

# **Contemporary Research and Practice in the field of Community-based Disaster Resilience**

Prepared for the Foundation of Rural and Regional Renewal

by

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## FOREWORD

Natural disasters continue to cost the Australian economy billions per year in repair bills and economic impacts, and untold costs in terms of the impacts on health and wellbeing and increased disadvantage. Yet, research (Alrich, D P, 2012, Building Resilience – Social Capital in Post-Disaster Recovery, The University of Chicago Press, Chicago) confirms that communities with higher levels of social capital pre-disaster will respond and recover better than those with lower levels of social capital. The communities that are engaged and understand the emergency management system, and the community's role in this, are better equipped at the time of a disaster.

This prompted FRRR, in partnership with Prince's Trust Australia, to found the **Disaster Resilient: Future Ready project**. Leveraging our combined experience in community recovery, bridging disaster recovery and preparedness with community development approaches, we have scoped an applied research project to develop the framework and processes for communities to use to enable disaster resilience. The **Disaster Resilient: Future Ready** project will utilise an action research and co-design methodology, leveraging current research and engaging a broad range of stakeholders, to work with communities to develop and evaluate reality-tested indicators, methods and tools for building resilience.

This is a multi-stage program that will ultimately develop a practical, whole-of-community evidence-based approach that communities can adopt to build their resilience and adaptive capacity to enable them to be well prepared before, and bounce back stronger and better, after a disaster.

The first stage of the program is this Literature Review, which we have commissioned from the Torrens Resilience Institute at Flinders University. Our aim is to review the academic research, commentary, policy and practice that exists around building resilience and resilient communities. The various methodologies outlined herein will now be used to inform in-community pilots, with a view to identifying and developing indicators and strategies to build and sustain resilience in communities at-risk of natural disaster.

We trust that you find this interesting and informative. If you share our views about the urgency of this issue, please get in touch. We are keen to work collaboratively to develop systemic, sustainable and community-led, place-based responses to this high-impact challenge.

**Natalie Egleton**

*Chief Executive Officer*

*Foundation for Rural & Regional Renewal*



**DISASTER RESILIENT  
FUTURE READY**

## EXECUTIVE SUMMARY

This review was undertaken on behalf of Foundation for Rural and Regional Renewal as part of the Disaster Resilient: Future Ready national program. It brings together contemporary research in the field of community disaster resilience, with relevance to rural and regional communities in Australia.

It defines the concept of community resilience and discusses the closely related concepts of capacity building, community connectedness and stakeholder engagement. Recent research focusing on strategies to build community resilience, improve the level of disaster preparedness and strengthen key capacities is discussed. The review includes an analysis of existing community resilience measurement and evaluation tools, with a discussion focusing on the most widely accepted indicators of resilience and the data required to assess resilience at the community level. The sources, availability and quality of these data are described and some issues regarding culturally and linguistically diverse communities are outlined.

**There is no single, commonly agreed-upon definition of community resilience.** Although many different definitions are found in the literature, the majority share a number of common themes:

- ability to prepare for, withstand and absorb disruptions arising from disasters and other emergency events
- ability to adapt to changing conditions, including in the physical, social and economic environment
- ability to recover and continue to function and maintain self-sufficiency while under stress
- ability to 'build back better', improve over time and learn from previous disaster experiences

**Community resilience is enhanced through robust social networks and stakeholder partnerships within communities, responsive local leadership, and commitment to shared values, knowledge and social norms.**

Recent research on strategies to enhance community disaster resilience has focused on strength-based approaches, effective partnerships within communities and participatory research strategies that engage communities in reflexive learning processes. The importance of community engagement and active participation and the significance of communities' unique culture and shared values are emphasised in the majority of resilience building approaches.

Numerous **resilience measurement and assessment tools** can be applied to rural and regional communities in Australia. The majority of these are conducted **in a workshop format and bring together local governments, community organisations, emergency services and community representatives to discuss and assess indicators of community resilience.** In these **process-focused, bottom-up approaches** to resilience assessment, **the assessment process** is considered to be **more important than the outcome, because it is through bringing community stakeholders together** and discussing the community's strengths and weaknesses that resilience is enhanced and plans for further action are made. **Taking cultural diversity into account is important.**

Indicators of community disaster resilience are relatively consistent across assessment tools and include:

population demographics	transportation infrastructure and connectivity
health status	communication infrastructure and connectivity
access to healthcare	community preparedness
food, water and medical supplies	self-sufficiency
housing condition	partnerships and collaboration
shelter availability and capacity	governance, policy and leadership
insurance coverage	social connectedness
employment opportunities	risk communication
income	risk identification and planning
road conditions	emergency services

While many of the indicators can be assessed subjectively through self-assessment, it is generally accepted that **assessments based on community-level data enhance the validity of the resilience measurement exercise**. Demographic, health, employment and income data are readily accessible through organisations such as the Australian Bureau of Statistics and the Australian Institute of Health and Welfare. Housing, insurance and infrastructure data may be more difficult to access, as government and community organisation records may be restricted or unavailable.

In instances where existing data are inaccessible or unavailable, community-level data may be collected to inform the self-assessments made during the resilience measurement exercise. However, **the costs associated with data collection and analysis may mean that this is not a viable strategy for many rural and regional communities in Australia. Nevertheless, active participation and engagement** in the resilience measurement process will **still produce an overall assessment of resilience** within a community and identify areas in need of attention. These assessments can subsequently be used by communities to **track their progress over time and evaluate the impact of resilience building initiatives**.

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# 1. INTRODUCTION

The purpose of this review is to bring together current research focused on community disaster resilience that is relevant to rural and regional communities in Australia. Specifically, the review will present widely agreed-upon definitions of community resilience and discuss the related concepts of capacity building, community connectedness and stakeholder engagement. Current research examining the application of community-based disaster preparedness and resilience building approaches and interventions will be discussed, including strength-based approaches, effective partnerships and participatory research methods. The review will present and critique community resilience measurement methods, with a focus on approaches and tools that can be applied to rural and regional settings in Australia. Finally, the indicators and associated data sources needed to assess disaster resilience at the community level will be presented, detailing the relevant data custodians, and availability and quality of data.

Enhancing community disaster resilience is intrinsically linked to the ability to assess and monitor disaster resilience over time.(1) Assessment of community disaster resilience can facilitate the identification of areas of weakness in need of attention, as well as community strengths that can be further developed and cultivated.(1) The difficulty lies in the fact that there is no universally accepted definition of community resilience, nor is there a uniform and widely-agreed upon approach to measuring a community's level of disaster resilience. Furthermore, communities are complex and dynamic social structures, meaning that community resilience is not static.(2) Community resilience therefore needs to be regularly assessed to detect fluctuations and changes in response to disruptive challenges and resilience-building interventions.(2) The identification of suitable and reliable indicators and metrics for assessing community disaster resilience has been described as one of the grand challenges of disaster risk reduction.(1, 3) Nonetheless, it is generally accepted that community resilience can be assessed through several proxy indicators, including those that capture economic growth and structure, local infrastructure, the distribution of income and assets, demographic and institutional characteristics, individual and organisational capacity, and social structures and networks.(4)

## Aim

The aim of this literature review is to collate and distil the contemporary research and practice in the field of community-led natural disaster preparedness, with a focus on rural and regional communities in Australia, and other nations experiencing similar challenges.

## Objectives

- Document the contemporary research in the field of disaster resilience in relation to strengthening key capacities;
- Document the best practice evidence of community-based/led disaster preparedness approaches (including all hazards approaches and those that have social inclusion as their focus) and;
- Identify and document existing indicator frameworks and their application across the key capacity areas of social, economic, physical infrastructure, information and networks, emergency services, and policy, governance, and leadership.

The review will cover from post 2009 (Black Saturday Bushfires) including Australia, New Zealand, USA & Canada, and potentially pacific nations, and discuss:

1. Commonly agreed definitions of community resilience and their relative merits or limitations in the context of disaster recovery;
2. Existing or potential indicators for measuring contributions to community resilience and their features (e.g. metrics, assumptions, likely costs);
3. Examples of the literature 'in action' at the community level with a focus on evidence of approaches to social and cultural inclusion and community-led responses that align to the research and policy context; and
4. Current and/or prospective data sources for monitoring these contributions

The review is organised according to the following sections:

- Introduction
- Method
- Commonly agreed upon definitions of community resilience
- Applications of community-based resilience building approaches
- Indicators for measuring contributions to community resilience
- Current and prospective data sources for monitoring contributions to disaster resilience
- Considerations regarding culturally and linguistically diverse communities



## 2. METHOD

Searches were conducted on PubMed and Google using the search strategy detailed below. The reference lists of included publications and the Torrens Resilience Institute's existing reference libraries yielded further relevant publications included in the review.

### Search strategy

Concept	Terms
<b>Disaster</b>	Emergencies OR emergency [MeSH] mass casualty OR mass casualty incident [MeSH] OR natural disaster [MeSH] OR disaster [Title/Abstract].
<b>Model</b>	Model [Title/Abstract] OR plan [Title/Abstract] OR policy [Title/Abstract] OR guideline [Title/Abstract] OR procedure [Title/Abstract] OR governance [Title/Abstract].
<b>Resilience</b>	Disaster recovery [Title/Abstract] OR disaster recovery management [Title/Abstract] OR disaster response [Title/Abstract] OR preparedness [Title/Abstract] OR resilience [Title/Abstract] OR mitigation [Title/Abstract] OR disaster arrangement [Title/Abstract] OR disaster recovery OR governance [Title/Abstract] OR key capabilities [Title/Abstract].
<b>Demographic</b>	Community [Title/Abstract] OR community development [Title/Abstract] OR neighbourhood [Title/Abstract] OR rural [Title/Abstract] OR remote [Title/Abstract] OR remote area [Title/Abstract] OR rural area [Title/Abstract] OR country community [Title/Abstract] Australia [Title/Abstract] OR New Zealand [Title/Abstract] OR United States of America [Title/Abstract] OR Canada [Title/Abstract] OR USA [Title/Abstract] OR NZ [Title/Abstract].

### 3. DEFINITIONS OF COMMUNITY RESILIENCE

The term resilience was originally used in the fields of psychology, ecology and engineering to refer to an individual's or object's ability to withstand damage or impact and either remain at or return to the pre-event state. However, when used in the disaster preparedness and emergency management context, resilience takes on a broader meaning.

In these fields, resilience not only describes an individual's, business' or community's ability to recover and rebuild after an emergency event, but also refers to the capacity of communities and organisations to learn from responses to previous events, and recover and rebuild after each disaster to a state that is an improvement on the pre-event situation.

This concept of 'building back better' refers to the ability of resilient communities to use their experiences during emergencies to enhance their preparedness and response strategies for both foreseeable and unforeseeable future events.

There is no single, widely agreed-upon definition of community disaster resilience.(5, 6) It has been described in various ways, including:

- "A disaster resilient community is one that can work together to understand and manage the risks that it confronts"(7)
- "Resilience is the sustained ability of a community to withstand and recover from adversity"(8)
- "Community resilience is the ability to prepare and plan for, absorb, recover from and more successfully adapt to adverse events"(9)
- "Community resilience is a community's ability to withstand and recover from hard times. Even in the case of a widespread emergency, residents can meet their basic needs including food, water, energy, transportation, housing, and economic and social services"(10)
- "A community will prove resilient in the event of a severe emergency or disaster when members of the population are connected to one another and work together, so that they are able to: function and sustain critical systems, even under stress; adapt to changes in the physical, social or economic environment; be self-reliant if external resources are limited or cut off; and learn from experience to improve over time"(4)
- "Resilient communities are able to plan for, respond to and thrive after a disastrous event. At the heart of a resilient community is a robust set of social networks which help people address the challenges in their day-to-day lives, as well as those that occur in times of extreme stress"(11)
- "Community resilience is the capability to anticipate risk, limit impact, and bounce back rapidly through survival, adaptability, evolution, and growth in the face of turbulent change"(11)
- "Resilient communities minimise any disaster's disruption to everyday life and their local economies. Resilient communities are not only prepared to help prevent or minimise the loss or damage to life, property, and the environment, but they also have the ability to quickly return citizens to work, reopen businesses, and restore other essential services needed for a full and timely economic recovery"(12)

- “Community resilience entails the ongoing and developing capacity of the community to account for its vulnerabilities and develop capabilities that aid that community in: preventing, withstanding, and mitigating the stress of a health incident; recovering in a way that restores the community to a state of self-sufficiency and at least the same level of health and social functioning after a health incident; and using knowledge from a past response to strengthen the community's ability to withstand the next health incident”(13)
- “Community resilience is the ability of a community to adapt to changing conditions, withstand disruption, and rapidly recover from emergencies”(14)
- “Community resilience is the capacity of communities to prepare for, absorb and recover from natural hazard events”(15)
- “A resilient community is one whose members are connected to one another and work together in ways that enable it to function in the face of stress and trauma. A resilient community has the ability to adapt to changes in the physical, social or economic environment, and the potential to learn from experience and improve over time. A resilient community can also be self-sufficient, as least for a time, if external assistance is limited or delayed”(2)
- “Descriptions of resilience take three different forms: resistance, which refers to the ability of a community to absorb perturbation; recovery, which focuses on the speed and ability to recover from the stressors; and creativity, which addresses the ability of a social system to maintain a constant process of creating and recreating, so that the community not only responds to adversity, but in doing so, reaches a higher level of functioning”(4)
- “The capacity of individuals, communities, institution, businesses and systems to survive, adapt and thrive no matter what kind of chronic stresses and acute shocks they experience”(16)
- “The ability to anticipate and adapt to shocks and stresses, implementing lessons learned to leverage emerging opportunities and effectively reduce vulnerabilities”(17)
- “The ability of individuals, communities, organisations or countries exposed to disaster, crises and underlying vulnerabilities to anticipate, prepare for, reduce the impact of, cope with and recover from the effects of shocks and stresses without compromising their long-term prospects”(18)
- Emergency Management Victoria identifies seven resilience characteristics that for communities: (1) Safe and well; (2) Connected, inclusive and empowered; (3) Dynamic and diverse local economy; (4) Sustainable built and natural environment; (5) Culturally rich and vibrant; (6) Democratic and engaged; and (7) Reflective and aware.
- “The ability of individuals, communities, organizations or countries exposed to disasters, crises and underlying vulnerabilities to anticipate, prepare for, reduce the impact of, cope with and recover from the effects of shocks and stresses without compromising their long-term prospects”(19)

The National Strategy for Disaster Resilience(7) describes a disaster resilient community in great detail as one where:

- people understand the risks that may affect them and others in their community. They understand the risks assessed around Australia, particularly those in their local area. They have comprehensive local information about hazards and risks, including who is exposed and who is most vulnerable. They take action to prepare for disasters and are adaptive and flexible to respond appropriately during emergencies;
- people have taken steps to anticipate disasters and to protect themselves their assets and their livelihoods, including their homes and possessions, cultural heritage and economic capital, therefore minimising physical, economic and social losses. They have committed the necessary resources and are capable of organising themselves before, during and after disasters which helps to restore social, institutional and economic activity;
- people work together with local leaders using their knowledge and resources to prepare for and deal with disasters. They use 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;
- people work in partnership with emergency services, their local authorities and other relevant organisations before, during and after emergencies. These relationships ensure community resilience activities are informed by local knowledge, can be undertaken safely, and complement the work of emergency service agencies;
- emergency management plans are resilience-based, to build disaster resilience within communities over time. Communities, governments and other organisations take resilience outcomes into account when considering and developing core services, products and policies. They are adaptive and flexible to respond appropriately in disasters;
- the emergency management volunteer sector is strong;
- businesses and other service providers undertake wide-reaching business continuity planning that links with their security and emergency management arrangements;
- land use planning systems and building control arrangements reduce, as far as is practicable, community exposure to unreasonable risks from known hazards, and suitable arrangements are implemented to protect life and property; and
- following a disaster, a satisfactory range of functioning is restored quickly. People understand the mechanisms and processes through which recovery assistance may be made available and they appreciate that support is designed to be offered, in the first instance, to the most vulnerable community members.” (p. 5)

Several key concepts are emphasised in many of the above definitions, including community engagement, partnership among residents and organisations, robust local leadership, and individual-level and community-level knowledge, preparedness and self-sufficiency. (8, 13) Community resilience encompasses the concepts of social resilience, economic resilience, institutional resilience, infrastructure resilience, ecological resilience, and community capital. (2, 15, 20)

**Increasing connectedness involves fostering and strengthening links and relationships between individuals and organisations to create social capital and strengthen communities.**

**Strategies to promote and enhance community resilience include building capacity, increasing connectedness and fostering cooperation. (11).**

Capacity building refers to developing, strengthening and increasing knowledge, skills and resources that are required and valued by the community in the lead up to, during, and in the aftermath of a disaster or emergency event. These resources enable the community to adequately prepare for potential future disasters, respond to current hazards, disruptions and

emergencies, and recover and rebuild in the aftermath of disaster. (15) Community disaster resilience building strategies aim to enhance communities' capacity to anticipate hazards, limit their impact, and recover and rebuild efficiently following a disaster through learning, adaptation and transformation. (15)

Social capital consists of factors that promote and maintain community wellbeing, including social support, social structures and connections, community linkages, and sense of place. (15) Increased social capital results in multiple sources of practical and social support for community members and produces networks that are robust and resilient to disruption. Communication networks are strengthened and social trust is developed, which encourages coordination, collaboration and information sharing among community members for mutual benefit. (2)

Fostering cooperation relates to initiatives that promote trust, reciprocity and interdependence among diverse individuals and organisations within communities. Social capital is increased when varied stakeholders cooperate and collaborate on the common goal on strengthening the community's resilience to disaster and other disruptive events.

## 4. APPLICATIONS OF COMMUNITY-BASED RESILIENCE BUILDING APPROACHES

*“Mitigating, preparing for and building resilience against global risks is long and complex, something often recognized in theory but difficult in practice.”(21)*

Recent research focusing on resilience building initiatives in community settings has emphasised the importance of active community participation and engagement at all stages of the process.(22-26) Tactics that enhance community resilience include strength-based approaches, which aim to ease physical and psychological difficulties within communities through identifying the existing strengths that can be utilised to improve outcomes.(22)

A strength-based approach employed in Canterbury, New Zealand following earthquakes in 2010 and 2011 focused on supporting goal setting and problem-solving by utilising the communities’ existing assets, such as social support networks, cultural and spiritual practices and community diversity.(22) Similarly, the value of culture in community disaster resilience was emphasised by Maori-led initiatives in Christchurch, which centred around pre-existing community linkages that promoted the spontaneous organisation of support services, evacuation centres and distribution of essential supplies.(23)

Effective partnerships and collaborative arrangements between community organisations, emergency services and local governments similarly promote community disaster resilience. (6, 24, 27)

Partnerships between communities and emergency services in which communities take responsibility for disaster planning and preparedness activities through the effective leadership of emergency management agencies contribute to the development of interventions that are locally tailored and sustainable. (24)

These partnerships rely on effective two-way communication, to ensure that community needs are met and local interest and engagement in resilience building activities are maintained. (24, 25) Specifically, emergency services may partner with local schools to incorporate resilience building activities into the curriculum or with community clubs and groups to offer information and training in disaster preparedness and response. (25) Such partnerships contribute to a community-wide commitment to a culture of preparedness. (6)

Partnerships and collaboration between community organisations enhance social capital, which supports the rapid mobilisation of coping resources and support networks in the event of a disaster. (6, 26, 28) Strong family and community links and strong social networks increase resilience and help communities to cope, recover and adapt in the event of a disaster. (28) Partnerships and networks linked to community organisations such as parents and citizens associations, sporting clubs and schools are particularly important in rural communities, where they play a key role in maintaining the relationships and connectedness of community members, thereby enhancing social capital. (27)

Participatory research strategies can also enhance community resilience through engaging communities in reflexive learning processes. (29) Such strategies typically include the assessment of community resilience through a scorecard or toolkit, which involves community stakeholders actively participating in the evaluation process and post-evaluation goal-setting and planning activities. Therefore, these approaches provide the opportunity for communities to assess their level of resilience and gain a deeper understanding of their strengths and weaknesses. (29) For maximum benefit, researchers undertaking this work have a responsibility to enable and encourage full community participation in all phases of research. (29)

Emergency Management Victoria (EMV) and the Monash University Disaster Resilience Initiative (MUDRI) have jointly created a Compendium of case studies that reflects Victorian community-based resilience building case studies. (30) The Compendium is a resource that promotes resilience-building activities to community members wanting to strengthen their own community's resilience through being able to draw on the 19 examples and expertise embedded within the case studies. The case studies were:

- Alpine Shire Council Community Resilience Committee Case Study
- Be Ready Warrandyte – Living with Bushfire Risk (2012-2015)
- Centre of Resilience (CoR)
- CONNECT Warrnambool
- Dig in Community Café
- Fire Ready Carers Kit
- Gembrook Emergency and Resilience
- Gender and Disaster Pod (GAD Pod)
- Healthy and Resilient Together (HART) Project
- In an emergency, what's your plan?
- Managers of Spontaneous Emergency Volunteers Pilot Program – G21 Region
- Mansfield Community Resilience Leadership Program
- Rivers and Ranges Community Leadership Program
- Rural Fire Tales
- Rural People: Resilient Futures (RP-RF)
- Supporting communities in the 3999 postcode
- 'Survive and Thrive' Program – Anglesea Fire Education Partnership
- Warramunda Village Builds Resilient Leadership
- Whittlesea Township and Surrounds Community Emergency Plan

The Compendium with detail about each of these case studies can be downloaded from [https://www.monash.edu/\\_data/assets/pdf\\_file/0004/514462/Compendium\\_201703.pdf](https://www.monash.edu/_data/assets/pdf_file/0004/514462/Compendium_201703.pdf)

The Resilient Australia Awards is a national program that recognises and promotes initiatives that strengthen community disaster resilience across the nation. The awards program started in 2000, is run annually and offers a wealth of examples of community initiatives. It has a solid history in Australia's emergency management sector. More information about the awards can be found at <https://www.ag.gov.au/EmergencyManagement/Resilient-Australia-Awards/Pages/default.aspx>

Other examples of community-led initiatives from utilising strengths-based approaches, effective partnerships and participatory research strategies to enhance resilience are detailed in Table 1 below.

**Table 1 – Community-led initiatives to enhance resilience**

Initiative	Location	Program summary	Community engagement strategies
<b>National</b>			
<b>Pillowcase Project(31)</b>	National	The Pillowcase Project is run by the Australian Red Cross to educate children about disaster resilience. Aimed at students in Years 3 and 4, the workshop involves engaging discussions and interactive activities to help students to understand and discuss the importance of being prepared; prepare their mind for the thoughts and feelings that may arise before, during and after an emergency; and know the difference between need and want items and what to pack in an emergency kit	The project focuses on children’s strengths rather than their increased vulnerability to disaster. Children are given the opportunity to practice skills that contribute to increased resilience and act as positive change agents in their communities. This creates flow-on effects in households and community organisations, which contributes to an overall culture of preparedness and resilience
<b>Victoria</b>			
<b>Through Women’s Eyes (32)</b>	Alpine Shire, VIC	Women’s Health Goulbourn North East in conjunction with the Alpine Shire ran a series of workshops to gather women’s unique perspectives on disasters and resilience, and to contribute to local community resilience planning. The women’s disaster resilience insights, stories and suggestions for change were captured on six posters which have been displayed locally within their communities and published on websites, to ensure widespread access to these messages	The workshop program required close collaboration between Women’s Health Goulbourn North East, local council and members of the community. The program also focused on women’s strengths and unique experiences, drawing out valuable lessons in preparing for, coping with and recovering in the aftermath of disaster
<b>Survive and Thrive (33)</b>	Strathewen, VIC	The Country Fire Authority expanded their Survive and Thrive program to Strathewen Primary School, which was severely damaged in the 2009 Black Saturday bushfires. As part of the program, students created a bushfire safety claymation video about preparing properties, reading	The program promotes learning through active participation in a year-long project, which gives students a sense of ownership of the final product and increases their confidence in being able to take actions to adequately prepare for bushfire hazards



Initiative	Location	Program summary	Community engagement strategies
		fire danger ratings and actions to take in the event of an emergency. The program equips children with the knowledge, skills and confidence to prepare for and respond to bushfire emergencies	in the future. The effective partnership between the school and the CFA ensures that the program is tailored to the unique experiences and needs of the Strathewen community
<b>Fit for Free (34)</b>	Toolangi, VIC	The program has been run by the Toolangi District Community House for the past six years, initially designed to assist those after the bushfires of 2009. The program has four main target areas including the reduction of trauma after the 2009 bushfires; improvement of both physical and psychological health of the older members of the community; increasing community connectedness; and building community resilience through connectedness. An evaluation of the program found that participants reported improved quality of life, increased fitness, weight loss, reduced need for medications, less frequent doctor visits, improved mental health outcomes	The program has improved the community's economy, with cost savings identified for public funding of health and crisis services. There have been significant positive impacts on the community, including increased volunteering rates and improved support for community groups. By improving community connectedness, the program contributed to residents' increased sense of belonging within the community, which increases community resilience
<b>NSW</b>			
<b>Activate Wollondilly (35)</b>	Wollondilly Shire, NSW	In response to the 2016 Picton storm, Activate Wollondilly aims to support key community capabilities for disaster resilience; communicate with and educate people about risks; lead change and coordinate effort; and partner with those who effect change to reinforce resilience and preparedness of the community	The initiative encourages active community engagement through participation in resident forums and discussions on social media channels. Partnerships with local businesses, community organisations, charities, schools, government representatives and emergency services are viewed as essential to creating a coordinated approach to disaster planning and recovery

Initiative	Location	Program summary	Community engagement strategies
<p><b>Six Steps to Resilience for Community Organisations across the Hunter Region (36)</b></p>	<p>Hunter Valley, NSW</p>	<p>The project aims to raise awareness and capacity within community service organisations of the importance service continuity during disasters; provide direct support to organisations via a collaborative workshop process to complete business continuity plans using the 6 Steps to Resilience framework; and evaluate the effectiveness of the 6 Steps process</p>	<p>The project recognises the important role that community organisations play in supporting communities during disasters. Therefore, working with and strengthening the resilience of these organisations is viewed as central to enhancing community disaster resilience. Effective partnerships between community organisations, community members and local councils are central to this project</p>
<p><b>Disaster Preparedness for Children's Services in Rural Remote NSW (37)</b></p>	<p>Bourke, NSW</p>	<p>The project aims to enhance the disaster preparedness of Bourke Children's Services. The project will focus on developing effective strategies to educate children about natural hazards risks and preparedness actions. The focus is on developing cost-effective programs that enhance resilience among children, schools, households and communities</p>	<p>Collaboration and maintaining effective partnerships is central to this project. Project partners are actively involved in all stages of the project, including forum discussions, educational material development and evaluation. This approach ensures community ownership and widespread benefits for the whole community</p>
<p><b>Project Bounce Forward (38)</b></p>	<p>Dungog Shire, NSW</p>	<p>The project provides free support to community members affected by the 2015 storm with insurance claims and legal matters, landscaping, counselling and temporary accommodation. Community members have access to a fortnightly support group and various community events</p>	<p>Strong partnerships with local stakeholders such as Local Lands Services and Habitat for Humanity allow for community support services to be tailored to local needs and delivered in a timely manner. There is strong community ownership of the project, as many of the services and events have been developed and delivered by community members</p>

Initiative	Location	Program summary	Community engagement strategies
<b>Queensland</b>			
<b>Exercise Bright Spark (39)</b>	Atherton Tablelands, QLD	Exercise Bright Spark was a multi-agency desktop exercise designed for Community Disaster Teams. The key objectives of the exercise were to: test activation of community disaster plans and resources; examine the ability of Community Disaster Teams to identify local resources, check on vulnerable people and determine and communicate priorities during disaster events; and test the linkages between Community Disaster Teams and the Local Disaster Coordination Centre	The exercise focused on testing the strength and practicality of existing community networks in an emergency situation. The exercise engaged community stakeholders in reflexive learning, encouraging participants to address identified gaps and weaknesses
<b>Riding Through the Storm (40)</b>	Tully, QLD	This program involved teachers and students at Tully High School receiving training in positive psychology to increase resilience, wellbeing and optimism in the school community. The program was implemented in response to declining mental wellbeing among students following Cyclone Yasi in 2011	The broader school community was actively involved in the program, demonstrating a commitment to community ownership of the intervention. The program was tailored to the unique environment and needs of the local community, addressing the uncertainty and recent upheavals experienced by the students
<b>Quadriders to the Rescue (41)</b>	Tully, QLD	In response to Cyclone Yasi, quad bike riders in affected areas such as Tully volunteered their time, quad bikes and chainsaws, helping to remove fallen trees and debris and allowing residents to gain access to their homes and businesses. This work meant that local residents could more easily contact their neighbours and families, and the service was immensely appreciated by these small communities	The work of these volunteers was seen as extremely valuable by the local communities. This was particularly important at a time when resources of emergency services and other response agencies were stretched, and timely support was not always available. This initiative mobilised existing resources within the community, enhancing community resilience and self-sufficiency

Initiative	Location	Program summary	Community engagement strategies
<b>Together We Can Do It (42)</b>	Bundaberg, QLD	The Bundaberg community suffered considerable damage as a result of severe weather events in January 2013. Through donations and collaboration with the Salvation Army Tom Quinn Centre, the Combined Churches of Bundaberg, established a volunteer organisation to assist with the rebuilding of damaged infrastructure in the region. The project operated for 15 months, assisting with the refurbishment of 64 homes of those identified as the most vulnerable members of the community, who would not have been eligible for funding	The outcomes from the project extend beyond the rebuild and refurbishment of infrastructure to the positive emotional impact and collaboration between local community groups. Due to the success of this project, State Government is looking to formalise processes and policies regarding agency collaboration as a model for response in future disasters
<b>Disaster Resilience Leadership Project (43)</b>	QLD	The project aims to bring together a broad cross-section of stakeholders in order to explore their role in building community resilience and develop action plans which address local issues. This involves participation in a capacity building workshop for community leaders living in disaster affected or at risk communities	Both formal and informal leaders are encouraged to participate and expand their knowledge with respect to local issues, community strengths and available resources. Ultimately, well informed, connected and empowered local community leaders have the means to make significant positive contributions to their communities
<b>Western Australia</b>			
<b>Beyond the Gate (44)</b>	City of Mandurah, WA	The project aimed to develop an Aged Care Support Plan through participatory research, workshopping, networking, and ongoing persistent engagement. The outcomes included a better understanding of vulnerable communities; an appreciation of the challenges facing the aged care community; and an understanding of the capability and capacity of evacuation centres, hospitals, families	The project focused on strengthening and reinvigorating the aged care community network, and committed to an increased level of consultation and cooperation between aged care facilities and community stakeholders. The project utilised existing community networks and promoted a shared responsibility for enhancing resilience in the aged care sector

## 5. INDICATORS FOR MEASURING CONTRIBUTIONS TO COMMUNITY RESILIENCE

Measuring and monitoring contributions to disaster resilience is inherently challenging, due to the fact that many factors influence resilience and it is difficult to view any of them in isolation. The range of disasters, hazards and emergency situations further complicate efforts to monitor communities' disaster resilience, as some indicators may contribute to resilience in a general sense, while others may be specific to a particular hazard or emergency. Furthermore, the subjective nature of community resilience restricts the capacity to make comparisons over time and between different communities.

Nevertheless, numerous models for assessing and measuring community disaster resilience have been developed that have addressed the challenges associated with measuring resilience by establishing replicable assessment methods that enable tracking of community resilience over time. These models therefore allow for the impact of disasters and other disruptive events, as well as resilience-building interventions, to be evaluated.

Given that there is no single accepted definition of community resilience, numerous strategies and methods of measuring a community's level of disaster resilience have been developed and implemented.

These methods may relate to assessing community processes, outcomes or outputs. Models or tools that assess processes typically examine a community's disaster preparedness and response planning actions and activities, governance arrangements and communication strategies. Tools that are outcomes-focused look at communities' responses to previous disasters or disruptions to determine each community's capacity to recover and rebuild in the aftermath of an emergency event. Models that consider outputs generally focus on communities' existing emergency response and business continuity plans, conducted risk assessments and other relevant documents.

Community resilience assessment tools also differ in their overall approach to measuring resilience, with some taking a broad, top-down approach, while others employ a community-centred, bottom-up approach.

Top-down approaches generally involve an organisation or agency being tasked with applying a single assessment tool or scorecard to numerous communities or organisations, and then collating, analysing and comparing the results to build an overall picture of resilience at a state or national level. Typically, top-down approaches tend to rely on easily quantifiable indicators, such as population demographics and economic measures.

On the other hand, bottom-up approaches focus on community processes and activities that influence disaster resilience at the local level, and tend to rely more on qualitative indicators and expert opinion. These approaches typically involve community stakeholders completing a self-assessment scorecard or questionnaire in a workshop format, with the ultimate goal of highlighting areas in need of further attention and providing a baseline picture of disaster resilience that can be used to assess the impact of future resilience building interventions.

**Very few measures or indicators of community disaster resilience have undergone formal evaluation**, in part due to the fact that the majority of resilience measurement tools have been developed relatively recently. Therefore, it is not clear how effective many of the included indicators are at capturing and assessing community disaster resilience.

Despite this, there is widespread agreement that participating in the process of a community disaster resilience evaluation exercise is far more important than the final score or rating arising from these assessments. It is through participation in the process of critically evaluating and discussing each of the indicators of disaster resilience that communities can identify areas in need of further attention or improvement.

The choice of which measurement or assessment tool to use depends very much of the purpose of the assessment. The purpose should guide the choice. In addition, the process of doing the assessment can be more important than the outcome of the process. It is often in the bringing together of people in order to carry out the assessment that results in laying the foundation for building resilience. This is because a key aspect in resilience is connectedness and bringing people together to focus on a common goal has the potential to initiate and foster relationships – often between parties who are disconnected, e.g., members of community groups and emergency management.

**Table 2** provides a number of tools and approaches to assess resilience at the community level. A useful resource that provides a review of disaster resilience measurement tools can be found at <http://www.preventionweb.net/publications/view/37916>.

The review is concerned with measurements of resilience against natural disasters. It includes issues that are closely linked to disaster resilience such as disaster risk management, vulnerability to disasters and food and nutrition. It does not cover the more narrowly focused forms of resilience, such as psychological resilience, limitation to physical resilience from an engineering point of view, cyber resilience, and supply chain resilience. The review distinguishes national level measurements, but importantly for purposes of this review, details community-level assessments as well. These include some country specific tools, as well as more specific approaches or broad frameworks (45):

- Tsunami Recovery Impact Assessment and Monitoring System (TRIAMS)
- Indonesia Disaster Recovery Index (DRI)
- DRLA/UEH Haiti Evaluation Resilience framework
- Minimum characteristics of the Nepal Risk Reduction Consortium
- Expert Consultation on Resilience Measurement for Food Security
- Resilience cost approach
- Network of Adaptive Capacities
- Livelihoods Change Over Time (LCOT)
- Peoples Resilience Framework
- Community-based Resilience Analysis (COBRA)
- MCEER R4 Resilience Framework
- USAID Resilience Domain Framework
- Basket of indicators of economic resilience
- ODI Disaster Risk Management Indicators

Other useful resources are those related to the global 100 Resilient Cities initiative (<http://www.100resilientcities.org/>). Even though these focus on urban environments, the definitions and indicators are useful for rural contexts as well. Resilient Melbourne (<https://resilientmelbourne.com.au/>) is one example. More details about specific community measurement tools found in the review are included in **Table 2**.

**Table 2 – Community disaster resilience measurement tools**

Tool	Author	Indicators/ Areas of assessment	Target audience	Format	Assumptions / Required information	Costs	Outcomes
<b>FAO Resilience Tool (45)</b>	Food and Agriculture Organisation of the United States	Income and access to food; assets including land and livestock; social safety nets; access to basic services; household adaptive capacity; stability of factors over time	Local communities; decision and policy makers	Surveys	National household budget surveys	Minimal – production and retrieval of surveys	Identification of root causes of <b>household</b> vulnerability
<b>Resilience United States (ResilUS) (45)</b>	Western Washington University; Huxley College of the Environment	Household and business well-being (health; employment, productivity and product demand)	Local communities; Government and policy makers	Computer simulation	Census data; planning documents; empirical data from previous disasters (if applicable)	High – Use of computerised technology in order to visually represent community resilience.	Computer simulated models, identifying loss and recovery dynamics of households, businesses, neighbourhoods and communities before, during and after a hazard event.



Tool	Author	Indicators/ Areas of assessment	Target audience	Format	Assumptions / Required information	Costs	Outcomes
<b>Baseline Resilience Indicators for Communities (BRIC) (45)</b>	Department of Geography and Hazards & Vulnerability Research Institute at the University of South Carolina, USA	Categories include survey data in the areas of ecological, social, economic, institutional, infrastructure and community competence.	Local communities	Combination of Disaster Resilience of Place (DROP) model and data from the Community and Regional Resilience Institute (CARRI) Framework with indicators of resilience.	Census data; American community surveys; county business patterns	Minimal but labour intensive	Baseline characteristics, which are the antecedent conditions within communities before the implementation of any programs, policies and interventions that foster resilience.
<b>Resilience Capacity Index (RCI) (45)</b>	Buffalo Regional Institute, State University of New York	Income equality; economic diversification; regional affordability; business environment, educational attainment; without disability; out of poverty; health-insured, civic infrastructure, metropolitan stability; homeownership; voter participation	Regional level; community organisations; small, medium and large metropolitan regions	Single statistic scored on 12 equally weighted areas; framework measurement tool using secondary data and existing indices (GINI coefficient for income equality and the Innovation Index)	Census data; Bureau of labour statistics; American community survey 1 and 5-year estimates; County business patterns; Atlas of US Presidential elections	Minimal but labour intensive	Summarises a region's score on the 12 indicators to calculate overall resilience capacity of regions.

Tool	Author	Indicators/ Areas of assessment	Target audience	Format	Assumptions / Required information	Costs	Outcomes
<b>Community Disaster Resilience Toolkit (46)</b>	Torrens Resilience Institute, Adelaide, Australia	Community connectedness; community level of risk and vulnerability; existing disaster planning, response and recovery procedures and available resources	Local councils, community organisations	Workshop	Census data, local planning documents, local surveys	Minimal - workshop catering/venue hire	Overall resilience score. Areas in need of further attention are highlighted
<b>Know Your Patch to Grow Your Patch (47)</b>	Centre for Disaster Studies, James Cook University	Community capacity and vulnerability to bushfire; community expectations of fire service delivery; fire service expectations of community; organisational needs	Local government, fire education officers, fire brigades	Workshop	Census data, local maps, community organisation documents, stakeholder interviews, community meetings	Minimal – workshop catering/venue hire, travel to interviews/meetings	Community bushfire risk profile, which should be updated and developed over time

Tool	Author	Indicators/ Areas of assessment	Target audience	Format	Assumptions / Required information	Costs	Outcomes
<b>Resilience Quick Assessment Tool (48)</b>	Resilient Organisations New Zealand	Leadership within organisation; staff engagement; situational awareness; decision making processes; innovation and creativity; partnerships; leveraging knowledge; breaking silos; internal resources; unity of purpose; proactive posture; planning strategies; stress testing plans	Community organisations and local governments	Workshop	Organisation documents and reports	Minimal – workshop catering/venue hire	Overall resilience score and graph, which shows areas in need of attention
<b>How to Make Cities More Resilient (49)</b>	UNISDR	Health and wellbeing; urban systems and services; economy and society; and leadership and strategy	Local governments	Ongoing strategic development within local government	Population-level data, organisation documents and reports	High – requires governments to oversee stakeholder engagement, risk assessments, and implementation and evaluation of a resilience action plan	Development of a processed called the Resilience Building Cycle

Tool	Author	Indicators/ Areas of assessment	Target audience	Format	Assumptions / Required information	Costs	Outcomes
<b>Community Assessment of Resilience Tool (CART) (50)</b>	Terrorism and Disaster Center at the University of Oklahoma	Connectedness; shared values; support systems; equity; justice; diversity; natural, physical, financial, human and social resources; transformative potential	Community organisations, local governments	Assessment surveys, groups meetings, and strategy development and implementation	Data are collected using the CART survey instrument which is administered to community members	Moderate – data access, collection and analysis, and meeting-related costs	Profile of strengths and weaknesses of community; action plan to address identified weaknesses
<b>Community Resilience Toolkit (10)</b>	Bay Localize, California, USA	Community assets (individuals, associations, infrastructure, social connections). Equitable access, quality, sustainability and ownership of food; water; energy; transportation and housing; jobs and economy; and civic services	Community organisations, city planners, neighbourhood associations, schools	Workshop	None – participants are guided through a process of evaluating their community's resilience in each of the key indicators	Minimal – workshop catering/venue hire	Overall resilience score. Guidance to create a targeted resilience-building plan addressing identified areas in need of attention

Tool	Author	Indicators/ Areas of assessment	Target audience	Format	Assumptions / Required information	Costs	Outcomes
<b>Wellbeing and Resilience Measure (WARM) (51)</b>	The Young Foundation, London, UK	Education, health, material wellbeing, social structures, local economy, public services, crime and anti-social behaviour, infrastructure	Local councils	Framework guiding process of: measuring current state of community in each indicator; identifying assets and vulnerabilities; benchmarking against comparable areas; setting targets and priorities; acting on set plan	Existing data on jobs and health	Moderate – data access, collection and analysis costs	Graphs illustrating the evaluation of community's assets and vulnerabilities and benchmarking against comparable communities

**Table 2** demonstrates that community disaster resilience assessment tools most commonly focus on capitals-based and process-focused indicators. Capitals-based indicators are varied and include human capital, social capital, natural capital, physical capital and financial capital.

**Human capital** encompasses indicators such as educational attainment, health status, and range of skills and knowledge within the population. Many of these indicators require access to Census or similar population datasets in order to make an objective assessment. However, these community attributes may also be assessed in a qualitative manner, for example by discussing the community's access to schools and tertiary education providers, and attitudes towards health-seeking behaviours and skill development in focus groups or interviews.

**Social capital** refers to the social structures, networks and relationships within communities. Unlike human capital, social capital can be difficult to quantify and is most commonly qualitatively assessed. Frequently this requires those participating in the assessment process to estimate the degree to which community organisations and residents are interconnected and the level of social cohesion. This may be achieved through estimating community members' engagement with community organisations and participation in community events.

Similar assessments can be made regarding community organisations' relationships with each other, including existing formal professional networks and informal working relationships. However, social capital may also be assessed quantitatively, for example by considering the proportion of residents living alone or membership lists of volunteer organisations and community associations.

**Natural capital** encompasses natural resources, such as land, water, ecosystems and local climate. Indicators assessing natural capital typically include land surveys, flood mapping, ecological assessments and weather data. Therefore, measurement of natural capital is dependent on access to these data from external agencies, which may be expensive, restricted or only available to certain stakeholders.

**Physical capital** includes housing, public buildings and infrastructure, local businesses and industries and other aspects of the built environment. Public infrastructure incorporates essential resources, such as electricity, water, and communication technologies, as well as critical services, such as health facilities, schools and emergency services. Some of these indicators can be relatively easily assessed using simple statistics such as the number of community residents serviced by each school, hospital or other service providers. Assessment of essential resources may be more complicated, as it may involve a consideration of supply chains and contingency plans in the event of emergencies, which may not be readily accessible.

**Financial capital** encompasses economic resources, including income, savings and investments. Assessment of these indicators is likely to involve analysis of population level data, for example by considering average household income levels or the proportion of community residents currently in the labour force.

Process-focused community disaster resilience assessments tools are intended to be used to track progress in each of the included indicators of resilience over time. Thus, the results achieved upon the initial completion of the process act as a baseline against which resilience building initiatives are

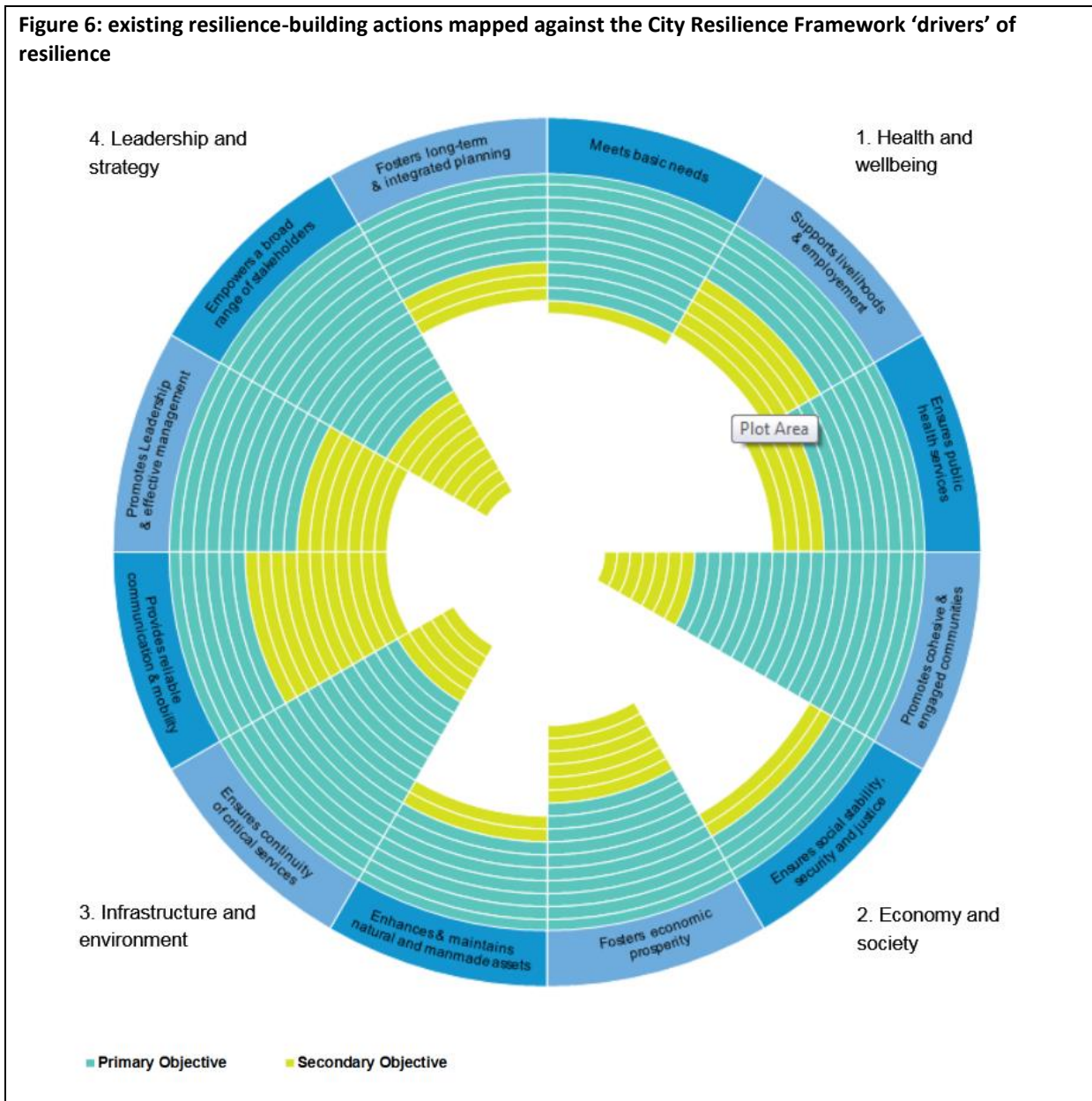
evaluated in the community. Many of the measurement tools are participatory in nature and reiterate the importance of community members engaging with the process of implementing the tool and repeating the process at regular intervals in order to track progress and gain the most benefit from the resilience assessment process. In many cases, the end result of the resilience measurement process is considered to be less significant than the process itself. Specifically, the process of reaching consensus for each of the indicators of resilience is important, as it is during these discussions among stakeholders that both community strengths and shortcomings are frequently identified. Engagement with these participatory assessment methods enhances community connectivity and social cohesion, and may facilitate collective approaches to disaster planning and capacity building.(1) The end product of process-focused measurement tools is likely to be a plan for future resilience building or a document highlighting areas in need of attention.

The majority of community disaster resilience assessment tools have an all-hazards approach and evaluate community resilience to all types of disasters and emergency events, rather than a specific hazard or risk.

All-hazards approaches focus on measuring aspects of community resilience that are likely to be damaged or disrupted in the event of any disaster or severe disruption, such as essential resources and infrastructure, transportation and communication systems. However, risk-specific measurement tools do exist, and may be particularly useful for communities with a known vulnerability to a certain hazard, such as flooding or bushfire.(47) The information collected through the application of these tools may be particularly useful to local emergency services responsible for dealing with the hazard in question by enabling planning, preparedness and response strategies to be tailored to the unique characteristics, needs and resources of the community. The information required often includes specific risk assessments, which may be a time-consuming and resource-intensive exercise for communities that do not routinely conduct risk-assessments and may lack the required resources.

A good example of the results of assessing a community's resilience can be found in a report under the Resilient Melbourne initiative. The figure below outlines the key "drivers" of resilience that the Resilient Melbourne Strategy focuses on and shows how the results of assessing these areas were mapped (52):

**Figure 6: existing resilience-building actions mapped against the City Resilience Framework 'drivers' of resilience**



*Copied from: Preliminary Resilience Assessment: Identifying the Focus Areas for Melbourne's Resilience Strategy published by the City of Melbourne (p 20)*



## 6. DATA SOURCES FOR MONITORING CONTRIBUTIONS TO DISASTER RESILIENCE

Community disaster resilience monitoring strategies that rely on existing or readily accessible data are likely to be more efficient and robust than models that require the collection of new data, specifically for the purpose of assessing a community's level of disaster resilience. The use of existing data minimises the time and resources required to assess the level of resilience in a community, increasing the likelihood that the exercise will be repeated in the future or following the implementation of resilience-building initiatives. This therefore acts as an enabler to monitor contributions to disaster resilience over time.

However, the majority of community resilience assessment tools require the input of data from a range of sources, including existing datasets (Census data, Australian Bureau of Statistics and Australian Institute of Health and Welfare data, surveys, risk assessments, and planning documents), focus groups or workshops, stakeholder interviews, qualitative surveys, and qualitative self-assessments of community infrastructure and resources by key informants.

Self-assessments are frequently informed and supported by available data, such as community surveys, records and reports. In instances where these data are unavailable, assessments are based on opinion or stakeholder discussion, meaning that they are only usable in a limited context and not suitable for comparison. However, it should be noted that while the use of existing quantitative data facilitates comparability of resilience across communities and over time, the use of subjective qualitative information ensures a sense of ownership and specificity for the local community involved in the exercise.

Based on the literature and the community resilience measurement tools detailed in the previous section, **Table 3** outlines the indicators of community resilience and their respective data sources. In most cases, access to community or local-level data is required, as these data allow for localised characteristics and nuances to be captured and analysed.(1)

**Table 3 – Data sources for community disaster resilience indicators**

Indicator	Description	Examples of measures	Data source	Data accessibility
<b>Population demographics (1, 4, 13, 15, 20)</b>	Demographic factors, including age, household structure, literacy and education influence residents' ability to prepare for, respond to and recover from a disaster.	Proportion of residents over 75 years of age Proportion of single-occupant households Proportion of residents who do not speak English well or not at all Proportion of residents with high school certificate or above	Census Self-report Self-assessment	Census data available free of charge (customised datasets available for a fee)(53, 54) Telephone interview surveys (e.g. Victorian Population Health Survey) collect self-report data (annual reports are available online)(55)
<b>Health status (4, 14, 15, 20)</b>	Communities with high baseline levels of physical and mental health are more likely to be resilient to disaster	Self-reported health and wellbeing status Proportion of residents living with a disability or chronic health condition that limits their capacity to prepare for emergency events, evacuate in the event of a disaster, receive warnings/information, etc. Proportion of residents reliant on medications or medical equipment	Census AIHW Self-report	Census data available free of charge (customised datasets available for a fee)(53, 54) AIHW data cubes on a range of subjects (e.g. aged care, disability services, mental health) available free of charge (custom data requests attract a fee based on complexity/level of detail)(56)
<b>Access to healthcare services (1, 2, 13-15)</b>	Community members have adequate access to healthcare and continuity of care, including outside of regular business hours and during disruptive events	Number of doctors per 10,000 residents Number of nurses/allied health professional per 10,000 residents Number of hospital beds per 10,000 residents	Census AIHW Local healthcare provider records Self-assessment	Census data available free of charge (customised datasets available for a fee)(53, 54)  AIHW My Hospitals data includes details on number of

Indicator	Description	Examples of measures	Data source	Data accessibility
		Number of hospitals or general practices open extended hours		beds by hospital and is available free of charge(57) The Australian Department of Health has an online tabulation tool for health workforce data that incorporates the National Health Workforce Dataset and the Clinical Placements Dataset(58)
<b>Food, water and medical supplies (2)</b>	Resilient communities should have adequate emergency supplies of food, water, medicine and medical equipment, in the event that supply mechanisms are cut off or disrupted	Number of days food supplies will last if all deliveries are suspended and refrigerated storage is unavailable Number of days drinking water supplies will last if supply or water treatment infrastructure is damaged Number of days medicines and medical equipment will last if all deliveries are suspended and refrigerated storage is unavailable	Community organisation (supermarkets, healthcare facilities, etc.) records/reports Government planning documents Self-assessment	Australian Government FOODmap has limited and very broad information on factors influencing food distribution and supply, including an assessment of self-sufficiency and stability(59)
<b>Housing condition (1, 2, 4, 14, 15)</b>	Housing is well-maintained and complies with building codes, and is therefore less susceptible to damage in the event of a disaster and associated injuries	Proportion of housing compliant to current code Proportion of residents living in caravans, cabins, houseboats, tents and other unsecured dwellings  Proportion of schools, healthcare services, emergency services and other	Construction records Building codes Building inspections	Government documents detailing compliance with building codes may not be easily accessible. Community organisations may be reluctant to disclose building construction details

Indicator	Description	Examples of measures	Data source	Data accessibility
		community buildings compliant to current code		
<b>Shelter availability and capacity (1, 2, 20)</b>	Access to buildings that may be used as shelters in the event of a disaster facilitates timely evacuation	Number of buildings that may be used as emergency shelters (hotels, motels, schools, town halls) Average bed occupancy rate at local hotels and motels	Self-assessment Building plans Local hotel and motel records	Tourist accommodation data is available from the ABS(60)
<b>Insurance coverage (1)</b>	Adequate insurance coverage facilitates rapid recovery following a disaster or emergency event, as it reduces the financial strain on individuals and businesses	Proportion of households with home insurance policies that cover natural disaster damage Proportion of community organisations, businesses and government departments with insurance policies that cover natural disaster damage	Self-report (households and businesses) Insurance company records Local government records	Insurance company and local government documents detailing insurance coverage may not be easily accessible Self-report data may be unreliable
<b>Employment opportunities (1, 4, 13-15, 20)</b>	High employment rates reflect community economic stability, enabling it to absorb disruption and recover rapidly	Unemployment rate Single sector employment dependence Number of organisations employing over 20 individuals	Census Self-assessment Local business records	The Australian Government labour Market Portal produces custom datasets and maps free of charge(61)
<b>Income (1, 13-15)</b>	Community residents with lower incomes are less likely to have the capacity and required resources to adequately prepare for, respond to, and recover from disaster	Average individual income Average household income	Census	Data are available from the ABS Survey of Income and Housing(62)

Indicator	Description	Examples of measures	Data source	Data accessibility
<b>Road conditions (13-15, 20)</b>	Well-planned and maintained roads that are able to withstand natural hazard impacts are essential in the event of a disaster, as they ensure that access to essential services is maintained	Number of roads designated as in need of repair/replacement Number of road access points at each essential service provider (hospitals, evacuation centres, aged care providers, etc.)	Self-assessment Government records	Government documents detailing road maintenance records may not be easily accessible. Maps detailing road access points are easily accessible through Google Maps and other similar services
<b>Transportation infrastructure and connectivity (1, 13, 14, 20)</b>	Multiple transportation alternatives ensure that access is maintained in the event that one or several systems are non-operational	Proportion of community covered by public transport Average number of buses/trains/trams/ferries per 10,000 residents Proportion of households with a vehicle Remoteness category Distance to nearest major highway Distance to nearest airstrip or helicopter pad	Government records Self-assessment Self-report Census ABS	Australian Transport Metadata Portal contains information of public transport and personal vehicles(63) Public Transport Victoria has a number of freely available public transport datasets(64)
<b>Communication infrastructure and connectivity (1, 2, 14, 15)</b>	Access to multiple robust communication channels (landline telephones, mobile telephones, mass text messaging, social media, mass media) ensures that community members have access to information and support in the event of a disaster	Mobile phone coverage Internet coverage Proportion of residents with access to mobile phone Proportion of residents with internet access Proportion of residents with access to television and/or radio	Telecommunications provider data Internet provider data Self-report	Mobile and internet coverage maps are freely available from individual providers and services such as Live Connected(65) Household internet and mobile phone use data is available from the ABS

Indicator	Description	Examples of measures	Data source	Data accessibility
<b>Community preparedness (1, 2, 14)</b>	High proportion of households and businesses with emergency and business continuity plans that are well-developed and regularly tested/updated	<p>Proportion of households with a current (updated within two years) emergency plan (e.g. bushfire action plan)</p> <p>Proportion of businesses, community organisations and government departments with a current (updated within two years) business continuity plan and/or emergency plan</p> <p>Uptake of community emergency training and preparedness exercises</p> <p>Proportion of buildings with regularly (at least once per year) cleaned gutters, drains and flood channels</p>	<p>Self-report</p> <p>Business records and self-report</p> <p>Emergency services records/report</p> <p>Self-assessment</p>	<p>Self-report data may be unreliable</p> <p>Obtaining information from individuals and organisations is likely to be time-consuming and resource-intensive</p>
<b>Self-sufficiency (2, 13, 15)</b>	Capacity of community members to act as “first responders” and assist their family members, neighbours, and themselves in the event of an emergency	<p>Proportion of residents who have completed first aid training within five years</p> <p>Proportion of residents who have attended emergency training or workshops/Proportion of trained volunteers</p> <p>Proportion of residents who act as carers or provide support to relatives living outside their household</p>	<p>First aid training provider records</p> <p>Emergency services records</p> <p>Self-report</p> <p>ABS</p>	<p>First aid training providers and emergency services may be unable or reluctant to disclose training records</p> <p>Data about carers in Australia is available from the ABS(66)</p>

Indicator	Description	Examples of measures	Data source	Data accessibility
<b>Partnerships and collaborative (4, 13-15, 20)</b>	Degree of interconnectedness between community organisations and residents. Partnerships can be both formal and informal and involve stakeholders working together to prepare for, mitigate and respond to emergency events and disasters	Proportion of businesses and community organisations with active links to other community organisations Proportion of residents and community organisations participating in community consultations or briefing sessions with respect to disaster preparedness and resilience building	Self-report Business records/reports Self-assessment	Self-report data may be unreliable Obtaining information from individuals and organisations is likely to be time-consuming and resource-intensive
<b>Governance, policy and leadership (4, 15, 67)</b>	Community organisations that are flexible and adaptable are able to learn from experience, review and adjust policies and procedures, and transform organisational practices in order to improve their disaster resilience	Community organisations' leadership style Community organisations' investment in professional development and learning opportunities Last update of organisations' policy documents	Business records Self-report Self-assessment	Self-report data may be unreliable Obtaining information from organisations is likely to be time-consuming and resource-intensive
<b>Social connectedness(1, 4, 13-15, 20, 67)</b>	Degree of community members' engagement with local organisations and each other, through organised sport, association membership, volunteering or social/family networks. Socially isolated individuals are less resilient and may not have access to shared resources, and practical and emotional support	Proportion of residents participating in organised sport Proportion of residents who are members of a community association/volunteer organisation/church group/club	Self-report Club/volunteer organisation/community association membership records	Self-report data may be unreliable

Indicator	Description	Examples of measures	Data source	Data accessibility
<b>Risk communication (2, 13-15)</b>	Communities with well-developed and tested risk communication tools and strategies that reach a large proportion of residents and organisations are more likely to be well-prepared for emergencies and disasters. Emergency information should be communicated and made available through a range of channels for the greatest reach	Emergency services agencies' expenditure on community engagement and risk communication  Proportion of service providers with a current (updated within two years) community engagement strategy	Emergency service records Self-report Self-assessment	Self-report data may be unreliable  Organisations may be reluctant to disclose expenditure data
<b>Risk identification and planning(14, 15, 20)</b>	Communities that have a known increased risk of particular hazards (bushfire, flooding, earthquake, etc.) are likely to implement specific planning, preparedness and mitigation actions to reduce their level of vulnerability	Proportion of community land vulnerable to flooding, storm damage, bushfire, earthquake, etc.	Flood maps Strom surge maps Fault line maps Bushfire risk assessments	Mapping and assessment exercises may not be routinely performed in communities. Undertaking these exercises is likely to be time-consuming and resource-intensive  Flood maps are available free of charge from the Australian Flood Risk Information Portal(68)  State governments produce bushfire risk maps, such as the Victorian Government's online customisable map(69)
<b>Emergency services(15)</b>	The presence and actions of emergency services influence the community's ability to plan for, respond to and recover after a disaster.	Emergency services labour force Number of emergency services volunteers per 10,000 residents Expenditure per capita on emergency services	Emergency service records Self-report Self-assessment	Volunteer data is available from the ABS(70)



## 7. CONSIDERATIONS REGARDING CULTURALLY AND LINGUISTICALLY (CALD) DIVERSE GROUPS

The Sendai Framework for Disaster Risk Reduction 2015–30 states that there “has to be a broader and a *more people-centred preventive approach* to disaster risk. Disaster risk reduction practices need to be multi-hazard and multisectoral, inclusive and accessible in order to be efficient and effective” and that “Governments should engage with relevant stakeholders, including women, children and youth, persons with disabilities, poor people, migrants, indigenous peoples, volunteers, the community of practitioners and older persons in the design and implementation of policies, plans and standards.” (18)

The National Strategy for Disaster Resilience states that resilience is the collective responsibility of *all social sectors* and that every sector must do more. (7)

These documents highlight that particular attention needs to be paid to culturally diverse communities and to social inclusivity to ensure that different needs and expectations are met and that capabilities are recognised.

Issues to consider in regard to CALD groups are (71):

- There is the potential for communication problems if they speak little or no English.
- Migrants may have been exposed to hazards and/or risks in their countries of origin that do not occur here in Australia and they may have they have developed skills or experienced events whereby their response and/or recovery techniques conflict and/or contradict Australian approaches.
- They may be recently arrived and not yet have family or community support networks in Australia and therefore no defined support groups/networks protecting their interests.
- There may be issues with accommodation, such as, insecure or temporary housing;
- New migrants may not be aware of the various risks associated with their new environments and may not know where they can access appropriate information.
- Authority figures, such as police or uniform wearing services, can be viewed with suspicion and mistrust for previous citizens of countries where democracy has failed.

Migrants can, however, be more resilient and therefore be a key resource in regard to building community resilience. They can be more likely to know, understand and accept responsibility for the events and/or circumstances that impact on their lives. Possible reasons for this include, but are not limited to, their migration experience that can be more fraught for refugees or asylum seekers. Multicultural communities may have low expectations about relying on governments to provide them with the resources and/or access to information or financial support.(71)

A number of relevant case studies are available to show how a multicultural approach can be taken.

A research consultation project funded under the Australian National Emergency Management Project Program, titled Project Red, was undertaken with young people from refugee and migrant backgrounds around volunteering in the emergency management sector. The Centre for

Multicultural Youth was commissioned to undertake this consultation. A comprehensive picture of the young people's current awareness and interest in the roles was built and the opportunities and barriers for their active involvement were identified. The project report showed that there was much good will among young people in CALD communities to be involved in volunteering, particularly if their involvement.(72)

Another example is the VICSES Multicultural Project that ran from 2013-2016.(71) The aim of this project, undertaken by the Victorian State Emergency Services, was to define an engagement framework whereby VICSES and culturally and linguistically diverse (CALD) and/or Indigenous communities can liaise effectively, utilise some of the key findings of the VICSES Environment Review (2010) and harness the experience from similar projects that had shared objectives prior to this project being instigated. Key initiatives taking place under this project banner included:

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Establishment of a Project Team consisting of subject matter experts

Development of CALD community profiles for each municipality (Case Study 1)

Direct community engagement pilot programs in the East (Case Study 2) Northwest and Southern regions of Metropolitan Melbourne

Cultural awareness brainstorming sessions – to determine the best way to increase cultural understanding amongst Volunteers

Publication of StormSafe and FloodSafe Key Safety Messaging in 34 Languages

Large scale community events such as Cultural Diversity Week

Direct engagement presentations to community groups and schools

Collaboration with Country Fire Authority, Metropolitan Fire Brigade, Australian Red Cross, Victoria Police and Local Municipalities

Liaison with state and federal government bodies such as Australian Emergency Management Institute, Victorian Multicultural Commission and Centrelink

Membership in over 10 CALD community networks and advisory groups establishment of a Project Team consisting of subject matter experts

Development of CALD community profiles for each municipality (Case Study 1)

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The VICSES Multicultural Project culminated in the development of the VICSES CALD and Indigenous Community Engagement Strategy 2013-2016. This strategy was a key deliverable of the over-arching VICSES Community Education Strategy 2011-2016 which in written terms, is VICSESs commitment to disseminating key safety information surrounding floods and storms to the entire community.

Life Saving Victoria demonstrates how a multicultural approach can successfully be implemented through their multicultural learn-to-swim program ([http://lsv.com.au/wp-content/themes/abomb/pdf/multicultural/LSV\\_1011\\_CALD\\_2015\\_FA\\_2.0.pdf](http://lsv.com.au/wp-content/themes/abomb/pdf/multicultural/LSV_1011_CALD_2015_FA_2.0.pdf)).

One more example is the disaster resilience in at-risk communities' project that started in August 2017 in Adelaide undertaken by Red Cross Australia that aims to:

- Identify how organisations can work together to support and strengthen disaster resilience with people more at-risk during emergencies.
- Capture this information in a framework under the South Australian Emergency Management Plan.
- Develop an implementation plan that maps out how we can take the framework into action.
- Identify tools and resources that can support action in different sectors and organisations.

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