclone season (DM2).</p>	<p>There aren't any specific programs in place here. We can only get the word out the best we can ... when you have limited resources and thousands of people and a large geographical area, you can only do what you can with what you have got. We feel the best, most efficient way to do this is to have stalls at community events where we can talk to people and hand out information (DM4).</p>



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**Evacuation Centre Policies**

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**Cairns Regional Council**

We can only provide shelter for storm surge, not cyclones, because we only have the one shelter. When people come to the shelter they must provide proof that they reside in a storm surge area, otherwise they are turned away (DM1).

**Cassowary Coast Council**

Our shelters take anyone who will be badly affected by either the cyclone or storm surge. We don't check where they live because we don't want 200 people waiting to come in – you don't have time for that (DM2).

We have two shelters, one here in Innisfail, and one in Tully (DM3).

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Source: Interviews

#### 9.4.2.2 Reliance on past disaster relief practices.

The reliance of citizens on disaster relief was not restricted to older adults; however, older adult participants in particular, confessed their dependence on financial assistance due to the financial restrictiveness of their pensions (see Table 9.4). Many were also very grateful to the Army, whose personnel assisted with the clean-up after Cyclone Larry, but were dismayed after Cyclone Yasi, when this form of assistance was not forthcoming. There was also a clear concern about the unpredictability of disaster relief. Many said disaster relief was vital to ensure they were able to remain residing in these vulnerable locations, yet others were dismayed at the reliance of their fellow senior citizens on, what they referred to as “government hand-outs”, saying that such dependence creates a welfare mentality.

This belief was also of concern to local government disaster managers, who agreed that setting a monetary precedence by providing cyclone victims disaster funding, in particular, could never be guaranteed, for it was always a decision of the government at the time. Local government disaster managers were also concerned that funding cuts at the local level had left understaffed a range of vital and community services. Local government disaster managers predicted that there would be a backlash in the future, when disaster relief packages of the past are not repeated.

Table 9.4 Reliance on past disaster relief practices.

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**Older adult participants (OA)**

After Cyclone Larry and Cyclone Yasi the government were shell-shocked, [they] gave money away left, right and centre, which left a level of expectation with the people that when we get a big blow they think they are going to get all of this money. It becomes embedded in society. They expect it every time. It's a welfare mentality (male, Innisfail, 72 years).

If we didn't get any help we would have to reconsider living here (male, Kurrimine Beach, 76 years).

The money the government gives us is so important (male, Mena Creek, 72 years).

After Larry the Council provided us with fuel, but after Yasi we didn't get any. People got irate. You can't give people help and then take it away (female, Babinda, 76 years).

The money the government gave us after Larry and Yasi is important. Without that we would not be able to recover. We are only on pensions, so there's no spare money for anything. That money is really important (female, South Mission Beach, 82 years).

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**Local government disaster managers (DM)**

Yasi set up an unfortunate precedence. But the criteria for assistance have changed through the Department of Families, so now, unless people can provide an individual hardship case, nothing will be paid for (DM2).

Community development officers used to be integral to dealing with communities after a cyclone, and now that team has been massively depleted with staff redundancies (DM2).

After Larry there was so much help from the Army that people thought that this is what would happen each time. That didn't come after Yasi (DM3).

If the Army comes in and starts cleaning up an individual's property like they did after Cyclone Larry, then this then becomes expected. Larry was the worse precedent that could be set. Everyone got \$1000, every person or company with an ABN got \$25,000 minimum, with most getting \$50,000 – it was money for jam! (DM3).

I'm waiting for the next one, because there will be a huge uproar because they won't be getting any money (DM3).

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Source: Interviews

#### 9.4.2.3 Reliance on in situ care and the barriers to its provision.

Questionnaire data collected from older adult participants showed that from the sample population of OA (N=36), many participants relied upon *in situ* care<sup>80</sup>. One older adult participant openly discussed his and his wife's reliance on *in situ* care, saying,

... we have community health come and help with vacuuming, housework, shopping and with the lawns. And I have a BlueCare nurse come because I have bladder cancer (male, Innisfail, 72 years).

ESOs also spoke of the reliance many have on the provision of *in situ* care, adding that such care was important from both the perspective of survival and of social dynamics: "... sometimes Meals-on-Wheels [staff] are often the only contact some older adults get ... some won't see another human being all day" (ESO1). But this officer also described the shame and embarrassment felt by those seniors who needed assistance, but who could not afford to pay for it:

It's typical of people in the bush ... it's personal pride ... we see people who really need help ... living in areas with no hygiene, no roof, nothing ... where you see dog food on the shelf ... These people are ashamed of their situation and so won't ask for help. They don't want anyone to know how they are living. And Meals-on-Wheels and BlueCare have to be paid for—so many can't afford those, hence the dog food (ESO1).

Refusing assistance was also noted by the CHCs who said that some "... people don't even go on the pension when they can—they don't want hand-outs—it's degrading" (CHC1).

Interestingly, *in situ* community health care providers noted that this stoicism was gender-specific, and reported that women were more likely than men to refuse assistance:

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<sup>80</sup> See Figure 6.3

... older adult women are less likely to ask for help. They are more stubborn, and independent ... women of that generation did not have a voice in society for so long that they just quietly put up with the situation they are in. Their opinion has never mattered in the past so they are conditioned to saying nothing (CHC3).

## **9.5 Article Discussion**

This study provides an insight into the political implications of ageing in regional cyclone-prone communities in Far North Queensland, Australia, and highlights the vulnerabilities of ageing in these communities, which are associated with past political decisions that have influenced future adaptive capacity and resilience. At this juncture, the limitations of the study need to be acknowledged: a relatively small self-selected sample from two cyclone-aware Queensland coastal hamlets. However, the findings have raised several questions about inconsistent emergency management policies; reliance on past disaster relief practices; and the long-term economic effect of repeated disaster assistance policies.

Despite the important role played by disaster relief in the immediate aftermath of past disasters, these results showed that such political decisions can have a negative long-term effect, far beyond those deemed positive at the time of the disaster. Results suggest that the precedent set regarding disaster relief following Cyclone Larry (2006) had reassured residents that “government hand-outs” would be used again in the future, affecting their perspectives of risk about future cyclone recovery processes. This agrees with Kaplow’s (1991) claim that the provision of disaster relief can distort an individual’s perception of risk, influencing, for example, one’s choice to age-in-place in a regional coastal hamlet. However, when the same level of assistance was not afforded cyclone victims in 2011 following Cyclone Yasi, participants were angry and concerned that any further reductions could affect their ability to both cope and recover.

Past studies examining societal perception of risk have found such perspectives rely upon a value-dependent social process to determine which risks should be assessed (Bickerstaff, 2004). In a social context, understanding risk involves considering people’s beliefs, attitudes and judgements, and thinking about how these influences and

risk factors are understood, imagined and interpreted. In this case, after Cyclone Larry people expected the same sort of support they received following Cyclone Yasi, and expected monetary compensation and a workforce to clean-up and rebuild a township—but were disappointed, which fuelled concern and uncertainty.

Insights from the case studies speak to the literature. For example, Ollerensham *et al.* (2014) have acknowledged that, in terms of economic analysis, there is general consensus that disasters destroy assets, which undermines the market flow of goods and services to ‘specific business ecosystems’. Past research acknowledges the role played by local economic activity in the ongoing resilience of the affected area for, as Handmer and Choong (2006) have observed, without such a focus the ability to continue living, let alone recovering, is limited. Examining Phuket’s economic recovery following the 2004 Boxing Day Tsunami, Handmer and Choong (2006) described post-disaster spending as having leaked out of the local economy to benefit overseas companies, with recovery efforts largely ignoring the economic recovery needs of local economies. Similarities between the outcomes of that study can be drawn here, for just as the Thai participants affected by the tsunami felt no attention had been given to their long-term economic issues that affected their livelihoods, so too did the participants in this study.

Participants of this research held both insurance companies and governments responsible for the downturn in their local economies, causing younger members of their communities to leave the region, along with the subsequent loss of services and support. All participants, including local government DMs, supported these views—with participants now admitting they faced an uncertain future in terms of economic recovery, social support, and future emergency management capacity. All participants stated that what they needed was a revitalisation of their local economies. Yet, results implied the opposite was in fact the case. Participants felt that there had been no emphasis on the needs of those who resided in their region, or on their livelihoods. There were also no incentives in place to entice residents back, which, quoting Handmer and Choong highlighted the gap between “... government and bureaucratic rhetoric, and the reality of needing to secure livelihoods to underpin the rebuilding of people’s lives” (2006, p.14).

Results also highlighted inconsistencies in disaster authorities' policies between the two councils, with differences existing in relation to evacuation, community education programs and Vulnerable Persons Registers. Local government DMs stated that in the Cairns Regional Council LGA only one purpose-built cyclone shelter exists, while two exist in the Cassowary Coast Regional Council LGA. Although the number of evacuation centres is problematic and a probable consequence of funding restrictions, of greatest concern were the differences in evacuation policies between the two LGAs. One DM from Cassowary Coast Regional Council stated that "... our shelters take anyone who will be badly affected by either the cyclone or the storm surge. We don't check where they live because we don't want 200 people waiting to come in. You don't have time for that" (DM2). In contrast, Cairns Regional Council restricted access to those residing in a storm surge area, with their DM stating that all those attempting to enter must provide proof of residency within a storm surge zone, "... otherwise they are turned away" (DM1). As these claims suggest, there could be residents without adequate shelter, and further investigations are recommended on the choices available to residents in relation to evacuation in regional areas of Far North Queensland.

Differences also existed in how community awareness programs were implemented by the two local government authorities, and in relation to the existence and characteristics of a Vulnerable Persons Register in only one of them. Additional research is warranted to investigate the tacit elements of the Vulnerable Persons Register compiled by Cairns Regional Council, as well as its restrictive characteristics.

Such differences add to the growing number of emergency management standards that vary throughout the State, the most recent of which were raised by the Queensland Flood Commission Enquiry (QFCI, 2012). The Commission blamed differing flood management standards of various affected council areas for the 33 fatalities during the 2011 Queensland floods in which 78 % of the State was declared a disaster zone after 29,000 homes and business were inundated, with more than 2.5 million people affected resulting in a damage bill of more than AU\$5 billion (QFCI, 2012). The Commission found that flood management was not uniform across councils in the flood-affected region, with guidelines failing to consider each area's unique features, such as demographic complexities, environment, economic base, urban structure and societal perception of risk, thus leading to unequal levels of flood risk assessments across local



government boundaries within a river basin (Grech, 2011). One of the recommendations made by the Commission was that state-wide mapping be undertaken, raising concerns by Councils about the associated costs of remodelling (Venn, 2012). In short, the economics of such a project was simply outside the funding capacity of local authorities, particularly smaller, low-growth councils (Venn, 2012).

In turn, this study has found that the provision of cyclone awareness programs and of services that identify the location of vulnerable members of the community rely on available funds, which have been considerably reduced, as has the capacity to implement community awareness programs and strategies. As such, community awareness campaigns provided by both Councils involved making inequitable assumptions that could seriously affect the effectiveness of their campaigns. A preference in Cairns Regional Council was to partner with other organisations that provide support, such as migrant and disability service organisations, and target specific minority groups identified by Council as vulnerable, such as new migrants and those with disabilities. Council has partnered with these organisations in an effort to disseminate cyclone preparation information to their ratepayers and residents. Cassowary Coast Regional Council's approach of disseminating cyclone awareness information only at large public events did not reach those who avoid large public events or who have little or no access to vital information and assistance.

However, inconsistencies in relation to disaster assistance following Cyclone Larry (2006) and Cyclone Yasi (2011) were also problematic. Despite the importance that older adult participants placed on the receipt of both financial and physical assistance following the two cyclones, research continues to warn of potential problems that could arise in regard to the future adaptive capacity of vulnerable communities whose residents depend on the distribution of post-disaster aid. Notwithstanding the important role external resources play in area and community recovery, Schipper and Pelling (2006) have warned both that post-disaster assistance can increase vulnerability by becoming a disincentive for preventive action, and that problems arise when individuals and governments regard disaster-aid as a strategy for risk management, rather than risk reduction. This phenomenon has been noted by Astill and Griggs (2014) while interviewing businesses owners in Holloways Beach, a northern suburb of Cairns, Queensland, Australia, an area prone to tropical cyclones. When asked about their

cyclone preparations, business owners overwhelmingly responded in terms such as these: "... I don't worry about reading anything because insurance covers everything ... that's why I have insurance" (Astill & Griggs, 2014, p.44).

Similarly, according to Kaplow (1991), government disaster relief has the potential to distort an individual's perception of risk; that is, an individual will only consider their potential for loss, minus the proportion compensated for by government relief, thereby not considering the total loss. This kind of calculation results in individuals no longer bearing the full costs for their actions, providing a disincentive to those who reside in hazardous areas to reconsider their choices (Kaplow, 1991). With expectations distorted following Cyclone Larry, and left unfulfilled after Cyclone Yasi, there is widespread concern that the impact of more recent State government budgetary constraints will see a further reduction in future response capabilities, something that means people will need to be more self-reliant.

Yet Paton and Jang (2016) have cautioned against such a presumption, saying that for vulnerable communities to accept risk and take responsibility for their own safety and recovery, they must believe their relationship with authorities is fair, empowering and trustworthy. Describing his community engagement theory, Paton (2008) has described how empowerment and trust were influenced by an individual's personal and social precursors, especially while making uncertain natural hazard decisions. Nevertheless, these conditions are all the more serious for the older adults, particularly those living alone, dependent on *in situ* care. Neo-liberalist policies designed to reduce the role of the state now encourage individuals to manage ageing independently, while interweaving disaster preparedness and recovery (Tuohy & Stephens, 2015). However, the loss of traditional forms of social assistance, such as family networks, that older adults once relied upon has also become a challenge (Tuohy & Stephens, 2015), with the problem exacerbated in regional communities. Yet, as this study's results show, the problem is even worse for those who cannot afford *in situ* care, with social isolation, reduced personal, financial, and social resources and physical decline contributing to increases in community vulnerability.

The final outcome of this study was that stoicism and pride were blamed for the older adults not seeking assistance, with *in situ* community health care providers and

emergency service officers explaining that many refuse assistance for fear of appearing unable to cope with everyday life, while others refuse even to accept the pension, regarding it as a hand-out they neither want nor need. However, the most interesting aspect of these findings was the claim that stoicism is greater amongst older female adults. The claims made by CHC3 that "... women of that generation did not have a voice in society for so long that they just quietly put up with the situation they are in. Their opinion has never mattered in the past so they are conditioned to saying nothing", confirms Aronson's (2006) research which noted that some women facing the challenges of ageing (such as being unable to provide adequate self-care) produces feelings of inadequacy, perceived as a failure to live up to cultural norms. Aronson (2006, p.552) added that self-sufficiency and stoicism were qualities that older adult women often referred to, fuelled by "... dominant neo-liberal discourse and its associated policy narratives [that] prize self-sufficiency and stoicism; [punishing] the articulation of dependence or need that is implicit in negative evaluations of care".

Although these views were not in relation to natural hazard resilience, the implication that females are less likely or willing to accept or seek *in situ* care is significant considering the ageing population statistics in Australian coastal hamlets in Far North Queensland, as well as projected age expectancy outcomes. According to the Queensland Government (2009) it is predicted that more than 100,000 new residents will take up residence in the cyclone-prone region, and that the proportion of older people over 65 years or more will double by 2025. These figures, coupled with Gurran, Hamlin and Norman's (2008) regarding the ageing nature of Australian coastal hamlet populations, are concerning, particularly when viewed along ABS (2015) predictions that Australian women are expected to outlive their male counterparts by five years. In effect, there is a possibility that there could be a concentration of older female adults, over the age of 80 years, residing alone without any form of social or governmental support. These findings raise serious concerns for emergency management authorities in the region. It is a recommendation that further research investigating gender differences in levels of stoicism be undertaken.

## 9.6 Article Conclusion

This study was a phenomenological qualitative analysis that focused on the post-cyclone experience of more vulnerable older adults residing in recently cyclone-affected regional Australian coastal hamlets. Interviews and focus groups with older adults over the age of 65 years, *in situ* CHCs, ESOs and local government DMs revealed that past political disaster relief decisions have had negative long-term impacts on local economies, resulting in continued economic declines, and losses of social, health and welfare services in the region. Many were concerned that past decisions had fostered a reliance on past disaster relief practices amongst some citizens, while others insisted disaster relief was vital if they were to remain living in these areas. Results also found inconsistencies in disaster management policies between two neighbouring local government areas in relation to evacuation centre policies, community awareness campaign delivery, as well as identifying vulnerable persons in the region. Finally, this study found that the reluctance of older female adults to accept assistance could result in growing numbers of vulnerable, very older adult women living alone in regional communities exposed to the effects of future cyclones. These findings highlight the need for emergency management to reassess future ability of ageing regional coastal hamlets to remain ‘self-reliant’ during natural hazard events.

## 9.7 Chapter Conclusion

Chapter 9 expanded on the outcomes of this research beginning by outlining the concerns of the participants regarding the declining economic viability of their communities, which they blamed on past post-disaster decisions made by governments and insurance companies following successive cyclones. The chapter presented a paper written by the researcher, which began with an overview of the relevant literature, followed by a presentation of the participants’ comments relating to the impact of past decision, declining economic viability, loss of social support and loss of services. The chapter then continued with participant comments regarding the theme of response challenges, in which the data was categorised relating to inconsistent local government disaster management policies, reliance on past disaster relief practices and the reliance on *in situ* care. The chapter then presented an in-depth discussion of the outcomes in relation to past research and the implications this may have on both ageing coastal hamlets and future disaster management policies. The chapter concluded that it is vital

to consider the negative externalities associated with past post-disaster decisions, particularly in relation to smaller communities such as coastal hamlets whose fragile economies are reliant on industries that are vulnerable to the impacts of extreme weather. It also stressed the importance of consistent disaster management policies and highlighted the potential problems associated with claims by CHCs that older females were less likely to ask for assistance than their male counterparts. This chapter concludes the presentation of results. Next, the final chapter in this dissertation provides a summary discussion, reflection on the effectiveness of the theoretical model, a summary of the findings, practical and policy implications of the research, the limitations of this study, future research recommendations and a final conclusion.

### ***Synopsis of Chapter 9***

Chapter 9 concluded the results chapters for this research. Chapter 10 follows, and is the final chapter in this dissertation. This chapter provides an outline of the contributions made by this research, a critical review of the theoretical and conceptual models used for this research, a summary of the findings, practical and policy implications, the limitations of the research and a final conclusion.

## Chapter 10 Discussion, Recommendations and Conclusions

### 10.0 Introduction

Although much has been written on the vulnerability of older adults during natural hazards, there is limited knowledge in regard to how ageing remote communities will prepare and recover from the impacts of climate-induced natural hazards in the future, particularly in the face of climate change predictions. Moreover, to the best of this researcher's knowledge, there have been no studies into the implications this may have for future disaster management procedures. This research addresses this knowledge gap from the perspectives of 36 older adults aged 65 years or more, ten emergency services officers, seven *in situ* community health care providers and four local government disaster managers located in townships impacted by both Cyclone Larry (2006) and Cyclone Yasi (2011) in Far North Queensland, Australia. This dissertation provides an in-depth understanding of the lived cyclone experience of older adults residing in more remote communities impacted by successive cyclones, as well as an insight into the issues facing those who are charged with caring for them, both on a day-to-day basis and during times of an emergency. The study also focuses on the expectations by local government disaster managers that disaster management is the sole responsibility of the individual, highlighting a contradiction between what is expected and what is achievable.

The contemporary political shift towards self-reliant disaster management approaches assumes that all citizens are aware and prepared to mitigate against the risks they live with, relying on the individual to put in place strategies that ensure the safety of themselves and their properties when faced with the potential impact of a natural hazard (COAG 2011). Despite the expanding body of literature identifying the potential vulnerability of older adults during a natural hazard, with a few authors questioning the neo-liberalist shift in disaster management (Tuohy & Stevens 2015; Wild *et al.* 2016), there are limited studies that contain rigorous input from older adults exploring the impact of these policies on them. Thus, this mixed-methods study extends the current disaster literature by exploring the adaptive capacity of remote communities recovering from successive natural hazards, the impact of post-disaster policies and the impact an ageing population could potentially have on self-reliant disaster management

approaches in the future. As the cyclone experience of older adults has attracted little research or policy attention, this dissertation makes a number of important and significant contributions to the field of disaster studies.

The first contribution is that of the literature review (Chapter 2). This multi-discipline review has documented a number of wide research perspectives that have been identified as being relevant to both the older person's natural hazard experience, and that of the more isolated community. Focusing on tropical cyclones, the review identified the potential impact of climate change on the future intensities of cyclones, highlighting the problems associated with the modern trend of 'sea-change' migration. The review also examined the issue of population ageing, focusing on the contemporary shift towards independent-living and the problems associated with ageing-in-place in remote sea-change communities, as well as the vulnerability of older adults during a natural hazard. The literature review then explained the 'self-help' approach to disaster management and the role played by politics in determining such policy. Critically, the literature review identified that whilst there is existing literature on the social variables that cause natural hazard vulnerabilities, it contributed little in regards to explaining how disaster management would deal with the impact of another intense cyclone on ageing communities struggling to recover from past events, particularly considering their ageing demographic profiles.

Secondly, this dissertation applied a mixed-methods approach (see Chapter 5), utilising both a quantitative questionnaire and qualitative interviewing techniques. As understanding the real-life cyclone experience of older adults was the core concern of this dissertation, a predominantly phenomenological qualitative study, challenging the dominant positivists paradigm typically found in disaster and disaster management research (Ferrier & Haque 2003). This inductive approach enabled the researcher to highlight the older person's unique experiences by incorporating not only the views and experiences of older adults, but also the views of those who care for them, both on a day-to-day basis, and during times of emergency. These were compared to the beliefs and expectations of policy makers, allowing distinct comparisons to be made between what was expected, and reality.

The next contribution is that of the research's published papers, which were presented in revised format in Chapters 7, 8 and 9, which collectively presented the findings of this study. A critical finding was that the experience of poor post-disaster policies and decisions which had not only contributed to the economic downturn of the study sites, they had also exacerbated each community's ageing population statistics. The consequence of this was many residents in these communities lost their employment forcing families to relocate in search of work, with the resulting loss of population causing a decrease in essential health and community services, and the consequent social isolation of many independent-living older adult citizens. As such, poor policy decisions of the past now contributed to the decline in the region's adaptive capacity and resilience to future intense cyclonic events, with an increasing number of independent-living older adults now reliant on *in situ* home care, whereby reducing their ability to be self-reliant, both on a day-to-day basis and during times of emergency. The final contribution is that of advancing theoretical perspectives by expanding on Social Cognitive Theory. This contribution is discussed in further detail at the conclusion of Section 10.1.

This chapter concludes this dissertation by discussing the theoretical implications of this research, responding to the initial research questions posed in Chapter 1, outlining the practical implications of this study and the contributions this research has made to knowledge within natural hazard, gerontology and disaster management research fields, and concluding with an overview of the research limitations, recommendations and a short conclusion.

## **10.1 Theoretical Models**

Conceptually, this dissertation drew on the Social Cognitive Model proposed by Paton (2003) (see Figure 3.2). At this juncture, it is appropriate to reflect on the advantages and limitations of using this model. Paton (2003) provided this dissertation with a model designed specifically to identify the factors that motivate a person to prepare for the impact of a natural hazard, outlining a simple, clear link between motivation and intention. However, the simplicity itself could be regarded as a weakness, for the factors that influence an individual's intention to prepare can be complicated, specific and uncertain, even to the individual involved. Furthermore, as this dissertation sought



to understand the impact of community ageing on future disaster management practices in relation to smaller, more remote coastal hamlets vulnerable to cyclones, it is important to focus on whether this model provided a sound conceptual framework upon which to examine the collective efficacy of an ageing community, rather than only the individual. Hence, this chapter discusses the effectiveness of Paton's (2003) model, focussing on how effectively it predicts the self-reliance capabilities of remote communities whose populations are ageing faster than the national average.

#### *10.1.1 Paton's SCT Model: intentions*

The second phase of Paton's (2003) model outlines self-efficacy, outcome expectancy, response efficacy and problem solving capabilities as the factors that influence the intention of individuals to prepare for the impact of a natural hazard (see Figure 3.2). Paton (2003) regarded a person's outcome expectancy (perception of whether or not personal actions would lead to an effective mitigation of the problem faced) as proceeding and linking with one's self-efficacy (a person's belief in their ability to implement a plan of action). As such, the model suggests that if a person does not feel that any action that they were capable of undertaking would achieve a positive result, the person is unlikely to proceed with adequate preparations, hence having a direct impact of that individual's resilience (Benight & Bandura 2004). When taken into the context of remote communities whose populations comprise of more than 30% of older adults over the age of 65 years, the impact of these outcomes could be catastrophic. Almost all of the participants in this research believed the effects of ageing had the potential to impact the ability of older adults to remain self-reliant. As Figure 10.1 demonstrates, the OAs, ESOs and CHCs all recalled features that would impede an older adult's intention to prepare. OAs admitted that they were concerned about the physical effects of ageing on their ability to adequately prepare their properties before an event, as well as the problems they faced in regards to the physical energy and strengths required to clean up after a cyclone. These, coupled with financial limitations and a lack of social support networks, concerned older adult participants. These findings are consistent with a large body of literature identifying older adults as vulnerable during a natural hazard (see Table 2.9) and are in stark contrast with the expectations of disaster management (see Figure 2.2) and the views expressed by the DMs interviewed for this study (see Table 7.1).

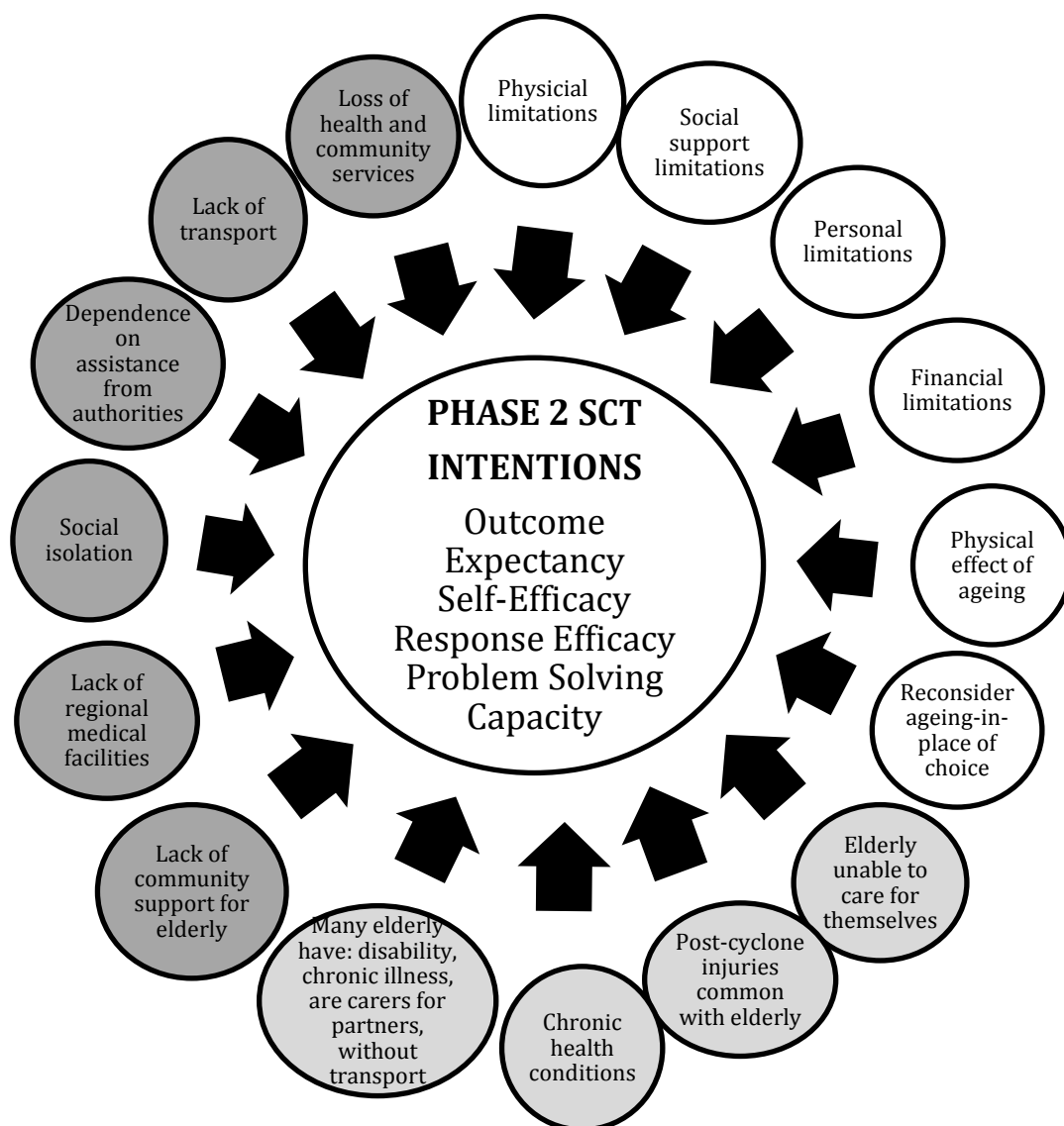
Despite these expectations, ESOs and CHCs all confirmed the views of the OAs, agreeing that chronic health conditions, dependence on others for day-to-day survival, the lack of community and medical support, and social isolation would result in a reduction in the resilience of these coastal hamlets. These were also the views of Muramatsu and Akiyama (2011) who highlighted the importance of ensuring older adults develop, strengthen and maintain community-based support networks, particularly those older adults with physical or cognitive limitations, and chronic health conditions. Yet, the impact of post-disaster policy decisions following Cyclone Larry (2006) and Cyclone Yasi (2011) had had negative down-stream externalities resulting in a downturn in the local economies and the out-migration of those who found themselves without employment.

As such, some OAs were reconsidering their residential location, with one OA stating, “... without assistance we would have to consider leaving the area ... we can’t go through that again”. Han and Corcoran (2014) warned of the limited choices older adults have in regards to ageing-in-place due to the considerations that needed to be made in regards to reliable and accessible health services. Clemens *et al.* (2013) confirmed that these factors result in statistics showing the health of older adults residing in more remote Australian areas is consistently worse than their urban counterparts, warning that these factors also have a negative impact on natural hazard preparedness and planning. Yet, despite the relocation of family and friends, those who have the potential to be most affected by a natural hazard, tend to remain because of their lack of capacity to migrate (Adam 2015). This overrepresentation of social disadvantage is a feature of small remote communities, which worsens with the further loss of health and community services resulting from a reduction in population. This study confirms these findings.

The final two factors in the second phase of Paton’s (2003) model are response efficacy and problem solving ability. Described as a person’s perception of their ability to implement a plan depending on the availability of time, skills, physical ability, financial constraints and assistance from others, response efficacy plays an important role in one’s problem-solving ability (Paton 2003). Problematically, if there is a conflict between the expectations of authorities and the individual’s capabilities, an individual’s problem-solving ability could be severely restricted (Paton 2003). Once more, Figure

10.1 highlights the effectiveness of Paton's (2003) SCT model in demonstrating the impact of an increase dependence on authorities on the adaptive capacity of older adults to undertake measures to prepare and recover from a natural hazard. Comments from both CHCs and ESOs confirm that many older adults are unable to care for themselves adequately on a day-to-day basis without support, which effectively places them at great risk during extreme weather events.

Burby (2006) and Paton (2003) both warned that an increasing dependence on authorities could lead to a reduction in the incentive to be adequately prepared for a natural hazard, resulting in a shift in a person's perceived responsibility over time. Despite participants' resilience in the past, results of this study show that the effects of ageing, and the consequences of successive cyclones had resulted in an increase in the dependence on others; as many now faced the prospect of reduced family support, they admitted they will be increasingly turning to authorities for support and assistance. Such findings are in conflict with EMA's policies, and as such highlight the difficulty facing ageing communities and disaster coordinators in the future. Such outcomes raise the question as to trust in authorities and as such lead to the third phase of Paton's (2003) SCT model.



Themes from Community Care Providers



Themes from Emergency Services Officers



Themes from older adult responders 65 years or older

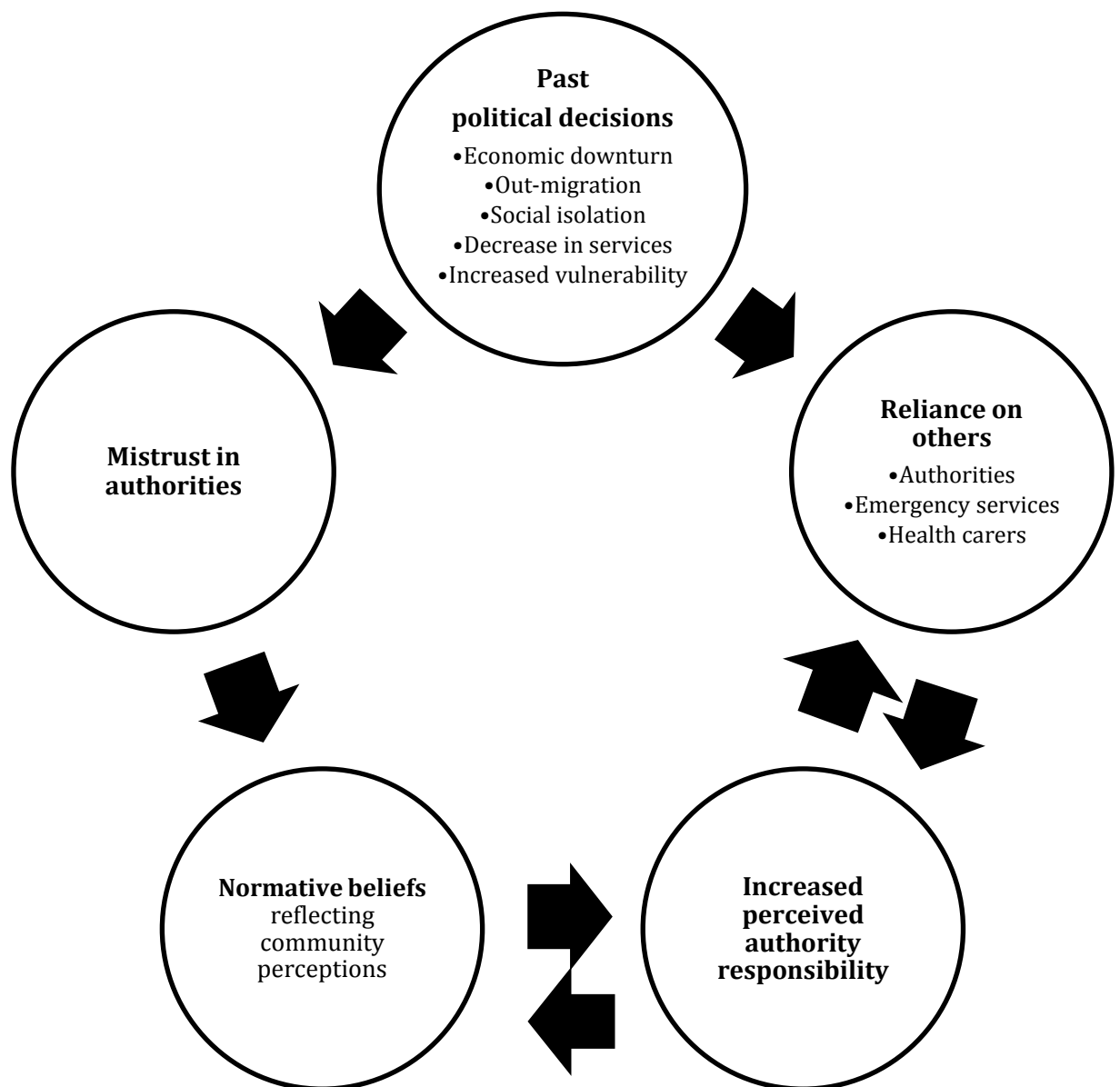
**Figure 10.1 Impact of themes from older adult participants, emergency services officers and *in situ* community health care providers on the second phase of Paton's (2003) Social Cognitive Theory Model**

### *10.1.2 Phase three of Paton's SCT model: linking intentions and preparedness*

The third phase of Paton's (2003) SCT model links intentions and preparedness factors, which Paton (2003) states will lead to a person taking actions to prepare, adapt and recover. As such, he introduces five factors: community normative beliefs, the timing of the event, perceived responsibility, sense of community and trust in authorities. Focusing on the variable, trust in authorities, Paton's (2003) SCT model provides an understanding of how one factor can influence others within the phase. In the case of this research, results showed that negative impacts from past political post-disaster decisions have led to an economic decline, driving many to seek futures elsewhere, leaving behind the most vulnerable. The consequences of this have fostered normative community beliefs and perceptions indicating mistrust in authorities.

Yet, as social isolation increases, the reliance of older adults on support by authorities also increases, along with the community's belief that it is the perceived responsibility of authorities to 'step-up' and assist those who now require help, resulting in entire segments of vulnerable communities relying on the very authorities with which there is so much mistrust (see Figure 10.2). Yet, these beliefs are in stark contrast with those of the DMs interviewed for this study, which reaffirmed that all citizens, including older adults, must accept sole responsibility for the risk they face.

Paton and Jang (2016) warned that those at risk are less likely to accept any responsibility for their own safety unless they believe their relationship with risk managers is fair and empowering. Putting this into the context of a community as a collective, such mistrust interacts with community-level interpretive processes, producing socially constructed normative beliefs. As such, Paton's (2003) SCT model provides an understanding that the actions of the past (that is, past post-disaster decisions) on the collective efficacy of communities affected by successive natural hazards have the potential to provide a disincentive to undertake actions to prepare in the future. Such are the findings of this study. It is, therefore, the belief of this researcher, that Paton's (2003) SCT model provided this research with an adequate tool with which to predict the future ability of ageing communities to remain self-reliant.



**Figure 10.2 Impact of mistrusting authorities following past post-disaster political decisions using the variables from themes from the third phase of Paton's (2003) Social Cognitive Theory Model.**

This dissertation supports existing theory emphasising the importance of self-efficacy on an individual's outcome expectancy, response efficacy and problem-solving capacity in relation forming the intention to undertake actions to ameliorate the impacts of a natural hazard on themselves and their properties. It therefore follows that collectively, the efficacies of entire communities influence collective outcome expectancies, response efficacies and problem solving capacities. As such, these findings highlight the importance of understanding how personal and community characteristics interact to influence a community's hazard readiness, response and ability to recover.

Currently disaster management policies advocate self-reliance, assuming that positive outcome expectancies can be achieved by having high levels of collective-efficacies based on all citizens having well-maintained homes, effective evacuation plans, strong social networks and stockpiles of food and water (see Figure 10.3). The assumption that all citizens are well prepared leads to a positive flow-on effect by increasing the collective response efficacies and problem-solving capacities, leading to community empowerment and self-reliance.

This dissertation advances theoretical perspectives by adding to Social Cognitive Theory, highlighting that such assumptions could have an adverse effect on socially vulnerable communities. Using cyclone-impacted ageing coastal hamlets as the example, Figure 10.3 shows that a vulnerable demographic composition, high levels of chronic illness, high reliance on *in situ* care, social isolation and poor access to services have a negative impact on outcome expectancies, whereby further impacting the collective efficacies, response efficacies and problem-solving abilities of the community, leading to community disempowerment and an increased reliance on assistance by authorities. As the outcomes of this dissertation have shown such reliance on authorities is not within the scope of Australian disaster management policies, as the findings highlighted in this dissertation threaten to have a catastrophic effect on both disaster management practices and on vulnerable communities in the future, particularly considering climate change predictions.

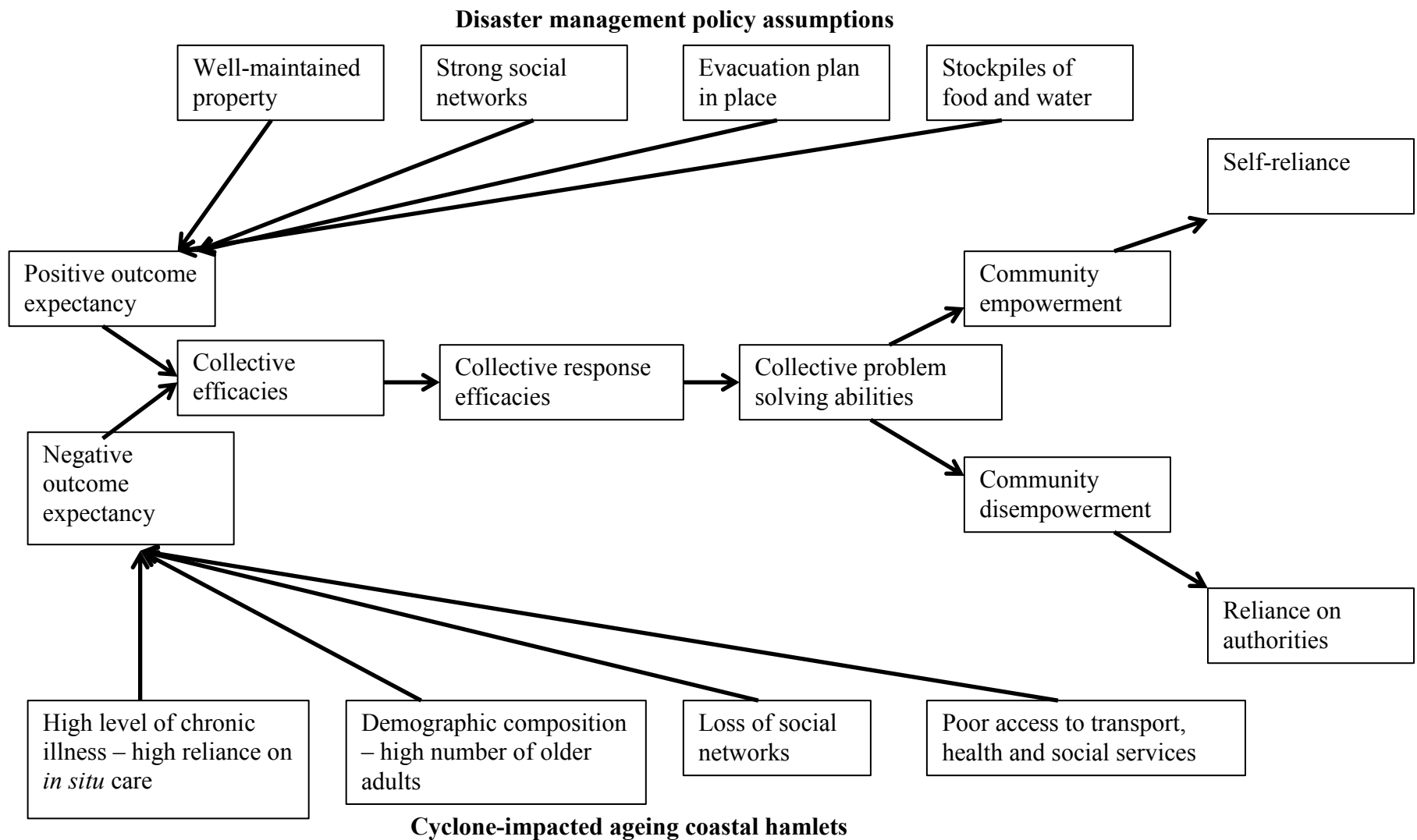


Figure 10.3 Advanced theoretical perspective showing variables that inform collective efficacies.



## 10.2 Summary of Findings

This dissertation centres on a series of four questions concerned with the ability of older adults to fulfill disaster management's expectation of self-reliance during the impact of a natural hazard. Although the results from this study provide an insight into these questions, they by no means provide absolute answers to them. Unique community characteristics ensures the findings of this study can only provide a starting point, however, it is hoped that the results presented will inform future work in other communities vulnerable to natural hazards which are also experiencing population ageing.

### *10.2.1 Research question 1: What is the disaster experience for older Far North Queensland (FNQ) residents?*

Results presented in Chapter 6 and Chapter 7 suggest that older adult citizens are concerned about the physical, cognitive and financial effects of ageing on their capacity to remain adaptive in the face of future cyclone threats, with those who have experienced successive events frightened that experiences from the past might be repeated in the future. Such experiences include post-disaster decisions that have impacted the economy of their communities, resulting in a loss of family and friends. As such, many older adult residing within the study sites face a future with declining social networks following the out-migration of family and friends following Cyclone Larry (2006) and Cyclone Yasi (2011). Participants stated that they increasingly relied on the assistance of *in situ* community health providers for their day-to-day care, which during times of extreme weather, often ceased to operate.

This study found those reliant on care accepted that pre-cyclone checks to property could not be carried out, with many reluctant to ask for further assistance, hampering their pre-cyclone preparations further. Despite this, most were more concerned with the cleanup after the storm had passed, admitting that such devastation was overwhelming and beyond their physical and mental capabilities. However, despite these findings, many older adult participants expressed a desire to remain residing in these communities, adamant that they also wished to remain residing in their own homes, which is in line with government policies that encourage ageing-in-place (Taylor & Donoghue 2015).

Yet, to remain independent the older adults stated that they required a commitment from authorities that adequate resources would be made available, particularly financial aid, medical and in-home care, physical assistance, adequate transport, long-term psychological help, adequate shelter and reliable accessible information. Thus, a significant finding of this research was the NSDR's (COAG 2011) limitations associated with viewing self-reliance solely as utilizing individual and community strengths, without acknowledging the need to recognize the reliance smaller communities, in particular, have on institutional resources. This finding is even more significant in communities with high numbers of older adults, which Cutter and Finch (2008) stated were communities that were more vulnerable due to the length of time required to recover from a disaster.

Another significant finding was that the recommendations of local government DMs did not always resonate with the older participants with limited incomes. Financial restraints associated with being on a pension meant many older adults could not afford home insurance, nor could they afford to stockpile food or organise an emergency kit, as recommended in disaster preparedness literature. In addition, as many no longer had family and friends in close proximity, many did not have a safe place to evacuate to, nor did they have a vehicle with which to drive to an evacuation centre. As such, many of the older adults interviewed for this research ignored local government disaster managers' recommendations, relying instead on post-disaster disaster relief and the assistance of authorities. As already mentioned, such outcomes, Burby (2006) and Paton (2003) warned, had the potential to lead to a reduction in the incentive to be adequately prepared for a natural hazard. This research supports these claims.

*10.2.2 Research question 2: Do local government disaster managers, emergency services officers and social workers think older adults living independently in the community are prepared for cyclones?*

Chapter 8 focused on the results of interviews with DMs and outlined their expectations in relation to the citizens residing in the communities with which they were assigned to manage. As highlighted in Chapter 2, and supported by the study results, the expectations of all DMs in both LGAs were in line with disaster management policies reiterating self-reliance. All stated that they felt their communities were alert and active with high levels of self-efficacy, and although they acknowledged that there were high

numbers of older adults in their communities, they did not regard older adults as vulnerable. They were not given any special consideration and their whereabouts was primarily unknown.

Significantly, these views were in stark contrast with those of the CHCs and the ESOs who disagreed with the DMs, stating overwhelmingly that the ageing population of their communities has resulted in increasing numbers of people with diminishing health requiring *in situ* home care with which to survive. Alarmingly, CHCs informed this study that such care is only provided to those who have the financial capacity to pay for it, despite government subsidies being available. The CHCs and ESOs stated that many older adults did not have the financial capacity to afford such care, and that although they were concerned about their clients, they were more concerned about older adults who do not receive care, with one community nurse stating that "... if they haven't seen us then we wouldn't know where they are". Despite Muramatsu and Akiyama's (2011) warning that social isolation reduced the resilience of older adults during a natural hazard, the DMs admitted that maps identifying the location of the vulnerable were not available. These results suggest that there could potentially be an increasing number of older adults facing future natural hazards without support. This cross-discipline finding is significant, not only for disaster management, but also for the disciplines of medicine and health, social sciences and psychology, urban planning and design, government and authority, and human geography (see Table 2.2).

As discussed in Chapter 7, the term 'self-reliant' appears to be ill-defined. Despite disaster management's expectation that being self-reliant meant having the capacity to take actions to reduce an individual's risk in the face of a natural hazard, the CHCs stated that older adults regard themselves as self-reliant if they have the capacity to afford the services necessary to allow them to remain living independently. The significance of this finding lies in the reliance older independent-living people have on government support to merely survive day-to-day. Again, the increasing dependence on authorities raises questions as to the ability of these people to remain self-reliant during times of an emergency. Remembering that *in situ* community care ceases during periods of extreme weather, and that services do not resume again until roads are deemed accessible and safe, this finding suggests that older adults reliant on care could potentially be isolated for many days, if not weeks. Such findings are concerning, as

disruptions to services, such as electricity and telecommunications, are also common. Such were the concerns of the OAs, CHCs and ESOs, but surprisingly were not a concern of DMs, who stated that the health and wellbeing of older adults was not their responsibility, rather, it was the responsibility of organisations that provided *in situ* care. This statement was vehemently denied by the *in situ* CHCs. Such is the most concerning finding: If disaster management does not take responsibility for independent-living older adults unable to care for themselves without the assistance of in-home care, nor do *in situ* care providers who care for them on a daily basis, who does?

According to DMs, the individual is responsible for their own care, with the support of family. The literature warns of such assumptions, with the results of this study confirming these warnings. Chapter 9 outlined that the CHCs confirmed that older independent-living adults, particularly females, were reluctant to ask for assistance from family for fear of appearing unable to care for themselves. These findings were consistent with the literature, with Aronson (2006) highlighting the challenges some women face when ageing (such as being unable to care for themselves). Such admissions tend to produce feelings of inadequacies, which are in conflict with the qualities that women value, namely, self-sufficiency and stoicism (Aronson 2006). As such, with Gurran *et al's.* (2008) Australian coastal hamlet population ageing predictions, coupled with ABS (2015a) predictions that Australian women are expected to outlive their male partners by five years, this finding implies that an increasing number of older women could be residing alone in vulnerable locations, without support, unknown to disaster management authorities.

### *10.2.3 Research question 3: What is the role of policy in disaster preparation and response in small regional communities?*

The results presented in Chapter 9 provided an understanding of the long-term downstream effects of past post-disaster policy decisions on the present and future cyclone capacities of coastal hamlets on the Far North Queensland coastline. As such, this dissertation has shown that the role of policy extends beyond simply dealing with the immediate aftermath of a natural hazard, potentially continuing to impact the adaptive capacities of those who may have not yet recovered from past losses. Such policies include those that unintentionally set post-hazard expectations in regard to the

government disaster relief, setting precedence in the face of future impacts. This finding agrees with Kaplow (1991) who warned of the influence of disaster relief in the distortion of an individual's perception of risk. Bickerstaff (2004) concurred extending this warning to include the impact past policies could have on societal perceptions of risk, with the results of this research confirming that the reliance and expectation of the community on similar financial compensation and the provision of work crews to undertake clean-up and recovery activities post Cyclone Larry (2006), had led to similar expectations post Cyclone Yasi (2011). As such, collectively the community felt reassured that similar government support would be forthcoming. When this was not the case, many now felt uncertain of their abilities should the community be impacted in the future. Paton's (2003) SCT model warned of the impact of reduced perception of risk on an individual's self-efficacy, which, as this dissertation has shown, impacts also on the collective efficacies of the entire community.

Chapter 9 also outlined the negative impact of past post-disaster policies on the fragile economies of the communities within the study site, which had led to many older adults now facing a future without the support of friends and family due to an out-migration of younger family members seeking employment. Despite Handmer and Choong (2006) warning of the vital role played by local economic activity on the future capacity of an affected area to recover from a natural hazard, all participants stated that policy decisions made after Cyclone Larry and Cyclone Yasi had not emphasised the needs of those who resided in the area, ignoring livelihoods and providing no incentive for residents to return. As such, policy decisions of the past had further impacted the adaptive capacity of the area in the future. Therefore, the results of this dissertation show that the role of policy in disaster preparation and response, particularly in smaller regional communities, must extend further than the immediate threat. Policy must also consider the long-term effects of decisions, which have the potential to further impede the adaptive capacities of communities well into the future.

### **10.3 Practical Implications**

The combination of population ageing and climate change is creating a new threat for coastal regions in Australia, particularly those referred to as coastal hamlets by Gurrin *et al.* (2007). As population projections estimate that almost half (48%) of Australia's

population will be over the age of 50 years of age by 2051 (ABSc 2015), exposed ageing coastal hamlets face unique challenges in relation to natural hazards adaptive capacity and resilience. Disaster policies that depend on the self-reliance of all citizens, disregarding demographics, socio/situational factors, cognitive behavioural factors or individual/personal experiential factors, are developed largely ignoring the difficulties facing vulnerable people, especially during times of extreme stress. If the focus of disaster management remains the sole responsibility of the individual, then it is critical that government authorities, non- government organisations and communities work co-operatively to ensure all members of our society have equitable access to the resources that encourage self-reliance.

#### *10.3.1 Identifying those at risk*

To ensure those most at risk are provided adequate assistance, it is vital local government disaster managers and support organisations are aware of their location. Despite the NDRS (COAG 2011) identifying the importance of strategic planning to consider risks within a community's social environment, the social vulnerability of the residents of both the CRC and the CCRC was virtually unknown to all DMs interviewed for this dissertation. Results found that vulnerability mapping only existed within the scope of storm surge, but did not extend to identifying where vulnerable persons resided. Similarly, vulnerability registers or lists did not exist within the CCRC, with the CRC officers stating that they did have a register, but if an individual had a medical condition that required treatment, they were unable to be included. This raises serious practical concerns for older adults, particularly in remote regions with limited disaster management resources. The results of this research support the need for LGA authorities, in conjunction with State and Federal authorities, to compile and maintain lists or registers to identify the location of those most at risk, which could be further utilized in the formation of vulnerability mapping. Such resources are imperative to effective disaster response planning.

### *10.3.2 Consistent disaster policies*

#### *10.3.2.1 Local Government Disaster Management Policies*

In light of the results of this study highlighting the inconsistencies between the disaster management policies of two neighbouring LGAs affected by both Cyclone Larry (2006) and Cyclone Yasi (2011), it is suggested that consideration be given to reviewing local disaster policies to ensure equity amongst all hazard victims, regardless of their residential location. This research has highlighted differences between the disaster policies of CRC and CCRC in relation to the number of available cyclone shelters, the criteria for cyclone shelter entry, as well as differences in community awareness program strategies (see Section 9.1.10). Such discrepancies have the potential to cause confusion, reducing the ability of the individual to accurately assess their risk, whereby impacting their self-efficacy.

#### *10.3.2.2 State and Federal Government policies*

Further inconsistencies also existed between the level of State and Federal government support afforded victims following Cyclone Yasi, compared to what had previously been offered following Cyclone Larry (see Section 9.1.10). Such inconsistencies could potentially lead to an increase in vulnerability by impeding recovery and altering the preparatory habits of those at risk, with the narratives of the participants indicating confusion and concern that future impacts could see future reductions in disaster recovery resources. Practically, these results suggest that such actions could result in a further mistrust in disaster authorities. Therefore, it is suggested that considerations must be given to past disaster support, to ensure that communities, particularly those that are repeatedly impacted, are afforded assistance that considers the possibility that the level of social disadvantage could have increased as a result of previous events. As such, it is quite possible that a previously affected community could require higher levels of support.

### *10.3.3 Identify the social impact of past post-disaster policy decisions*

Policy decisions made following the impact of a natural hazard are made quickly, often within hours of the hazard making landfall, focusing on short-term recovery and rescue, aimed at delivering immediate positive relief for those most affected. However,

narratives from participants repeatedly discussed the negative down-stream effects of past post-disaster decisions on the economy of their communities. These included the loss of vital local enterprise, the out-migration of younger citizens seeking employment and the consequential loss of health and community services reliant on population statistics for availability. Such consequences exacerbate the ageing population statistics, resulting in many older adults facing a future without the family support they assumed they would have throughout their final years. As such, it is the suggestion of this study that investigations into the social impact of post-disaster policies should be undertaken to identify both the positive and negative externalities of such policies, so as to avoid repeating the mistakes of the past.

#### **10.4 Policy Implications**

The World Health Organization (2002) described population ageing as one of humanity's greatest triumphs, yet it also acknowledges that it is also one of its greatest challenges. It states that government policies must therefore enhance the health, participation and security of older adults, focusing on their rights, needs, preferences and capacities. Despite such suggestions, results from this research have highlighted that Australian disaster management policies do not appear to consider the needs, preferences or capacities of older people, nor has the participation of older people been encouraged in current policy development. As consultation with older Australians has not been a priority, it is suggested that the implications of an ageing population on disaster management policies has not been a consideration, nor has the impact this might have on the ability of ageing populations to remain self-reliant, particularly in remote localities.

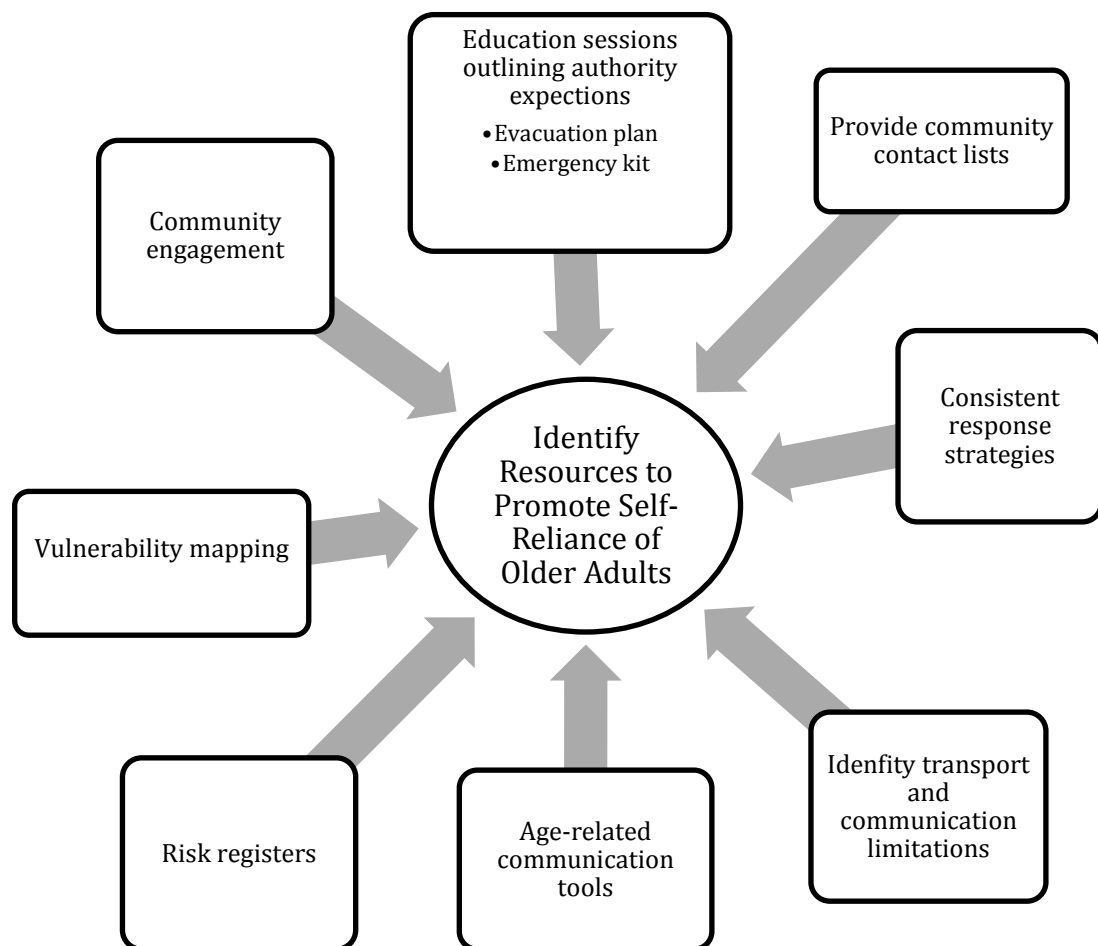
This research has demonstrated that older independent-living adults want to remain residing in the place of their choice, understanding and agreeing that people must be able to care for themselves. However, to do so, they must engage the assistance of others, regarding the ability to pay for services (or volunteer their time *in lieu* of a service), as a form of self-reliance, giving little thought to the consequences should that assistance cease. Thus, it is vital to engage with older adults, so as to fully understand how policy can support their independence and assist them with maintaining their ability to be self-reliant and increasing their self-efficacy.



It is imperative that the development of policy begins with focusing on the needs of older adults, by identifying the areas of vulnerability and understanding that disaster management policies are not a 'one size fits all'. Figure 10.4 provides a starting point from which to engage the opinions of older people, allowing them to have a voice in policy development that directly impacts their natural hazard adaptive capacity and resilience. Narratives with the OAs highlighted the need to ensure older adults were aware of the expectations of disaster management authorities, including their expectation that all citizens were self-reliant pre and post a disaster, that everyone must have an evacuation plan, as well as a comprehensive emergency kit that includes at least a week's supply of food and water. As this dissertation's results showed there was considerable confusion in regard to these points, Figure 10.4 suggests that it is vital to actively engage with older adults, providing specific education sessions aimed at older adults to outline these expectations, and providing support so as to achieve them. These engagement sessions also need to offer the opportunity for older adult participants to identify areas in which they require assistance and support, with policy developers then implementing strategies that address those issues.

As this research's results also highlighted that the whereabouts of those at risk was relatively unknown, it is also imperative that risk registers, lists and maps be developed and shared amongst government and other emergency services organisations, to ensure the safety and well-being of older adults is a coordinated procedure, with a focus on ensuring strategies are consistent and engaging. It is also the suggestion of this dissertation that policies and strategies be developed to ensure older adults, particularly in more remote communities, have access to transport, to enable evacuation if necessary. In addition, communication tools and methods of information dissemination must be developed to engage with, and respond to, the needs of older adults. Such communication must incorporate information related to any risks to life and property, support information, disaster preparation strategies that are sympathetic to age-related limitations and emergency contact lists. Communication must also be mindful that many older adults, particularly in remote localities, do not own a computer, may not have access to the Internet, or are typically uneasy about using the Internet and social network sites, preferring instead to use more traditional methods of communication, such as print, radio, television or telephone.

Most importantly, there must be consensus as to who is responsible for assisting older adults during times of a natural hazard emergency. This study highlighted that in the area of FNQ affected by both Cyclone Larry (2006) and Cyclone Yasi (2011), both local government disaster managers and the community and health care providers, denied responsibility for ensuring older adults were safe, despite acknowledging many were socially isolated, without the support of friends or family. It is suggested that the sharing of information collected from community engagement sessions, vulnerability registers, lists and maps, and the formation of consistent, equitable and engaging policies could provide a more integrated approach that meets the specific needs of older adults engaging not only the older adults, but also government officials, non-government officers, health care providers, emergency services, individuals and the community at large.



**Figure 10.4 Policy considerations to identify resources to promote natural hazard self-reliance amongst older adults.**

## 10.5 Limitations of This Study

It is acknowledged that, despite the contribution of this study to the understanding of natural hazard emergency management, limitations exist. Firstly, it is acknowledged that the sample size for this research could be regarded as relatively small, despite the literature recommending that the ideal phenomenological research sample size being between five and 25. This is often a criticism related to qualitative research. However, as the sample size of each of the four participant groups was between four and 36, it was the consideration of the researcher that the final sample size of 57 participants was sufficient. Debate also exists amongst phenomenologists regarding when research has reached saturation point, as the in-depth interviewing and analysis techniques required to undertake phenomenology typically limits a sample size. According to Liamputtong and Ezzy (2005), data saturation is more important than sample size, claiming that when “... the researcher is satisfied that the data are rich enough to cover enough of the dimensions they are interested in, then the sample is large enough” (2005, p. 49). As this research accepted the participation of every person who volunteered to be a part of it, it was felt that the sample size for this study was sufficient.

The second limitation is in regards to using the quantitative data collected from the questionnaire for statistical analysis. Using Table 5.2 to estimate the population of the study site at the time of data collection, the data suggests there were approximately 3000 eligible people in the study area. As the sample size of the older adult participants was 39, this represents only 1.3 % of the total population. The validity of any statistical analysis of such a small group, and low sampling fraction, would produce results that would be questioned in light of the sampling methodology, which was non-random. It is the belief of the researcher that the strength of the data is in the rich qualitative data collected for the dissertation. The use of the questionnaire, as highlighted in Section 4.5.1, was to collect information related to contextual and locational factors relating to the OAs, in order to prevent lengthy and tiring focus group sessions. Using Table 3.3 as a guide, it was felt this data were best collected using quantitative methods, as highlighted under the heading *Weaknesses*, point number 5. As such, the data collected were used to provide this dissertation with simple descriptive statistics only. Upon reflection, the questionnaire data were not necessary for this dissertation, as the questions asked in the focus group sessions were comprehensive and adequate.

A further limitation was that the participants who volunteered to participate in this study did so because of their concern about the consequences of ageing on one's ability to prepare and recover from a cyclone, thus the views of those who were not concerned were not offered or included. In addition, as all those who volunteered were Caucasian, Australian and long-term residents, the views and opinions of Indigenous, culturally diverse or recent sea-change migrants were not offered or included. Additionally, data collection was restricted to study sites recovering from the impacts of Cyclone Larry (2006) and Cyclone Yasi (2011), during the 2014-2015 cyclone season, while the FNQ coastline was under cyclone watch, whereby creating a heightened sense of awareness. Therefore, data from older adults residing in unaffected areas were not investigated.

It is also acknowledged that as data were collected from OAs using both face-to-face interviewing techniques, as well as the telephone, it is possible that rapport with participants using the telephone may have been compromised, which could also be regarded as a limitation of this dissertation. It is also acknowledged that it was only possible to gauge the emotions of those on the telephone by listening to their voice, whereas those interviewed face-to-face were also able to be observed.

The final limitation of this study was that participants were asked to retrospectively recall their cyclone experiences, focusing on their coping strategies in 2006, after the impact of Cyclone Larry, and 2011 after Cyclone Yasi. It is possible that details may have been confused between the two events, due to their similarity; however, this did not seem to be the case.

A potential limitation is that the experiences of those in this study may not be similar to the experiences of other ageing coastal hamlets in Far North Queensland or Australia, thus the findings of this research can only be cautiously extrapolated to other regions. The study sites in this dissertation are unique within the Australian context; that is, the region was impacted twice within five years by two separate catastrophic events resulting in sequential destruction of properties, agricultural industries and environments, which altered the demographics of the region.

## 10.6 Future Research

Although this study successfully addressed the aims of the research, it also unearthed further issues that need to be addressed by future studies. As discussed, further research should be undertaken to establish who is best placed to take responsibility for the most vulnerable people in communities during times of a natural hazard. As both the local DMs and CHCs argued as to who was responsible for older adults in their local area, it became obvious that there was in fact no organisation prepared to take responsibility. Also outlined previously, it is also suggested that research be carried out to help develop strategies to assist communities recover economically following the impact of a natural hazard. If coastal hamlets are to remain viable, much needs to be done to ensure that these centres are economically resilient, especially following a natural hazard. 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 outmigration 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 consequences, paradoxically at a time in their lives when many require specialist care.

Another research proposal that requires consideration is the unwillingness of older females to accept assistance, both during times of an emergency, and on a day-to-day basis. This research is imperative, considering population estimates that predict an increasing number of women living five years longer than their male partners, and government policies encouraging older adults to remain in their own homes. This then leads to the suggestion that further research be undertaken into an older adults' decision to age-in-place in remote, exposed coastal locations. As policies that support ageing-in-place, conflict with policies that expect self-reliance during a natural hazard, this area is likely to become an important consideration in the light of future population ageing predictions.

Finally, as 53% of the sample was male, revealing a high number identifying themselves as suffering from depression, a final research concept is that of the long-term mental health impact of natural hazards on males. As this study was unique, in that the participants had experienced two catastrophic cyclonic events within a five-year

period, some male participants expressed feelings of shame that they were unable to carry out the same level of preparedness and recovery activities in 2011 that they had in 2006. One participant stated, "... 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". As such, it is the opinion of this researcher that further research is needed into the long-term mental health amongst male victims of natural hazards, particularly in remote locations with limited medical services.

## **10.7 Conclusion**

This dissertation focussed on the ability of ageing remote Australian coastal hamlets to remain self-reliant when faced with more intense cyclones in the future. Using a mixed-methods approach, with a focus on phenomenological qualitative analysis, this study examined the cyclone experience of independent-living older adults residing in vulnerable coastal locations recovering from successive cyclones in FNQ, Australia. Interviews and focus groups involved 36 older adults aged 65 years or over, ten emergency services officers, seven *in situ* community health care providers and four local government disaster managers. Results revealed that in order for independent living older adults in remote communities to remain self-reliant, disaster management authorities need to develop disaster policies that consider the needs, preferences and capacities of older people, acknowledging that to do so older people's voices need to be heard by engaging them in policy development. Disaster policy must recognise that self-reliance is not simply the ability to utilise individual and community strengths, it must also acknowledge the increasing dependence more fragile communities, such as remote, ageing communities, have on the provision of institutional resources. This research has significant implications for disaster policy in the future, particularly in light of climate change and population ageing predictions. This research makes an important contribution to the field of emergency management and gerontological disaster research.

## References

- Access Economics 2006, *A review of the 2002 Intergenerational Report: A review by Access Economics Pty Limited for Medicines Australia*, Access Economics, Canberra.
- Adams, H 2016, 'Why populations persist: mobility, place attachment and climate change', *Population and Environment*, vol. 37, no. 4, pp. 429-448.
- Adams, V, Kaufman, SR, Van Hattum, T, & Moody, S 2011, 'Aging disaster: mortality, vulnerability, and long-term recovery among Katrina survivors', *Medical anthropology*, vol. 30, no. 3, pp. 247-270.
- Adelman, C 2009, 'Substantive theory', *Encyclopaedia of case study research*.
- Adger, WN, Hughes, TP, Folke, C, Carpenter, SR, & Rockström, J 2005, 'Social-ecological resilience to coastal disasters', *Science*, vol. 309, no. 5737, pp. 1036-1039.
- Adserà, A 2004, 'Changing fertility rates in developed countries. The impact of labor market institutions', *Journal of Population Economics*, vol. 17, no. 1, pp. 17-43.
- Allan, K 2005, *Explorations in classical sociological theory: seeing the social world*, Pine Forge Press, Thousand Oaks, Ca.
- Allen, C 2015, Humanistic geography, Oxford Bibliographies, viewed 22 September 2016, <<http://www.oxfordbibliographies.com/view/document/obo-9780199874002/obo-9780199874002-0015.xml>>.
- Anderson-Berry, L, & King, D 2005, 'Mitigation of the impact of tropical cyclones in Northern Australia through community capacity enhancement', *Mitigation and Adaptation Strategies for Global Change*, vol. 10, no. 3, pp. 367-392.
- Anderson-Berry, LJ 2003, 'Community vulnerability to tropical cyclones: Cairns, 1996–2000', *Natural Hazards*, vol. 30, no. 2, pp. 209-232.
- Andrew, S, & Halcomb, EJ 2007, 'Mixed methods research is an effective method of enquiry for community health research', *Contemporary Nurse*, vol. 23, no. 2, pp. 145-153.
- Andrews, T 2012, 'What is social constructivism?'. *Grounded Theory Review: an International Journal*, vol. 11, no. 1, viewed 4 November 2016 <<http://groundedtheoryreview.com/2012/06/01/what-is-social-constructionism/>>.
- Archer, MS 2007, 'The ontological status of subjectivity: the missing link between structure and agency', In C Lawson, J Latsis and N Martins (eds), *Contributions to Social Ontology*, Routledge, London, pp. 17-21.
- Aronson, J 2006, 'Silenced complaints, suppressed expectations: the cumulative effects of home care rationing', *International Journal of Health Services*, vol. 36, no. 3, pp. 535-556.

Astill, S, & Griggs, P 2014, 'Investigating the hazard preparatory information-seeking habits of far north Queensland coastal communities', *Australian Journal of Emergency Management*, vol. 29, no., pp. 37-45.

Åström, DO, Bertil, F, & Joacim, R 2011, 'Heat wave impact on morbidity and mortality in the elderly population: a review of recent studies', *Maturitas*, vol. 69, no. 2, pp. 99-105.

Australian Institute for Disaster Resilience 2004, *Emergency management in Australia: concepts and principles*, Emergency Management Australia, Canberra,  
<<https://www.aidr.org.au/media/1433/manual-1-concepts-and-principles.pdf>>.

Australia. myagedcare 2015, Help at home: costs explained, viewed 7 April 2015,  
<<http://www.myagedcare.gov.au/financial-and-legal/help-home-costs-explained>>.

Australia. Treasury 2010, *Australia to 2050: future challenges: the Intergenerational Report*, Treasury, Canberra,  
<[http://archive.treasury.gov.au/igr/igr2010/report/pdf/IGR\\_2010.pdf](http://archive.treasury.gov.au/igr/igr2010/report/pdf/IGR_2010.pdf)>.

Australian Bureau of Statistics (ABS) 2004, Australian social trends, 2004, cat. no. 4102.0 ABS, viewed 22 May 2014,  
<<http://www.abs.gov.au/AUSSTATS/AB@.NSF/2F762F95845417aeca25706c00834efa/df9b2318e79ab891ca256e9e001fb3e8!OpenDocument>>.

Australian Bureau of Statistics (ABS) 2009, Future population growth and ageing, cat. no. 4102.0, ABS, viewed 17 April 2014,  
<<http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4102.0Main+Features10March%202009>>.

Australian Bureau of Statistics (ABS) 2010, The health of Australia's Aboriginal and Torres Strait Islanders, Oct 2010, cat. no. 4704.0, ABS, viewed 21 September 2016,  
<<http://www.abs.gov.au/AUSSTATS/abs@.nsf/lookup/4704.0Chapter216Oct+2010>>.

Australian Bureau of Statistics (ABS) 2011, Quickstats, ABS, viewed 13 April 2014,  
<<http://www.abs.gov.au/websitedbs/censushome.nsf/home/quickstats>>.

Australian Bureau of Statistics (ABS) 2013, Reflecting a nation: stories from the 2011 Census, cat. no. 2071.0, ABS, viewed 21 June 2014,  
<<http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/2071.0main+features702012-2013>>.

Australian Bureau of Statistics (ABS) 2013a, Australian demographic statistics, cat. no. 3101.0, ABS, viewed 7 March 2014,  
<<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3101.0Dec%202012?OpenDocument>>.

Australian Bureau of Statistics (ABS) 2013b, Measures of Australia's progress: summary indicators, 2011: population, cat. no. 1370.0.55.001, ABS, viewed 20 March 2014,



<<http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1370.0.55.001~2011~Main%20Features~Population~3>>.

Australian Bureau of Statistics (ABS) 2014, Regional population growth, Australia 2012–13, cat. no. 3218.0, ABS, viewed 8 August 2016, <<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3218.02012-13>>.

Australian Bureau of Statistics (ABS) 2015a, Gender Indicators, Australia, Feb 2015, cat. no. 4125.0, ABS, viewed 27 May 2016, <<http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4125.0~Feb%202015~Main%20Features~Health~2321>>.

Australian Bureau of Statistics (ABS) 2015b, Health status, cat. no. 4125.0, ABS, viewed 15 July 2016, <<http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/4125.0main+features6155Feb%202015>>.

Australian Bureau of Statistics (ABS) 2016, Data & analysis: 2011 population for Australia, ABS, viewed 6 April 2016, <[www.censusdata.abs.gov.au](http://www.censusdata.abs.gov.au)>.

Australian Institute of Health & Welfare 2002, *Australia's Health 2002*, Australian Institute of Health & Welfare, Canberra.

Australian Institute of Health & Welfare 2014, Chronic diseases, AIHW, viewed 16 September 2014, <<http://www.aihw.gov.au/chronic-diseases/>>.

Australian Institute of Health & Welfare 2016, Chronic diseases, AIHW, viewed 21 September 2016, <<http://www.aihw.gov.au/chronic-diseases/>>.

Babbie, ER 1999, *The basics of social research*, Cengage Learning, Belmont, Ca.

Bahar, HI, Laciner, S, Bal, I, & Özcan, M 2009, 'Older migrants to the Mediterranean: the Turkish example', *Population, Space and Place*, vol. 15, no. 6, pp. 509-522.

Ball, DJ, & Boehmer-Christiansen, S 2007, 'Societal concerns and risk decisions', *Journal of Hazardous Materials*, vol. 144, no. 1, pp. 556-563.

Bandura, A 1989, 'Human agency in social cognitive theory', *American Psychologist*, vol. 44, no. 9, pp. 1175-1184.

Bandura, A 1997, *Self-efficacy: the exercise of self-control*, Freeman, New York.

Bandura, A 1998, 'Health promotion from the perspective of social cognitive theory', *Psychology and Health*, vol. 13, no. 4, pp. 623-649.

Bandura, A 2001, 'Social cognitive theory: an agentic perspective', *Annual Review of Psychology*, vol. 52, no. 1, pp. 1-26.

Bandura, A 2002, 'Social cognitive theory in cultural context', *Applied Psychology*, vol. 51, no. 2, pp. 269-290.

- Bandura, A 2004, 'Health promotion by social cognitive means', *Health Education & Behavior*, vol. 31, no. 2, pp. 143-164.
- Bartle, P 2007, Durkheim and Weber, Community Empowerment Collective, viewed 22 September 2016, <<http://cec.vcn.bc.ca/cmp/modules/cla-duw.htm>>.
- Beck, U 1992, *Risk society: towards a new modernity*, Sage, London.
- Becker, HA 1991, 'The future of impact assessment in the european communities and their member countries', *Impact Assessment*, vol. 9, no. 4, pp. 69-79.
- Becker, HA 2001, 'Social impact assessment', *European Journal of Operational Research*, vol. 128, no. 2, pp. 311-321.
- Benight, CC, & Bandura, A 2004, 'Social cognitive theory of posttraumatic recovery: the role of perceived self-efficacy', *Behaviour Research and Therapy*, vol. 42, no. 10, pp. 1129-1148.
- Benight, CC, & Harper, ML 2002, 'Coping self-efficacy perceptions as a mediator between acute stress response and long-term distress following natural disasters', *Journal of Traumatic Stress*, vol. 15, no. 3, pp. 177-186.
- Berwick, M 2007, 'Growth pressures on coastal hamlets: the challenge of coastal governance', In AJ Brown and JA Bellamy (eds), *Federalism and regionalism in Australia: new approaches, new institutions?*, ANU E Press, Canberra, pp. 83-94.
- Bi, P, Williams, S, Loughnan, M, Lloyd, G, Hansen, A, Kjellstrom, T, Dear, K, & Saniotis, A 2011, 'The effects of extreme heat on human mortality and morbidity in Australia: implications for public health', *Asia-Pacific Journal of Public Health*, vol. 23, no. 2 suppl, pp. 27s-36s.
- Bickerstaff, K 2004, 'Risk perception research: socio-cultural perspectives on the public experience of air pollution', *Environment International*, vol. 30, no. 6, pp. 827-840.
- Blaikie, P, Cannon, T, Davis, I, & Wisner, B 1994, *At risk: natural hazards, people's vulnerability and disasters*, Routledge, London.
- Blowers, A 1997, 'Environmental policy: ecological modernisation or the risk society?', *Urban Studies*, vol. 34, no. 5-6, pp. 845-872.
- Bohnet, IC, & Pert, PL 2010, 'Patterns, drivers and impacts of urban growth—a study from Cairns, Queensland, Australia from 1952 to 2031', *Landscape and Urban Planning*, vol. 97, no. 4, pp. 239-248.
- Booth, H 2009, 'The changing face of the Australian population: growth in centenarians', *Medical Journal of Australia*, vol. 188, no. 12, pp. 720-723.
- Booth, K, & Williams, S 2014, 'A more-than-human political moment (and other natural catastrophes)', *Space and Polity*, vol. 18, no. 2, pp. 182-195.

Bord, RJ, O'Connor, RE, & Fisher, A 2000, 'In what sense does the public need to understand global climate change?', *Public Understanding of Science*, vol. 9, no. 3, pp. 205-218.

Bouwer, LM 2013, 'Projections of future extreme weather losses under changes in climate and exposure', *Risk Analysis*, vol. 33, no. 5, pp. 915-930.

Bowles, RT, & Cook, JV 1981, *Social impact assessment in small communities: an integrative review of selected literature*, Butterworths, Toronto, Canada.

Bradbury-Jones, C, Sambrook, S, & Irvine, F 2009, 'The phenomenological focus group: an oxymoron?', *Journal of Advanced Nursing*, vol. 65, no. 3, pp. 663-671.  
Brisbane City Council Flood Response Review Board 2011, *Brisbane flood January 2011: independent review of Brisbane City Council's response, 9-22 January 2011*, Brisbane City Council, Brisbane, viewed 1 August 2015, <[http://www.brisbane.qld.gov.au/sites/default/files/emergency\\_management\\_Independent\\_Review\\_of\\_BCCs\\_Response\\_Final\\_Report\\_v4.pdf](http://www.brisbane.qld.gov.au/sites/default/files/emergency_management_Independent_Review_of_BCCs_Response_Final_Report_v4.pdf)>.

Brunkard, J, Namulanda, G, & Ratard, R 2008, 'Hurricane Katrina deaths, Louisiana, 2005', *Disaster Medicine and Public Health Preparedness*, vol. 2, no. 4, pp. 215-223.

Bryant, EA 2005, *Natural hazards*, Cambridge University Press, New York.

Bryman, A 2008, *Social research methods*, Oxford University Press New York.

Bulkeley, H 2001, 'Governing climate change: the politics of risk society?', *Transactions of the Institute of British Geographers*, vol. 26, no. 4, pp. 430-447.

Burby, RJ 2006, 'Hurricane Katrina and the paradoxes of government disaster policy: bringing about wise governmental decisions for hazardous areas', *The Annals of the American Academy of Political and Social Science*, vol. 604, no. 1, pp. 171-191.

Burby, RJ, Steinberg, LJ, & Basolo, V 2003, 'The tenure trap: the vulnerability of renters to joint natural and technological disasters', *Urban Affairs Review*, vol. 39, no. 1, pp. 32-58.

Bureau of Meteorology (BOM) 2014a, About tropical cyclones, BOM, viewed 23 May 2014, <<http://www.bom.gov.au/cyclone/about/>>.

Bureau of Meteorology (BOM) 2014b, Previous tropical cyclones, viewed 23 July 2014, <<http://www.bom.gov.au/cyclone/history/larry.shtml>>.

Bureau of Meteorology (BOM) 2014c, Severe Tropical Cyclone Larry, viewed 24 July 2014, <<http://www.bom.gov.au/cyclone/history/larry.shtml>>.

Bureau of Meteorology (BOM) 2014d, Severe Tropical Cyclone Yasi, viewed 24 July 2014, <<http://www.bom.gov.au/cyclone/history/yasi.shtml>>.

Bureau of Meteorology (BOM) 2016a, Storm surge preparedness and safety, viewed 22 September 2016, <<http://www.bom.gov.au/cyclone/about/stormsurge.shtml>>.

Bureau of Meteorology (BOM) 2016b, Tropical cyclone intensity and impacts, viewed 9 October 2016, <<http://www.bom.gov.au/cyclone/about/intensity.shtml>>.

Burnley, IH, & Murphy, P 2004, *Sea change: movement from metropolitan to Arcadian Australia*, UNSW Press, Kensington, NSW.

Burton, I, Kates, RW, & White, GF 1978, *The environment as hazard*, Oxford University Press, New York.

Butler-Kisber, L 2010, *Qualitative inquiry: thematic, narrative and arts-informed perspectives*, Sage Publications, Thousand Oaks, Ca.

Cairns Regional Council 2016, About Cairns: facts figures & history, viewed 24 May 2016, <<http://www.cairns.qld.gov.au/region/facts>>.

Cairns Regional Council 2016, Publications and reports, viewed 17 August 2016, <<http://www.cairns.qld.gov.au/council/news-publications/reports>>.

Callaghan, J 2011, 'Known impacts of tropical cyclones, East Coast, 1858 – 2008' vol., <[http://hardenup.org/umbraco/customContent/media/1150\\_EastCoastImpactsofTropicalCyclones\\_1858-2008.pdf](http://hardenup.org/umbraco/customContent/media/1150_EastCoastImpactsofTropicalCyclones_1858-2008.pdf)>.

Carson, D, Gilmore, A, Perry, C, & Gronhaug, K 2001, *Qualitative marketing research*, Sage, London.

Cassowary Coast Regional Council (CCRC) 2010, *Liveable Cassowary Coast*, Cassowary Coast Regional Council, Innisfail.

Cassowary Coast Regional Council (CCRC) 2016, Regional profile, viewed 24 May 2016, <<http://www.cassowarycoast.qld.gov.au/regional-profile1>>.

Chandra, A, Williams, M, Plough, A, Stayton, A, Wells, KB, Horta, M, & Tang, J 2013, 'Getting actionable about community resilience: the Los Angeles County community disaster resilience project', *American Journal of Public Health*, vol. 103, no. 7, pp. 1181-1189.

Cherniack, EP, Sandals, L, Brooks, L, & Mintzer, M 2008, 'Trial of a survey instrument to establish the hurricane preparedness of and medical impact on a vulnerable older population'. *Prehospital and Disaster Medicine*, vol. 23, no. 3, pp. 242-249, <<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.176.1343&rep=rep1&type=pdf>>.

Cherry, KE, Galea, S, Su, LJ, Welsh, DA, Jazwinski, SM, Silva, JL, & Erwin, MJ 2010, 'Cognitive and psychosocial consequences of Hurricanes Katrina and Rita among middle-aged, older, and oldest-old adults in the Louisiana Healthy Aging Study (LHAS)', *Journal of Applied Social Psychology*, vol. 40, no. 10, pp. 2463-2487.

Cherry, KE, Silva, JL, & Galea, S 2009, 'Natural disasters and the oldest-old: a psychological perspective on coping and health in late life', *Lifespan perspectives on natural disasters*, Springer, New York, pp. 171-193.

Christensen, JH, Hewitson, B, Busuioc, A, Chen, A, Gao, X, Held, R, Jones, R, Kolli, RK, Kwon, WK, & Laprise, R 2007, 'Regional climate projections', *Climate change, 2007: the physical science basis. contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, pp. 847-940.

Christensen, K, Doblhammer, G, Rau, R, & Vaupel, JW 2009, 'Ageing populations: the challenges ahead', *The Lancet*, vol. 374, no. 9696, pp. 1196-1208.

Clemens, SL, Berry, HL, McDermott, BM, & Harper, CM 2013, 'Summer of sorrow: measuring exposure to and impacts of trauma after Queensland's natural disasters of 2010–2011', *Medical Journal of Australia*, vol. 199, no. 8, pp. 552-555.

Cloke, PJ, Philo, C, & Sadler, D 1991, *Approaching human geography an introduction to contemporary theoretical debates*, Paul Chapman, London.

Cohen, C, & Werker, ED 2008, 'The political economy of “natural” disasters', *Journal of Conflict Resolution*, vol. 52, no. 6, pp. 795-819.

Conner, M, & Norman, P 2005, *Predicting health behaviour*, 2nd edn. Open University Press, Maidenhead, Berkshire.

Conradson, D 2005, 'Questionnaire design and sampling', In R Flowerdew and D Martin (eds), *Methods in human geography: a guide for students doing a research project*. 2nd edn, Pearson Prentice Hall, Harlow, pp. 78-109.

Convertito, C 2011, 'The Health of British Seamen in the West Indies, 1770-1806'. Doctoral thesis, University of Exeter, Exeter, Devon,  
<<https://ore.exeter.ac.uk/repository/bitstream/handle/10036/3918/ConvertitoC.pdf?sequence=3>>.

Cornell, V 2015, 'What do older people's life experiences tell us about emergency preparedness?', *The Australian Journal of Emergency Management*, vol. 30, no. 1, pp. 27-30.

Cornell, VJ, Cusack, L, & Arbon, P 2012, 'Older people and disaster preparedness: a literature review', *The Australian Journal of Emergency Management*, vol. 27, no. 3, pp. 49-53.

Cottrell, A 2016, 'The mesosystem in disaster resilience', In HJ Boon, A Cottrell and D King (eds), *Disasters and social resilience*, Routledge, Oxford, pp. 114-137.

Council of Australian Governments (COAG). National Emergency Management Committee 2011, *National Strategy for Disaster Resilience: building our nation's resilience to disasters*,

<<https://www.ag.gov.au/emergencymanagement/documents/nationalstrategyfordisasterresilience.pdf>>.

Cova, TJ, Dennison, PE, & Drews, FA 2011, 'Modeling evacuate versus shelter-in-place decisions in wildfires', *Sustainability*, vol. 3, no. 10, pp. 1662-1687.

Cova, TJ, Drews, FA, Siebeneck, LK, & Musters, A 2009, 'Protective actions in wildfires: evacuate or shelter-in-place?', *Natural Hazards Review*, vol. 10, no. 4, pp. 151-162.

Crawford, TW, Bradley, DE, & Marcucci, DJ 2013, 'Impacts of in-migration and coastal amenities on housing growth in coastal North Carolina, United States', *Population, Space and Place*, vol. 19, no. 3, pp. 223-238.

Creswell, JW 1998, *Qualitative inquiry and research design: choosing among five traditions*, Sage, Thousand Oaks, Ca.

Creswell, JW 2008, *Research design: qualitative, quantitative, and mixed methods approaches*, Sage, Thousand Oaks, Ca.

Creswell, JW, & Plano Clark, VL 2011, *Designing and conducting mixed methods research*, Sage, Thousand Oaks, Ca.

Creswell, JW, Plano Clark, VL, Gutmann, ML, & Hanson, WE 2003, 'Advanced mixed methods research designs', In A Tashakkori and C Teddlie (eds), *Handbook of mixed methods in social and behavioral research*, Sage, Thousand Oaks, Ca., pp. 209-240.

Crowell, S 2015, 'Existentialism', *Stanford Encyclopaedia of Philosophy*, viewed 22 September 2016, <<http://plato.stanford.edu/entries/existentialism/>>.

Culver, L, Egner, H, Gallini, S, Kneitz, A, Lousley, C, Lübken, U, Mincyte, D, Mom, G, & Winder, G 2011, 'Revisiting risk society: a conversation with Ulrich Beck '. *RCC Perspectives*, vol., no. 6/2011, <[http://www.academia.edu/download/34924045/RCC\\_2011.pdf](http://www.academia.edu/download/34924045/RCC_2011.pdf)>.

Cummings, W 2012, *The Cairns story*, Cummings Economics, Cairns, Qld.

Cutter, SL 1996, 'Vulnerability to environmental hazards', *Progress in Human Geography*, vol. 20, no. 4, pp. 529-539.

Cutter, SL, Barnes, L, Berry, M, Burton, C, Evans, E, Tate, E, & Webb, J 2008, 'A place-based model for understanding community resilience to natural disasters', *Global Environmental Change*, vol. 18, no. 4, pp. 598-606.

Cutter, SL, Boruff, BJ, & Shirley, WL 2003, 'Social vulnerability to environmental hazards', *Social Science Quarterly*, vol. 84, no. 2, pp. 242-261.

Cutter, SL, & Finch, C 2008, 'Temporal and spatial changes in social vulnerability to natural hazards', *Proceedings of the National Academy of Sciences*, vol. 105, no. 7, pp. 2301-2306.

Cvetkovich, G, & Earle, TC 1988, 'Judgment and hazard adaptation: s longitudinal study of responses to the risks of water contamination', *Acta Psychologica*, vol. 68, no. 1, pp. 343-353.

Daily Telegraph, 2011, 3 February, Cardwell residents return to ground zero after Cyclone Yasi smashed the town. *The Daily Telegraph*. viewed 14 April 2014, <<http://www.dailytelegraph.com.au/queensland-cyclone-yasi/news-story/a0ae0dd4b46771a8ba526e6c9bbf4b2b>>

Davis, S, & Bartlett, H 2008, 'Healthy ageing in rural Australia: Issues and challenges', *Australasian Journal on Ageing*, vol. 27, no. 2, pp. 56-60.

de Guzman, EM 2003, *Towards total disaster risk management approach*, United National Office for the Coordination of Humanitarian Affairs, Asian Disaster Response Unit, viewed 23 May 2014, <<http://unpan1.un.org/intradoc/groups/public/documents/apcity/unpan009657.pdf>>.

Dewhurst, C 2014, 'Italians in north Queensland', *Queensland historical atlas*, viewed 1 August 2014, <<http://www.qhatlas.com.au/content/italians-queensland>>.

DiPiazza, SA 2002, *Integrating Political Risk into Enterprise Risk Management*, Price Waterhouse Cooper, <<https://www.pwc.com/gx/en/political-risk-consulting-services/pdf/praermfinal.pdf>>.

Doughney, J, & King, JE 2006, 'Crisis? What Crisis? Myth and Reality in the Debate on an Ageing Australia', *People and Place*, vol. 14, no. 1, pp. 65-74.

Drozdowski, D 2008, 'We're moving out': youth out-migration intentions in coastal non-metropolitan New South Wales', *Geographical Research*, vol. 46, no. 2, pp. 153-161.

Drysdale, R 1991, 'Aged migration to coastal and inland centres in NSW', *Australian Geographical Studies*, vol. 29, no. 2, pp. 268-284.

Eisenman, DP, Cordasco, KM, Asch, S, Golden, JF, & Glik, D 2007, 'Disaster planning and risk communication with vulnerable communities: lessons from Hurricane Katrina', *American Journal of Public Health*, vol. 97, no. Supplement\_1, pp. S109-S115.

Elliott, A 2002, 'Beck's sociology of risk: a critical assessment', *Sociology*, vol. 36, no. 2, pp. 293-315.

Elliott, JR, & Pais, J 2006, 'Race, class, and Hurricane Katrina: Social differences in human responses to disaster', *Social Science Research*, vol. 35, no. 2, pp. 295-321.

ElmerB 2015, Top ten reasons climate change is a hoax, Global Climate Scam.com, viewed 17 September 2016, <<http://www.globalclimatescam.com/opinion/top-ten-reasons-climate-change-is-a-hoax/>>.

Emanuel, K 2005, 'Increasing destructiveness of tropical cyclones over the past 30 years', *Nature*, vol. 436, no. 7051, pp. 686-688.

Emergency Management Australia 2014, *Be prepared*, Emergency Management Australia, Canberra, viewed 16 September 2014, <<http://www.emergency.qld.gov.au/emq/css/emergency.kit.asp>>.

Emergency Management Australia 2014, *Emergency management approaches*, Emergency Management Australia, Canberra, viewed 23 May 2014, <<http://www.em.gov.au/Emergencymanagement/Pages/EmergencyManagementApproaches.aspx>>.

Etkin, D, & Ho, E 2007, 'Climate change: perceptions and discourses of risk', *Journal of Risk Research*, vol. 10, no. 5, pp. 623-641.

Fay-Ramirez, S, Antrobus, E, & Piquero, AR 2015, 'Assessing the effect of the Queensland "Summer of Disasters" on perceptions of collective efficacy', *Social Science Research*, vol. 54, no. 1, pp. 21-35.

Fernandez, LS, Byard, D, Lin, C-C, Benson, S, & Barbera, JA 2002, 'Frail elderly as disaster victims: emergency management strategies', *Prehospital and Disaster Medicine*, vol. 17, no. 2, pp. 67-74.

Few, R 2007, 'Health and climatic hazards: framing social research on vulnerability, response and adaptation', *Global Environmental Change*, vol. 17, no. 2, pp. 281-295.

Finnis, J, Sarkar, A, & Stoddart, MCJ 2015, 'Bridging science and community knowledge? The complicating role of natural variability in perceptions of climate change', *Global Environmental Change*, vol. 32, no. 1, pp. 1-10.

Fothergill, A, & Peek, LA 2004, 'Poverty and disasters in the United States: a review of recent sociological findings', *Natural Hazards*, vol. 32, no. 1, pp. 89-110.

Furukawa, K, Ootsuki, M, Kodama, M, & Arai, H 2012, 'Exacerbation of dementia after the earthquake and tsunami in Japan', *Journal of Neurology*, vol. 259, no. 6, pp. 1243.

Ganter, R 2010, 'Pearling', *Queensland Historical Atlas*, viewed 2 August 2014, <<http://www.qhatlas.com.au/content/pearling>>.

Geoscience Australia 2015, Prevention and mitigation, Geoscience Australia, viewed 15 July 2015, <<http://www.ga.gov.au/scientific-topics/hazards/emergency-management/prevention-mitigation>>.

Giddens, A 1990, *The consequences of modernity*, Stanford University Press, Redwood City, Ca.

Giles, BD, & Balafoutis, CJ 1990, 'The Greek heatwaves of 1987 and 1988', *International Journal of Climatology*, vol. 10, no. 5, pp. 505-517.



- Giuliana, M 2015, 'Theory of attachment and place attachment', In T Lee (ed.), *Psychological theories for environmental issues*, Ashgate, Aldershot, pp. 137-170.
- Glanz, K, & Bishop, DB 2010, 'The role of behavioral science theory in development and implementation of public health interventions', *Annual Review of Public Health*, vol. 31, no. 1, pp. 399-418.
- Goldstraw, P, Strivens, E, Kennett, C, Lie, D, Geddes, J, & Thwaites, J 2012, 'The care of older people during and after disasters: a review of the recent experiences in Queensland, Australia and Christchurch, New Zealand', *Australasian Journal on Ageing*, vol. 31, no. 2, pp. 69-71.
- Gray, DE 2009, *Doing research in the real world*, Sage, London.
- Grech, P 2011, *Report to Queensland Floods Commission of Inquiry addressing town planning issues*, Grech Planners, Sydney,  
<[http://www.floodcommission.qld.gov.au/\\_\\_data/assets/file/0017/10736/Grech\\_Paul\\_Grech\\_Planners.pdf](http://www.floodcommission.qld.gov.au/__data/assets/file/0017/10736/Grech_Paul_Grech_Planners.pdf)>.
- Griggs, P 2010, 'Sugar', *Queensland historical atlas*, viewed 2 August 2014,  
<<http://www.qhatlas.com.au/content/sugar>>.
- Griggs, PD 1997, 'The origins and early development of the small cane farming system in Queensland, 1870–1915', *Journal of Historical Geography*, vol. 23, no. 1, pp. 46-61.
- Grothmann, T, & Reusswig, F 2006, 'People at risk of flooding: why some residents take precautionary action while others do not', *Natural Hazards*, vol. 38, no. 1-2, pp. 101-120.
- Gualdi, S, Scoccimarro, E, & Navarra, A 2007, *Changes in tropical cyclone activity due to global warming: results from a high-resolution coupled general circulation model, CMCC Research Paper 16*,  
<[https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1366806](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1366806)>.
- Guelke, L 1974, 'An idealist alternative in human geography', *Annals of the Association of American Geographers*, vol. 64, no. 2, pp. 193-202.
- Guggenheim, M 2014, 'Introduction: disasters as politics–politics as disasters', *The Sociological Review*, vol. 62, no. S1, pp. 1-16.
- Gurran, N 2008, 'The turning tide: Amenity migration in coastal Australia', *International Planning Studies*, vol. 13, no. 4, pp. 391-414.
- Gurran, N, & Blakely, E 2007, 'Suffer a sea change? Contrasting perspectives towards urban policy and migration in coastal Australia', *Australian Geographer*, vol. 38, no. 1, pp. 113-131.
- Gurran, N, Blakely, EJ, & Squires, C 2007, 'Governance responses to rapid growth in environmentally sensitive areas of coastal Australia', *Coastal Management*, vol. 35, no. 4, pp. 445-465.

- Gurran, N, Hamin, E, & Norman, B 2008, *Planning for climate change: Leading practice principles and models for sea change communities in coastal Australia*, University of Sydney, Faculty of Architecture Design & Planning, <<http://www.pc.gov.au/inquiries/completed/climate-change-adaptation/submissions/sub075-attachment.pdf>>.
- Gurran, N, Squires, C, & Blakely, E 2005, 'Planning for sea change in coastal Australia', *Australian Planner*, vol. 42, no. 4, pp. 10-11.
- Guthrie, G 2010, *Basic research methods: an entry to social science research*, Sage, London.
- Han, JH, & Corcoran, J 2014, 'Ageing Australia: changing location patterns of older people in South East Queensland', *Australian Planner*, vol. 51, no. 1, pp. 2-14.
- Handmer, J 2008, 'Risk creation, bearing and sharing on Australian floodplains', *International Journal of Water Resources Development*, vol. 24, no. 4, pp. 527-540.
- Handmer, J, & Choong, W 2006, 'Disaster resilience through local economic activity in Phuket', *The Australian Journal of Emergency Management*, vol. 21, no. 4, pp. 8-15.
- Handmer, J, & Hillman, M 2004, 'Economic and financial recovery from disaster', *The Australian Journal of Emergency Management*, vol. 19, no. 4, pp. 44-50.
- Hanna, EG, Kjellstrom, T, Bennett, C, & Dear, K 2011, 'Climate change and rising heat: population health implications for working people in Australia', *Asia-Pacific Journal of Public Health*, vol. 23, no. 2 suppl, pp. 14S-26S.
- Harrison, J 2010, 'Colonial immigration to Queensland', *Queensland historical atlas*, <<http://www.qhatlas.com.au/content/colonial-immigration-queensland>>.
- Harwood, S, Carson, D, Wensing, E, & Jackson, L 2014, 'Natural hazard resilient communities and land use planning: the limitations of planning governance in tropical Australia', *Journal of Geography & Natural Disasters*, vol. 4, no. 2, pp. 1-5.
- Hay, C 1995, 'Structure and agency', In D Marsh and G Stoker (eds), *Theory and methods in political science*, Macmillan, London, pp. 189-206.
- Haynes, K, Tibbits, A, Coates, L, Ganewatta, G, Handmer, JW, & McAneney, J 2008, *100 years of Australian civilian bushfire fatalities: exploring the trends in relation to the stay or go policy*, Bushfire Cooperative Research Centre, East Melbourne, Vic., <[https://www.researchgate.net/profile/Lucinda\\_Coates2/publication/242556183\\_100\\_years\\_of\\_Australian\\_civilian\\_bushfire\\_fatalities\\_exploring\\_the\\_trends\\_in\\_relation\\_to\\_the\\_stay\\_or\\_go\\_policy%27/links/54a64502cf256bf8bb4de65.pdf](https://www.researchgate.net/profile/Lucinda_Coates2/publication/242556183_100_years_of_Australian_civilian_bushfire_fatalities_exploring_the_trends_in_relation_to_the_stay_or_go_policy%27/links/54a64502cf256bf8bb4de65.pdf)>.
- Healy, J 2004, *The benefits of an ageing population, Discussion Paper Number 63*, The Australia Institute, Manuka, ACT, <[http://www.tai.org.au/documents/dp\\_fulltext/DP63.pdf](http://www.tai.org.au/documents/dp_fulltext/DP63.pdf)>.

HelpAge International (HAI) 2008, *Older people in disaster and humanitarian crises: Guidelines for best practice*, HelpAge International, London, <<http://www.refworld.org/docid/4124b9f44.html>>.

Hogan, DJ, & Marandola Jr, E 2007, Vulnerability to natural hazards in population-environment studies, Paper presented at the United Nations International Strategy for Disaster Reduction, Population-Environmental Research Network (PERN) Cyberseminar on Population & Natural Hazard United Nations International Strategy for Disaster Reduction, Population-Environmental Research Network (PERN) Cyberseminar on Population & Natural Hazard, Hyogo, 5-19 November 2007.

Holloway, K, Toye, C, McConigley, R, Tieman, J, Currow, D, & Hegarty, M 2015, 'National consultation informing development of guidelines for a palliative approach for aged care in the community setting', *Australasian Journal on Ageing*, vol. 34, no. 1, pp. 21-26.

Horney, JA, MacDonald, PDM, Van Willigen, M, Berke, PR, & Kaufman, JS 2010, 'Individual actual or perceived property flood risk: did it predict evacuation from Hurricane Isabel in North Carolina, 2003?', *Risk Analysis*, vol. 30, no. 3, pp. 501-511.

Horney, JA, MacDonald, PDM, Willigen, M, & Kaufman, JS 2012, 'The importance of effect measure modification when using demographic variables to predict evacuation', *Risk, Hazards & Crisis in Public Policy*, vol. 3, no. 1, pp. 1-19.

Hrostowski, S, & Rehner, T 2012, 'Five years later: resiliency among older adult survivors of Hurricane Katrina', *Journal of Gerontological Social Work*, vol. 55, no. 4, pp. 337-351.

Hudson, LA, & Ozanne, JL 1988, 'Alternative ways of seeking knowledge in consumer research', *Journal of Consumer Research*, vol. 14, no. 4, pp. 508-521.

Huerta, F, & Horton, R 1978, 'Coping behaviour of older adult flood victims', *Gerontologist*, vol. 18, no. 6, pp. 541-546.

Hugo, G 2007, 'Contextualising the crisis in aged care in Australia: a demographic perspective', *Australian Journal of Social Issues*, vol. 42, no. 2, pp. 170-182.

Hulme, M 2009, *Why we disagree about climate change: understanding controversy, inaction and opportunity*, Cambridge University Press, Cambridge.

Ikeda, S, Sato, T, & Fukuzono, T 2008, 'Towards an integrated management framework for emerging disaster risks in Japan', *Natural Hazards*, vol. 44, no. 2, pp. 267-280.

Intergovernmental Panel on Climate Change (IPCC) 2007, *Climate change 2007-impacts, adaptation and vulnerability: Working group II contribution to the fourth assessment report of the IPCC: summary for policymakers*, IPCC Secretariat, Geneva, <[http://www.meteotrentino.it/clima/pdf/rapporti\\_meteo/IPCC\\_Impacts\\_Adaptation\\_and\\_Vulnerability.pdf](http://www.meteotrentino.it/clima/pdf/rapporti_meteo/IPCC_Impacts_Adaptation_and_Vulnerability.pdf)>.

International Federation of Red Cross and Red Crescent Societies (IFRC) 2007, *World disasters report 2007: focus on discrimination*, International Federation of Red Cross and Red Crescent Societies, Geneva,  
<<http://www.ifrc.org/Global/Publications/disasters/WDR/WDR2007-English.pdf>>.

International Strategy for Disaster Reduction 2007, *Building disaster resilient communities: good practices and lessons learned*, United Nations, Geneva. , Global Network of NGOs for Disaster Risk Reduction, Geneva,  
<[http://www.unisdr.org/files/596\\_10307.pdf](http://www.unisdr.org/files/596_10307.pdf)>.

James, X, Hawkins, A, & Rowel, R 2007, 'An assessment of the cultural appropriateness of emergency preparedness communication for low income minorities', *Journal of Homeland Security and Emergency Management*, vol. 4, no. 3, pp. 1-24.

Jasanoff, S 1998, 'The political science of risk perception', *Reliability Engineering & System Safety*, vol. 59, no. 1, pp. 91-99.

Jasper, MA 1994, 'Issues in phenomenology for researchers of nursing', *Journal of Advanced Nursing*, vol. 19, no. 2, pp. 309-314.

Jensen, M 2014, *Structure, agency and power: a comparison of Bourdieu and Foucault*, *Central Debates in Anthropology*, viewed 22 September 2016,  
<[https://www.academia.edu/10258956/Structure\\_Agency\\_and\\_Power\\_A\\_Comparison\\_of\\_Bourdieu\\_and\\_Foucault](https://www.academia.edu/10258956/Structure_Agency_and_Power_A_Comparison_of_Bourdieu_and_Foucault)>.

Jia, Z, Tian, W, Liu, W, Cao, Y, Yan, J, & Shun, Z 2010, 'Are the elderly more vulnerable to psychological impact of natural disaster? A population-based survey of adult survivors of the 2008 Sichuan earthquake'. *BMC Public Health*, vol. 10, doi:10.1186/1471-2458-10-172,  
<<http://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-10-172>>.

Johnson, B, & Christensen, L 2008, *Educational research: quantitative, qualitative, and mixed approaches*, Sage, Thousand Oaks, Ca.

Johnson, PF, Johnson, CE, & Sutherland, C 2012, 'Stay or go? Human behavior and decision making in bushfires and other emergencies', *Fire Technology*, vol. 48, no. 1, pp. 137-153.

Johnson, RB, & Onwuegbuzie, AJ 2004, 'Mixed methods research: A research paradigm whose time has come', *Educational Researcher*, vol. 33, no. 7, pp. 14-26.

Johnston, RJ, & Sidaway, J 1979, *Geography and geographers* Oxford University Press, Oxford.

Jonassen, DH 1991, 'Objectivism versus constructivism: Do we need a new philosophical paradigm?', *Educational Technology Research and Development*, vol. 39, no. 3, pp. 5-14.

Kalache, A, Barreto, SM, & Keller, I 2005, 'Global ageing: the demographic revolution in all cultures and societies', In M Johnson, V Bengtson, P Coleman and T Kirkwood

(eds), *The Cambridge handbook of age and ageing*, Cambridge University Press, Cambridge, pp. 30-46.

Kamenev, M 2011, Australia's worst cyclones: timeline, Australian Geographic, viewed 1 August 2014, <<http://www.australiangeographic.com.au/topics/science-environment/2011/02/australias-worst-cyclones-timeline/>>.

Kaplow, L 1991, 'Incentives and government relief for risk', *Journal of risk and Uncertainty*, vol. 4, no. 2, pp. 167-175.

Kelly, J 2015, 'Housing for seniors needs action'. *Australian Ageing Agenda*, vol. Mar/Apr 2015, viewed 16 July 2015, <<https://search.informit.com.au/fullText;dn=167849935509597;res=IELFSC>>.

Kevern, J, & Webb, C 2001, 'Focus groups as a tool for critical social research in nurse education', *Nurse Education Today*, vol. 21, no. 4, pp. 323-333.

Khazai, B, Daniell, JE, & Wenzel, F 2011, 'The March 2011 Japan earthquake: Analysis of losses, impacts, and implications for the understanding of risks posed by extreme events'. *Technikfolgenabschätzung–Theorie und Praxis*, vol. 20, no. 3, pp. 22-33, viewed 29 March 2014, <[http://www.tatup-journal.de/downloads/2011/tatup113\\_khual1a.pdf](http://www.tatup-journal.de/downloads/2011/tatup113_khual1a.pdf)>.

Kilijanek, TS, & Drabek, TE 1980, 'Assessing long-term impacts of a natural disaster: a focus on the elderly'. *The Gerontologist*, vol. 19, no. 6, pp. 555-566.

King, D 2015, 'The exosystem and the community', In H Boon, A Cottrell and D King (eds), *Disasters and social resilience: a bioecological approach*, Routledge, Oxford, pp. 139-161.

King, D, Ginger, J, Williams, S, Cottrell, A, Gurtner, Y, Leitch, C, Henderson, D, Jayasinghe, N, Kim, P, & Booth, K 2012, *Planning, building and insuring: Adaptation of built environment to climate change induced increased intensity of natural hazards*, <[https://www.nccarf.edu.au/sites/default/files/attached\\_files\\_publications/King\\_2013\\_Planning\\_building\\_and\\_insuring.pdf](https://www.nccarf.edu.au/sites/default/files/attached_files_publications/King_2013_Planning_building_and_insuring.pdf)>.

King, D, & MacGregor, C 2000, 'Using social indicators to measure community vulnerability to natural hazards', *The Australian Journal of Emergency Management*, vol. 15, no. 3, pp. 52-57.

King, R, Warnes, AM, & Williams, AM 1998, 'International retirement migration in Europe', *International Journal of Population Geography*, vol. 4, no. 2, pp. 91-111.

Knutson, TR, McBride, JL, Chan, J, Emanuel, K, Holland, G, Landsea, C, Held, I, Kossin, JP, Srivastava, A, & Sugi, M 2010, 'Tropical cyclones and climate change', *Nature Geoscience*, vol. 3, no. 3, pp. 157-163.

Krongkant, P, & Ahmad, MM 2010, 'Typhoon risk perceptions and evacuation decisions of older persons: a case study of a rural community in southern Thailand', *International Journal of Emergency Management*, vol. 7, no. 2, pp. 190-205.

Krueger, R, & Casey, M 2000, *Focus groups: a practical guide for applied research*, Sage, Thousand Oaks, Ca.

Kumar, R 2000, *Research methodology: a step-by-step guide for beginners*, Sage, London.

Landsea, C 2007, Frequently asked questions, National Oceanic and Atmospheric Administration. Hurricane Research Division. Atlantic Oceanographic & Meteorological Laboratory, viewed 19 September 2016, <<http://www.aoml.noaa.gov/hrd/tcfaq/G3.html>>.

Lang, RS, & Armour, A 1981, *The assessment and review of social impacts*, Federal Environmental Assessment Review Office, Ottawa, Canada.

Leech, NL, & Onwuegbuzie, AJ 2009, 'A typology of mixed methods research designs', *Quality & Quantity*, vol. 43, no. 2, pp. 265-275.

Leroux, A, & MacLaren, D 2011, 'The optimal time to remove quarantine bans under uncertainty: the case of Australian bananas', *Economic Record*, vol. 87, no. 276, pp. 140-152.

Li, GM 2009, 'Tropical cyclone risk perceptions in Darwin, Australia: a comparison of different residential groups', *Natural hazards*, vol. 48, no. 3, pp. 365-382.

Liamputtong, P, & Ezzy, D 2005, *Qualitative research methods*, 3rd edn. Oxford University Press, New York.

Lidstone, J 1994, 'Learning to Live Safely in the Australian Environment', In JW Handmer (ed.), *Education for disaster reduction*, Australian National University, Canberra, pp. 15-22.

Lindsay, S, & Comisley, S 2012, *Final Report: Scheduling Banana Production after Tropical Cyclones for Australian Banana Growers Council*, Queensland Department of Agriculture, Fisheries and Forestry, Brisbane, Qld.

Loos, N 2008, *The history of North Queensland in black and white: a personal retrospective*, Sir Robert Philip Lecture Series number 2, 7 July 2008, Citilibraries, Thuringowa, Qld.

Luszczynska, A, Scholz, U, & Schwarzer, R 2005, 'The general self-efficacy scale: multicultural validation studies', *The Journal of Psychology*, vol. 139, no. 5, pp. 439-457.

Luxton, E 2005, How much do natural hazards cost the world?, World Economic Forum, viewed 19 September 2016, <<https://www.weforum.org/agenda/2015/12/how-much-do-natural-disasters-cost-the-world/>>.

Macnaughton, S, Webb, T, & Rolfe, J 2012, *The Flood Commission calls for a uniform approach to planning for floods*, Lawyers McCullough Robertson, viewed 24 April

2014,

<[http://www.mccullough.com.au/page/Publications/Planning\\_and\\_Environment/The\\_Flood\\_Commission\\_calls\\_for\\_a\\_uniform\\_approach\\_to\\_planning\\_for\\_floods/Planning\\_and\\_Environment\\_-\\_12\\_April\\_2012/](http://www.mccullough.com.au/page/Publications/Planning_and_Environment/The_Flood_Commission_calls_for_a_uniform_approach_to_planning_for_floods/Planning_and_Environment_-_12_April_2012/)>.

Marshall, N, Murphy, P, Burney, I, & Hugo, G 2003, *Welfare Outcomes of Migration of Low-Income Earners from Metropolitan to Non-Metropolitan Australia*, Australian Housing and Urban Research Institute AHURI Positioning Paper No. 34, AHURI, Melbourne, Vic.,

<[https://www.ahuri.edu.au/\\_\\_data/assets/pdf\\_file/0015/2850/AHURI\\_Positioning\\_Paper\\_No34\\_Welfare\\_outcomes\\_of\\_migration\\_of\\_low\\_income\\_earners.pdf](https://www.ahuri.edu.au/__data/assets/pdf_file/0015/2850/AHURI_Positioning_Paper_No34_Welfare_outcomes_of_migration_of_low_income_earners.pdf)>.

Masozera, M, Bailey, M, & Kerchner, C 2007, 'Distribution of impacts of natural disasters across income groups: A case study of New Orleans', *Ecological Economics*, vol. 63, no. 2, pp. 299-306.

Matten, D 2004, 'The impact of the risk society thesis on environmental politics and management in a globalizing economy—principles, proficiency, perspectives', *Journal of Risk Research*, vol. 7, no. 4, pp. 377-398.

Maxcy, SJ 2003, 'Pragmatic threads in mixed methods research in the social sciences: The search for multiple modes of inquiry and the end of the philosophy of formalism', In A Tashakkori and C Teddlie (eds), *Handbook of mixed methods in social and behavioral research*, Sage, Thousand Oaks, Ca., pp. 51-89.

Mayhorn, CB 2005, 'Cognitive aging and the processing of hazard information and disaster warnings', *Natural Hazards Review*, vol. 6, no. 4, pp. 165-170.

McCann, DG 2011, 'A review of hurricane disaster planning for the elderly', *World Medical & Health Policy*, vol. 3, no. 1, pp. 1-26.

McEwan, I 2012, *Comments on Queensland Flood Commission of Inquiry final report* Engineers Australia Queensland Division, Brisbane,  
<[https://www.engineersaustralia.org.au/sites/default/files/shado/Divisions/Queensland%20Division/ea\\_flood\\_response\\_official\\_release.pdf](https://www.engineersaustralia.org.au/sites/default/files/shado/Divisions/Queensland%20Division/ea_flood_response_official_release.pdf)>.

McFarlane, AC 2005, 'Psychiatric morbidity following disasters: epidemiology, risk and protective factors', In JJ López-Ibor, G Christodolou, M Maj, N Sartorius and A Okasha (eds), *Disaster and mental health*, Wiley, Chichester, West Sussex, pp. 37-63.

McGregor, R 2010, 'Whiteness in the tropics', *Queensland historical atlas*,  
<<http://www.qhatlas.com.au/content/whiteness-tropics>>.

McIvor, D, & Paton, D 2007, 'Preparing for natural hazards: normative and attitudinal influences', *Disaster Prevention and Management: An International Journal*, vol. 16, no. 1, pp. 79-88.

McKendrick, JH 1999, 'Multi-method research: an introduction to its application in population geography', *The Professional Geographer*, vol. 51, no. 1, pp. 40-50.

- McLafferty, I 2004, 'Focus group interviews as a data collecting strategy', *Journal of Advanced Nursing*, vol. 48, no. 2, pp. 187-194.
- McLennan, BJ, & Handmer, J 2012, 'Reframing responsibility-sharing for bushfire risk management in Australia after Black Saturday', *Environmental Hazards*, vol. 11, no. 1, pp. 1-15.
- McQuillan, C [nd], 'German idealism', *Internet encyclopaedia of philosophy*, viewed 22 September 2016, <<http://www.iep.utm.edu/germidea/>>.
- Mendelsohn, R, Emanuel, K, & Chonabayashi, S 2011, 'The impact of climate change on tropical cyclone damages'. *National Center for Environmental Economics Report*, vol. Number EE-0566, <[https://yosemite.epa.gov/ee/epa/erm.nsf/vwAN/EE-0566-104.pdf/\\$file/EE-0566-104.pdf](https://yosemite.epa.gov/ee/epa/erm.nsf/vwAN/EE-0566-104.pdf/$file/EE-0566-104.pdf)>.
- Menter, I, Elliot, D, Hulme, M, Lewin, J, & Lowden, K 2011, 'Questionnaires and questionnaire design', *A guide to practitioner research in education*, Sage, Thousand Oaks, Ca., pp. 104-125.
- Mercer, DC, & Powell, JM 1972, *Phenomenology and related non-positivistic viewpoints in the social sciences, Geography volume 1*, Department of Geography, Monash University, Melbourne, Vic.
- Mergel, T 2012, 'Modernization', *European History Online (EGO)*, viewed 22 September 2016, <<http://ieg-ego.eu/en/threads/models-and-stereotypes/modernization>>.
- Mileti, D 1999, *Disasters by design: a reassessment of natural hazards in the United States*, Joseph Henry Press, Washington, D.C.
- Mileti, DS, & Sorensen, JH 1990, 'Communication of emergency public warnings'. *Landslides*, vol. 1, no. 6, pp. 52-70, viewed 13 October 2012, <[http://cires.mx/docs\\_info/CIRES\\_003.pdf](http://cires.mx/docs_info/CIRES_003.pdf)>.
- Morrissey, S, & Reser, J 2003, 'Evaluating the effectiveness of psychological preparedness advice in community cyclone preparedness materials', *Australian Journal of Emergency Management*, vol. 18, no. 2, pp. 46-61.
- Morse, JM 2003, 'Principles of mixed methods and multimethod research design', In A Tashakkori and C Teddlie (eds), *Handbook of mixed methods in social and behavioral research*, Sage, Thousand Oaks, Ca., pp. 189-208.
- Muramatsu, N, & Akiyama, H 2011, 'Japan: super-aging society preparing for the future', *The Gerontologist*, vol. 51, no. 4, pp. 425-432.
- Ngo, EB 2001, 'When disasters and age collide: reviewing vulnerability of the elderly', *Natural Hazards Review*, vol. 2, no. 2, pp. 80-89.
- Norio, O, Ye, T, Kajitani, Y, Shi, P, & Tatano, H 2011, 'The 2011 eastern Japan great earthquake disaster: overview and comments', *International Journal of Disaster Risk Science*, vol. 2, no. 1, pp. 34-42.



Nott, J 2006, *Extreme events: a physical reconstruction and risk assessment*, Cambridge University Press, Cambridge.

O'Connor, RE, Bord, RJ, & Fisher, A 1999, 'Risk perceptions, general environmental beliefs, and willingness to address climate change', *Risk Analysis*, vol. 19, no. 3, pp. 461-471.

Ollerenshaw, A, Dahlhaus, P, McDonald, K, Courvisanos, J, Graymore, M, Thompson, H, Sheil, H, Miner, A, & Corbett, J 2014, *Understanding the 2011 Grampians Natural Disaster, addressing the risk and resilience final report*, Federation University. Grampians Natural Disaster Research, Ballarat, Vic.,  
<[http://muse.cecc.com.au/programs/maynard/view\\_resource.php?resource\\_id=4087&account=1231b297284857baba85176bb824e377](http://muse.cecc.com.au/programs/maynard/view_resource.php?resource_id=4087&account=1231b297284857baba85176bb824e377)>.

Olsen, W 2004, 'Triangulation in social research: qualitative and quantitative methods can really be mixed', In M Holborn (ed.), *Developments in Sociology*, Causeway Press, Omskirk, West Lancashire, pp. 1-30.

Olson, RS 2000, 'Toward a politics of disaster: Losses, values, agendas, and blame', In A Boin (ed.), *Crisis Management, volume III*, Sage, Thousand Oaks, Ca., pp. 154-167.

Onwuegbuzie, AJ, & Collins, KMT 2007, 'A typology of mixed methods sampling designs in social science research', *The Qualitative Report*, vol. 12, no. 2, pp. 281-316.

Oppenheim, AN 2000, *Questionnaire design, interviewing and attitude measurement*, Continuum, New York.

Oreskes, N, & Conway, EM 2011, *Merchants of doubt: How a handful of scientists obscured the truth on issues from tobacco smoke to global warming*, Bloomsbury Publishing, New York.

Organization of American States [1990], *Disaster, planning and development : managing natural hazards to reduce loss*, Organization of American States. Natural Hazards Project, Washington, D.C.

Oven, KJ, Curtis, SE, Reaney, S, Riva, M, Stewart, MG, Ohlemüller, R, Dunn, CE, Nodwell, S, Dominelli, L, & Holden, R 2012, 'Climate change and health and social care: defining future hazard, vulnerability and risk for infrastructure systems supporting older people's health care in England', *Applied Geography*, vol. 33, no. 1, pp. 16-24.

Owens, JK 2010, 'How individuals with chronic illnesses manage health-related concerns during disasters: development of a theoretical framework'. Doctoral thesis, Kent State University, Kent, Ohio.

Palacios, R 2002, 'The future of global ageing', *International Journal of Epidemiology*, vol. 31, no. 4, pp. 786-791.

- Pandey, BH, & Okazaki, K 2005, 'Community-based disaster management: empowering communities to cope with disaster risks', *Regional Development Dialogue*, vol. 26, no. 2, pp. 52.
- Parfitt, J 2005, 'Questionnaire design and sampling', In R Flowerdew and D Martin (eds), *Methods in human geography: a guide for students doing a research project*, Pearson Education, Denver, Co., pp. 76-109.
- Paton, B, Martin, S, & Weir, N 2004, 'Doing phenomenological research collaboratively', *The Journal of Continuing Education in Nursing*, vol. 35, no. 4, pp. 176-181.
- Paton, D 2003, 'Disaster preparedness: a social-cognitive perspective', *Disaster Prevention and Management: An International Journal*, vol. 12, no. 3, pp. 210-216.
- Paton, D 2007, 'Preparing for natural hazards: the role of community trust', *Disaster Prevention and Management: An International Journal*, vol. 16, no. 3, pp. 370-379.
- Paton, D 2008, 'Risk communication and natural hazard mitigation: how trust influences its effectiveness', *International Journal of Global Environmental Issues*, vol. 8, no. 1-2, pp. 2-16.
- Paton, D, & Jang, L-j 2016, 'Earthquake Readiness and Recovery: An Asia-Pacific Perspective', In S D'Amico (ed.), *Earthquakes and their Impact on society*, Springer, Cham, Switzerland, pp. 647-663.
- Paton, D, & Johnston, D 2001, 'Disasters and communities: vulnerability, resilience and preparedness', *Disaster Prevention and Management*, vol. 10, no. 4, pp. 270-277.
- Patton, MQ 1990, *Qualitative evaluation and research methods*, 2nd edn. Sage, Thousand Oaks, Ca.
- Peduzzi, P, Chatenoux, B, Dao, H, De Bono, A, Herold, C, Kossin, J, Mouton, F, & Nordbeck, O 2012, 'Global trends in tropical cyclone risk', *Nature Climate Change*, vol. 2, no. 4, pp. 289-294.
- Peel, J, & Godden, L 2010, *Environmental law: scientific, policy and regulatory dimensions*, Oxford University Press, South Melbourne, Vic.
- Pekovic, V, Seff, L, & Rothman, M 2007, 'Planning for and responding to special needs of elders in natural disasters', *Generations*, vol. 31, no. 4, pp. 37-41.
- Pelling, M, & Dill, K 2009, 'Disaster politics: tipping points for change in the adaptation of sociopolitical regimes', *Progress in Human Geography*, vol. 34, no. 1, pp. 21-37.
- Pielke Jr, RA, Landsea, C, Mayfield, M, Laver, J, & Pasch, R 2005, 'Hurricanes and global warming', *Bulletin of the American Meteorological Society*, vol. 86, no. 11, pp. 1571-1575.

Queensland Floods Commission of Inquiry 2012, *Final report*, The Commission, Brisbane, Qld.,  
<[http://www.floodcommission.qld.gov.au/\\_\\_data/assets/pdf\\_file/0007/11698/QFCI-Final-Report-March-2012.pdf](http://www.floodcommission.qld.gov.au/__data/assets/pdf_file/0007/11698/QFCI-Final-Report-March-2012.pdf)>.

Queensland Government (QG) 2009, *Far North Queensland regional plan 2009-2031*, Queensland Department of Infrastructure and Planning, Brisbane, Qld.,  
<<http://dilgp.qld.gov.au/resources/plan/far-north-queensland/fnq-regional-plan-2009-31.pdf>>.

Queensland Government (QG) 2013, *Social impact assessment guidelines*, Queensland Department of State Development, Infrastructure and Planning, Brisbane, Qld.,  
<<http://www.statedevelopment.qld.gov.au/resources/guideline/social-impact-assessment-guideline.pdf>>.

Queensland Government (QG) 2014, *Queensland regional profiles*, Queensland Government Statistician's Office, Brisbane, Qld., viewed 12 June 2014,  
<<http://statistics.qgso.qld.gov.au/qld-regional-profiles>>.

Queensland Government (QG) 2016, Business and industry portal, Queensland regions, Queensland Government, viewed 16 August 2016,  
<<https://www.business.qld.gov.au/invest/queenslands-regional-locations/queensland-regions>>.

Queensland Government Statistician's Office 2013, Population growth highlights and trends, Queensland, Queensland Government Statistician's Office,  
<http://www.qgso.qld.gov.au/products/reports/pop-growth-highlights-trends-qld/pop-growth-highlights-trends-qld-2013.pdf>>.

Queensland Government Statistician's Office 2015, *Queensland seniors, 2013–14*, Queensland Government Statistician's Office, Brisbane, Qld., viewed 8 August 2016,  
<<http://www.qgso.qld.gov.au/products/reports/qld-seniors/qld-seniors-2013-14.pdf>>.

Queensland Reconstruction Authority 2011, *Planning for stronger, more resilient floodplains: Part 1 – Interim measures to support floodplain management in existing planning schemes*, The Authority, Brisbane, Qld.,  
<<http://www.qldreconstruction.org.au/u/lib/cms2/resilient-floodplains-part1-full.pdf>>.

Queensland Reconstruction Authority 2011, *Planning for stronger, more resilient floodplains: Part 2 – Measures to support floodplain management in existing planning schemes*, The Authority, Brisbane, Qld.,  
<<http://www.qldreconstruction.org.au/u/lib/cms2/resilient-floodplains-part2-full.pdf>>.

Reichertz, J 2010, 'Abduction: The logic of discovery of grounded theory'. *Forum: Qualitative Social Research: Sozialforschung*, vol. 11, no. 1, viewed 4 November 2016,  
<<http://www.qualitative-research.net/index.php/fqs/article/view/1412/2902>>.

Reiners, GM 2012, 'Understanding the differences between Husserl's (descriptive) and Heidegger's (interpretive) phenomenological research'. *Journal of Nursing & Care*, vol. 1, no. 5, doi:10.4172/2167-1168.1000119,

<<http://www.omicsgroup.org/journals/understanding-the-differences-husserls-descriptive-and-heideggers-interpretive-phenomenological-research-2167-1168.1000119.php?aid=8614>>.

Renn, O, Burns, WJ, Kasperson, JX, Kasperson, RE, & Slovic, P 1992, 'The social amplification of risk: theoretical foundations and empirical applications', *Journal of Social Issues*, vol. 48, no. 4, pp. 137-160.

Reser, JP 2007, 'The experience of natural disasters: Psychological perspectives and understandings', In J Lidstone, LM Dechano and JP Stoltman (eds), *International perspectives on natural disasters: Occurrence, mitigation, and consequences*, Springer, Dordrecht, The Netherlands, pp. 369-384.

Riebeek, H 2005, The rising cost of natural hazards, NASA Earth Observatory, viewed 19 September 2016 <<http://earthobservatory.nasa.gov/Features/RisingCost/>>.

Rietveld, K, Simms, A, & Sparrow, J 2001, 'The ecology of disaster recovery', In IFoRCaRCS (IFRC) (ed.), *World Disasters Report 2001: Focus on Recovery*, International Federation of Red Cross and Red Crescent Societies, Geneva, Switzerland, pp. 35-57.

Risk Frontiers 2012, *Historical analysis of natural hazard building losses and fatalities for Queensland 1900-2011*, Queensland Department of Community Safety, Brisbane, Qld., <<http://www.disaster.qld.gov.au/Disaster-Resources/Documents/Historical%20analysis%20of%20natural%20hazard%20building%20losses%20and%20fatalities%20for%20Queensland%201900-2011.pdf>>.

Roocke, N 2013, Lessons from Larry show cyclones can be ovals, ABC, viewed 12 April 2014, <<http://www.abc.net.au/news/2013-06-26/nrn-cyclone-larry-lessons/4782368>>.

Sarewitz, D, Pielke, R, & Keykhah, M 2003, 'Vulnerability and risk: some thoughts from a political and policy perspective', *Risk Analysis*, vol. 23, no. 4, pp. 805-810.

Saunders, MNK 2012, *Research methods for business students*, 6th edn. Pearson, New York.

Savin-Baden, M, & Major, CH 2013, *Qualitative research: The essential guide to theory and practice*, Routledge, London.

Scannell, L, & Gifford, R 2010, 'Defining place attachment: a tripartite organizing framework', *Journal of Environmental Psychology*, vol 30, no. 1, pp. 1-10.

Schipper, L, & Pelling, M 2006, 'Disaster risk, climate change and international development: scope for, and challenges to, integration', *Disasters*, vol. 30, no. 1, pp. 19-38.

Schoorl, J, Heering, L, Esveldt, I, Groenewold, G, & van der Erf, R 2000, *Push and pull factors of international migration: a comparative report*, Office for Official

- Publications of the European Communities,  
<<https://www.nidi.nl/shared/content/output/2000/eurostat-2000-theme1-pushpull.pdf>>.
- Schoorl, J, Heering, L, Esveldt, I, Groenewold, G, & van der Erf, R 2000, *Push and pull factors of international migration: a comparative report*,  
<<https://www.nidi.nl/shared/content/output/2000/eurostat-2000-theme1-pushpull.pdf>>.
- Seamon, D, & Lundberg, A 2015, 'Humanistic geography', In D Richardson, N Castree, MF Goodchild, A Kobayashi, W Liu, RA Marston and KF Al-Hindi (eds), *International encyclopedia of geography: people, the earth, environment, and technology*, Wiley, New York, pp. 1-11.
- Seamon, D, & Sowers, J 2009, 'Existentialism/existential geography', In R Kitchen and N Thrift (eds), *The international encyclopedia of human geography*, vol. 3, Elsevier, Oxford, pp. 666-671.
- Semenza, JC, Rubin, CH, Falter, KH, Selanikio, JD, Flanders, WD, Howe, HL, & Wilhelm, JL 1996, 'Heat-related deaths during the July 1995 heat wave in Chicago', *New England Journal of Medicine*, vol. 335, no. 2, pp. 84-90.
- Sharma, A 2012, 'Temporal and Spatial Analysis of Later-Life Migration into Florida from 1980–2010 with an Application of the Palm Bay Parkway', *Planning Theory & Practice*, vol. 13, no. 4, pp. 631-640.
- Sheng, X, Simpson, PM, & Siguaw, JA 2014, 'US winter migrants' park community attributes: An importance–performance analysis', *Tourism Management*, vol. 43, no. 1, pp. 55-67.
- Silverman, MA, Weston, M, Llorente, M, Beber, C, & Tam, R 1995, 'Lessons learned from Hurricane Andrew: recommendations for care of the elderly in long-term care facilities', *Southern Medical Journal*, vol. 88, no. 6, pp. 603-608.
- Sim, J 1998, 'Collecting and analysing qualitative data: issues raised by the focus group', *Journal of Advanced Nursing*, vol. 28, no. 2, pp. 345-352.
- Sjöberg, L 2000, 'Factors in risk perception', *Risk Analysis*, vol. 20, no. 1, pp. 1-12.
- Sleebos, JE 2003, 'Low fertility rates in OECD countries: facts and policy responses'. *OECD Social, Employment and Migration Working Papers*, vol. 15, doi:10.1787/568477207883, <[http://www.oecd-ilibrary.org/low-fertility-rates-in-oecd-countries\\_5lgsjhvj7qg7.pdf?contentType=%2fns%2fWorkingPaper&itemId=%2fcontent%2fworkingpaper%2f568477207883&mimeType=application%2fpdf&containerItemId=%2fcontent%2fworkingpaperseries%2f18151981&accessItemIds=&option6=imprint&value6=http%3a%2f%2foecd.metastore.ingenta.com%2fcontent%2fimprint%2foecd](http://www.oecd-ilibrary.org/low-fertility-rates-in-oecd-countries_5lgsjhvj7qg7.pdf?contentType=%2fns%2fWorkingPaper&itemId=%2fcontent%2fworkingpaper%2f568477207883&mimeType=application%2fpdf&containerItemId=%2fcontent%2fworkingpaperseries%2f18151981&accessItemIds=&option6=imprint&value6=http%3a%2f%2foecd.metastore.ingenta.com%2fcontent%2fimprint%2foecd)>.
- Slovic, P 1986, 'Informing and educating the public about risk', *Risk Analysis*, vol. 6, no. 4, pp. 403-415.
- Slovic, P (ed.) 2000, *The perception of risk*, Earthscan Publications, London.

Smailes, P, Griffin, T, & Argent, N 2014, 'Demographic change, differential ageing, and public policy in rural and regional Australia: a three-state case study', *Geographical Research*, vol. 52, no. 3, pp. 229-249.

Smith, DM, Gregory, D, & Johnston, RJ 1994, *The dictionary of human geography*, Blackwell Reference, Oxford.

Smith, DW 2013, 'Phenomenology', *Stanford Encyclopedia of Philosophy*, viewed 22 September 2016, <<https://plato.stanford.edu/entries/phenomenology/>>.

Smith, T, & Doherty, M 2006, *The suburbanisation of coastal Australia*, Australia. Department of the Environment, Canberra, ACT, <<http://155.187.2.69/soe/2006/publications/integrative/coastal/pubs/coastal.pdf>>.

Solangaarachchi, D, Griffin, AL, & Doherty, MD 2012, 'Social vulnerability in the context of bushfire risk at the urban-bush interface in Sydney: a case study of the Blue Mountains and Ku-ring-gai local council areas', *Natural Hazards*, vol. 64, no. 2, pp. 1873-1898.

Stevens, MR, Song, Y, & Berke, PR 2010, 'New Urbanist developments in flood-prone areas: safe development, or safe development paradox?', *Natural Hazards*, vol. 53, no. 3, pp. 605-629.

Sydney Morning Herald 2006, Homes to tumble 'like house of cards', Sydney Morning Herald, viewed 14 August 2014, <<http://www.smh.com.au/environment/weather/homes-to-tumble-like-a-house-of-cards-20110202-1ad92.html>>.

Tatsuki, S 2012, 'Challenges in Counter-disaster Measures for People with Functional Needs in Times of Disaster Following the Great East Japan Earthquake', *International Journal of Japanese Sociology*, vol. 21, no. 1, pp. 12-20.

Taylor, C, & Donoghue, J 2015, 'New ways to provide community aged care services', *Australasian Journal on Ageing*, vol. 34, no. 3, pp. 199-200.

Teague, B, McLeod, R, & Pascoe, S 2010, *2009 Victorian bushfires royal commission: Final report*, 2009 Victorian Bushfires Royal Commission, Melbourne, <<http://www.royalcommission.vic.gov.au/Commission-Reports/Final-Report.html>>.

Thomas, SJ 2004, *Using web and paper questionnaires for data-based decision making: From design to interpretation of the results*, Corwin Press, Thousand Oaks, Ca.

Timmermans, S, & Tavory, I 2012, 'Theory construction in qualitative research from grounded theory to abductive analysis', *Sociological Theory*, vol. 30, no. 3, pp. 167-186.

Tuan, Y-F 1976, 'Humanistic geography', *Annals of the Association of American Geographers*, vol. 66, no. 2, pp. 266-276.

Tuohy, R, & Stephens, C 2016, 'Older adults' meanings of preparedness: a New Zealand perspective', *Ageing and Society*, vol. 36, no. 03, pp. 613-630.

United Nations (UN) 2002, *World population ageing: 1950-2050*, United Nations. Department of Economic and Social Affairs Population Division New York, <<http://www.un.org/esa/population/publications/worldageing19502050/>>.

United Nations (UN) 2015, World population aging report 2015, United Nations, viewed 8 August 2016, <[http://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2015\\_Report.pdf](http://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2015_Report.pdf)>.

United Nations Environment Program 2004, 'Impacts of summer 2003 heat wave in Europe'. *Environment Alert Bulletin*, vol. 2, <[http://www.unisdr.org/files/1145\\_ewheatwave.en.pdf](http://www.unisdr.org/files/1145_ewheatwave.en.pdf)>.

United States Census Bureau 2016, Quick facts: Florida, U.S. Department of Commerce, viewed 20 September 2016 <<http://www.census.gov/quickfacts/table/PST045215/12>>.

United States Department of Agriculture 2006, Cyclone Larry lashes northeastern Queensland, United States Department of Agriculture Foreign Agricultural Service, viewed 4 July 2016, <[http://pecad.fas.usda.gov/highlights/2006/03/australia\\_23mar2006/](http://pecad.fas.usda.gov/highlights/2006/03/australia_23mar2006/)>.

University of Adelaide. Hugo Centre for Migration and Population Research 2015, ARIA: Accessibility/Remoteness Index of Australia, University of Adelaide. Hugo Centre for Migration and Population Research, viewed 25 September 2016, <[https://www.adelaide.edu.au/apmrc/research/projects/category/about\\_aria.html](https://www.adelaide.edu.au/apmrc/research/projects/category/about_aria.html)>.

University of Queensland 2014, Queensland places, University of Queensland. Centre for the Government of Queensland, viewed 1 August 2014, <<http://www.queenslandplaces.com.au/home>>.

van den Honert, RC, & McAneney, J 2011, 'The 2011 Brisbane floods: causes, impacts and implications', *Water*, vol. 3, no. 4, pp. 1149-1173.

Van Krieken, R, Habibis, D, Smith, P, Hutchins, B, Haralambos, M, & Holborn, M 2000, *Sociology: themes and perspectives*, Pearson Longman, French's Forest, NSW.

Vann, G 2011, *Town planning report: planning aspects of alternative approaches to mapping the effect of flood* Buckley Vann Town Planning Consultants, Fortitude Valley, Qld., <[http://www.floodcommission.qld.gov.au/\\_\\_data/assets/file/0017/10826/Vann\\_Greg\\_Buckley\\_Vann\\_Town\\_Planning\\_Consultants.pdf](http://www.floodcommission.qld.gov.au/__data/assets/file/0017/10826/Vann_Greg_Buckley_Vann_Town_Planning_Consultants.pdf)>.

Victoria. Country Fire Authority [2016], About Black Saturday, viewed 21 September 2016 <<http://www.cfa.vic.gov.au/about/black-saturday/>>.

- Vincent, K 2007, 'Uncertainty in adaptive capacity and the importance of scale', *Global Environmental Change*, vol. 17, no. 1, pp. 12-24.
- Wang, C, & Yarnal, B 2012, 'The vulnerability of the elderly to hurricane hazards in Sarasota, Florida', *Natural Hazards*, vol. 63, no. 2, pp. 349-373.
- Warburton, J, & Bartlett, H 2004, *Economic implications of an ageing Australia*, The Australasian Centre on Ageing, The University of Queensland  
<[http://www.pc.gov.au/inquiries/completed/ageing/submissions/the\\_australasian\\_centre\\_on\\_ageing/sub009.pdf](http://www.pc.gov.au/inquiries/completed/ageing/submissions/the_australasian_centre_on_ageing/sub009.pdf)>.
- Wild, K, Wiles, JL, & Allen, RES 2013, 'Resilience: thoughts on the value of the concept for critical gerontology', *Ageing and Society*, vol. 33, no. 01, pp. 137-158.
- Wiles, JL, Leibing, A, Guberman, N, Reeve, J, & Allen, RES 2011, 'The meaning of "ageing in place" to older people'. *The Gerontologist*, vol. 52, no. 3, pp. 357-366, doi:10.1093/geront/gnr098,  
<<http://gerontologist.oxfordjournals.org/content/early/2011/10/07/geront.gnr098.full.pdf+html>>.
- Williams, S, Bi, P, Newbury, J, Robinson, G, Pisaniello, D, Saniotis, A, & Hansen, A 2013, 'Extreme heat and health: perspectives from health service providers in rural and remote communities in South Australia', *International Journal of Environmental Research and Public Health*, vol. 10, no. 11, pp. 5565-5583.
- Wisner, B, Blaikie, P, Cannon, T, & Davis, I 2004, *At risk: natural hazards, people's vulnerability and disasters*, Routledge, London.
- Woods, C, West, C, Buettner, P, & Usher, K 2014, "'Out of our control": Living through Cyclone Yasi', *International Journal of Qualitative Studies on Health and Well-being*, vol. 9, no. 1, pp. 1-11.
- World Bank 2015a, *Life expectancy at birth, female (years)*, viewed 8 August 2016, <<http://data.worldbank.org/indicator/SP.DYN.LE00.FE.IN>>.
- World Bank 2015b, *Life expectancy at birth, male (years)*, World Bank, viewed 8 August 2016, <<http://data.worldbank.org/indicator/SP.DYN.LE00.MA.IN>>.
- World Bank 2015c, *Population ages 0-14 (% of total)*, World Bank, viewed 8 August 2016, <<http://data.worldbank.org/indicator/SP.POP.0014.TO.ZS>>.
- World Bank 2015d, *Population ages 65 and above (% of total)*, World Bank, viewed 8 August 2016, <<http://data.worldbank.org/indicator/SP.POP.65UP.TO.ZS>>.
- World Health Organization 2002, *Active ageing: a policy framework*, World Health Organization, Madrid, Spain.



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# Appendix A: Older Adult Participants' Questionnaire



## FUTURE CHALLENGES FOR OLDER ADULTS RESIDING IN AGEING COASTAL HAMLETS ON FAR NORTH QUEENSLAND'S CYCLONE-PRONE COASTLINE

You are invited to participate in a study examining the 'self-help' approach to natural hazard emergency management in small coastal communities in Far North Queensland. The research is being led by Sandra Astill BA (Hons), a Doctor of Philosophy (PhD) Candidate from James Cook University, Cairns, Queensland, and is an essential part of her PhD project in Human Geography. This project is investigating the current and predicted capacity of elderly citizens residing in Far North Queensland coastal communities to implement Emergency Management Australia's 'self-help' approach to natural hazard preparation and recovery. This study will examine the impact of the ageing demographic on these communities and their future ability to remain self-reliant when preparing for, and recovering from, a natural disaster. The research will seek to determine if Australian emergency managers will need to re-think their 'self-help' approach in the future in relation to ageing Far North Queensland coastal communities.

### Anonymity:

In undertaking this research the Researcher is required to follow a research protocol. No names or personal identification will be required. Your responses to the questionnaire will be anonymous. Any information that is obtained from this research study will be used as data for analysis for the Researcher's Doctoral dissertation.

### Focus group participation:

Please be aware that the nature of a focus group will result in others in the group hearing your responses, therefore, in this circumstance, confidentiality cannot be assured. However, the collected data will remain anonymous. The Researcher will ask your permission to record the focus group or interview discussion. If you do not want the discussion recorded, please let the Researcher know before the discussion begins.

### Participant selection:

You have been invited to participate voluntarily in this research. All participants are to be age of 65 years or over, and must reside in a coastal community in North Queensland whose population is under 15,000 people.

### Your right to the privacy and the security of records:

The original completed questionnaires and transcripts from focus group and interview discussions will be kept in a locked and secure place at James Cook University. At no time will your identity be revealed as neither your name or other means of personal identification are required as part of this study.

### Questionnaire:

The attached questionnaire contains questions covering topics about your past experience, perception of risk and preparation in relation to cyclones and storm surges, as well as questions on demographics and your current health status, and those residing with you. This questionnaire should take approximately 30 minutes to complete. Your answers should reflect your own opinion and not those of anyone else. The questionnaire will seek information about:

- Your past experience of cyclones and storm surges
- Your past preparations and evacuation history
- Your perceived level of personal and property risk from residing in a cyclone prone area
- Your emergency management and disaster support awareness
- Some information about you, such as your age, gender, family structure and current health status.

### Additional information:

To ensure this research does not cause any form of distress, the Researcher will provide the contact details of services that can assist you with emergency management, cyclone awareness and support and counselling upon request.

### Inquiries:

If you have any questions regarding this research please contact:

Dr Peter Griggs,  
College of Marine and Environmental Sciences,  
James Cook University  
PO Box 6811, Cairns, QLD 4870  
Ph: 07 4023 21540  
Email: peter.griggs@jcu.edu.au

Sandra Astill  
College of Marine and Environmental Sciences,  
James Cook University  
PO Box 6811, Cairns, QLD 4870  
Email: sandy.astill@jcu.edu.au

#### CYCLONE AND STORM SURGE EXPERIENCE

1. In the period of time that you have resided in your current home/dwelling, have you experienced the impact of a cyclone? (Please tick)

☐ Yes (Please list which cyclone(s) you have experienced)

Name of Cyclone

Year

_____	_____
_____	_____
_____	_____

☐ No

2. Have you experienced the impact of a cyclone-related surge of seawater (storm surge)? (Please tick)

☐ Yes (Please indicate when you experienced a storm surge)

Year/s \_\_\_\_\_

\_\_\_\_\_

☐ No

3. Have you experienced any other form of natural disaster in the past (e.g. bushfire, flood, severe earthquake, tsunami, typhoon)? (Please tick)

☐ Yes (Please state the type of natural disaster (s) you have experienced)

_____
_____
_____

☐ No

#### PREPARATION AND EVACUATION

4. Have you or your household ever had to evacuate your property because of a cyclone or storm surge? (Please tick)

☐ Yes If so, can you tell us when? \_\_\_\_\_ (year/s)

☐ No (Go to question 6)

5. If you answered 'yes' to question 4, to where did you evacuate? (Please tick all appropriate responses)

☐ To a friend's house

☐ To an evacuation centre

☐ Other (Please indicate) \_\_\_\_\_

6. Emergency Services Queensland and your local council recommend that you have an emergency kit prepared in case a cyclone or storm surge threatens you or your property. Does your household have an emergency kit prepared in case of a cyclone or storm surge? (Please tick)

☐ Yes

☐ No (Go to question 8)

**7. If you have an emergency kit, please indicate by ticking all that apply. In my kit I have: (Please tick)**

Non-perishable food	Toiletries (toothpaste, soap, etc.)	Battery powered radio	
Bottled water	Personal hygiene items	Clothing and sturdy shoes	
First aid kit and manual	Torch	Important personal documents	
Medications	Spare batteries	Waterproof bags	
Toilet paper	Candles	Can opener	
Matches	Tape for windows	Portable stove	
Eating utensils	Cooking utensils	Emergency phone number list	

What else might you have in your kit? \_\_\_\_\_

**8. Does your household have a plan in place in case you have to evacuate your home in the event of a cyclone or storm surge? (Please tick)**

- ☐ Yes  
☐ No (Go to question 10)

**9. Is that plan? (Please tick)**

- ☐ Written down  
☐ A verbal understanding between yourself and those you live with  
☐ Something you decide when and if you need to.

**10. If you had to evacuate, where would you go? (Please tick)**

- ☐ To a family member's house  
☐ To a neighbour's house  
☐ To a friend's house  
☐ To an evacuation centre  
☐ Other (Please indicate) \_\_\_\_\_  
☐ I would not evacuate under any circumstance

**11. When preparing your home (and yard) for a cyclone, do you? (Please tick all that apply)**

Trim trees and branches away from your house	Fill car and fuel cans with fuel	
Clean gutters	Ensure generator is in working order	
Check that your walls, roof and eaves are secure	Park your car under a solid shelter	
Fit shutters, metal screens or boards to your windows	Ensure valuables are secure	
Clear your property of loose items	Lock doors and windows	
Disconnect gas	Turn off power	

What else you do to prepare your property?  
 \_\_\_\_\_

**12. Is the preparation you mentioned in Question 11 something you do for: (Please tick all that apply):**

- ☐ All cyclone threats regardless of Category  
☐ Category 1 Cyclone  
☐ Category 2 Cyclone  
☐ Category 3 Cyclone  
☐ Category 4 Cyclone  
☐ Category 5 Cyclone

**RISK PERCEPTION**

13. How concerned are you about the threat of a cyclone or storm surge? (Please circle the appropriate response)

1	2	3	4	5
Very concerned	Concerned	A little concerned	Not concerned at all	I do not know

14. How concerned are you that your home could be seriously damaged by a cyclone (i.e. by strong winds, falling trees, debris, etc.)? (Please circle the appropriate response)

1	2	3	4	5
Very concerned	Concerned	A little concerned	Not concerned at all	I do not know

15. How concerned are you that your home could be seriously affected by cyclone-induced storm surge or flooding? (Please circle the appropriate response)

1	2	3	4	5
Very concerned	Concerned	A little concerned	Not concerned at all	I do not know

16. Does the onset of cyclone season concern you? (Please circle the appropriate response)

1	2	3	4	5
Very concerned	Concerned	A little concerned	Not concerned at all	I do not know

**EMERGENCY MANAGEMENT AND DISASTER SUPPORT AWARENESS**

17. Have you ever heard of the 'self-help' approach for emergency management? (Please tick)

- ☐ Yes  
☐ No

18. Do you know what the 'self-help' approach to emergency management is? (Please tick)

- ☐ Yes  
☐ No (Please go to Question 20)

19. If you answered 'yes' to Question 18, please explain what the 'self-help' approach is using your own words.

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20. Do you believe disaster preparation and recovery is your responsibility or should it be the responsibility of the Federal, State or Local government? (Please tick all that apply)

- ☐ My responsibility  
☐ The Federal Government's responsibility  
☐ The State Government's responsibility  
☐ The Local Government's responsibility

21. If you feel disaster prevention and recovery is the responsibility of the Federal Government, please tell us what you think they should do.

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22. If you feel disaster prevention and recovery is the responsibility of the State Government, please tell us what you think they should do.

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23. If you feel disaster prevention and recovery is the responsibility of the Local Government, please tell us what you think they should do.

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24. If you needed assistance preparing your home and yard for a cyclone or storm surge, or cleaning up after a cyclone or storm surge, from whom would you seek assistance? (Please tick all appropriate/applicable responses)

- ☐ Family  
☐ Neighbours  
☐ Friends  
☐ Local Council  
☐ Local volunteer organisation (Please indicate which organisation/s) \_\_\_\_\_  
☐ Police  
☐ Fire Brigade  
☐ Ambulance  
☐ Other (Please indicate) \_\_\_\_\_

#### DEMOGRAPHICS

25. Are you? (Please tick)

- ☐ Male  
☐ Female

26. What age group best describes your age? (Please tick)

- ☐ 65 – 69 years  
☐ 70 – 74 years  
☐ 75 – 79 years  
☐ 80 – 84 years  
☐ 85 – 89 years  
☐ 90 – 94 years  
☐ 95 – 99 years  
☐ 100+ years

27. How would you describe your household? (Please tick)

- ☐ I live alone  
☐ I live with my spouse/partner  
☐ I live with relatives  
☐ I live with friends  
☐ Other ..... (Please indicate)

28. Do you have any pets? (Please tick)

- ☐ Yes If you answered 'yes', please indicate how many pets you have: \_\_\_\_\_  
☐ No

29. Which of the following best describes your current home/dwelling? (Please tick)
- ☐ House (free standing)
  - ☐ Duplex
  - ☐ Home unit, flat or apartment
  - ☐ Mobile home or caravan
  - ☐ Other (Please indicate) \_\_\_\_\_
30. At home, do you have, and use, a: (Please tick all that apply)
- ☐ Television
  - ☐ Radio
  - ☐ Land line phone
  - ☐ Mobile phone
  - ☐ Internet
31. Which of the following best describes your situation? (Please tick)
- ☐ I own my dwelling
  - ☐ I have a mortgage
  - ☐ I rent or lease
  - ☐ Other (Please indicate) \_\_\_\_\_
32. Do you have insurance? (Please tick all that apply)
- ☐ I have home (building) insurance only
  - ☐ I have contents insurance only
  - ☐ I have home (building) and contents insurance
33. In what YEAR did you move into your current property? \_\_\_\_\_
34. When you first moved into your property did you: (Please tick)
- ☐ Live alone?
  - ☐ Live with a spouse/partner only?
  - ☐ Live with a spouse and other family members?
  - ☐ Live with friends?
  - ☐ Other (Please indicate) \_\_\_\_\_
35. Do you still: (Please tick)
- ☐ Live alone?
  - ☐ Live with a spouse/partner only?
  - ☐ Live with a spouse and other family members?
  - ☐ Live with friends?
  - ☐ Other (Please indicate) \_\_\_\_\_
36. Do you live in close proximity to: (Please tick all that apply)
- |  |                                 |
|--|---------------------------------|
| <input type="checkbox"/> Adult children/In-laws? | Please indicate how many? _____ |
| <input type="checkbox"/> Siblings?               | Please indicate how many? _____ |
| <input type="checkbox"/> Other family members?   | Please indicate how many? _____ |
| <input type="checkbox"/> Close friends?          | Please indicate how many? _____ |
37. Would these family and friends be able to assist you in an emergency situation? (Please tick)
- ☐ Yes
  - ☐ No
  - ☐ Unsure

38. When you first moved into your property, were you and those living with you able to prepare for a cyclone or storm surge in a different fashion than you can today? (Please tick)

- ☐ Yes
- ☐ No (Go to Question 39)
- ☐ Unsure

39. If you answered 'yes' to Question 38, please explain what you do differently now compared to when you first moved into your property. (Please state)

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40. What is your current employment status? (Please tick)

- ☐ Employed - Full-time
- ☐ Employed - Part-time
- ☐ Employed - Casual
- ☐ Unemployed – Seeking employment
- ☐ Self-Funded retiree
- ☐ Pensioner
- ☐ Other (Please indicate) .....

#### HEALTH AND FITNESS

41. Do you suffer from any of the following conditions? (Please tick all that apply)

- ☐ Alzheimer's disease
- ☐ Arthritis
- ☐ Asthma
- ☐ Breathing difficulties
- ☐ Cancer
- ☐ Cataracts
- ☐ Dementia
- ☐ Depression
- ☐ Diabetes
- ☐ Epilepsy
- ☐ Glaucoma
- ☐ Heart disease
- ☐ Kidney disease
- ☐ Multiple Sclerosis
- ☐ Osteoporosis
- ☐ Parkinson's disease
- Other ..... (Please indicate)
- Other ..... (Please indicate)
- Other ..... (Please indicate)
- Other ..... (Please indicate)

42. Do you require regular medication or treatment for any condition? (Please tick)

- ☐ Yes
- ☐ No



43. If you do suffer from a chronic condition, does it prevent you from doing some or all of the essential or emergency physical duties around the home? (Please tick)
- ☐ Yes  
☐ No
44. If you do suffer from a chronic condition, does it affect your memory? (Please tick)
- ☐ Yes  
☐ No
45. Do you require assistance to prepare your home (and yard) for a cyclone? (Please tick)
- ☐ Yes  
☐ No
46. Do you require assistance to clean up or repair your home (and yard) after a cyclone? (Please tick)
- ☐ Yes  
☐ No
47. Would you require assistance to evacuate from your home? (Please tick)
- ☐ Yes  
☐ No
48. Would you require any special care if you were in a cyclone shelter or sheltering in a place other than your home? (Please tick)
- ☐ Yes  
☐ No
49. Does any person in your household, other than yourself, suffer from any of the following conditions? (Please tick all that apply)
- ☐ Alzheimer's Disease  
☐ Arthritis  
☐ Asthma  
☐ Breathing difficulties  
☐ Cancer  
☐ Cataracts  
☐ Dementia  
☐ Depression  
☐ Diabetes  
☐ Epilepsy  
☐ Glaucoma  
☐ Heart disease  
☐ Kidney disease  
☐ Multiple Sclerosis  
☐ Osteoporosis  
☐ Parkinson's Disease  
Other ..... (Please state)  
Other ..... (Please state)  
Other ..... (Please state)  
Other ..... (Please state)

50. Does any person/persons in your household, other than yourself, require regular medication or treatment for any condition? (Please tick)
- ☐ Yes  
☐ No
51. If a member of your household, other than yourself, suffers from a chronic condition, does it prevent him/her/them from doing some or all of the essential or emergency physical duties around the home? (Please tick)
- ☐ Yes  
☐ No
52. If a member of your household, other than yourself, suffers from a chronic condition, does it affect his/her/their memory? (Please tick)
- ☐ Yes  
☐ No
53. Would this/these person(s) require assistance to prepare for a cyclone? (Please tick)
- ☐ Yes  
☐ No
54. Would this/these person(s) require assistance to recover after a cyclone? (Please tick)
- ☐ Yes  
☐ No
55. Would this/these person(s) require assistance to evacuate from your home? (Please tick)
- ☐ Yes  
☐ No
56. Would this/these person(s) require any special care if he/she/they were at a cyclone shelter or sheltering in a place other than your home? (Please tick)
- ☐ Yes  
☐ No

**Thank you for taking the time to complete this questionnaire.**

**Please feel free to use the back of this questionnaire to write any information you think would be relevant to this research.**

## Appendix B: Invitation to participate in study



11 Mar 2015

Herbert River Express, Ingham QLD

Section: General News • Article type : News Item • Audience : 2,568 • Page: 7  
Printed Size: 106.00cm<sup>2</sup> • Market: QLD • Country: Australia • ASR: AUD 190 • Words: 260  
Item ID: 381853062

isentia.mediaportal

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Page 1 of 1

### Research into disaster times

A JAMES Cook University study is set to investigate how to support the elderly in times of cyclone and clean up.

Residents over the age of 65 living in Cardwell, Tully Heads, Kurrimine Beach, Innisfail or Bramston Beach are being sought after by a James Cook University researcher.

Sandy Astill is on the look out for elderly community members around these areas to investigate the current emphasis on self-reliance in preparation and recovery from cyclones and storm surges.

Mrs Astill said this idea came about after the ageing population on Queensland's northern coastline came to light.

"Emergency Management Australia's emphasis is on self help in preparing for cyclone season, sheltering in your home if it's safe to do so, and cleaning up afterwards," she said. "I'm asking locals to help me investigate whether we need to adjust that strategy in any way, given that many northern coastal communities are seachange destinations with significant numbers of older residents. My aim is to gather information on how older residents are coping with their preparation for cyclones, and the clean up afterwards."

Mrs Astill also said some tasks become more difficult as people age. The questions will centre on what help seniors need, where they get help from and what changes might be considered to help them keep safe during and after cyclones.

All responses are confidential and all collected data will remain anonymous. The survey can be completed online at

[www.surveymonkey.com/s/TJ7G293](http://www.surveymonkey.com/s/TJ7G293). To register your interest or find out more, please contact Sandy Astill by emailing [sandy.astill@jcu.edu.au](mailto:sandy.astill@jcu.edu.au) or by phoning 0412 240 190.



11 Mar 2015

Innisfail Advocate, Innisfail QLD

Section: General News • Article type : News Item • Audience : 3,208 • Page: 4  
Printed Size: 154.00cm<sup>2</sup> • Market: QLD • Country: Australia • ASR: AUD 286 • Words: 389  
Item ID: 381874708

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Page 1 of 1

## Check on how seniors fare

IF you're aged 65 or older, and live in the coastal communities of Innisfail, Bramston Beach, Kurrimine Beach, Tully Heads or Cardwell, James Cook University researcher Sandy Astill hopes to hear from you.

Mrs Astill is investigating the current emphasis on self-reliance in preparing for and recovering from cyclones and storm surges, in light of the ageing population on Queensland's northern coastline.

"Emergency Management Australia's emphasis is on self help in preparing for cyclone season, sheltering in your home if it's safe to do so, and cleaning up afterwards," Mrs Astill said. "I'm asking locals to help me investigate whether we need to adjust that strategy in any way, given that many northern coastal communities are seachange destinations, with significant numbers of older residents."

Mrs Astill, who is a post-

graduate researcher at JCU in Cairns, also plans to interview staff in aged care facilities, as well as community health workers, emergency workers and volunteers.

"My aim is to gather information on how older residents are coping with their preparation for cyclones, and the clean-up afterwards," she said.

"Some tasks become more difficult as we age. My questions centre on what help seniors need, where they get help from, and what changes might be considered to help them keep safe during and after cyclones. It's all about ensuring seniors are able to live independently as possible, and, in North Queensland, that means ensuring seniors continue to cope with cyclones as well as they have in the past.

"I hope the research will make a positive contribution to future emergency management practices, particularly in

helping older residents live safely and independently."

Seniors over the age of 65 years residing in coastal communities are invited to take part, whether or not they have experienced a cyclone.

Each person will be asked to fill out a questionnaire, either online or on paper, and take part in an interview or focus group discussions, which will be held in the community at times to be arranged.

Emergency workers and volunteers and staff in aged care facilities are asked to take part in a personal or group interview but are not required to complete the survey.

Questionnaire and interview responses are strictly confidential and all collected data will remain anonymous.

To register your interest or find out more, contact Sandy Astill by emailing [sandy.astill@jcu.edu.au](mailto:sandy.astill@jcu.edu.au) or by phoning 0412 240 190.



12 Mar 2015  
Tully Times, Tully QLD

Section: General News • Article type : News Item • Audience : 2,771 • Page: 11  
Printed Size: 105.00cm<sup>2</sup> • Market: QLD • Country: Australia • ASR: AUD 188 • Words: 269  
Item ID: 383551686

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Page 1 of 1

## Over 65s needed for cyclone recovery strategy study

James Cook University researcher Sandy Astill hopes to hear from those aged 65 years or older who live in the coastal communities of Tully Heads, Kurrimine Beach, Innisfail, Bramston Beach or Cardwell.

Mrs Astill is investigating the current emphasis on self-reliance in preparing for and recovering from cyclones and storm surges, in light of the ageing population on Queensland's northern coastline.

"Emergency Management Australia's emphasis is on self-help in preparing for cyclone season, sheltering in your home if it's safe to do so, and cleaning up afterwards," Mrs Astill said.

"I'm asking locals to help me investigate whether we need to adjust that strategy in any way, given that many northern coastal communities are sea-change destinations, with significant numbers of older residents."

Mrs Astill, who is a postgraduate researcher at JCU in Cairns, also plans to interview staff in aged care facilities, as well as community health workers, emergency workers and volunteers.

"My aim is to gather information on how older residents are coping with their preparation for cyclones, and the clean-up afterwards," Mrs Astill said.

"Some tasks become more difficult as we age."

"My questions centre on what help seniors need, where they get help from, and what changes might be considered to help them keep safe during and after cyclones."

Emergency workers and volunteers, and staff in aged care facilities, are asked to take part in a personal or group interview but are not required to complete the survey.

To register an interest or to find out more, contact Sandy Astill at [sandy.astill@jcu.edu.au](mailto:sandy.astill@jcu.edu.au) or phone 0412 240 190.

The survey can be completed online at [www.surveymonkey.com/s/TJ7G293](http://www.surveymonkey.com/s/TJ7G293)



## Appendix C: 'Letter of Introduction for Older Adults 65 years and Older, Emergency Services Officers, Disaster Mangers and *in situ* Community Care Providers

### Your Invitation to Participate in Important Research



#### Rethinking The Self-Help Approach To Cyclone And Storm Surge Emergency Management: Implications For An Ageing Population In Vulnerable North Queensland Coastal Communities

You are invited to participate in a study examining the 'self-help' approach to cyclone and storm surge emergency management in small coastal communities in North Queensland. The research is being led by Sandra Astill BA (Hons), a Doctor of Philosophy (PhD) Candidate from James Cook University, Cairns, Queensland, and is an essential part of her PhD project in Human Geography. This research is supervised by Dr Peter Griggs.

This project is investigating the current and predicted capacity of elderly citizens residing in North Queensland coastal communities to implement the Emergency Management Australia's 'self-help' approach to cyclone and storm surge preparation and recovery. This study will examine the impact of the ageing demographic on these communities and their future ability to remain self-reliant when preparing for, and recovering from, cyclones and storm surges. The research will seek to determine if Australian emergency managers will need to re-think their 'self-help' approach in the future in relation to ageing north Queensland coastal communities.



The research is seeking participation from residents aged 65 years or over, emergency services workers and volunteers, and staff from aged care facilities located in any of the communities listed below.

Residents aged 65 years or over are invited to complete written questionnaire and to participate in a focus group or an interview. Please note that the questionnaire is also available <http://www.surveymonkey.com/s/TJ7G293>. Emergency workers and volunteers, as well as staff from aged care facilities, will be asked to participate in either a group or a personal interview only. Participation is voluntary, with questionnaire and interview responses, being strictly confidential with all collected data remaining anonymous.

It is hoped that the outcomes of this research will make a positive contribution to emergency management practices in the future, particularly in relation to ensuring the protection and safety of older citizens living independently in sea-change localities.

If you are a resident aged 65 years or more, an emergency worker or volunteer (SES),  
or an aged care facilities employee located in

Cooktown  
Kurrimine Beach  
Innisfail  
Forrest Beach

Wonga  
Wongaling Beach  
Bramston Beach  
Balgol Beach

Port Douglas  
Tully Heads  
Taylors Beach  
Saunders Beach

Cowley Beach  
Cardwell  
Cungulla

#### WE NEED YOUR HELP!

Please contact Sandy Astill to register your interest on 0412240190 or at [sandy.astill@jcu.edu.au](mailto:sandy.astill@jcu.edu.au)

## Appendix D: Information Sheet for Older Adult Participants



### INFORMATION SHEET

#### RETHINKING THE SELF-HELP APPROACH TO CYCLONE AND STORM SURGE IMPLICATIONS FOR AN AGEING POPULATION IN VULNERABLE NORTH QUEENSLAND COASTAL COMMUNITIES

You are invited to participate in a study examining the 'self-help' approach to cyclone and storm surge emergency management in small coastal communities in North Queensland. The research is being led by Sandra Astill BA (Hons), a Doctor of Philosophy (PhD) Candidate from James Cook University, Cairns, Queensland, and is an essential part of her PhD project in Human Geography. This research is supervised by Dr Peter Griggs.

This project is investigating the current and predicted capacity of elderly citizens residing in North Queensland coastal communities to implement the Emergency Management Australia's 'self-help' approach to cyclone and storm surge preparation and recovery. This study will examine the impact of the ageing demographic on these communities and their future ability to remain self-reliant when preparing for, and recovering from, cyclones and storm surges. The research will seek to determine if Australian emergency managers will need to re-think their 'self-help' approach in the future in relation to ageing north Queensland coastal communities.

As a participant in this study you will be invited to participate in a focus group or an interview. This process should take between 1 hour to complete. Please be aware that the nature of a focus group will result in others in the group hearing your responses, therefore, in this circumstance, confidentiality cannot be assured. However, the collected data will remain anonymous. The Researcher will ask your permission to record the focus group or interview discussion. If you do not want the discussion recorded, please let the Researcher know before the discussion begins.

Taking part in this study is completely voluntary. You may stop taking part in the study at any time without explanation or prejudice. You may also withdraw any unprocessed data from the study.

Your questionnaire and interview responses, along with your contact details, will be strictly confidential. You will not be identified in any way. Please be aware, however, that the nature of a focus group will result in others in the group hearing your responses, therefore, in this circumstance, confidentiality cannot be assured. However, the collected data will remain anonymous. The Researcher will ask your permission to record the focus group or interview discussion. If you do not want the discussion recorded, please let the Researcher know before the discussion begins.

If you have any questions about the study, please contact [sandy.astill@jcu.edu.au](mailto:sandy.astill@jcu.edu.au).

To ensure this research does not cause any form of distress, contact details of services that can assist you with emergency management, cyclone awareness and support and counselling are attached overleaf. This information sheet is titled 'Where can I find more information on cyclones and storm surges?'

**Principal Investigator:**  
**Sandra Astill**  
College of Marine and Environmental Sciences  
James Cook University Cairns Campus  
Email: [sandy.astill@jcu.edu.au](mailto:sandy.astill@jcu.edu.au)

**Supervisor:**  
**Name: Dr Peter Griggs**  
College of Marine and Environmental Sciences  
James Cook University Cairns Campus  
Phone: (07) 42321540  
Email: [peter.griggs@jcu.edu.au](mailto:peter.griggs@jcu.edu.au)

*If you have any concerns regarding the ethical conduct of the study, please contact:  
Human Ethics, Research Office*

*James Cook University, Townsville, Qld, 4811  
Phone: (07) 4781 5011 ([ethics@jcu.edu.au](mailto:ethics@jcu.edu.au))*

## Appendix E: Code Book

### SELF-ADMINISTERED QUESTIONNAIRE CODE BOOK

Question Number	Responses	Code
1	Yes	1
	No	2
2	Yes	1
	No	2
3	Yes	1
	No	2
4	Yes	1
	No	2
5	To a friend's house	1
	To an evacuation centre	2
	Other	3
6	Yes	1
	No	2
7	Number of items in emergency kit	Value depends on number of items identified by respondent
8	Yes	1
	No	2
9	Written down	1
	A verbal understanding between yourself and those you live with	2
	Something you decide when and if you need to	3
10	To a family members' house	1
	To a neighbour's house	2
	To a friend's house	3
	To an evacuation centre	4
	Other	5
	I would not evacuate under any circumstances	6
11	Number of actions undertaken	Value depends on number of actions identified by respondent
12	All cyclone threats regardless of Category	1
	Category 1 Cyclone	2
	Category 2 Cyclone	3
	Category 3 Cyclone	4
	Category 4 Cyclone	5
	Category 5 Cyclone	6
13	Very concerned	1
	Concerned	2
	A little concerned	3
	Not concerned at all	4
	I do not know	5
14	Very concerned	1



	Concerned	2
	A little concerned	3
	Not concerned at all	4
	I do not know	5
15	Very concerned	1
	Concerned	2
	A little concerned	3
	Not concerned at all	4
	I do not know	5
16	Very concerned	1
	Concerned	2
	A little concerned	3
	Not concerned at all	4
	I do not know	5
17	Yes	1
	No	2
18	Yes	1
	No	2
19	Qualitative response	
20	My responsibility	1
	The Federal Government's responsibility	2
	The State Government's responsibility	3
	The Local Government's responsibility	4
21	Qualitative response	
22	Qualitative response	
23	Qualitative response	
24	Family	1
	Neighbours	2
	Friends	3
	Local Council	4
	Local Volunteer organisation	5
	Police	6
	Fire Brigade	7
	Ambulance	8
	Other	9
25	65-69 years	1
	70-74 years	2
	75-79 years	3
	80-84 years	4
	85-89 years	5
	90-94 years	6
	96-99 years	7
	100+years	8
27	I live alone	1
	I live with my spouse/partner	2
	I live with relatives	3
	I live with friends	4
	Other	5

28	Yes	1
	No	2
29	House	1
	Duplex	2
	Home unity, flat or apartment	3
	Mobile home or caravan	4
	Other	5
30	Television	1
	Radio	2
	Land line phone	3
	Mobile phone	4
	Internet	5
31	I own my dwelling	1
	I have a mortgage	2
	I rent or lease	3
	Other	4
32	I have home (building) insurance only	1
	I have contents insurance only	2
	I have home (building) and contents insurance	3
33	Qualitative response	
34	Live alone?	1
	Live with my spouse/partner?	2
	Live with spouse and other family members?	3
	I live with friends?	4
	Other?	5
35	Live alone?	1
	Live with my spouse/partner?	2
	Live with spouse and other family members?	3
	I live with friends?	4
	Other?	5
36	Adult children/in-laws?	1
	Siblings?	2
	Other family members?	3
	Close friends?	4
37	Yes	1
	No	2
	Unsure	3
38	Yes	1
	No	2
	Unsure	3
39	Qualitative response	
40	Employed full-time	1
	Employed part-time	2
	Employed casual	3
	Unemployed - seeking employment	4
	Self- funded retiree	5
	Pensioner	6

	Other	7
41	Alzheimer's disease	1
	Arthritis	2
	Asthma	3
	Breathing difficulties	4
	Cancer	5
	Cataracts	6
	Dementia	7
	Depression	8
	Diabetes	9
	Epilepsy	10
	Glaucoma	11
	Hearth disease	12
	Kidney disease	13
	Multiple sclerosis	14
	Osteoporosis	15
	Parkinson's disease	16
	Other	17
42	Yes	1
	No	2
43	Yes	1
	No	2
44	Yes	1
	No	2
45	Yes	1
	No	2
46	Yes	1
	No	2
47	Yes	1
	No	2
48	Yes	1
	No	2
49	Alzheimer's disease	1
	Arthritis	2
	Asthma	3
	Breathing difficulties	4
	Cancer	5
	Cataracts	6
	Dementia	7
	Depression	8
	Diabetes	9
	Epilepsy	10
	Glaucoma	11
	Hearth disease	12
	Kidney disease	13
	Multiple sclerosis	14
	Osteoporosis	15
	Parkinson's disease	16

	Other	17
50	Yes	1
	No	2
51	Yes	1
	No	2
52	Yes	1
	No	2
53	Yes	1
	No	2
54	Yes	1
	No	2
55	Yes	1
	No	2
56	Yes	1
	No	2

## Appendix F: Focus Group Questions for Older Adults

### OLDER ADULTS FOCUS GROUP QUESTIONS

1. What made you all move to this community?
2. When did you move here?
3. Does everyone here know what to do if we are told a cyclone is expected to impact this community?
2. Tell me about what you do to prepare yourself or your property for a cyclone?
3. If you have never experienced a cyclone, would you know what to do, and where to find information to assist you prepare?
4. Does this differ to when you first moved in?
5. Is there anything you did then that you are unable to do now?
6. What are the obstacles that prevent you from preparing for a cyclone or a storm surge in the same manner you did when you first moved into your property?
7. Do you regard yourself as able to cope well emotionally when you hear a cyclone might affect your community?
8. Do you regard yourself as able to cope well emotionally during the clean up after a cyclone?
9. Do you think you cope emotionally as well now as you did when you first moved into your property?  
DO any of you depend on any home-care health services? Meals on Wheels? Other services?  
What happens to these services after a cyclone?
10. Do you recall hearing or seeing any warnings about cyclones or storm surges in this area?
11. Are these warnings clear and easy to understand?
12. If you have never experienced a cyclone, do you think you would understand the warning messages?
13. What do these warning messages tell you to do?
14. Are you able to follow the advice of these warnings easily?
15. Do you stay in your home during a cyclone, or do you go to a family or friend's house?
16. Has this been your own decision?
17. Have you ever been forced to evacuate by a local authority?
18. How did you feel about leaving your home?
19. Have you ever left your home and sheltered in an evacuation centre?
20. What was it like in an evacuation centre?

21. If you have never experienced the need to evacuate, do you think you would if authorities advised you that you should?
22. Do any of you get assistance from friends or family to prepare your property for a cyclone? Is this assistance helpful?
23. If you have recently moved into this community, would you have a network of friends who would be able to assist you?
24. Is there anyone or any group within your community that ensures you and other seniors are well prepared for a cyclone? Is this assistance helpful?
25. Is there anyone or any group within your community who ensure you and other seniors have assistance to clean up and/or repair any damage after a cyclone? Is this assistance helpful?
26. If you needed help to prepare or clean up, whom would you turn to?
27. Do you find that you prepare and/or recover from a cyclone or storm surge differently now you are older?
28. In what ways is this preparation or recovery different?
29. Do you recall any special assistance, or special procedures within your community that is offered to seniors and others who might need assistance during a cyclone warning or clean up period?
30. Do emergency services, such as the police, SES or the council, offer any special programs that might let you know where to source assistance?
31. Can you describe these special programs?
32. If you are a new resident, did you know that that every resident is expected to be self-reliant during a cyclone?
33. What do you think that means?
34. What do emergency management officials expect that you need to do to prepare your property?
35. What do they expect you will need to do after the cyclone has passed?
36. Have you seen any printed information, television commercials, newspaper advertisements, websites etc, that tell you how to prepare for a cyclone or storm surge?
37. What is it that they suggest you need to do?
38. Do you heed this advice?
39. Does your community have any special, unique procedures in place to ensure you are safe?
40. Do you know if this is done in any other community?
41. What does this mean to you and your ability to cope during cyclone season?

## **Appendix G: Focus Group and Questions for Local Government Disaster Managers, Emergency Services Officers and *in situ* Community Health Care Providers**

### Questions for Focus Groups, Personal Interviews, Emergency Managers and *In Situ* Care Providers

#### 1. Focus groups and Personal Interview Questions - Respondents over the Age of 65 years.

- i) Aim: To comparing participants' opinion of their current physical capacity to prepare for a cyclone or storm surge to when they may have first moved into their properties;
  - 1. Does everyone here know what to do if we are told a cyclone is expected to impact this community?
  - 2. Tell me about what you do to prepare yourself or your property for a cyclone?
  - 3. If you have never experienced a cyclone, would you know what to do, and where to find information to assist you prepare?
  - 4. Does this differ to when you first moved in?
  - 5. Is there anything you did then that you are unable to do now?
  - 6. What are the obstacles that prevent you from preparing for a cyclone or a storm surge in the same manner you did when you first moved into your property?
  
- ii) Aim: To reflect on any changes in participants' cognitive ability to cope with the threat of a cyclone or storm surge;
  - 7. Do you regard yourself as able to cope well emotionally when you hear a cyclone might affect your community?
  - 8. Do you regard yourself as able to cope well emotionally during the clean up after a cyclone?
  - 9. Do you think you cope emotionally as well now as you did when you first moved into your property?
  - 10. Do you recall hearing or seeing any warnings about cyclones or storm surges in this area?
  - 11. Are these warnings clear and easy to understand?
  - 12. If you have never experienced a cyclone, do you think you would understand the warning messages?
  - 13. What do these warning messages tell you to do?
  - 14. Are you able to follow the advice of these warnings easily?
  
- iii) Aim: To compare attitudes in relation to evacuation of properties, to either the homes of friends or families, or to organised evacuation centres;
  - 15. Do you stay in your home during a cyclone, or do you go to a family or friend's house?
  - 16. Has this been your own decision?
  - 17. Have you ever been forced to evacuate by a local authority?
  - 18. How did you feel about leaving your home?
  - 19. Have you ever left your home and sheltered in an evacuation centre?
  - 20. What was it like in an evacuation centre?
  - 21. If you have never experienced the need to evacuate, do you think you would if authorities advised you that you should?
  
- iv) Aim: To determine the group's opinion on assistance afforded the elderly in relation to preparation for, and recovery from, a natural hazard, as well as evacuation.
  - 22. Do any of you get assistance from friends or family to prepare your property for a cyclone? Is this assistance helpful?
  - 23. If you have recently moved into this community, would you have a network of friends who would be able to assist you?
  - 24. Is there anyone or any group within your community that ensures you and other seniors are well prepared for a cyclone? Is this assistance helpful?
  - 25. Is there anyone or any group within your community who ensure you and other seniors have assistance to clean up and/or repair any damage after a cyclone? Is this assistance helpful?
  - 26. If you needed help to prepare or clean up, whom would you turn to?
  
- v) Aim: To determine the group's response on the influence of ageing on one's ability to prepare and recover from a natural hazard;
  - 27. Do you find that you prepare and/or recover from a cyclone or storm surge differently now you are older?
  - 28. In what ways is this preparation or recovery different?

- vi) Aim: To determine if the group can recall procedures or processes that in place to assist the elderly with natural hazard preparatory and recovery.
- 29. Do you recall any special assistance, or special procedures within your community that is offered to seniors and others who might need assistance during a cyclone warning or clean up period?
- 30. Do emergency services, such as the police, SES or the council, offer any special programs that might let you know where to source assistance?
- 31. Can you describe these special programs?
- vii) Aim: To determine if the group can recall emergency management's expectation that all residents need to be self-reliant and undertake a self-help approach to disaster preparation and recovery;
- 32. If you are a new resident, did you know that that every resident is expected to be self-reliant during a cyclone?
- 33. What do you think that means?
- 34. What do emergency management officials expect that you need to do to prepare your property?
- 35. What do they expect you will need to do after the cyclone has passed?
- 36. Have you seen any printed information, television commercials, newspaper advertisements, websites etc, that tell you how to prepare for a cyclone or storm surge
- 37. What is it that they suggest you need to do?
- 38. Do you heed this advice?
- viii) Aim: To determine if the community to which they belong have in place any unique procedures or methods of assistance that are in place to ensure the elderly have the capacity to prepare and recover from an event.
- 39. Does your community have any special, unique procedures in place to ensure you are safe?
- 40. Do you know if this is done in any other community?
- 41. What does this mean to you and your ability to cope during cyclone season?

## 2. Emergency Managers

- i) Aim: To determine the expectation of the ability of the elderly in relation to preparing their families and property for the likelihood of a cyclone or storm surge;
  - Do you, as emergency managers, expect seniors (or those over the age of 65 years) to be as able to prepare or recover from a cyclone as younger members of this community?
  - Which areas of cyclone preparation or recovery do you expect are more difficult for those over the age of 65 years of age?
- ii) Aim: To determine the existence of special assistance that may be offered to the elderly to prepare and recover from a natural disaster;
  - Do you as emergency managers offer any form of special assistance to seniors in relation to preparing for, or recovering from, a cyclone or storm surge?
  - What does this assistance entail?
- iii) Aim: To determine the predicted problems arising in the future with ageing populations in remote coastal communities;
  - Do you feel that emergency managers are going to face difficulty in the future as the average age of small coastal communities increase?
  - What do you perceive will be problematic in the future?
  - Can you suggest any solutions to these problems?
- iv) Aim: To determine whether emergency managers regard the elderly as vulnerable;
  - Do you, as an emergency manager, regard the elderly as vulnerable?
  - In what way are they, or are they not, vulnerable?



- v) Aim: To identify any communication processes that might be in place to ensure the elderly are well informed in relation to natural disaster warnings, preparation, evacuation and recovery.
- Do you have any particular programs or initiatives in place to ensure the elderly in this community are well informed in relation to hazard preparedness?
- Do the elderly citizens embrace these special programs?
- Do you feel these programs have had a positive influence on an elderly person's ability to prepare and/or recover from a cyclone or storm surge?

### 3. Managers of Retirement Villages and Aged Care Facilities

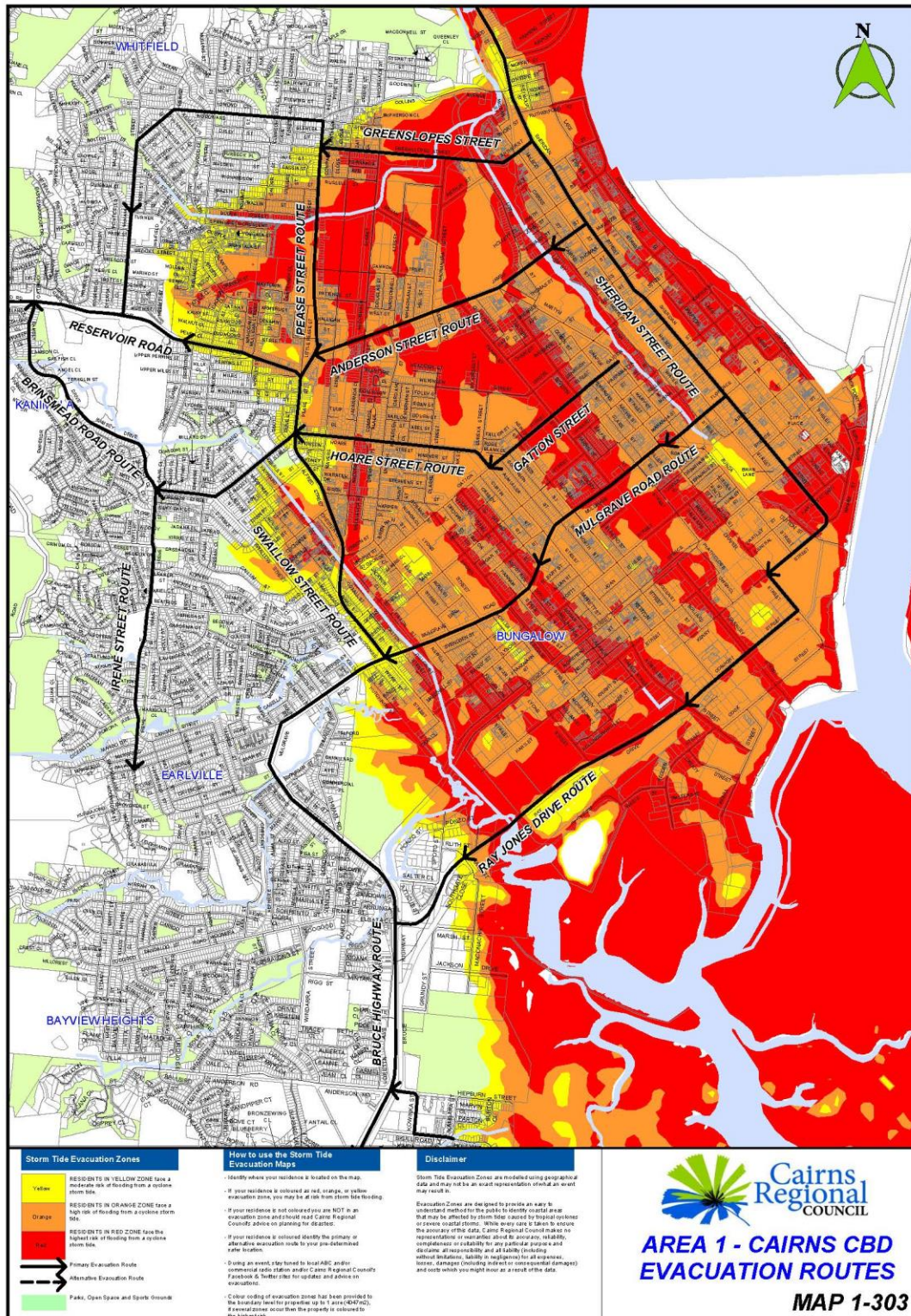
- i) Aim: To identify current emergency procedures for the preparation of property and of residents in aged care facilities in relation to cyclone and storm surge;
  - What procedures do you have in place to prepare this facility and its residents for the onset of a cyclone or storm surge?
  - Have you ever had to evacuate the residents from this facility?
  - Where do you evacuate the residents?
  - What were the challenges associated with this evacuation?
- ii) Aim: To identify future predicted issues in relation to preparing the elderly in aged care facilities for natural hazards in the aged care facility context;
  - As the population ages, and more demands are placed on facilities such as these, what problems do you foresee in the future in relation to preparing elderly residents for the onset of a natural hazard?
- iii) Aim: to recall problems with caring for the elderly in aged care facilities during an event;
  - What are the main issues in relation to caring for the aged during a cyclone or storm surge threat?
  - Are there any particular challenges associated with preparing the residents?
  - Are there any particular challenges to caring for elderly residents during a cyclone?
  - Have you noticed a change in the health of the residents post event?
- iv) Aim: To recall stress levels of residents in aged care facilities pre, during and post event;
  - Are the elderly residents particularly stressed during a cyclone?
  - Does their level of stress alter with advancing age?
  - Is there any particular incident that you can recall that best describes the level of stress amongst the residents during a cyclone?
  - In your opinion, does the stress associated with a cyclone or storm surge, affect the long-term health of the resident?
- v) Aim: to identify special procedures that might be in place for residents of high-need or high-dependency in aged care facilities;
  - Are there any special procedures that are in place for residents of high-need or high-dependency in this facility?
  - What are the challenges associated with preparing these patients for a cyclone?
  - Have you noticed a change in the health of a high-need or high-dependency resident post event?
- vi) Aim: To identify communication procedures that might be in place between residents and those charged with their care in aged care facilities.
  - How do you communicate the need to prepare the residents for a cyclone? (Announcement, individual conversations, etc.)
  - Do the residents resist your attempts to prepare them for a cyclone?

## **Appendix H: Ethics Approval Notification**

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has been removed

# Appendix I: Storm Tide Evacuation Maps Cairns Regional Council and Cassowary Coast Regional Council

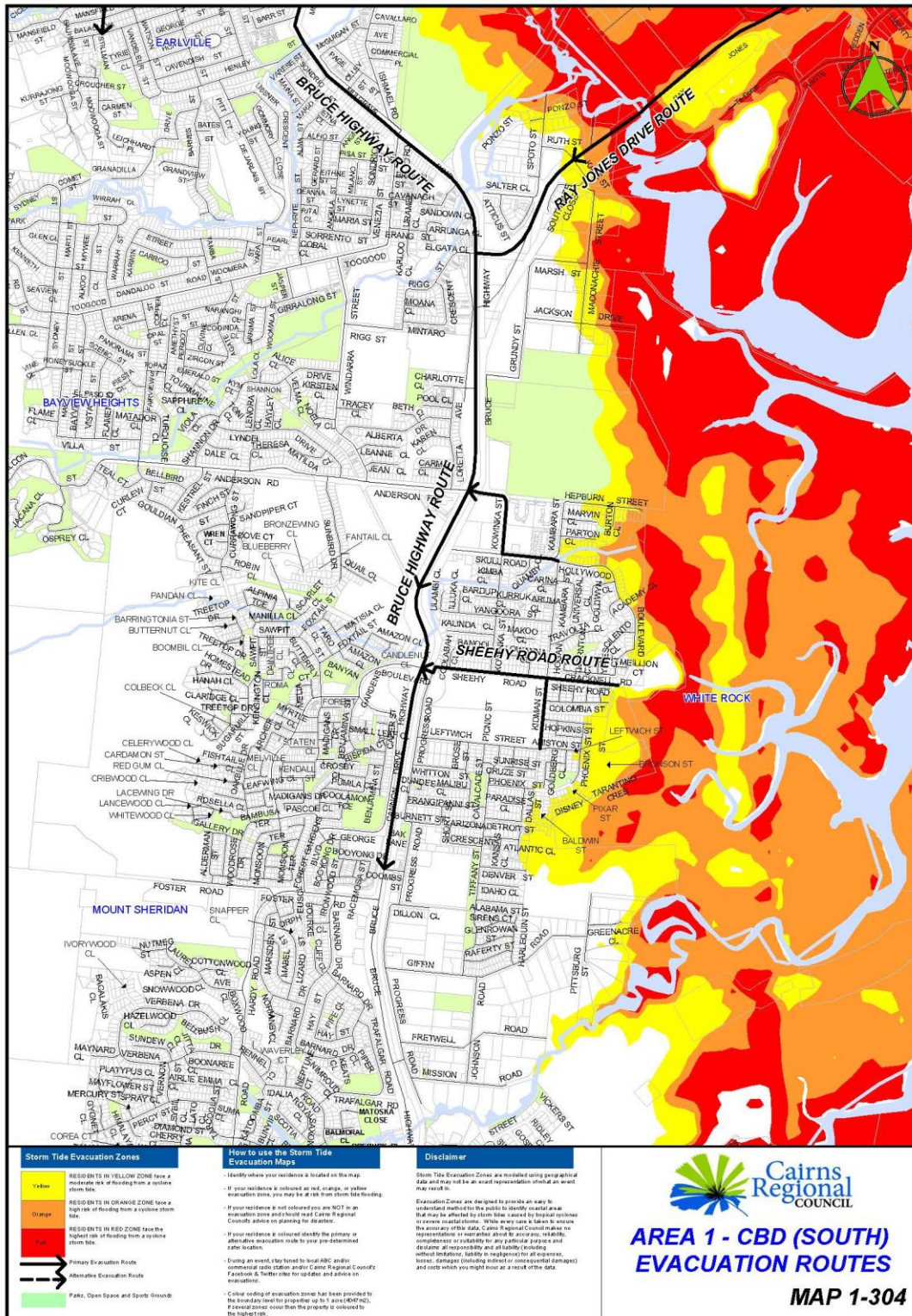
## Cairns CBD



G:\City Works\Business Support\Projects\EVAC STRATEGY 2010\WORKSPACE\STAGE 1300 - Evacuation Route Maps

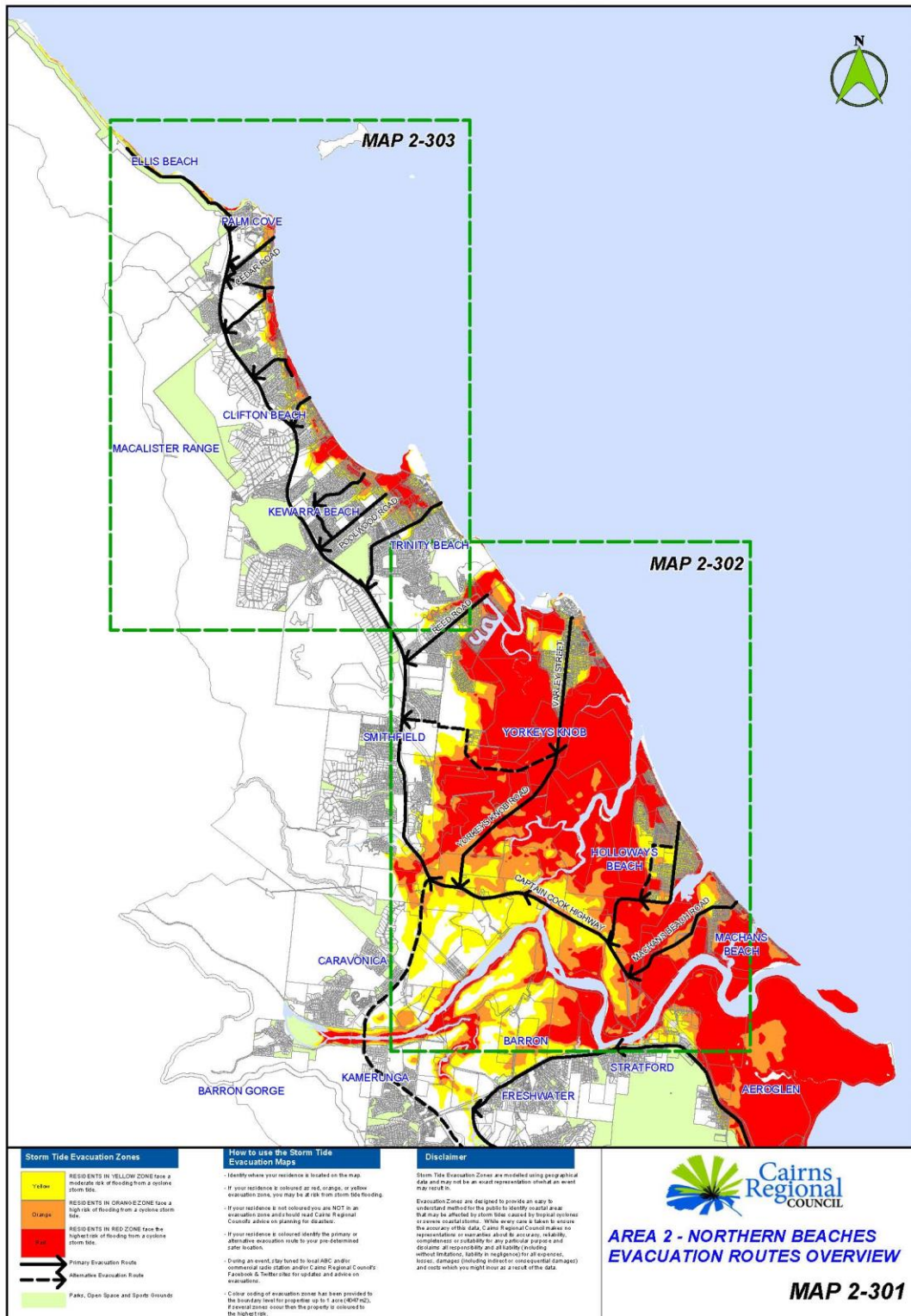


## Cairns South



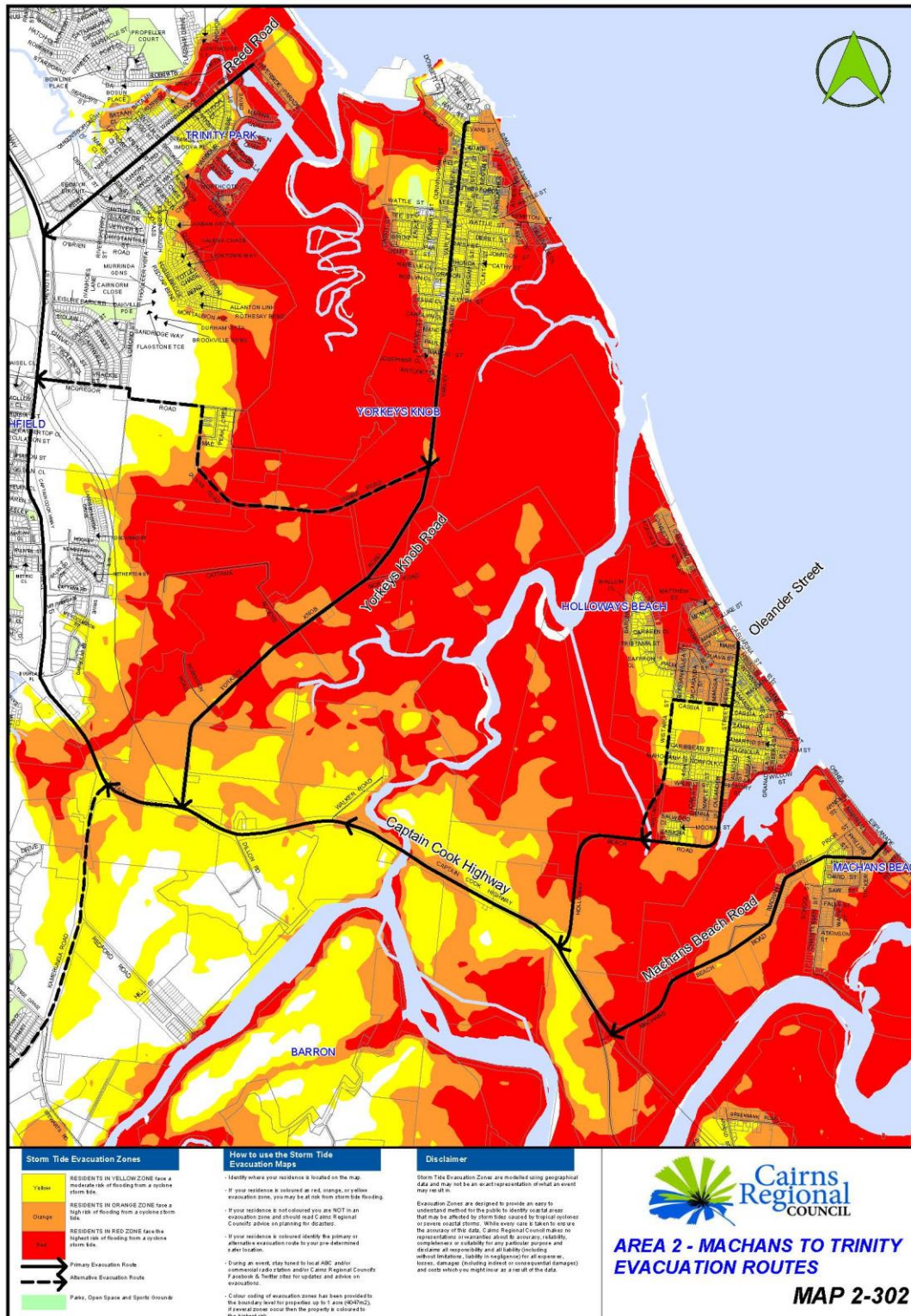
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## Northern Beaches



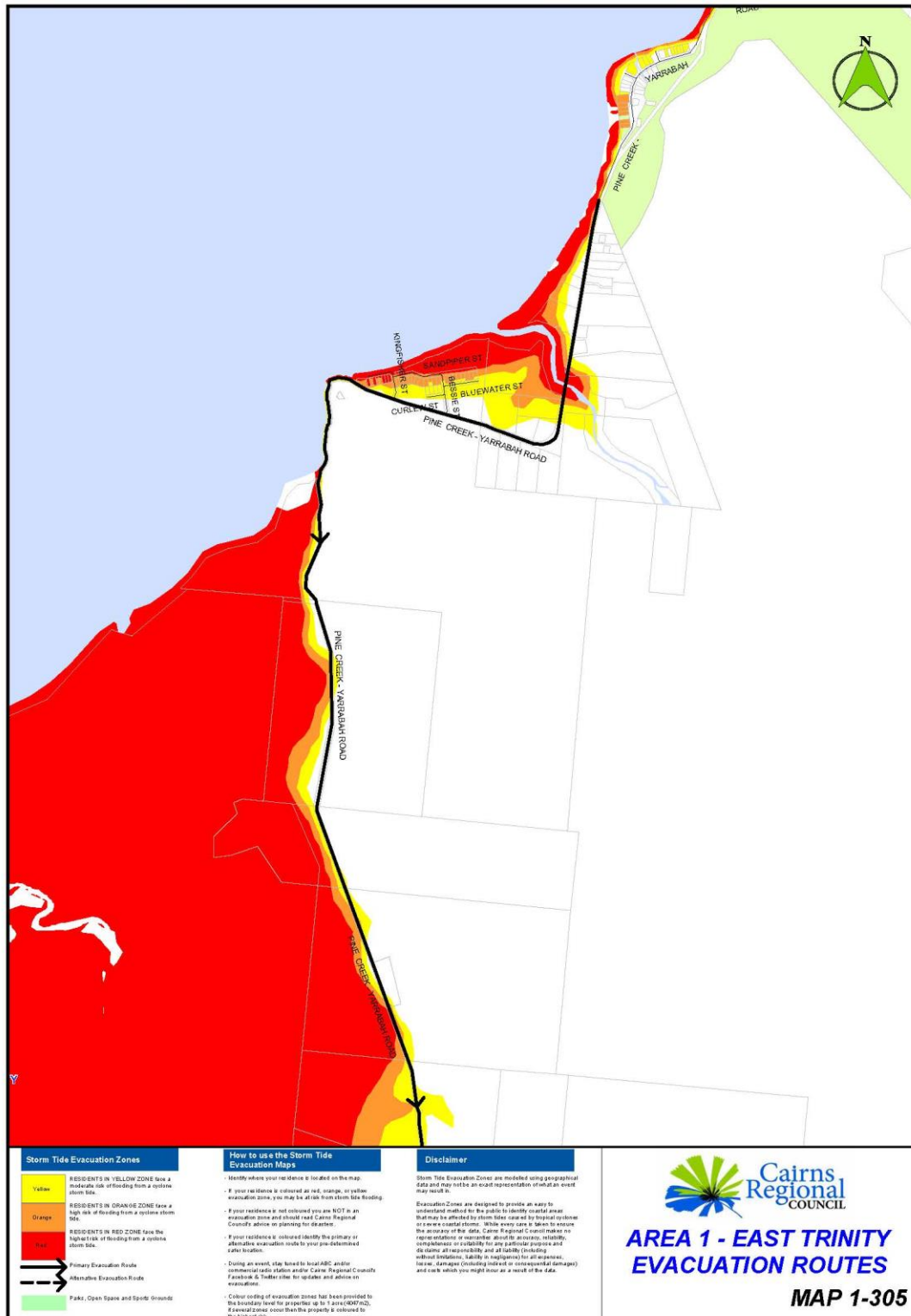


## Machans Trinity



G:\City Works\Business Support\Projects\EVAC STRATEGY 2010\WORKSPACE\STAGE 2\300 - Evacuation Route Maps\Zones Combined

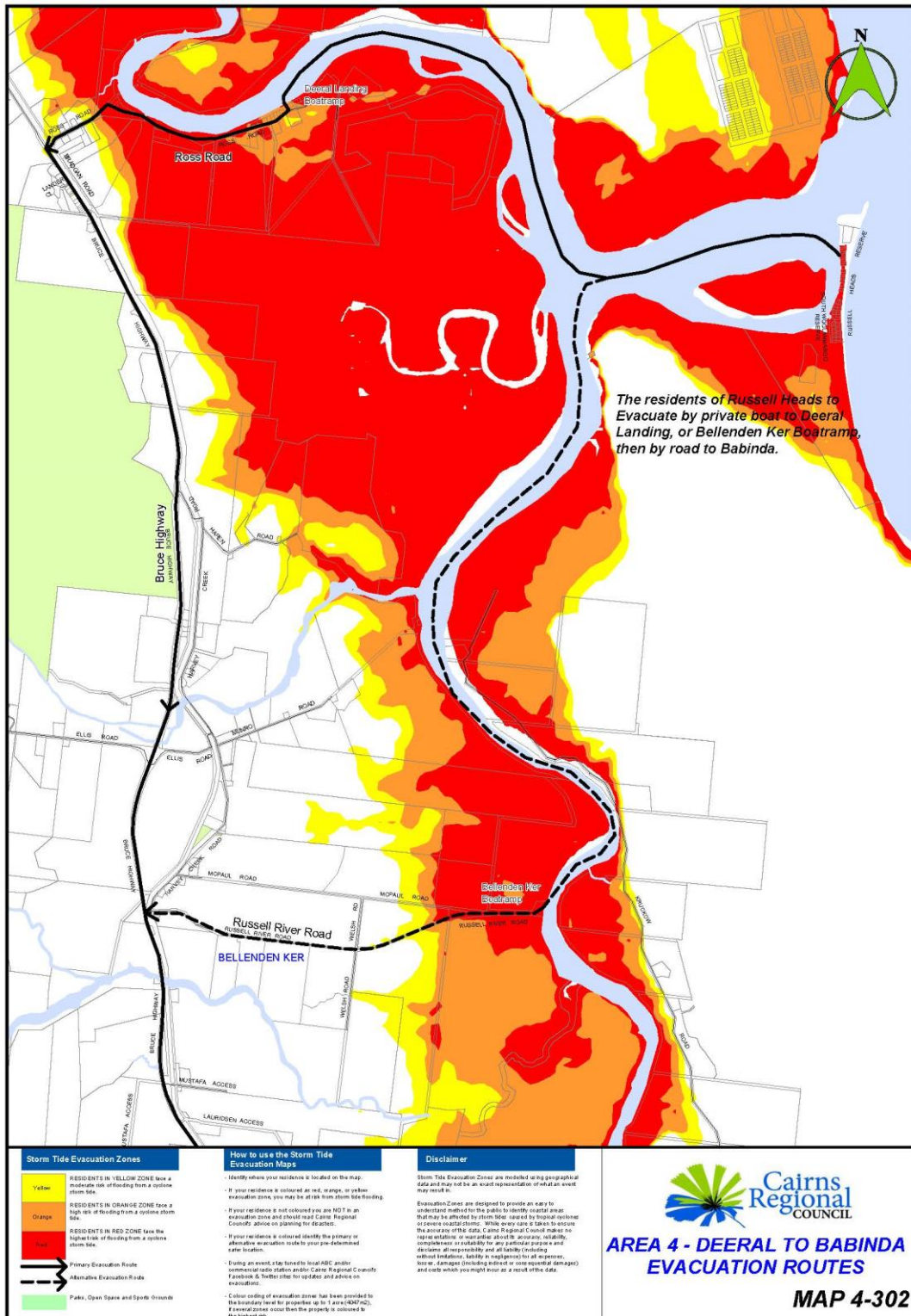
## East Trinity



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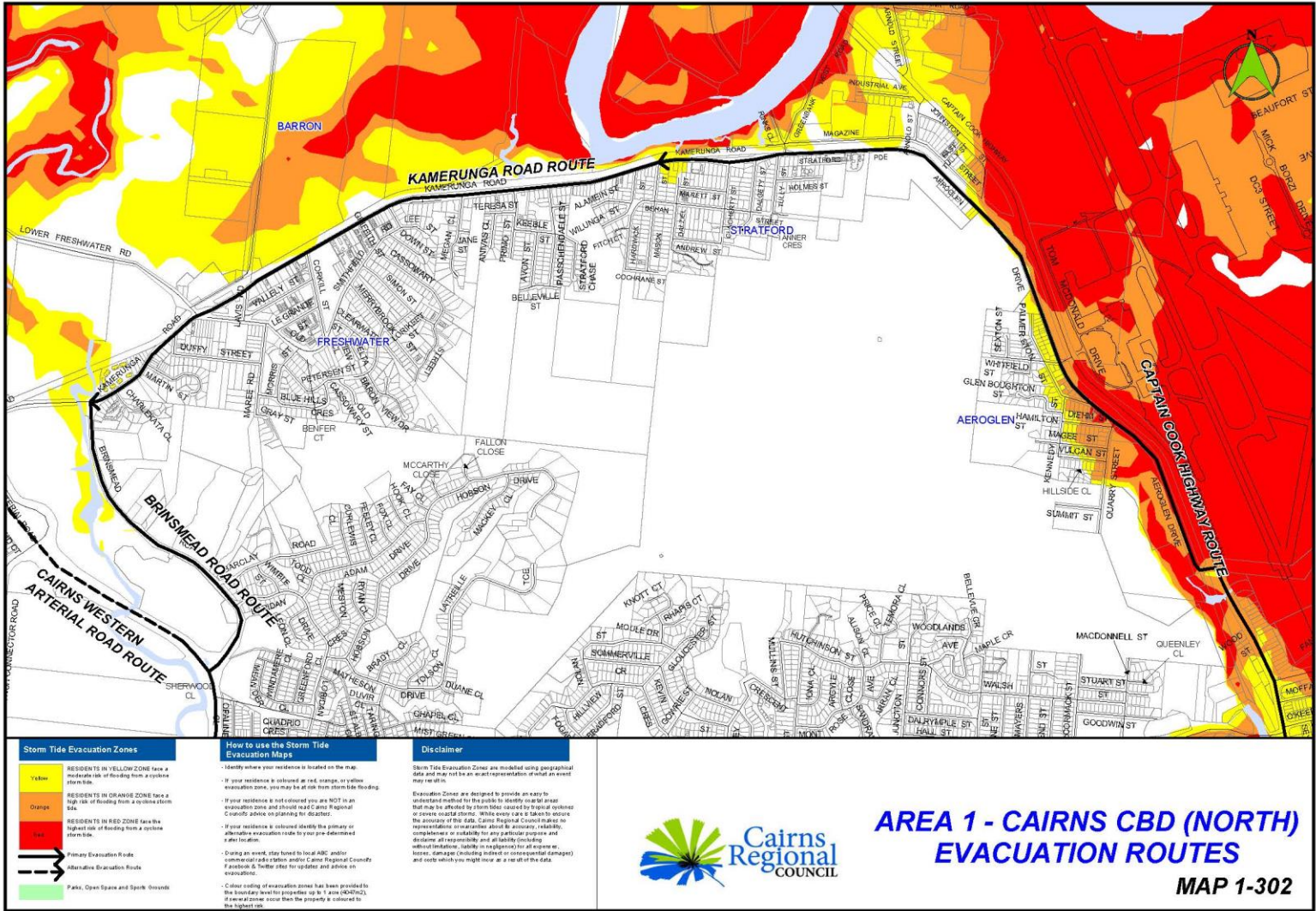
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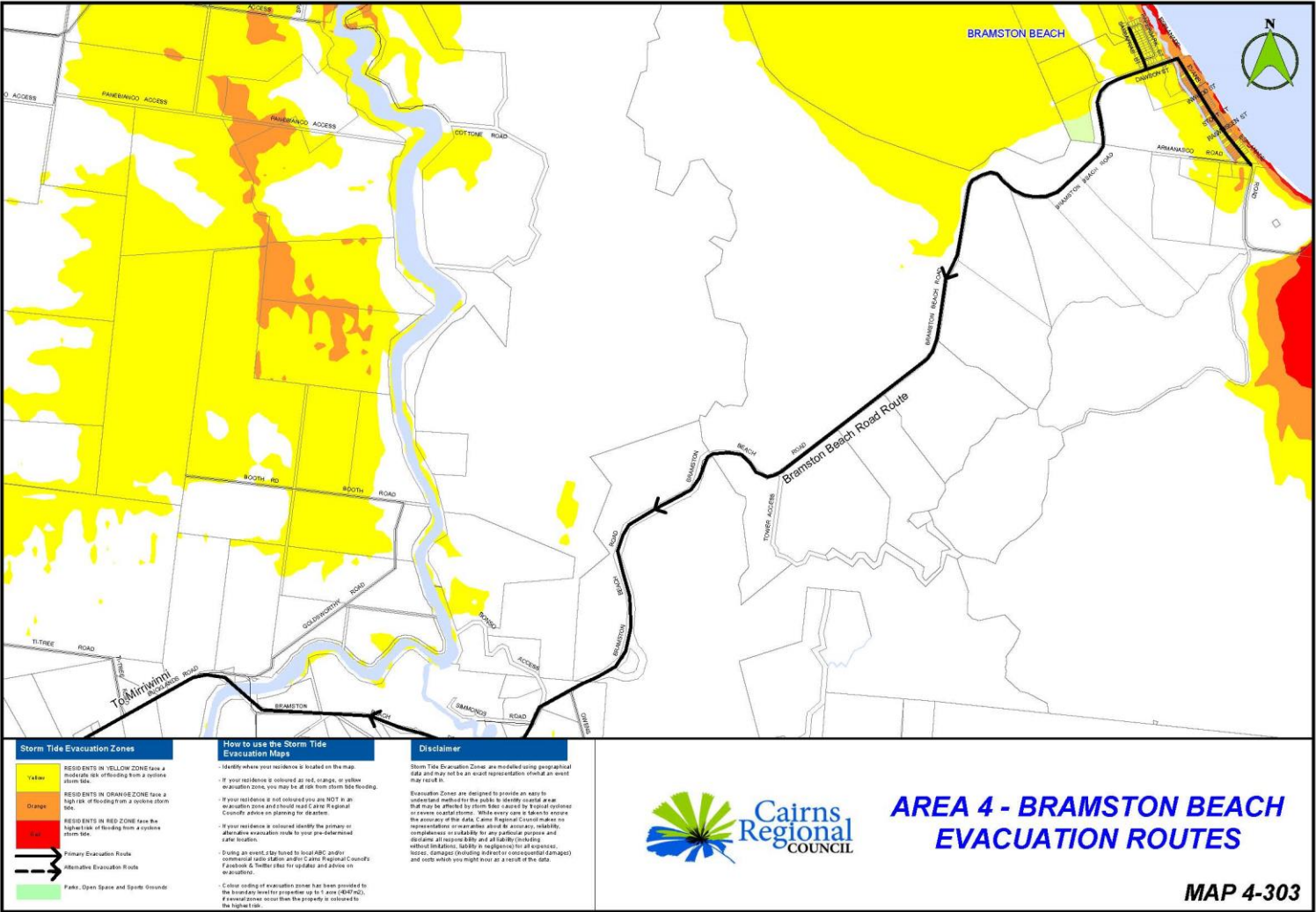
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Cairns North



Bramston Beach



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