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Queensland Climate Adaptation Strategy

Human Health and Wellbeing Climate Change Adaptation Plan for Queensland

NCCARF
National Climate Change Adaptation Research Facility

CLIMATE AND HEALTH ALLIANCE

Queensland Government

This Sector Adaptation Plan was developed by health care, aged care and early childhood education and care stakeholders with the support of the Queensland Government. Sector Adaptation Plans are important components of the Queensland Climate Adaptation Strategy, outlining industry-led responses to the challenges presented by climate change.

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Disclaimer

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Executive Summary

The Queensland Government committed to implementing the Queensland Climate Adaptation Strategy (Q-CAS) in 2017. This Human Health and Wellbeing Climate Change Adaptation Plan (H-CAP) was developed as a component of the Q-CAS. The National Climate Change Adaptation Research Facility (NCCARF) and the Climate and Health Alliance (CAHA) worked with key stakeholders in the health and wellbeing sector in Queensland to develop the H-CAP.

The goal of the H-CAP is to support human health and wellbeing services to be innovative and resilient in managing the risks associated with a changing climate, and to harness the opportunities provided by responding to the challenges of climate change. It provides a preliminary climate change adaptation framework and guidance for stakeholders across health care, aged care, and childcare services.

This document outlines the process to develop the H-CAP and describes its scope. It provides an overview of existing policy, and outlines policy drivers and enablers, and case studies to inspire action. It also summarises the concerns of stakeholders in Queensland about the health impacts of climate change, in addition to the barriers, opportunities and pathways forward they saw for climate adaptation.

The consultation revealed concerns among stakeholders that are consistent with multiple lines of evidence: there is a policy gap in relation to addressing the health impacts of climate change.

Health and wellbeing services are faced with climate change adaptation challenges, but lack policy guidance, as well as capacity and resources to respond. The consultation revealed a strong appetite to build climate resilience in the sector to ensure service quality and continuity, and to protect the health of the community. There was a clear emphasis on the need for stakeholder engagement and for the establishment of collaborative networks to guide and support action.

To help guide efforts towards climate change adaptation among health and wellbeing services in Queensland, this H-CAP proposes 10 Priority Adaptation Measures, together with a vision and a set of guiding principles. The Priority Adaptation Measures offer high level guidance for services, policymakers and the community to prioritise and plan for climate adaptation. They include examples of possible responses at service, system and government levels, informed by stakeholders and existing best practice.

The Priority Adaptation Measures are:

1. Leadership and governance—empowering leadership at all levels to plan and implement responsible, evidence-based, locally relevant climate change adaptation.

2. Building the preparedness and ability of the health and wellbeing services sector and the community to respond to climate threats to health.

3. Specific public health measures—evaluating specific vulnerabilities in the population and implementing appropriate measures to reduce avoidable morbidity and mortality.

4. Risk management and legal liability—ensuring the operational and strategic plans of all facilities and services acknowledge and reflect the short-, medium- and long-term risks of climate change to health and wellbeing services.

5. Research, data and evaluation—guiding policy and decision-making through well-planned research and climate-health risk surveillance to build greater understanding of risks, vulnerabilities and effective strategies.

6. Economics and financing—ensuring that financing decisions to support climate change related programs and initiatives include assessment of all the relevant health costs and benefits associated with climate change and adaptation.

7. Collaboration across agencies, sectors and stakeholder groups—ensuring that government agencies, peak bodies, and industry and professional associations and service providers work together to achieve climate change adaptation and sustainability goals.

8. Education and communication—developing communication, education and training initiatives that inform and build capacity across the health and wellbeing workforce, policymakers and the wider community to respond to the health impacts of climate change.

9. Policy, regulation and legislation—providing policy certainty for services, sectors and industries to guide decisions and investment for effective climate change adaptation.

10. Infrastructure, technology and service delivery—investing in climate-resilient infrastructure, technology and service design to avoid delayed costs and ensure service integrity.

This H-CAP represents the start of an ongoing and iterative journey towards climate change resilience within the health and wellbeing sector. The plan will need to be developed further through effective engagement with many more participants in the health and wellbeing sector, different government departments, and the community in general. Further engagement and additional strategies will need to be incorporated over time.

Introduction

The Human Health and Wellbeing Climate Change Adaptation Plan (H-CAP) supports healthcare, aged care and early childhood education and care services to be innovative and resilient in managing the risks, and to harness the opportunities provided by responding to the challenges of climate change.

As a high-level roadmap for adaptation, it aims to facilitate ongoing collaboration and provide direction for climate change adaptation planning, implementation and engagement. As such, the H-CAP scope does not include detailed actions for stakeholders. Queensland Government agencies, including Queensland Health, are concurrently assessing climate change risks to their assets and services.

Background

The H-CAP is one of eight sector adaptation plans being developed by the Queensland Government under the Queensland Climate Adaptation Strategy (Q-CAS). The Q-CAS conceptualises four major and interrelated 'pathways' for Queensland's adaptation:

i) People and Knowledge

ii) Local Governments and Regions

iii) Sectors and Systems—where this plan sits

iv) State Government

The Q-CAS identifies four complex issues that cut across all sectors or systems: community and social services, finance and insurance, natural resources, and research and development.

Figure 1 illustrates where the H-CAP sits within the four pathways and intersects with the cross-cutting issues.

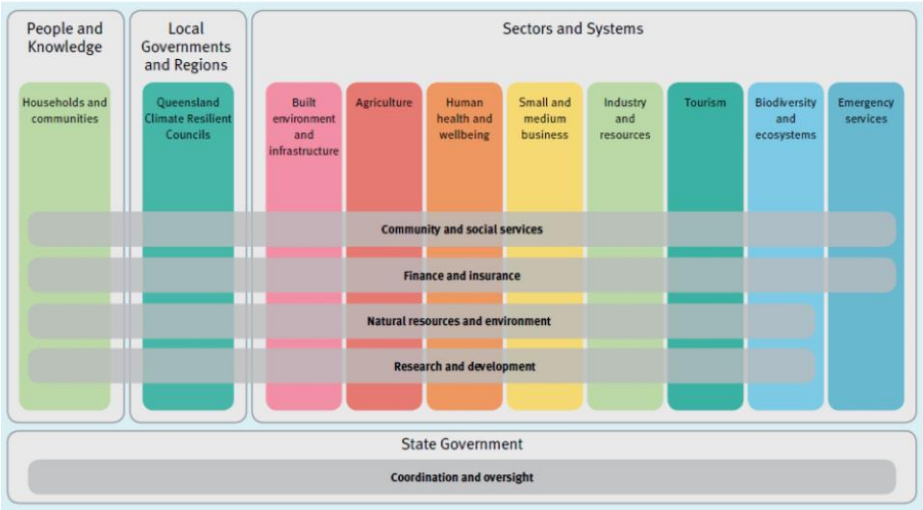

Figure 1: Matrix representation of Q-CAS pathways, eight Sectors and Systems, including the H-CAP, and cross-cutting issues

Scope of the Plan

For the purpose of the H-CAP, the human health and wellbeing sector includes health care(1), aged care and childcare services.

The H-CAP was developed with, and targets stakeholders in:

- health facilities such as hospitals, health services and clinics, and tertiary, primary and preventative health services for both physical and mental health
- social sector organisations providing services for, or representing, vulnerable or marginalised community members
- aged care services
- early childhood services, including kindergartens, preschools and child care, (e.g. community-based, not-for-profit and private providers of long day care and kindergarten services).

These stakeholders are part of Queensland's biggest industry. The health and wellbeing sector is the nation's largest industry by employment, providing jobs for 285,000 people in Queensland, and accounting for 13 per cent of all jobs in the state(2).

The health sector is also one of the most emissions-intensive industries in the state. A recent study estimates health care is responsible for 7 per cent of national emissions, or 35.7 million tonnes per annum. The authors estimate that emissions from health care in Queensland is 21 per cent of the national healthcare total, or around 7.5 million tonnes each year(3).

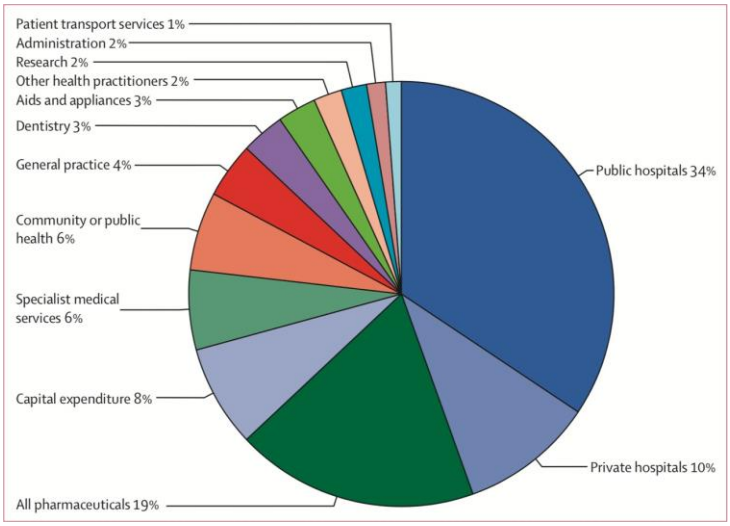

Figure 2: Breakdown of total healthcare emissions in Australia, from Malik *et al.* 2018

1 As shown in the Q-CAS, 'health care' includes health facilities such as hospitals, health services and primary health care.

2 Australian Bureau of Statistics 2017, *Healthcare and social assistance our largest industry*, Canberra, http://www.abs.gov.au/ausstats/abs@.nsf/mediareleasesbyReleaseDate/B611DFF5E8590F8ACA2581BF001F743B?OpenDocument (accessed 15 May 2018).

3 Malik, A, Lenzen, M, McAlister, S and McGain, F 2018, The carbon footprint of Australian health care, *The Lancet Planetary Health*, 2 (1):e27–e35, and personal communications with the authors.

The determinants of health and wellbeing (and illness) arise largely outside the healthcare system (e.g. economic, social, environmental, cultural and technological factors). However, the health sector and those focused on community health and wellbeing are in the frontline in responding to the health impacts of climate change. Thus the H-CAP and its strategies are largely focused on the factors that services involved in delivering health care, aged care and child care can influence. The scope of the project did not allow for engagement with stakeholders in the wider community, although participants noted the importance of community involvement in future adaptation planning and action.

Further, while mitigation is recognised as an essential ingredient for effective adaptation, the H-CAP focuses on climate change adaptation. Stakeholders, however, note that many climate change mitigation actions can directly reduce the burden of ill health, boost community resilience, and lessen poverty and inequity. It is hoped that in further development of this work, a combined focus on mutually reinforcing mitigation and adaptation can be incorporated(4). This approach is supported by institutions such as the World Health Organization and the World Bank, as exemplified in this statement from the latter's recent report on Climate-Smart Healthcare:

> *The health sector has a substantial role to play in both mitigating climate change through the adoption of low-carbon strategies, while also building resilience to climate impact in ways that plan for environmental change and expanded health threats. Taken together, these efforts comprise a 'climate-smart' approach that will help health planners and decision-makers adjust to a new era of climate reality while improving health, environment, and development. James Close and Olusoji Adeyi, World Bank*

It is important to recognise that the H-CAP represents the start of an ongoing and iterative journey. It will need to be revisited and updated, with further engagement and strategies incorporated over time.

Why are early childhood and aged care included?

Young children and the elderly represent two of Queensland's population groups most vulnerable to the negative impacts of a changing climate. For example, they are among the first to suffer from the effects of prolonged or extreme heat. Together, the aged care and childcare sectors are large employers with significant infrastructure and facilities, providing care and support to vulnerable groups, which makes them an important component of Queensland's health system.

The aged care sector particularly has a strong interaction with health service providers. Considering and managing climate change risks to these groups can have a substantial influence on the health of the broader community.

The proportion of older people (65 years and over) in Queensland's population is increasing. This proportion reached 13 per cent in 2011, and is projected to reach between 19 and 21 per cent by 2036, and between 22 and 25 per cent by 2061(5). Elderly people are often more vulnerable to a range of climate change mediated health impacts including heat stress, and buildings in aged care facilities are not always well adapted to reduce thermal stress during heatwaves(6).

What happens in early childhood shapes health and wellbeing throughout the lifespan, and research shows it also affects the wellbeing of society(7). For our children, despite the many benefits of modern society, the world is a less

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4 https://www.thelancet.com/climate-and-health?code=lancet-site

5 Queensland Government 2015, *Queensland Government population projections*, Queensland Government Statistician's Office, accessed 15 May 2017,

www.qgso.qld.gov.au/products/reports/qld-govt-pop-proj/qld-govt-pop-proj-2015- edn.pdf.

6 Miller, W 2017, To keep heatwaves at bay, aged care residents deserve better quality homes, The Conversation, accessed 15 May 2018, www.theconversation.com/to-keep-heatwaves-at- bay-aged-care-residents-deserve-better-quality-homes-85174.

7 Heckman, J 2006, Skill formation and the economics of investing in disadvantaged children, *Science*, 312: 1900–1902.

hospitable, more climate changed place than it was for us(8). Children and young people need to be resilient and have the capabilities to thrive in a changing world, including participating positively in society's transition to low carbon futures. Early childhood settings can play an important role in nurturing and amplifying the transformative changes required to create healthy, sustainable futures, including mitigating and adapting to climate change(9).

How the H-CAP was developed

The National Climate Change Adaptation Research Facility (NCCARF) and the Climate and Health Alliance (CAHA) were engaged by the Queensland Department of Environment and Science (DES) to facilitate the development of the H-CAP with the health and wellbeing sector in Queensland between January and April 2018.

A project steering committee guided the development of the H-CAP. Its members included representatives from Queensland Health (QH), Queensland Council of Social Services (QCOSS), NRM Regions Queensland (NRMRQ) and DES. Steering committee members defined the scope of the project, assisted in identifying and sharing project materials with relevant stakeholders, and provided feedback on the draft Plan. An expert reference group (Appendix 1) also reviewed the draft Plan. Figure 3 summarises the H-CAP development process, which is further discussed below.

Figure 3: The H-CAP development process

Consultation

The consultation process engaged stakeholders from healthcare, aged care, early childhood organisations, professional associations, peak bodies, academia, community and not-for-profit organisations, unions, government and industry.

An initial stakeholder mapping exercise identified major stakeholders in each of the health, early childhood and aged care groups. These peak organisations and individuals were then asked to nominate other key stakeholders. Participants are listed in Appendix 1.

Engagement process

A discussion paper and online survey were circulated to stakeholders to obtain their awareness of current climate change and health policy settings, policy gaps, key concerns, barriers, and drivers or opportunities to implement the H-CAP. Three regional workshops were also held. Workshop sites enabled representation by stakeholders from large urban (south-east Queensland / Brisbane), regional (Toowoomba) and more remote population centres, including those with large Indigenous communities (Cairns). This also reflected exposure to different climate futures and associated health risks. Rainfall and flooding prevented some of those who had registered for the Cairns workshop from attending. Subsequent key informant interviews sought input from Aboriginal and Torres Strait Islander people and groups. The engagement process is summarised in Table 1.

8 WHO 2018, Climate change and health, accessed 15 May 2018, www.who.int/en/news- room/fact-sheets/detail/climate-change-and-health.

9 Cooke, S 2015, Healthy and sustainable environments for children and communities, in JM Davis (ed.) *Young children and the environment: Early education for sustainability*, Pp. 162–186.

Table 1: Stakeholder engagement methods and participant numbers

Medium	**Number of participants**
Online survey	96
Workshops	71
Face-to-face and telephone meetings and interviews	15
TOTAL	182

Summary of climate risks for health and wellbeing services

There is an extensive body of evidence on the impacts of climate change on human health and wellbeing(10,11,12,13), a summary can be found in the discussion paper for this project(14) and in Appendix 2.

Climate change exacerbates existing threats to both physical and mental health and creates new public health challenges. Many health and medical experts and international organisations consider climate change to be the biggest threat to public health in the 21st century(15).

Climate change mitigation and adaptation, however, presents 'the greatest global health opportunity of the 21st century'(16). The most recent comprehensive international collaboration on climate change and health, 'Lancet

10 Costello, A, Abbas, M, Allen, A, Ball, S, Bell, S, Bellamy, R, Friel, S, Groce, N, Johnson, A, Kett, M, Lee, M, Levy, C, Maslin, M, McCoy, D, McGuire, B, Montgomery, H, Napier, D, Pagel, C, Patel, J, de Oliveira, JAP, Redclift, N, Rees, H, Rogger, D, Scott, J, Stepehenson, J, Twigg, J, Wolff, J and Patterson, C 2009, Managing the health effects of climate change, *The Lancet*, 373 (9676): 1693–1733.

11 Smith, KR, Woodward, D, Campbell-Lendrum, DD, Chadee, Y, Honda, Y, Liu, Q, Olwoch, JM, Revich, B and Sauerborn, R. 2014, Human health: Impacts, adaptation, and cobenefits, In Field, CB, Barros VR, Dokken, DJ, Mach KJ, Mastrandrea, MD, Bilir, TE, Chatterjee, M, Ebi, KL, Estrada, YO, Genova, RC, Girma, B, Kissel, ES, Levy, AN, MacCracken, S, Mastrandrea, PR and White, LL (eds.), *Climate change 2014: Impacts, adaptation, and vulnerability – Part A: Global and sectoral aspects*. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge, United Kingdom and New York, USA, Cambridge University Press, Pp. 709–754.

12 Australian Academy of Science 2015, Climate change challenges to health: Risks and opportunities, Recommendations from the 2014 Theo Murphy High Flyers Think Tank, Australian Academy of Science, Canberra.

13 Watts, N, Adger, WN, Ayeb-Karlsson, S, Bai, Y, Byass, P and Campbell-Lendrum, D 2017, The Lancet Countdown: tracking progress on health and climate change, *The Lancet*, 389: 1151–64.

14 https://d3n8a8pro7vhmx.cloudfront.net/caha/pages/1572/attachments/original/1519016682/QLD

_H-CAP_Discussion-Paper_Feb-2018.pdf?1519016682

15 Costello, A, Abbas, M, Allen, A, Ball, S, Bell, S, Bellamy, R, Friel, S, Groce, N, Johnson, A, Kett, M, Lee, M, Levy, C, Maslin, M, McCoy, D, McGuire, B, Montgomery, H, Napier, D, Pagel, C, Patel, J, de Oliveira, JAP, Redclift, N, Rees, H, Rogger, D, Scott, J, Stepehenson, J, Twigg, J, Wolff, J and Patterson, C 2009, Managing the health effects of climate change, *The Lancet*, 373 (9676): 1693–1733.

16 Watts, N, Adger, WN, Agnolucci, P, Blackstock, J, Byass, P, Cai, W, Chaytor, S, Colbourn, T, Collins, M, Cooper, A, Cox, PM, Depledge, J, Drummond, P, Ekins, P, Galaz, V, Grace, D, Graham, H, Grubb, M, Haines, A, Hamilton, I, Hunter, A, Jiang, X, Li, M, Kelman, I, Liang, L, Lott, M, Lowe, R, Luo, Y, Mace, G, Maslin, M, Nilsson, M, Oreszczyn, T, Pye, S, Quinn, T, Svensdotter, M, Venevsky, S, Warner, K, Xu, B, Yang, J, Yin, Y, Yu, C, Zhang, Q, Gong, P, Montgomery, H and Costello, A 2015, Health and climate change: Policy responses to protect public health, *The Lancet*, 386: 1861–1914.

Countdown', highlighted four key points:

- climate change has a substantial impact on people's health worldwide, and is affecting the health today
- delayed response to climate change over the past 25 years has jeopardised life and livelihoods
- health professions play an essential role in driving forward action and realising the health benefits of climate action
- there are new opportunities to protect and promote health through climate action, if we act now(17).

Climate change is leading to more intense, more frequent and longer lasting extreme events such as heatwaves, floods, storms and droughts. It is affecting water, air and food quality and quantity, and impacting ecosystems, agriculture, livelihoods and infrastructure.

This, in turn, affects human health directly through extreme weather events, food and water insecurity, psychological and mental distress, and increasing exposure and susceptibility to infectious diseases, and indirectly through associated economic instability, forced migration and as a driver of intergroup and interpersonal conflict.

Social dynamics such as age and gender, social capital, education, and access to, and quality of public infrastructure, health and social services, also influence vulnerability to the health impacts of climate change. These impacts affect all populations, but those particularly vulnerable include children, women, disadvantaged and elderly people, as well as some geographically vulnerable communities (e.g. remote or isolated communities). Many Aboriginal and Torres Strait Islander communities face multiple risks, including physical isolation, poor infrastructure and high underlying health disparities. Their deep cultural and spiritual connection to the land and sea also increases their potential for being emotionally affected by climate change.

The increasing intensity and limited predictability of climate change impacts and their complex interaction with pre-existing political, socioeconomic and cultural stresses on society make this an unprecedented and urgent challenge for health policy and practice.

Many health and wellbeing services are not well prepared to adapt to climate change or respond to climate change impacts(18). Extreme weather events pose challenges for healthcare service infrastructure, with many buildings not designed for current or projected climatic conditions. Extreme weather events also pose threats to public infrastructure such as transport and roads, which provide emergency evacuation routes and access to public health and other community services relied on during emergencies. They threaten safe water supplies and impact on electricity and communications infrastructure(19).

The health and wellbeing sector is oriented towards urgent responses to immediate demands. It does not generally focus on risks that emerge slowly and over long time frames. A recent study of hospital resilience to extreme weather events found hospital disaster planning was 'ad hoc and non-inclusive', hospitals are not well prepared for extreme weather events and lack resources to prepare and plan for such events(20). There remain significant gaps in research in this area, including with regard to: knowledge and skills of the health workforce, the ability of healthcare infrastructure to withstand climate-related impacts and shocks, and the integrity of the supply chain to

17 https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)32464-9/fulltext

18 Bell, E 2011, Readying health services for climate change: A policy framework for regional development, *American Journal of Public Health*, 101(5): 804–813, available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3076409/

19 Carthey, J, Chandra, V and Loosemore, M 2009, Adapting Australian health facilities to cope with climate-related extreme weather events, *Journal of Facilities Management*, 7(1): 36–51.

20 Chand, AM and Loosemore, M 2016, A socio-ecological analysis of hospital resilience to extreme weather events, *Construction Management and Economics*, 33: 11-12, 907–20, DOI: 10.1080/01446193.2016.1165856.

ensure continuity in disasters(21).

It is vital that these systems be climate-resilient to remain operational and continue to provide safe, quality care during times of surging demand and extreme weather events. The sector also needs to understand and gain skills to respond to the longer term, climate-induced changes in disease patterns, psychosocial and mental health challenges, changing human geographies, and to low carbon operations.

Existing policy frameworks

Stakeholders identified the absence of national and state level government policy for securing health and wellbeing against climate change impacts as a major barrier to sectoral climate change response.

This section describes international, Australian and state policy frameworks for climate change adaptation for health and wellbeing.

International

Australia's international commitments to address climate change include the 2015 Paris Agreement (PA) under the United Nations Framework Convention on Climate Change, the Sendai Framework for Disaster Risk Reduction and the Sustainable Development Goals (SDGs). As a signatory of these frameworks, Australia is required to transition towards a sustainable, zero-carbon, climate-resilient future for all (see Appendix 4 for more on SDGs).

For example, the Australian Government is expected to establish national frameworks to achieve and review progress towards the 17 SDGs, like SDG 3 (Good Health and Well-being) and 13 (Climate Action)(22). As a signatory to the PA, the Australian Government also has an obligation to consider the 'right to health' of citizens in the context of the nation's climate change response, and to recognise the co-benefits for health in developing its climate change response(23).

There is little evidence, however, of effort towards climate adaptation by health and wellbeing services in Queensland.

National

The Australian Government does not yet have a policy address the health risks of climate. A *National Climate Resilience and Adaptation Strategy* was released in 2015; however, this is limited to a set of principles and proposes areas for further review, consultation and action.

The climate change response in relation to health by the Australian Government is largely limited to disaster and emergency management. National coordination of health disaster management is led through the Australian Health Protection Principal Committee, the Environmental Health Standing Committee and Emergency Management Australia. The Queensland Department of Health is represented on the Australian Government Disaster and Climate Resilience Reference Group, which considers the risks and opportunities arising from climate change and natural disasters.

As such, there is an increasing need to focus on prevention of harm, preparation, climate readiness and climate resilience.

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21 Carthey, J, Chandra, V and Loosemore, M 2009, Adapting Australian health facilities to cope with climate-related extreme weather events, *Journal of Facilities Management*, 7(1): 36–51.

22 United Nations 2018, *Sustainable Development Goals 2018, The Sustainable Development Agenda*, accessed 15 May 2018, <https://www.un.org/sustainabledevelopment/development-agenda/>

23 Neira, M and Campbell-Lendrum, D 2015, New climate change agreement a historic win for human health, WHO, accessed 15 May 2018, <http://www.who.int/mediacentre/commentaries/climate-change-agreement/en/>

State

Queensland's current Climate Change Response is outlined in two key Government strategies:

- The Queensland Climate Transition Strategy (Q-CTS) outlines how the state will transition to a zero net emissions future that supports jobs, industries, communities and the environment.
- The Queensland Climate Adaptation Strategy (Q-CAS) outlines how the state will prepare for current and future impacts of a changing climate to reduce risk and increase resilience.

Queensland Government agencies, including Queensland Health, are concurrently assessing climate change risks to their assets and services. A whole-of-government, executive level Climate Change Interdepartmental Committee, co-chaired by DES and the Department of the Premier and Cabinet, meets quarterly to progress this agenda. A Q-CAS Partners Group, which includes a range of stakeholders, has been formed to support the delivery of the Q-CAS.

Other enablers of adaptation

Legal opinion – Board and directors' duties

There are financial and legal consequences for board directors, investors and governments who fail to account for climate change risks. This is relevant to the directors of boards of hospitals and health services, and aged care and early childhood services.

The Centre for Policy Development and Future Business Council commissioned and published a legal opinion by Noel Hutley QC in 2016 regarding the extent to which Australian corporate law requires board directors to take climate change into account when making decisions about organisational strategy, performance and risk disclosure(24). Directors who fail to consider the impact of foreseeable climate change risks on their business could be held personally liable in a court for breaching their duty of due care.

This decision has been endorsed by the Australian Prudential Regulation Authority and the Australian Institute of Company Directors.

Framework for a National Strategy on Climate, Health and Well-being for Australia

This Framework provides a 'roadmap' for action(25) for governments (local, state and Australian), the health sector and the community to respond to public health risks posed by climate change. It was released by an alliance of health and medical organisations in 2017 following two years of consultation with healthcare stakeholders and policymakers. It includes seven areas of policy action (Figure 4), and a number of recommendations relevant to the H-CAP.

24 McCullough R 2018, Heat remains on climate change – climate risk and directors' duties, The Chairman's Red Blog, 12 April. Available at: http://www.mccullough.com.au/2018/04/12/heat-remains-on-climate-change-climate-risk-and- directors-duties/

25 Horsburgh, N, Mulvenna, V and Armstrong, F 2017, *Framework for a National Strategy on Climate, Health and Wellbeing for Australia*, July, Our Climate, Our Health Collaboration.

Figure 4: Seven areas of policy action in the Framework for a National Strategy on Climate, Health and Well-being for Australia

Policy examples from the Framework relevant to the H-CAP include:

- the inclusion of climate risk management in healthcare sector accreditation standards to ensure response to climate risks to infrastructure, service provision, workforce and supply chains
- preparation of emergency management and service continuity plans in relation to extreme weather risks
- the establishment of a state-based healthcare sustainability unit to support health services to measure, monitor and reduce carbon emissions and environmental impacts
- support for community-based and social service organisations to understand climate risks to their service delivery
- development of educational campaigns to inform communities about the health impacts of climate change, health-protective adaptation strategies, and the health benefits of a low carbon future
- research to identify near- and long-term health threats from climate change.

Although well received by Australian state parliamentarians(26), this Framework will require formal endorsement and implementation to drive a coordinated and effective response to the health impacts of climate change.

The Lancet Countdown

The Lancet Countdown: Tracking Progress on Health and Climate Change is a global interdisciplinary project. It monitors and reports national and global efforts to reduce the health impacts of climate change, and to increase the

26 Climate and Health Alliance, Report from Health Leaders Roundtable Meeting, Canberra, 2016. Available at: https://d3n8a8pro7vhmx.cloudfront.net/caha/pages/419/attachments/original/1481522733/Report_from_Health_Leaders_Roundtable_Final_2_November_2016.pdf?1481522733

health benefits from climate action. It communicates this research to the broad health community, with the understanding that doctors, nurses and allied health professionals play a pivotal role to ensure climate change responses strengthen public health.

Findings are reported annually in the medical journal The Lancet, and cover climate change impacts, adaptation planning and resilience, mitigation actions and co-benefits, economics and finance, and public and political engagement.

WHO Hospital Safety Index

Queensland Health is supporting hospitals and health services to use the WHO Hospital Safety Index. The Index is a relatively rapid and low-cost diagnostic tool for assessing the probability of a hospital remaining operational in emergencies and disasters. It promotes a capacity-building approach to hospital safety that allows for improvement over time. The Index does not replace an in-depth vulnerability assessment, but it helps authorities to determine quickly what actions and measures improve safety and what capacity the hospital has to respond to emergencies and disasters.

Global Green and Healthy Hospitals(27)

Global Green and Healthy Hospitals (GGHH) is an international network of hospitals, health and aged care facilities, health systems, and health organizations dedicated to reducing their environmental footprint and promoting public and environmental health.

The GGHH network has more than 1005 members in 51 countries. As of March 2018, there were 41 GGHH members in the Pacific region (Australia and New Zealand), representing 797 hospitals and health services. Queensland-based members of the GGHH Pacific regional network include Children's Health Queensland Hospital and Health Service, Mater Misericordiae Health Services, Princess Alexandra Hospital and UnitingCare Queensland. Membership of GGHH is currently free.

The GGHH network provides guidance to support health services to achieve 10 interconnected goals that promote greater sustainability and environmental health. Members commit to working on at least two of the 10 goals. The goals relate to leadership, waste management, energy efficiency, water usage, transportation, sustainable food, pharmaceuticals, building infrastructure, the substitution of chemicals with safer alternatives and purchasing policies for sustainable products. The network is a project of international Health Care Without Harm, and is coordinated in Australia and New Zealand by CAHA.

Appendix 4 provides an overview of resources to guide health adaptation and mitigation planning. Some reports on climate adaptation planning for health at city, regional and national levels are also included.

Current progress towards adaptation

The most developed aspects of climate adaptation in Queensland's health and wellbeing sector are responses to health disasters and emergencies arising from extreme weather events. Under the state's disaster management arrangements, Queensland Health (QH) is the lead agency for health communication and health service delivery and coordination. QH adopts an all-agencies approach to disaster and emergency management across the prevention, preparedness, response and recovery phases. Relevant plans address food safety, mass casualty, blood supply emergency and contingency, pandemics, heatwave response, and mental and community health.

Although some climate adaptation activity is taking place in the form of disaster and emergency management, in the face of expected impacts, there is a need to scale up adaptation in the sector. For instance, early childhood and aged care stakeholders indicated lack of organisational engagement in climate change risk appraisal or management, despite adaptation to extreme weather events.

Robust and specialised tools and technologies are now available to help to assess climate change risk, and inform adaptation and mitigation over medium to long term periods. While most stakeholders indicated they had not

27 www.greenhospitals.net

undertaken formal climate change risk assessment, moves are beginning to be made in this direction. The Darling Downs Hospital and Health Service recently embarked on such a process (see Case Study 1 below).

Case study 1

Climate Change Risk Screening – Darling Downs Hospital and Health Service

The Darling Downs Hospital and Health Service (DDHHS) is taking a proactive approach to acknowledge and address the impacts of climate change on its business and ensure business continuity into the future.

DDHHS is identifying climate change risks and determining ways to focus future planning, including infrastructure investment, sustainability, and operational and workforce planning.

Climate change is likely to increase demand on services, and to impact some operational activities. It will also require changes to some buildings and infrastructure.

In general, the DDHHS is in good shape and, through early recognition of risks, is well placed to take further action, develop appropriate response plans and consider how best to respond to upcoming issues. Resources to address some of the issues may be a challenge, but taking a proactive, risk-based approach is helping to identify where no-regrets actions can be taken that address existing risks now. Actions that address future risks will be planned for and implemented in response to climate triggers, rather than in an ad hoc way. The risk assessment and associated response will also ensure that the DDHHS Board is well placed in a rapidly changing legal environment.

Figure 5: Two DDHHS facilities

Case study 2

Community Energy Efficiency Program – UnitingCare Queensland

In 2015–16, UnitingCare Queensland (which delivers community services such as UnitingCare Community and Blue Care), implemented a project to improve energy efficiency, energy management and reduce energy consumption costs, allowing savings to be channelled into increased client services. It achieved a total energy saving of 37 per cent across 27 sites, saving $99,000. Energy consumption savings were 124,069 kWh, equivalent to 100 tonnes of carbon dioxide. The combined payback of all initiatives is 6.4 years with a return on investment of 16 per cent. The average cost saving per retrofitted site was $3700. The project also improved energy efficiency practices through behaviour change among staff and volunteers, and increased knowledge and understanding of energy management practices across the organisation.

Figure 6: Sparky the energy-saving icon featured in a suite of communications, including an animated video

UnitingCare Community has more than 2400 staff and over 6000 volunteers across more than 280 services statewide. These include disability support services; children, young people and families services; counselling and wellbeing services; and Lifeline services.

Case study 3

Leadership – Koowerup Regional Health Service, Victoria

The Koowerup Regional Health Service (KRHS) in rural and peri-urban Gippsland, Victoria, recognises that climate change affects the health and wellbeing of the local community, and puts pressure on its infrastructure and service delivery. It is one of the first health services in Victoria to address climate change, and integrate health promotion and environmental sustainability based on a socio-ecological model of health. For this, it has been awarded the global Health Care Climate Challenge Awards—Climate Leadership (Gold) and Climate Resiliency (Silver).

Figure 7: Reflective white paint on KRHS buildings reduces heat impacts and lowers energy demand

KRHS has taken a proactive lead to build its and the local community's resilience and advocate for climate adaptation policies at state and national levels by:

- analysing and adopting policies to address local disaster risks due to climate change
- engaging with local government, health and environmental agencies to invest in climate mitigation and adaptation programs that produce health benefits
- educating staff, patients and the community on solutions to climate change issues
- advocating for policies at local, state and national levels that address climate change adaptation and mitigation strategies for rural and regional health services across Australia

The following factors contributed to KRHS successfully its climate strategies:

- having strong and clear leadership from its CEO and board
- a full-time health promotion practitioner leading a health promotion team
- staff engagement across all departments

Queensland stakeholder views

Four key themes were identified by stakeholders during the H-CAP engagement process:

- climate change impacts on human health and wellbeing
- barriers to successful adaptation
- opportunities related to adaptation
- priority needs to enable successful adaptation (pathways to action)

A summary of findings around these four areas is provided in Appendix 2, and highlights are discussed below. Workshops, surveys, meetings and interview responses demonstrated remarkable consistency with each other.

Note: Percentages below relate only to survey responses. Discussion points from workshops, meetings and interviews were not quantified in this way as they represented broad views of stakeholders involved in discussions. Information from all responses (workshop, meetings and interviews) was analysed using NVivo software.

Theme 1: Impacts of climate change on health and wellbeing

There was a high level of awareness of the impacts of climate change on health and wellbeing among stakeholders- 60 per cent of survey participants were highly aware and 99 per cent had at least some degree of awareness. Stakeholders were most concerned about impacts on population and community health, service delivery, and broader cross-cutting or cross-sectoral impacts.

Physical and mental health impacts

The most common physical and mental health impacts of climate change of concern to stakeholders were:

- heat stress (80 per cent)
- changes in patterns of infectious and vector-borne diseases (72 per cent)
- death and injuries from extreme events (70 per cent)
- mental health issues, and emotional and social distress (67 per cent)
- social vulnerability and increasing inequalities from climate change impacts on social (energy, housing, transport, livelihood / employment) and ecological (quality of water, air, soil) determinants of health; and cross-sectoral impacts (63 per cent)
- food and water safety and security (52 per cent and a strong theme in workshop discussions)
- cardiovascular and respiratory illness related to climate change effects on aeroallergens and air pollution

- impacts on children's health and development.

Figure 8: Word cloud from workshop discussion on impacts of climate change on health and wellbeing

There was a high level of recognition of the risks from vector-borne diseases, consistent with international literature. However, climate change impact on the prevalence and distribution of vector-borne illnesses is a complex issue affected by many contributing and interacting factors, including the status of health and disease management, changing land use and human behavioural responses. It should be noted that clear evidence of a significant impact of climate change on vector-borne diseases in Queensland has not been established yet.

Even stakeholders not currently planning for or responding to climate change risk clearly recognised the need to manage the effects of frequent or severe weather events. Early childhood and aged care stakeholders were particularly aware of the effects of extreme heat on their clients and staff. Aged care stakeholders in particular were acutely aware of the psychological and physical impacts of heat on the elderly.

Workshop discussions noted the mental health impacts of extreme weather, including severe effects on Queensland farmers of repeated crop and livestock losses. Mental health in the community (social and emotional stress and distress, rather than severe mental illness usually treated by the hospital and healthcare system) was a predominant issue in workshop discussions and survey responses (67 per cent), and is here demonstrated by the following response:

> *The challenge of dealing with increased numbers of distressed patients, more severe distress, and often having little remedy to offer other than support and understanding.*

Ability to provide safe, high-quality service under changing circumstances

Concerns about stakeholders' ability to provide safe, high quality service under a changing climate included:

- increasing pressure on services from climate impacts and other drivers (e.g. populations displaced by climate change)
- damage to infrastructure impacts and costs, including interruptions to supply chains. This is exacerbated in regional and remote areas where repair and recovery is often prolonged.
- lack of leadership at the senior executive level to manage climate change risks, including legal and financial risks
- absence of policy, regulation or guidance for climate change adaptation and mitigation by the sector
- lack of finance and resourcing, including human resources, to build capacity for adaptation and mitigation
- rising utility costs pushing up the cost of service provision, especially in areas prone to extreme events
- impacts on service delivery through climate impacts on other sectors like energy, housing, transport, environment, local councils and resources to support collaboration

Although many survey participants identified themselves as holding middle to senior management positions, only 7 per cent were aware of their legal and financial responsibilities to manage climate change risk, and only 10 per cent had assessed climate change risks to their business operations. This small proportion, however, recognised legal and financial liabilities as opportunities to trigger action at executive and decision-making levels.

While 62 per cent of survey respondents had implemented disaster and emergency management actions, there was recognition of the need for proactive, forward-looking processes to respond to the increasing intensity and complexity of climate risks. This was deemed particularly pertinent for planning future demands on services, workforce and facilities, and included considerations around where to locate, or relocate, health, aged care and early childhood services in relation to changing climate conditions and population movement.

The processes used to implement disaster and emergency management planning over recent years were acknowledged to have worked well. Similar processes were recommended to develop and implement climate change risk management and adaptation planning. (*Note*: a separate Sector Adaption Plan is also being developed for the emergency management sector.)

Many of the themes and issues identified above were further explored under topics like gaps and barriers, opportunities and pathways forward.

Theme 2: Gaps and barriers to adaptation

Stakeholders were acutely aware of barriers preventing their effective engagement in adaptation, including:

- lack of leadership, policy, regulation and guidance
- lack of resources (human and financial)
- gaps in capacity, knowledge, data and research
- cross-cutting and cross-sectoral barriers.

The combination of these challenges made it difficult for service providers to envision what a climate-resilient future for the health and wellbeing system and for Queenslanders would look like, and even harder to plan a pathway towards it.

Figure 9: Word cloud from workshop discussion on barriers to adaptation and knowledge gaps

Lack of leadership, policy, regulation and guidance

A lack of consistent political support for action was seen as a significant challenge, which created other barriers such as low prioritisation and the lack of funding and resourcing for climate change adaptation. Politicisation and polarisation of climate change in parliament, the mass media and society in general was seen to have created unhelpful and conflicting community attitudes and a hostile environment for sectoral or societal planning and action. Stakeholders however, acknowledged the need to take action, while continuing to strive for political support.

Lack of dedicated resources (human and financial)

Urgent day-to-day business and service demands, including increasing population and increasing utility (electricity and water) and other costs, are prioritised over forward-looking climate risk management or planning. Building a business case for adaptation and mitigation is difficult because of:

- competition for scarce resources (money, personnel, time)
- recognition of the likely need for significant financial investment in climate-related action both upfront and in the medium and long term
- difficulty predicting the costs and benefits of action or inaction over a necessarily longer planning and accounting period than usual

Gaps in capacity, knowledge, data and research

Stakeholders identified significant knowledge, data and research gaps, including:

- information and understanding of present and expected future impacts of climate change in Queensland, and their impacts on health and wellbeing
- adaptation options and solutions to manage climate risk
- available resources to support adaptation

Cross-cutting and cross-sectoral barriers

Some barriers beyond the control of the health and wellbeing sector include:

- lack of strong political support for climate action, let alone bipartisan or unilateral support
- disunited, maladaptive societal attitudes and understanding
- a sense of helplessness within the community, sector and its workforces. These present unique psychological and social challenges.
- difficulty working collaboratively across sectors and government levels (silo mentality).

An example of a cross-cutting and cross-sectoral barriers is poor urban and infrastructure planning, which fails to account for climate impacts, thereby locking in ongoing adaptation difficulties. Stakeholders noted that the top-down, state-led approach to planning prevents local governments enacting sustainability principles. They also believe pressure from developers is preventing councils from making sound, evidence-based decisions. Such cross-cutting issues require a whole-of-society approach.

While some sections of communities are sceptical about climate change, stakeholders noted the plethora of potentially relevant community-led climate change related programs that are often not coordinated or integrated. These were considered to have potential to be more effective if goals, resources and processes are shared. Stakeholders recognised the difficulty and sensitivity of openly connecting the dots between diverse programs as all being related to climate change (seen as a polarising label) because of the politicised state of government and community attitudes, and a lack of knowledge about climate change impacts on health and wellbeing.

Theme 3: Opportunities and co-benefits

There was strong interest in sustainability and in reducing the carbon footprint and emissions across the sector (including health, aged care, and early childhood) through, for example, waste reduction and renewable energy, such as rooftop solar. Stakeholders recognised significant economic, social, health and environmental co-benefits that would be derived from climate change mitigation and adaptation. They noted that such outcomes would increase sector sustainability and resilience, and build community connectedness. If economically quantified, they believed these co-benefits would offset or even outweigh the costs. These opportunities and co-benefits are described below.

Figure 10: Word cloud of workshop discussion on opportunities and benefits of climate change adaptation

Community resilience, wellbeing and financial co-benefits

Opportunities to build the resilience of individuals, communities and organisations were identified as the biggest co-benefit of adaptation (approximately 80 per cent of survey respondents). Such co-benefits would come from applying better design standards to address changing climatic conditions (more comfortable, climate-sensitive building design, infrastructure, public and urban spaces), and improved air quality from cleaner energy and transport, which would in turn reduce cardiovascular and respiratory disease burden.

Financial co-benefits of mitigation and adaptation included cost savings from energy efficiency and renewable energy (e.g. rooftop solar, batteries and wind), and from preventing or reducing costly building and infrastructure repairs following extreme weather events. Large financial savings are also being made through other environmental initiatives, including waste reduction.

No-regrets, win-win outcomes

Stakeholders suggested the need to go beyond the simplistic economic business case thinking when considering the costs and benefits of climate change responses. Workshop participants felt community-based health service planning and redesign around climate change adaptation, with co-investment by multiple organisations and services, could provide opportunities to better meet current and future health service needs, particularly in disadvantaged communities.

Co-benefits from a healthier natural environment

Stakeholders shared a widespread recognition of the ecological basis for physical, mental and social health. Efforts to protect and promote intact ecosystems and natural environments would create clean and adequate air and water and fertile soil. Opportunities were seen for increased urban and sector-specific greening for cooling by shading and urban heat island reduction, supporting more active lifestyles, local food production (which could improve food security), improving amenity, and providing social and mental health benefits.

Community engagement

Stakeholders felt that active climate change adaptation and mitigation by the sector would provide opportunities to improve community engagement and support effective community responses to climate change.

They noted the significant body of research about public attitudes to climate change, examining psychological adaptation to climate change(28). Active involvement of expert psychological, social and communication professionals is needed to help overcome complex psycho-social barriers that prevent broad community and political engagement in adaptation.

Key informant interviews with representatives from Aboriginal and Torres Strait Islander groups highlighted the opportunity to recognise the strengths of Indigenous cultural knowledge and practice to build their resilience to climate change.

Theme 4: Pathways to respond

Stakeholders had strong views on conditions and resources required to facilitate sector-wide responses to the health impacts of climate change. They identified ideal conditions to support climate change responses, while recognising challenges associated with current political and budgetary frameworks. Major recommended directions and requirements are discussed briefly below.

Leadership, policy and governance

After a decade of political and policy uncertainty, there is widely voiced cynicism about government commitment to climate change adaptation and mitigation. This has resulted in wariness and unwillingness to invest already stretched resources into adaptation.

Uncertainties in governance, coordination and planning need to be resolved. Governance review to ensure greater coordination, clearer roles and responsibilities and adequate resourcing is required. This will strengthen existing systems and alliances involved in disease prevention and management. It will also maintain effectiveness under stress, including the effects of climate change which will increase the challenges already being faced.

Stakeholders recognised the need for action beyond existing disaster and emergency responses. They highlighted the need for government leadership and policy on climate change as an investment in future-proofing against a whole suite of social and environmental pressures. They also recognised the importance of immediately pursuing no-regrets or win-win pathways to reap multiple immediate and ongoing potential co-benefits to ensure adaptation actions did not cause environmental harm e.g. increasing greenhouse gas emissions as a result of installing air-conditioning.

The development of consistent and complementary science-based policies, strategies, plans and practical guidance on climate change adaptation and mitigation at national, state, regional and local scales was recommended as an important enabler for action.

Figure 11: Word cloud of workshop discussion on pathways towards climate change adaptation

28 e.g. Reser, JP, Bradley, GL, Glendon, AI, Ellul, MC and Callaghan, R 2012, *Public risk perceptions, understandings, and responses to climate change and natural disasters in Australia and Great Britain*. National Climate Change Adaptation Research Facility, Griffith University, Gold Coast. www.nccarf.edu.au/publications/public-risk-perceptions-final

Health Impact Assessment

Stakeholders suggested the use of Health Impact Assessment (HIA) to inform policy and leadership. HIA is a tool to engage communities and other stakeholders to understand the complexities of the challenge. As one participant noted:

> *Health Impact Assessment requires deeper understanding of challenges, and addresses them in the broader contexts in which they arise, and emphasises the interconnections between issues that encourage multidisciplinary, community-engaged approaches to solutions that can be supported by health services, especially at primary health care level.*

One workshop group discussed the opportunity and necessity to progress beyond individual, often expert-driven risk assessment approaches to identifying individual climate hazards, and consider embracing more holistic approaches offered by HIA.

Risk assessment and legal responsibility

The low response rate in the survey in relation to assessment of climate risks and understanding of legal obligations was acknowledged as a barrier to effective adaptation, and an area that could be prioritised for immediate action. Conducting climate change risk assessment, and increasing understanding of the fiduciary responsibility and potential for personal liability of healthcare boards in relation to climate risk are seen as two of the top practical priorities, and important drivers for action.

Building resilience and adaptive capacity within the system

Building system capacity through professional workforce development and resourcing is also a practical priority. This includes workforce training and education, as well as the provision of robust, decision-ready data products, practical processes and tools to support decision-making and climate risk management across the health and wellbeing sector. For example, respondents from the early childhood sector reported that small, standalone services have little capacity to formulate policy and practices, and require support from peak bodies to do so.

Funding and resourcing

Dedicated financial and human capital for climate risk management and for reducing sector emissions (mitigation) or increasing sustainability is required. Cost-benefit analysis can also help to support business cases for raising the priority of climate change risk management in financially constrained times. This, however needs to include currently externalised or unrecognised risks and benefits to health and wellbeing. Aboriginal and Torres Strait Islander representatives pointed to the opportunity for building resilience and protecting the health and wellbeing of Aboriginal and Torres Strait Islander people through appropriate resourcing of the *National Aboriginal and Torres Strait Islander Health Plan*.

Collaboration across sectors

Creating a framework for cross-sectoral planning and response is vital for effective adaptation across all sectors, not only in the health and wellbeing sector. There is a need for collaboration between health and human services, energy, transport, local councils, and the building, infrastructure and development industries for better medium- and long-term planning.

Participants recognised the importance of the ecological foundations of health. This can be achieved through collaborative protection of water and air quality, land use, and food production and distribution. Examples include better management of climate change amplified risks to water-borne, food-borne, vector-borne and aeroallergen related conditions.

Community engagement and education

Education, engagement and collaboration among community and health service providers on climate change risks can help drive change and build resilience through practical actions (e.g. promoting changed outdoor work practices in increasingly hot locations or conditions).

Encouraging stakeholder engagement also means promoting psychological adaptation and planning, which has benefits for mental health and resilience. Effective listening to community members and demonstrating that their voices are heard and valued can drive the change and build resilience.

Concerns were raised regarding limited community mental health service capacity, especially in regional and

remote areas. Services that are available are mainly focused on severe mental illness. Community organisations such as Lifeline were recognised for promoting mental health resilience to climate change impacts, particularly in relation to extreme weather events.

Awareness of the toxicity of much of the public discussion around climate change prompted workshop discussion on the importance of careful framing and use of language. Examples include promoting adaptation 'by stealth' by framing or promoting action in terms of health or other co-benefits, and avoiding the use of the term climate change, using terms like 'future-proofing' and 'climate readiness' instead. Climate change understanding and risk communication should be improved, and lessons can be learned from past disaster events and from the climate change related psychological, sociological and communication research. This pathway requires a cross-sectoral and whole-of-community response.

Research and data

Better access to data on threats and impacts at a local level would help support better decision-making. More research and communication is required to investigate, monitor and manage climate-sensitive illnesses such as food- and water-borne illnesses, and existing and emerging vector-borne and zoonotic diseases. A better understanding of the carbon signature of all medical products would help guide decision-making. Examples include undertaking product lifecycle analysis, and having carbon emissions ratings for products and processes available (e.g. pre-packaged surgical and obstetric packs, and mobility and continence aids) to inform purchasing and practice decisions. Access to information and information-sharing forums or networks on effective adaptation options, and case studies of successful health or community service adaptation initiatives, is required.

Building on the strengths of vulnerable groups

There is a need to identify and prioritise actions for vulnerable groups, which build on their strengths. Key informant interviews with Aboriginal and Torres Strait Islander people highlighted the opportunity to learn from Indigenous cultural practices, such as shared responsibility, working together, acknowledging and learning from elders, and focusing on 'what's strong, not what's wrong', as an important approach to build psychological resilience and maximise the social value of community engagement.

Other opportunities identified for building the resilience of vulnerable communities included:

- *'Having a vision and plan for the future.'*
- *'Community connectedness is a really important strategy to build resilience.'*
- *'Building community spirit can help overcome social isolation.'*
- *'Having a network to share ideas and knowledge, and learn from and grow together; build connections via a shared platform.'*
- *'Sharing positive stories helps to showcase the tools that people are already using to adapt to climate change.'*

These impacts, gaps, barriers, opportunities and pathways forward informed the development of a plan for climate change adaptation for human health and wellbeing. This plan follows.

The Plan

Vision

An innovative and resilient health and wellbeing system that manages the risks and harnesses the opportunities of a changing climate.

This plan provides a roadmap to support the health and wellbeing system. It is targeted to the health care, aged care and early childhood education and care stakeholders, and all levels of government. It will enable sector participants to work collaboratively, harness opportunities to protect the health and wellbeing of present and future generations, and realise economic and social co-benefits through climate change adaptation and mitigation action.

Principles

Seven principles underpin the adaptation measures identified in this Plan. They are:

- Human health and wellbeing depends on a healthy natural environment.
- Effective adaptation requires avoiding and managing risk.
- Adaptation must be supported by mitigation to be effective.
- Collaboration with and engagement of all affected stakeholders is key.
- Adaptation must build resilience to be effective.
- Responses must be equitable, evidence-based, inclusive and responsive to change.
- Responses must recognise social vulnerability and build on existing strengths(29).

Priority Adaptation Measures

The following Priority Adaptation Measures have been developed in response to the needs and priorities identified in consultation with stakeholders, and informed by existing best practice climate change adaptation measures:

1. Leadership and governance
2. Building capacity in the sector and the community
3. Specific public health measures
4. Risk management and legal liability
5. Research, data and evaluation
6. Economics and financing
7. Collaboration across agencies, sectors and stakeholder groups
8. Education and communication
9. Policy, regulation and legislation
10. Infrastructure, technology and service delivery

The following section provides high level recommendations for each of these Priority Adaptation Measures. Some of the recommendations are cross-cutting and shared across the sectors, making them relevant across other SAPs in the Q-CAS, and should be addressed using whole-of- government and whole-of-community approaches.

Note: The specific examples given below are possible actions for different stakeholders; they are not intended to

29 Social vulnerability in this context means society's ability and capacity to prepare for, cope with and recover from events or impacts related to climate change. It differs between individuals, communities and varies spatially and in time.

provide a thorough or exhaustive list of actions. They are intended as a guide for government, services, institutions and facilities to plan their own actions, and to be shaped by local conditions.

1. Leadership and governance

Policy direction: **Empowering leadership at all levels to plan and implement responsible, evidence-based, locally relevant climate change adaptation.**
Desired outcomes The health sector becomes a leading example of effective climate change adaptation and climate resilience. Health executives, policymakers and health professionals provide strong and visible encouragement for services, staff and the community to prioritise climate change action as both a risk and an opportunity.

Building a culture of leadership in relation to climate change adaptation and mitigation is needed. Effective leadership can empower organisational staff to plan and act.

Stakeholders at all levels can play a part in demonstrating leadership, whether it is at the service level by facilities management or clinicians, government (local and state), academia and research, or the community. Many levers for institution-wide and sector-wide change, however lie with executive leadership and policymakers. Significant actions need to be highly visible to demonstrate leadership.

Health, aged care, early childhood and other social service sector boards must work to become more familiar with their climate change risks, and create a culture of leadership throughout their organisations. Health departments and other agencies, both not-for-profit and for profit, should respond to the evidence of risk and imperatives for action, and provide advice and leadership accordingly.

Creating an environment that harnesses the 'wisdom of the crowd' can cultivate buy-in as well as lead to innovative, locally relevant solutions and strategies. To implement the H-CAP, stakeholders are encouraged to form supportive networks to collaborate and collectively develop a culture of empowerment and engagement across health, aged care and childcare services. This can support the development of a more widely shared 'best practice' approach, and help reduce barriers and challenges, especially for smaller services with less capacity to pilot and test different responses.

Some examples of strategies to demonstrate leadership and strengthen governance in relation to climate, health and wellbeing are provided below.

Table 2: Examples of strategies to demonstrate leadership and strengthen governance

Influencers	**Example strategies**
State and local government	Establishing comprehensive cross-portfolio working committees on climate change to bring perspectives from all sectors to guide adaptation actions
	Developing guidelines to embed a climate lens in all health policy decision-making (i.e. what are the implication for human health and wellbeing associated with any given strategy? What are the likely benefits / risks associated with its implementation?)
All stakeholders (local and state government, peak bodies, public and private health and wellbeing service providers)	Embedding community consultation and engagement in all strategic planning efforts
	Embedding climate change risk assessment and planning in quality frameworks, accreditation standards and key performance indicators

2. Building capacity in the sector and the community

Policy direction: **Building the preparedness and ability of the health and wellbeing services sector and the community to respond to climate change threats to health and wellbeing.**
Desired outcomes Health and wellbeing services and their workforces understand and are well prepared to anticipate, respond to and recover from climate-related impacts. They are able to maintain service quality and continuity to best meet community needs, even during periods of surging demand.

Building the capacity of health and wellbeing services to respond and adapt to climate change is vital to ongoing service continuity and safety and quality of care. Services providing health care, child care and aged care are typically under strain in normal circumstances. Climate change places additional burdens on services, and amplifies existing health burdens for individuals and the population. Strengthening the ability of services to anticipate, prepare for and respond to climate-related disasters, extreme weather events, disease outbreaks and health crises must be prioritised across the sector. Existing international tools to manage health and hospital system risk, vulnerability and capacity assessments should be used to develop local tools and instruments and processes.

Lessons from successful capacity building for disaster and emergency management can inform climate health risk response capacity building. Wider community engagement, proactivity and resilience building is however required for long-term solutions to be effective. Supporting at-risk communities to increase their resilience to the effects of climate change can reduce near- and long-term demand on all health and wellbeing services.

Some practical steps to build capacity to respond to climate change in health and wellbeing services and community are shown in Table 3.

Table 3: Examples of strategies to build capacity in the sector and the community

Influencers	**Example strategies**
State and local government Healthcare and professional organisations Universities	Developing and widely disseminating guidelines, risk identification frameworks and tools to support decision-making
	Undertaking community education programs to raise awareness about climate change risks to health and wellbeing and promote behaviour change
	Undertaking workforce education and development to raise awareness about climate change risks to health and community services, and effective sector adaptation and mitigation measures
	Establishing / participating in collaborative stakeholder and service networks to share case studies and examples of successful implementation and leadership
	Undertaking scenario planning and climate hazard preparedness drills in service facilities
Public and private health and wellbeing service providers	Developing climate adaptation and mitigation plans to help future-proof all services (i.e. enhance resilience, promote preparedness, minimise climate change impacts and help manage costs)
	Encouraging and supporting innovation through stakeholder and community engagement in the development of climate adaptation plans
	Building on institutional and community strengths when developing strategies

3. Specific public health measures

Policy direction: **Evaluating specific health and wellbeing vulnerabilities in the population to well-established risks from climate change and implementing appropriate public health measures to reduce avoidable morbidity and mortality.**
Desired outcomes People in Queensland are well informed about the risks that climate change poses to their health and are able to reduce their exposure to risk. Services are provided to those most vulnerable to reduce their exposure to risks.

A significant gap currently exists between existing knowledge and coordinated public health initiatives on climate change. A coordinated public health action strategy is vital for effective climate change adaptation plans. Examples of specific public health measures to address immediate and longer term health threats are presented in Table 4.

Table 4: Examples of specific public health measures

Influencers	**Example strategies**
Local and state government, in cooperation with public and private health and wellbeing service providers	Heatwaves—developing community-wide and facility-level heatwave plans; expanding the reach of heatwave warnings to vulnerable populations and groups; identifying publicly accessible facilities for respite during heatwaves; and promoting changed work practices in increasingly heat-affected locales
	Bushfires, floods, storms—undertaking education and community preparedness programs to highlight the links between climate change and extreme weather and the likelihood of increasing frequency and severity of these events
	Air quality—undertaking public education campaigns to highlight links between rising temperatures and declining air quality / aeroallergens to support health-protective behaviours and early intervention for at-risk populations; collaboration between planning and health agencies to reduce environmental triggers
	Ensuring public health measures address indirect climate change impacts on health associated, including: - potential changes in the incidence of infectious and vector-borne diseases. Community and health sector education campaigns can help minimise risks of exposure and boost surveillance and precautionary behaviour - mental health—increased support to protect and promote positive mental resilience community-wide. This would recognise the effects on social and emotional wellbeing of extreme weather events, and anxiety and concern about future climate change projections. - food-borne diseases—develop resources to communicate impacts of climate change on food-borne illness and strategies to mitigate them - water-borne disease—align health and other planning efforts to ensure continuous access to safe drinking water in climate-related disasters and slow onset changes

4. Risk management and legal liability

Policy direction: **Ensuring the operational and strategic plans of all facilities and services acknowledge and reflect their short-, medium- and long-term risks from climate change.**
Desired outcome Health and wellbeing services ensure strategies to mitigate and manage risks from climate change are understood and addressed at every level of the organisation.

There is a significant opportunity to prioritise climate change adaptation across health care, aged care and child care through evaluation of climate risk. Very few stakeholders involved in consultation for the H-CAP reported any assessment of climate risks for their facilities, workforce or services. Recent clarification of legal liability for boards of governance and their directors highlights their fiduciary responsibility to acknowledge climate risks in their strategic and operational plans. This should prompt the evaluation of climate risk.

There is potential for climate risk assessment to be mainstreamed through service accreditation standards, key performance indicators for executives, and criteria for government funding and grants. Climate change risk should be reported at board level and should not be considered an environmental issue, but an overarching issue affecting all organisation interests and activities. The development of climate risk management frameworks should involve consultation across all levels of service provision, suppliers and clients and the community.

Where necessary, products and tools to support decision-making in the health sector should be developed to support climate risk management. One such tool is Health Impact Assessment (HIA), which recognises that human health and development are critically linked to environmental, social, cultural and economic factors. Use of HIA considers the types of health impacts that may occur, and the distribution of those impacts in any affected community. HIA is applicable to risk assessment of any new, or upgrades to existing development projects in sectors like health, transport, environment, mining and resources, agriculture, energy, waste, housing and planning. A new set of national guidelines for undertaking HIA (2017) is available from enHealth, the national body for environmental health(30).

Table 5: Examples of strategies to help address risk and legal liability issues

Influencers	**Example strategies**
Queensland Government (e.g. Department of Premier and Cabinet, Queensland Health) Public and private health and wellbeing service providers	Increasing understanding among executives and boards in relation to their fiduciary responsibility (‘duty of care’) and potential for personal liability if they fail to account for climate risks in strategic and operational plans
	Ensuring all services conduct climate change risk assessments as a core risk management strategy
	Embedding climate risk assessment and management in annual reporting, service accreditation standards, executive key performance indicators, service and grant funding requirements

30 enHealth 2017, Health Impact Assessment Guidelines, accessed 15 May 2018,

<http://www.health.gov.au/internet/main/publishing.nsf/content/A12B57E41EC9F326CA257BF0001F9E7D/$File/Health-Impact-Assessment-Guidelines.pdf>

5. Research, data and evaluation

Policy direction: **Guiding policy and decision-making through well-planned research and climate health risk surveillance, to build greater understanding of risks, vulnerabilities and effective strategies.**
Desired outcome Timely, relevant research supports the development of initiatives to reduce climate change related risks and promote positive community health and wellbeing.

Investment in knowledge about how climate change is challenging health and wellbeing and related services is required for both now and in the future. Decision-making needs to be guided by robust research. Research should particularly focus on building the capacity of vulnerable communities and community organisations. Further, regionally specific research is required into food-, water- and vector-borne disease transmission, and the mechanisms by which climate change interacts with other drivers. These other drivers include current trends in health and disease management, urbanisation, international travel, population growth and migration, water supply, and food production and distribution.

Other critical research priorities include greater understanding of ways to:

- build individual, family and community resilience, and increase community cohesion to plan, prepare for and respond to extreme climate events and impacts
- protect mental health and wellbeing in the face of uncertainties and traumatic events.

Monitoring, evaluation and reporting of all research projects must be properly resourced to ensure that initiatives are achieving desired outcomes, and that changes are made to programs and activities when outcomes are not being achieved. Monitoring over long time periods with robust indicators can help governments and services understand climate change risk and vulnerability and region-specific adaptation challenges, and track how communities and organisations are responding.

Development of indicators should also align other jurisdictions, locally, nationally and internationally, wherever possible. Such an approach would ensure interjurisdictional comparability, and facilitate Australia's annual reporting in this global program. It would also enable benchmarking of Queensland's efforts and effectiveness against those of others regionally and internationally.

One such monitoring tool is the *Lancet Countdown: Tracking Progress on Health and Climate Change*. It has developed 40 indicators across five thematic indicator groups covering:

- health impacts of climate change
- health resilience and adaptation
- health co-benefits of mitigation
- finance and economics associated with health and climate change
- political and broader engagement

Table 6: Examples of research projects to support adaptation to climate change in Queensland

Influencers	**Example strategies**
Research institutions State and Australian governments (including Treasury departments)	Assessing and forecasting climate health impacts across the state, and of vulnerable population groups
	Undertaking ongoing evaluation of community attitudes and knowledge (including psychological wellbeing) in relation to climate change
	Assessing the health-related economic benefits from pro-health climate mitigation and adaptation strategies
	Assessing the health sector's contribution to greenhouse gas emissions

6. Economics and financing

Policy direction: **Ensuring that financing decisions to support climate change programs and initiatives include assessment of all relevant health costs and benefits.**
Desired outcome: Health and wellbeing services have sufficient funding to manage climate change risks and realise savings from climate adaptation and mitigation programs.

Limited access to appropriate financing to support climate change adaptation was identified as a barrier by all stakeholders.

Building a business case for adaptation action through cost-benefit modelling would help services prioritise available funding and secure adaptation financing. A pathways approach (funding for sequenced adaptation activities) is recommended to build capacity and resilience. Evaluation of both the health costs of projected climate impacts, as well as savings from health co-benefits can help build the case to persuade decision-makers and justify investment.

Greater awareness of the financial and legal drivers should assist decisions regarding the allocation of funds to address adaptation and climate risk management at whole-of-government and Department of Treasury levels, and within the sector. Consideration should be given to public–private partnerships, redirection of subsidies that support activities harmful to health and climate stability, and application of levies or taxes on external drivers (e.g. 'the polluter pays' principle for the health and environmental costs of activities which traditionally have not been accounted for).

Table 7: Examples of economic and financing initiatives

Influencers	**Example Strategies**
State government	Allocating funds to support development of climate adaptation and climate mitigation plans
	Assessing the current and future economic costs of health impacts from climate change, and economic savings from health co-benefits of climate adaptation and mitigation measures
Public and private health and wellbeing service providers	Exploring opportunities for private funding for social and ecosystem resilience, for example through impact investing and philanthropy

7. Collaboration across agencies, sectors and stakeholder groups

Policy direction: **Ensuring that Government agencies, peak bodies, and industry and professional associations work together to achieve climate change adaptation and sustainability goals across service provider groups.**
Desired outcome: Collaboration across agencies, sectors and stakeholder groups to share information, guidance and good practice. This makes the most of scarce resources and results in innovative, effective and locally relevant responses for health and wellbeing services.

The health and wellbeing community crosses a range of different sectors. To reduce pressures on the system and increase the resilience of vulnerable groups, there is a need for the many stakeholder groups in the system to collaborate, share information and guidance, and make the most of scarce resources.

Climate risk can be effectively addressed with a bottom-up and a top-down approach, provided there is clarity of purpose and shared awareness of the challenges. Processes to identify gaps, and systems to monitor, review progress and ensure lessons learned are used to develop agility to respond to changing circumstances are also

required.

Funders and regulators should embed health impact and climate change risk assessment and planning in quality frameworks and accreditation standards. Peak bodies, and industry and professional associations should work together to support their members achieve climate change adaptation and sustainability goals. This might include, for example, practitioner learning networks, resourcing professional development and sharing practical resource materials.

For hospitals, health and aged care services, the Global Green and Healthy Hospitals (GGHH) network is an opportunity for collaboration with others locally and globally to share information and ideas, access tools and resources, and learn from one another.

Table 8: Examples of initiatives to improve collaboration across agencies, sectors and stakeholder groups

Influencers	**Example strategies**
State government Health and wellbeing services Peak bodies Professional organisations	Establishing collaborative cross-sectoral groups in different regions throughout Queensland to support climate change and adaptation knowledge sharing and collaboration
	Encouraging participation in existing platforms such as the GGHH network
	Developing outreach material to support better knowledge and understanding of cross-sectoral issues and opportunities

8. Education and communication

Policy direction:

Developing communication, education and training initiatives that inform and build capacity across the health and wellbeing workforce, policymakers and the wider community to respond to the health impacts of climate change.

Desired outcomes:

The health and wellbeing workforce is well educated about, and can confidently respond to, the health risks of climate change.

The Queensland community, including socially vulnerable individuals and groups, is well informed and empowered to participate actively in climate change adaptation planning and responses locally and regionally.

A key cross-cutting factor in effective climate adaptation is the application of accurate, appropriate and relevant information for decision-making. Staff across the sector need to be made aware of the health impacts of climate change and its risks to service provision and quality of care. Equally important is access to knowledge and guidance about robust, evidence-based and solutions-focused climate adaptation and mitigation options.

Targeted communication and deliberative engagement is needed to overcome issues of psychological distancing, motivation and differences in available information. This targeted communication should be informed by psychological and sociological research and climate change communication science. Inclusive approaches to risk assessment and planning at local community and service levels can also strengthen and empower communities, services and individuals and help reduce feelings of helplessness.

As a highly trusted source of credible information, the health and medical community can advance community understanding of climate change and its health impacts, and the message that climate solutions are a health priority and will provide health benefits. Professional health and medical organisations are increasingly advocating for policy on climate change. Increasing their profile and capacity to contribute to public dialogue would help build understanding and support for adaptation in the community.

The inclusion of climate change content, including climate change risk management, in all curricula for health and wellbeing practitioners is vital for workforce development—from undergraduate to postgraduate and continuing professional education. Well-designed (and social science research-informed) social marketing efforts can help address what is understood to be a significant knowledge gap among health and wellbeing practitioners, health service executives, policymakers and the wider community.

Public education and communication must also focus on disadvantaged groups who are most at risk from climate-related pressures. These groups are less likely to access information through conventional channels. Educational and communication efforts need to support such groups to understand, prioritise and respond to increasing volumes of complex information. Some suggested interventions are listed below.

Table 9: Examples of initiatives to improve education and communication

Influencers	Example strategies
State government	Compiling and promoting climate change related health adaptation materials on departmental and institutional websites
Local and state government Health and wellbeing services	Using social media as a tool to swiftly engage large audiences to promote information and alerts related to climate adaptation
	Working with communities and stakeholders to identify information gaps and developing tailored resources to address them
	Developing approaches to engage the entire community about these issues
	Recognising that vulnerable communities are dynamic, and that as an aging population in changing climatic conditions, many people who are not at risk now will be in the future
Academic and educational institutions Accrediting bodies	Developing curricula for the health, aged care and childcare workforces at all levels (undergraduate, postgraduate and professional development) about health impacts of climate change, effective adaptation and mitigation strategies, at-risk communities, and how to talk about climate risks with patients, clients and the public

9. Policy, regulation and legislation

Policy direction: **Providing policy certainty for services, sectors and industries to guide decisions and investment for climate change adaptation.**
Desired outcome: Appropriate and evidence-based policy, regulation and legislation provide a predictable environment to support decision-making by public and private health and wellbeing service providers.

There is a clear need for policy guidance to help public and private sector organisations to adapt effectively to climate change. Policy, regulation and legislation can together ensure responses are timely, appropriate and evidence-based. Targeted policy would also help to reduce inequity, by ensuring those that are at socioeconomic, geographical and cultural disadvantage receive the investment necessary for effective adaptation.

Supportive policy from state and Australian governments is critical to provide clear direction for both public and private service providers. A comprehensive policy framework on climate mitigation and adaptation for health and wellbeing services should be developed in close consultation with the sector and the broader community as a follow on from this high level adaptation plan. Local and state governments should jointly advocate for a national policy on climate change and human health, and collaborate to develop a coordinated response.

Existing quality standards and accreditation in health, aged care and early childhood service should be reviewed to ensure appropriate climate risk management criteria are included. Implementation must be supported with training and professional development, tools, and human and financial resources.

Inevitability services will need to adopt low carbon operations. The Queensland Government should establish a dedicated unit to guide and support services to reduce their carbon and environmental footprint.

Some examples of policy initiatives are shown in Table 10.

Table 10: Examples of policy, regulation and legislation initiatives to support adaptation

Influencers	Example strategies
State government Public and private service providers	Establishing standards for the implementation and monitoring of climate change adaptation for the health and wellbeing sector
	Providing practical support for initiatives to reduce energy and waste in service delivery and the supply chain (e.g. baseline audits, targets to reduce waste, energy, water, resource consumption and pollution)
	Collaborating with industry manufacturers to supply carbon neutral products
Local government	Preventing development in areas which place communities or community services at risk
	Providing guidance and practical support to help community support organisations undertake risk assessment and adaptation planning
Health and wellbeing service providers	Exploring initiatives that provide energy and water security (e.g. solar power and rainwater tanks)
	Providing amenities to encourage low carbon transport options
	Joining supportive organisations and networks and exploring evidence- and practice-based options (e.g. GGHH network)

10. Infrastructure, technology and service delivery

Policy direction: **Investing in climate-resilient infrastructure, technology and service delivery to avoid future costs and ensure service integrity.**
Desired outcome: Health and wellbeing services are able to withstand climate change related shocks and stresses, and ensure the community has access to affordable, high-quality care.

Improved designs for low carbon infrastructure and technology are increasingly available to support climate adaptation and mitigation, and reduce operational and service costs. Given that the determinants of health occur largely outside the healthcare sector, prioritising climate adaptation measures through decisions around the design of buildings, transport, infrastructure, energy and urban areas will help reduce climate impacts on health.

Rapid improvements and cost reductions in smart technologies provide opportunities to improve service delivery, and manage and respond to climate risks. As well as advances in telemedicine, 'hospital in the home', and other primary and community-based approaches, the smart building and smart city concepts have much to offer changing models of acute care and the management of chronic conditions, and should be further investigated and developed.

Some examples of actions that could be taken in relation to infrastructure, technology and service delivery are outlined below.

Table 11: Examples of infrastructure, technology and service design to support adaptation

Influencers	Example strategies
State government Public and private service providers Facilities and asset management professionals	Retrofitting service infrastructure such as hospital, emergency, aged care and early childhood centres to improve climate resilience, enhance energy and water security, and improve capacity to continue providing essential and emergency services(31)
	Investing in communications technologies that can withstand climate shocks and stresses to support service coordination during disasters and reduce vulnerability of isolated or remote communities
	Changing models of care to reduce exposure and build community and sector resilience to climate change threats (e.g. shifting from a reliance on centralised facilities, adopting 'hospital in the home' approaches and localised service provision, and using information communications technologies to provide guidance)

31 WHO 2015, Hospital Safety Index Guide for Evaluators, accessed 15 May 2018, <http://www.who.int/hac/techguidance/hospital_safety_index_evaluators.pdf?ua=1>

Glossary

CAHA	Climate And Health Alliance
CO2 or CO2 equivalent	Carbon dioxide or concentrations of other greenhouse gases expressed as carbon dioxide (e.g. equivalents)
DES	Department of Environment and Science
GGHH	Global Green and Healthy Hospitals network
H-CAP	Human Health and Wellbeing Climate Change Adaptation Plan for Queensland
kWh	Kilowatt hour (a unit of energy)
NCCARF	National Climate Change Adaptation Research Facility
QCOSS	Queensland Council of Social Services
QH	Queensland Health
Adaptation	In the context of human dimensions of global change usually refers to a process, action or outcome in a system (household, community, group, sector, region, country) for the system to better cope with, manage or adjust to some changing condition, stress, hazard, risk or opportunity (Smit and Wandel 2006, p. 282)
Adaptive capacity	'The ability of a system to adjust to climate change (including climate variability and extremes), to moderate potential damages, to take advantage of opportunities, or to cope with the consequences' (IPCC 2007, p. 869)
Adaptive capacity (psychological)	Having the ability and resources (psychological, social, community, economic, etc.) to adjust to, adapt to and cope with the impacts of climate change (APA 2009)
Climate	The average weather over a period of months to thousands or millions of years
Climate change	Any significant change in the measures of climate lasting for several decades or longer, including changes in temperature, precipitation or wind patterns. Historically, the Earth's climate has changed over time, but there is strong scientific consensus that the recent observed changes, over the past 50 years or so, have been primarily caused by human activities.
Climate legal risk	Climate legal risk is the risk of exposure to legal action that accompanies a decision that relates to climate change impacts. It encompasses the elements of factual and legal uncertainty, and specifically concerns the risk arising from legal duties and obligations as they relate to the impacts of climate change.
Climate risk	The potential for adverse consequences on lives, livelihoods, health, ecosystems and species, economic, social and cultural assets, services (including environmental services) and infrastructure.

Co-benefits	When additional benefits accrue beyond the single objective of a policy or measure
Disaster resilience	The capacity to prevent, mitigate, prepare for, respond to and recover from the impacts of disasters
Fiduciary risk	The risk that people with fiduciary responsibilities (e.g. a board) do not perform their duties or achieve the best value with relation to the beneficiary's interests
Hazard	In the context of climate change, any potential occurrence of a natural or human-induced physical event that may cause damage to property, infrastructure, livelihoods, service provision, environmental resources, etc.
Health Impact Assessment (HIA)	A combination of procedures or methods by which a policy, program or project may be judged as to the effects it may have on the health of a population
Health and wellbeing	A 'state of complete physical, mental, and social wellbeing, and not merely the absence of disease or infirmity' (World Health Organisation 1948) 'The extent to which an individual or group is able to realize aspirations and satisfy needs, and to change or cope with the environment. Health is a resource for everyday life, not the objective of living; it is a positive concept, emphasizing social and personal resources, as well as physical capacities' (Ottawa Charter for Health Promotion 1986) Wellbeing is generally seen as a broader concept. For example, QCOSS has a wellbeing framework for individuals and families (domains: safe, healthy, strong personal relationships, community connections, adequate standard of living, achieving in life, secure for the future), which is nested within community (domains: healthy, safe and democratic, dynamic and resilient, sustainable, culturally rich and vibrant, democratic and engaged). The Queensland Mental Health Commission uses a Wheel of Wellbeing model (https://www.wheelofwellbeing.org/) characterised by the domains mind, body, spirit, people, place and planet (https://www.qmhc.qld.gov.au/media-events/news/wheel-of-wellbeing-rolls-on).
Health and wellbeing 'sector'	This term (for the purposes of this document) arises from the Q-CAS, and refers to services related to human health and wellbeing, and includes hospitals, health services, primary healthcare services, as well as aged care and early childhood services.
Heatwave	Three or more days of unusually high maximum and minimum temperatures in any area
Maladaptation	An action that leads to an increased risk from climate change
Mitigation	For climate change mitigation, actions taken globally, nationally and individually to limit changes in global climate caused by human activities. Mitigation activities are designed to reduce greenhouse emissions or increase the amount of greenhouse gases removed from the atmosphere.
No-regrets options	Adaptation options which, if implemented immediately, will address current climatic pressures and extremes, as well as influencing longer term pressures. If pursued now, they will move toward climate-resilient pathways, while at the same time helping to improve livelihoods, health, social and economic wellbeing, and responsible environmental management.
Psychological adaptation	In the context of climate change, those within-individual adjustments and changes in risk perception, threat appraisal, and associated cognitive, emotional and motivational responses to the threat and perceived physical

	environmental impacts of climate change, as well as to altered behavioural responses and engagements associated with such changed thinking, feeling and motivational responses. Psychological adaptation also refers to those underlying psychological processes mediating and moderating such individual change (e.g. emotion management, self- perception, self-efficacy, protection motivation, coping strategies), as well as to the achieved state of relative balance with respect to own needs and environmental pressure or threat. Psychological adaptation in the context of climate change can also encompass community and societal changes in how the phenomenon and threat of climate change is perceived, understood and responded to in terms of shared understandings and collective behaviour change and adjustment.
Resilience	The capacity of social, economic and environmental systems to cope with a hazardous event, trend or disturbance, responding or reorganising in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation
Risk assessment	A systematic process of evaluating the potential risks that may be involved in a projected activity or undertaking
Social capital	Links, shared values and understandings in society that enable individuals and groups to trust each other and so work together
Social vulnerability	Differing levels of access to resources to prepare for, cope with and recover from disasters and climate change. It is influenced by factors such as poverty and inequality, marginalisation, education, food security and diet, access to insurance, transport options, community and family networks, gender, race, socio-economic status, age and language, geography and housing quality. While low-income families and disadvantaged communities contribute the least to climate change, they are most at risk of being impacted by climate change and climactic events, and are least able to respond effectively.
Vulnerability	The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a result of the type, magnitude and rate of climate variation to which a system is exposed, its sensitivity and its ability to adapt

Appendix 1 – List of participants

The H-CAP engaged a variety of stakeholders, who are listed below. Another 46 people participated anonymously in the survey.

Workshops and survey participants

First name	Last name	Organisation
Judene	Andrews	UnitingCare Community
Fiona	Armstrong	Climate and Health Alliance (CAHA)
Janet	Baillie	Queensland Nurses and Midwives Union
Hilary	Bambrick	Queensland University of Technology
Nicola	Banwel	Griffith University
Harriet	Barker	
Sophie	Barrett	Cairns Regional Council
Susan	Bassett	Atherton Hospital
Rhiannon	Boden	Darling Downs Hospital and Health Service
Peter	Boland	Darling Downs Public Health Unit
Sioux	Campbell	
Marianne	Cannon	Australasian College for Emergency Medicine
Nimish	Chand	Gold Coast Health
Christine	Cocks	Queensland Nurses and Midwives Union
Sue	Cooke	Climate and Health Alliance (CAHA)
Andrea	Cruickshank	West Moreton Health
Ian	Cumming	
Andrew	D'Addona	Queensland Health, Tropical Public Health Services
Jonathan	Dalton	
James	Dance	
Janet	Davies	Queensland University of Technology
Gregor	Devine	
Christine	Dewar	Viridis Australasia P/L
Andrew	Drysdale	NRM Regions Queensland

First name	Last name	Organisation
Gary	Duffey	Sunshine Coast Council
Jo	Durham	The University of Queensland
Sophie	Dwyer	Queensland Health, Health Protection Branch
Joanne	Dyson	Queensland Health
Nai	Evans	
Richard	Gair	Queensland Health, Tropical Public Health Services
Cai Ru	Gan	Griffith University
Ewan	Gunn	Torres Strait Island Regional Council
Nina	Hall	The University of Queensland, School of Public Health
Melissa	Haswell	Queensland University of Technology
Perry	Hembury	Volunteering Queensland
Garth	Henniker	
Carey	Herrmann	
Chris	Hill	
Penny	Hutchinson	
Susan	Hogan	Gold Coast Health
Carla	Jaggar	Mater Misericordiae Ltd
Cassie	Jansen	Queensland Health, Communicable Diseases Branch
Bryan	Jepsen	
Anette	Jonsson	Queensland Health
Michelle	Kerr	Queensland Health
Alister	Keyser	Tropical Public Health Services, Cairns
David	King	Doctors for the Environment Australia
Karin	Kochmann	General Practitioner
Ian	Kuhl	
Anne	Leitch	Griffith University
Lois	Levy	
Minda	Lowry	Mater Misericordiae Ltd

First name	Last name	Organisation
Ngaire	McGaw	Mater Misericordiae Ltd
Julie	McLellan	Healthy Land and Water
Brett	Mendezona	
Lea	Merone	Public Health Association Australia
Brad	Milligan	Queensland Health, Tropical Public Health Services
Paul	Morgan	Darling Downs Public Health Unit
Sharon	Murray	
Andrew	Nicholson	Householders Options to Protect the Environment, Toowoomba
Greg	Nielsen	
Wayne	Ng	
Tai	Nguyen	University of Southern Queensland
Ben	Norris	Queensland Health
Michelle	O'Loughlin	Cairns Regional Council
Esther	Onyango	Griffith University
Gillian	Paxton	Queensland Department of Environment and Science
Sue	Phillips	Queensland Health
Tony	Pirrottina	
Lyndal	Plant	
Paige	Preston	Cancer Council Queensland
Suren	Putter	
John	Rainbird	Torres Strait Regional Authority
Jyotishma	Rajan	Queensland Department of Environment and Science
Uma	Rajappa	Queensland Health
Luke	Reade	Queensland Council of Social Service (QCOSS)
Joseph	Reser	
David	Rissik	National Climate Change Adaptation Research Facility (NCCARF), BMT Global
Jenne	Roberts	Menzies School of Health Research

First name	Last name	Organisation
Shannon	Rutherford	Griffith University
Caitlin	Saunders	Queensland Health, Cairns and Hinterland Hospital and Health Service
David	Sellars	James Cook University
Linda	Selvey	The University of Queensland, Faculty of Medicine, School of Public Health
Kamil	Shah	QCOSS
Genevieve	Siddle	Queensland Nurses and Midwives Union
Emma	Somerville	
Bob	Speirs	NRM Regions Queensland
John	Stalker	
Louise	Stayte	Douglas Shire Council
Brent	Stokes	
Ainslie	Suey	Darling Downs Hospital and Health Service
Mark	Taylor	Brisbane City Council
Roscoe	Taylor	
Matthew	Thompson	Queensland Fire and Emergency Services
Jayne	Thorpe	Condamine Alliance
Liz	Todhunter	
Fahim	Tonmoy	National Climate Change Adaptation Research Facility (NCCARF)
Simon	Towle	Climate and Health Alliance (CAHA)
Bhakti	Vasant	Queensland Health, Public Health
Tammra	Warby	
David	Ward	Queensland Health
Gary	Warner	Cairns Regional Council
Jean	Watt	Early Childhood Teachers Association
Torres	Webb	Community Connections
Gabrielle	Williams	Mareeba Hospital

First name	Last name	Organisation
Kellie	Williams	
Bede	Wilson	Darling Downs Hospital and Health Service
Helen	Zahos	Queensland Nurses and Midwives Union Nurses and Midwives for Refugees and Asylum Seekers

Written response to workshop questions were provided by the following:

Raelene Phillips, Chief Executive Officer, Good Shepherd Lodge Limited

Luke Greive, Executive Director, Transformation & Aged Care

Sue Thomson, Chief Executive Officer, Mclean Care

Two anonymous responses were also received from the aged care sectors sector.

Interviews

Aged care

Leona Counsell and Jenny Fraser, Lutheran Services, Woodridge (community services, including aged care)

Early childhood

Dr Lisa Sonter, Early childhood educator and President Queensland Early Childhood Sustainability Network
Michelle Page, Safety and Rehabilitation Manager, The Creche and Kindergarten Association Limited

Aboriginal and Torres Strait Islander health and wellbeing

Torres Webb, Community Connections

Paul Gibson, Australian Indigenous Doctors Association

Queensland Health

Sophie Dwyer, Health Protection Branch

Associate Professor Peter Aitken, Health Disaster Management Unit, Aeromedical Retrieval and Disaster Management Branch

Joanne Dyson, Health Disaster Management Unit, Aeromedical Retrieval and Disaster Management Branch

Dave Ward, Health Protection Branch

NRM Regions Queensland

Geoff Penton, CEO, Queensland Murray Darling Region Committee

Andrew Drysdale, CEO, NRM Regions Queensland

Robert Speirs

Queensland Council of Social Service

Luke Reade

Dr Kamil Shah

Steering Committee

Sophie Dwyer, Queensland Health
Luke Reade, Queensland Council of Social Services
Dr Kamil Shah, Queensland Council of Social Services

Andrew Drysdale, NRM Regions Queensland

David Putland, Department of Environment and Science
Jyotishma Rajan, Department of Environment and Science

Professor Jean Palutikof, National Climate Change Adaptation Research Facility

Expert Reference Group (reviewers)

Dr Kamil Shah, Queensland Council of Social Services
Luke Reade, Queensland Council of Social Services

Sophie Dwyer, Queensland Health
Peter Schneider, Queensland Health
Bob Speirs, NRM Regions Queensland

Matt Brearley, Thermal Hyperformance
Dr Hilary Bambrick, Queensland University of Technology

Dr Melissa Haswell, Queensland University of Technology

Dr Linda Selvey, University of Queensland

Dr Lisa Sonter, Queensland Early Childhood Sustainability Network

Genevieve Siddle, Queensland Nurses and Midwives Union

Dr Joseph Reser, Griffith University

Dr Anne Roiko, Griffith University

Associate Professor Gregor Devine, Mosquito Control Laboratory, QIMR Berghofer Medical Research Institute

David Putland, Department of Environment and Science

Jyotishma Rajan, Department of Environment and Science

Appendix 2 – Summary of expected impacts of climate change on health in Queensland

Extreme weather events

Increased intensity, duration and frequency of extreme weather events such as floods, storms, droughts, bushfires and heatwaves are putting more Queenslanders and visitors at risk of injury, illness, death and post-traumatic stress, and placing increasing pressure on health services and infrastructure (1,2,3,4). Such events may also interrupt other essential services such as electricity, water and sewerage treatment. The economic costs of extreme weather events is significant. For example, the health and social costs (from fatalities, exacerbation of chronic illness, physical injury and disability) associated with the 2011 Queensland floods amounted to $7.4 billion, exceeding the costs to infrastructure and commerce ($6.7 billion) (28).

Increasing temperature and heatwaves

Heatwaves have caused more deaths in Australia since 1890 than bushfires, cyclones, earthquakes, floods and severe storms combined. Queensland is experiencing increasingly hotter weather, with an increase in exposure to higher temperatures and heatwaves causing heat stress and illness, and deaths. Extreme heat increases the risk of heat-related illness across the whole population, and can also exacerbate pre-existing cardiovascular, mental health and respiratory conditions. Children and the elderly are most at risk (5,6). Rising temperatures will also affect a range of pests and diseases, with implications for health, agriculture and tourism. For example, changes in ocean temperatures, acidity and currents mean that marine organisms such as the deadly *irukandji* jellyfish may increase its range southwards to areas where it has not been seen previously (12).

Infectious diseases and vector-borne threats

A warmer climate and changing rainfall patterns will increase the range and prevalence of food-, water- and vector-borne diseases such as dengue fever (which may reach northern NSW by 2100), parasitic (zoonotic) diseases (e.g. leptospirosis), and the prevalence of illnesses resulting from exposure to pathogens (e.g. gastroenteritis, respiratory illnesses following exposure to moulds and fungi after floods) (3,8,9,10). Dengue is transmitted by the *Aedes aegypti* and *Aedes albopictus* mosquitoes. *Aedes aegypti* is also the vector of the zika and chikungunya viruses, which are both potential threats to Queensland (11).

Food and water security

Changes in prevailing weather patterns threaten the security and quality of water sources and the productivity of major agricultural regions in Queensland, with implications for ensuring food and water security for a growing population (3,9,13,14). Severe weather events like floods and cyclones may interrupt water and sewerage treatment services, as well as transportation of food, medicines and other supplies. Food spoilage and water safety impacts will increase.

Occupational health impacts

Hotter temperatures place outdoor and manual labourers at increased risk of heat-related illnesses, work accidents and death, while the increased incidence of extreme weather events increases occupational risks for emergency services (15,16,17). Heat stress in the workplace resulting in reduced productivity and absenteeism is estimated to cost the Australian economy $6.2 billion per annum (27).

Mental illness and stress

Ongoing environmental change and more frequent and severe weather events, combined with the social and economic impacts of climate change, increase the risk of mental illness and stress (13,14,18,19). Increased levels of anxiety, depression, family violence, and alcohol and drug abuse often follow weather disasters, and can have ongoing effects on children and adults. Emergency service workers and first responders are also at risk.

Aeroallergens and air pollution

Higher atmospheric temperatures lengthen the pollen season and alter chemical reactions of some air pollutants such as ozone and particulate matter. This increases the population's exposure to aeroallergens and aggravates conditions such as allergic rhinitis, heart and lung conditions including asthma, and the risk of mortality. Longer,

more frequent and severe bushfires also increase air pollution and respiratory illnesses such as asthma (13,20,21,22).

Vulnerable populations

Vulnerable populations will suffer disproportionate adverse health impacts of climate change, with people with pre-existing medical conditions, older people, young, disabled, socio-economically disadvantaged, isolated and Indigenous Australians identified as being particularly vulnerable (1,4,8,9,16,19,24,25).

Social instability, national security and conflict

With millions globally at risk of becoming environmental refugees (10,16), and with the low-lying islands of the Asia–Pacific region being particularly vulnerable to the effects of climate change (3) (despite their minimal contribution to causing climate change and its consequences), the most vulnerable and those least able to adapt suffer earliest and hardest. Displacement of populations in the region as sea levels rise, may see increasing population pressures in Queensland. The accompanying demands on infrastructure, and subsequent economic and social pressures, may lead to future conflicts over scarce resources (29), and place increasing pressure on Australia and its defence force (3,13,26).

References for this appendix

1. Australian Academy of Science, 2015, *Climate change challenges to health: Risks and opportunities, Recommendations from the 2014 Theo Murphy High Flyers Think Tank*, Australian Academy of Science, Canberra.
2. Department of Infrastructure and Transport Major Cities Unit, 2013, *State of Australian Cities*, Australian Government, Canberra.
3. Dupont, A, 2009. The strategic implications of climate change, In WT Tow and C Kin Wah, *ASEAN India-Australia: Towards closer engagement in a New Asia*, Institute of Southeast Asian Studies, Singapore. Pp 131 -152.
4. Hughes, L, Hanna, E and Fenwick, J 2016 *The silent killer: Climate change and the health impacts of extreme heat*, Climate Council of Australia.
5. Coates, L, Haynes, K, O'Brien, J, McAneney, J, de Oliveira, FD 2014, Exploring 167 years of vulnerability: An examination of extreme heat events in Australia 144_2010, *Environment Science and Policy* 42: 33-44.
6. Watts, N, Adger, WN, Agnolucci, P, Blackstock, J, Byass, P, Cai, W, Chaytor, S, Colbourn, T, Collins, M, Cooper, A, Cox, PM, Depledge, J, Drummond, P, Ekins, P, Galaz, V, Grace, D, Graham, H, Grubb, M, Haines, A, Hamilton, I, Hunter, A, Jiang, X, Li, M, Kelman, I, Liang, L, Lott, M, Lowe, R, Luo, Y, Mace, G, Maslin, M, Nilsson, M, Oreszczyn, T, Pye, S, Quinn, T, Svensdotter, M, Venevsky, S, Warner, K, Xu, B, Yang, J, Yin, Y, Yu, C, Zhang, Q, Gong, P, Montgomery, H and Costello, A 2015, Health and climate change: Policy responses to protect public health, *The Lancet*, 386: 1861–1914.
7. The Climate Council, 2017, *Hot and dry: Australia's weird winter*. The Climate Council.
8. Hall, GV, Hanigan, IC, Dear, KB and Vally, H 2011, The influence of weather on community gastroenteritis in Australia, *Epidemiology of Infections* 139: 927-936.
9. Harley, D, Swaminathan, A, Tong, S and Williams, C 2011, Climate change and infectious diseases in Australia: Future prospects, adaptation options, and research priorities, *Asia-Pacific Journal of Public Health*, Supplement to 23 (2): 54S-66S.
10. Spickett, JT, Brown, HL and Rumchev, K 2011, Climate change and air quality: The potential impact on health, *Asia-Pacific Journal of Public Health*, Supplement to 23 (2): 375-455.
11. The Lancet Countdown on Health and Climate Change, *Australia Policy Brief*, 31 October 2017. Available at www.lancetcountdown.org/media/1341/2017-lancet-countdown-australian-policy-brief.pdf

12. ABC News 10 January 2019, Irukandji jellyfish discovery off Fraser Island sparks warning from surf lifesavers, www.abc.net.au/news/2018-01-09/irukandji-found-in-stinger-drags-at-fraser-island/9315674
13. Barrie, C, Steffen, W, Pearce, A and Thomas, M 2015, *Be prepared: Climate change, security and Australia's defence force*, Climate Council of Australia.
14. Hughes, L, Steffen, W, Rice, M, and Pearce, A 2015, *Feeding a hungry nation: Climate change, food and farming in Australia*, Climate Council of Australia.
15. Kjellstrom, T, Briggs, D, Freyberg, C, Lemke, B, Otto, M and Hyatt, O 2016, Heat, human performance, and occupational health: A key issue for the assessment of global climate change impacts, *Annual Review of Public Health*, 37: 97-112.
16. Maloney, SK and Forbes, CF 2011, What effect will a few degrees of climate change have on human heat balance? Implications for human activity, *International Journal of Biometeorology*, 55 (2): 147-160.
17. Wilks, CR, Turner, AJ and Azoulas, J, 2006, Effects of flooding on the occurrence of infectious diseases, *Advances in Ecological Research*, 39: 107-124.
18. Hanigan, IC, Butler, CD, Kokic, PN and Hutchinson, MF 2012, Suicide and drought in New South Wales, Australia, 1970-2007, *Proceedings of the Royal Academy of Sciences*, 35: 13950-13955.
19. Parkinson, DF 2015, Women's experiences of violence in the aftermath of the Black Saturday bushfires, PhD thesis. Available at: http://arrow.monach.edu.au/vital/access/manager/Repository/monash:153836
20. Beggs, P and Bennett, CM 2011, Climate change, aeroallergens, natural particulates, and human health in Australia: State of the science and policy, *Asia-Pacific Journal of Public Health*, Supplement to 23 (2): 46S-53S.
21. Beggs, PJ and Bambrick HJ 2005, Is the global rise of asthma an early impact of anthropogenic climate change? *Environmental Health Perspectives*, 113 (8): 915-919.
22. Broome, RA, Fann, N, Cristina, TJ, Fulcher, C, Duc, H and Morgan, GG 2015, the health benefits of reducing air pollution in Sydney, Australia, *Environmental Research*, 143: 19-25.
23. Maté, J and Oosthuizen, J 2012, Global warming and heat stress among Western Australian mine, oil and gas workers, *Environmental Health - Emerging Issues and Practice*, ECU Publications. Pp. 289 - 305.
24. Hansen, A, Ni, L, Saniotis, A and Nitschke, M 2013, Vulnerability to extreme heat and climate change: is ethnicity a factor? *Global Health Action*, 6.
25. Liu, JC, Pereira, G, Uhl, SA, Bravo. MA and Bell, ML 2015. A systematic review of the physical health impacts from non-occupation exposure to wildfire smoke, *Environmental Research*, 136: 120-132.
26. Hodgkinson, D, Burton, T, Anderson, H and Young, L 2010, The hour when the ship comes in: A convention for persons displaced by climate change, *Monash University Law Review*, 36 (1): 69-120.
27. Zander, KK, Botzen, WJW, Opperman, E and Kjellstrom, T 2015, Heat stress causes substantial labour productivity loss in Australia, *Nature Climate Change*, 4 May.
28. Deloitte Access Economics, *Social and economic costs of natural disasters*. Available at: http://australianbusinessroundtable.com.au/assets/documents/Report%20-%20Social%20costs/Report%20-%20The%20economic%20cost%20of%20the%20social%20impact%20of%20natural%20disasters.pdf
29. Sturrock, R and Ferguson, P 2015, *The longest conflict*, Report, Centre for Policy Development. Available at: https://cpd.org.au/wp-content/uploads/2015/06/Climate-Change-and-Security-Paper-FINAL.pdf

Appendix 3 – Analysis of survey, workshop, meeting and interview data

The survey, workshops and interviews aimed to:

- engage health and wellbeing stakeholders in Queensland to provide feedback on the core elements of the discussion paper and contribute to the development of the H-CAP
- evaluate awareness among stakeholders concerned with human health and wellbeing regarding current policy settings relevant to climate change and health
- identify policy gaps, key concerns, barriers and key drivers or opportunities which may be helpful in implementing the next stages of the H-CAP.

Survey data collection

A discussion paper and online survey were circulated to more than 400 relevant stakeholders across Queensland through CAHA, NCCARF, steering committee and other professional networks. Recipients were encouraged to share the discussion paper and survey with their members (organisations) and colleagues. The three workshops attracted 71 participants, and 96 completed responses to the survey were received by the closing date and shortly after. Forty one per cent of respondents read the discussion paper before completing the survey. Details of the distribution of participants (e.g. sector, type of organisation, geographical locations) are provided below.

Who responded to the survey?

The survey was open for four weeks and the response was encouraging, with 94 completed responses. (*Note:* Two further completed surveys were subsequently received from early childhood stakeholders). Here we look at who responded to the survey—where they work, what type of institution they work at, and how they categorise themselves.

Forty three respondents completed the survey as a delegate of an organisation, and a further 51 completed the survey as individuals (two people did not respond to this question).

Of the respondents who categorised themselves within at least one type of organisation, the largest category was academic and research organisations (20 per cent). This was followed by primary healthcare services (18 per cent) and state health department employees (16 per cent). Responses from the early childhood and aged care sectors were 8 per cent and 4 per cent respectively. A large proportion of respondents (34 per cent) categorised themselves in the 'other' category, which includes local governments, environmental and sustainability consultants, defence, natural resource management groups and non-government organisations (NGOs). Of the respondents who reported that they were representing an organisation, 46 per cent reported that they represented an organisation of at least moderate size, with over 100 staff. The rest of the organisational representatives in the sample were from organisations of one to five staff, six to 20 staff or 21 to 49 staff members.

Forty per cent of organisational representatives said that over 100,000 people are under the care of their organisation. More than 50 per cent of these respondents hold a mid to senior level management position within their organisation, while more than 10 per cent are either board members or advisors to the organisation. This suggests that survey responses captured viewpoints of relatively high management within the organisations. A quarter of respondents were from health departments (state and local), and a fifth were from primary healthcare services.

The consultation process aimed to obtain input from stakeholders across Queensland. Figure A1 shows the geographic distribution of survey respondents.

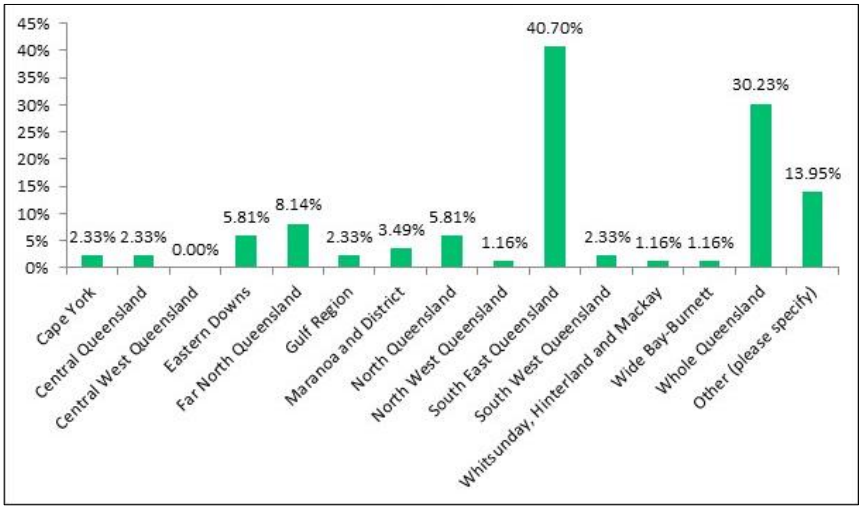

Figure A1: Geographic distribution of the respondents

Workshop data collection

Who attended the workshops?

Seventy one participants attended three workshops held in Toowoomba, Brisbane and Cairns. Attendees came from the Department of Health, hospital and primary health service providers, local government, professional, union and peak body groups, NGOs, community organisations, emergency management practitioners, environmental resource management groups, academic and research institutions, aged care and child care organisations.

How were the workshops structured?

The 3.5 hour workshops consisted of four sessions. Following a brief introduction about the project and the current state of knowledge on the topic, participants discussed the following topics in breakout groups:

- Which impacts of climate change on health and wellbeing are we most concerned about?
- What are the barriers to acting on climate change in the health and wellbeing community? What are the main knowledge gaps?
- What are the opportunities from acting on climate change (e.g. for improving health and wellbeing, economic or other community outcomes)?
- What is required to move adaptation forward? What strategies, policies, plans and actions are necessary? What are possible funding mechanisms?

Discussions were recorded (in text form) for further analysis and reporting. All recorded discussions and group facilitator notes from each table were coded in NVivo software (Version 11) to extract the major themes of the discussions (see word clouds in the main body of the document, Figures 8, 9, 10 and 11).

Meeting and interview data collection

A number of telephone interviews and some face-to-face meetings were conducted with representatives of key stakeholder organisations and peak bodies in health, aged care and early childhood education and care.

Meetings were also held with key informants from the project steering committee—Queensland Health (including executive representation of Health Protection Branch and Aeromedical Retrieval and Disaster Management Branch, Prevention Division), NRM Regions Queensland, Queensland Council of Social Services and the Department of Environment and Science (see Appendix 1). Notes taken during the meetings were analysed for key points and themes, and included in overall data summaries.

Engagement of early childhood and aged care services proved more difficult than healthcare services. Early enquiries indicated that heat and other extreme weather events or disasters were recognised as requiring adaptation action at organisational and service level. However, ‘climate change’ itself was not yet considered as a

sectoral level driver or threat for planning (strategic, operational, financial or legal). To stimulate a conversation about climate change risk management and to ensure their perspectives were represented in the plan, key informant interviews, following the workshop structure and questions, were held by phone and in person with management representatives from peak organisations, large service providers, professional associations and academics in these fields.

Synthesis of data from workshops, survey responses, meetings and interviews with key informants

Climate change impacts on health and wellbeing in Queensland

Note: Percentages reported are from survey responses. Workshops, meetings and key stakeholder interviews provided detailed qualitative responses.

Stakeholder concerns about climate change impacts relate to physical and mental health, their capacity to provide service continuity, safety and quality under changing circumstances, and from impacts on other sectors.

Theme 1 – Physical and mental health

The following climate change impacts were of greatest concern:

- heat stress (80 per cent)
- changes in patterns of vector-borne disease (72 per cent)
- death and injuries from extreme events (70 per cent)
- mental health issues including emotional and social distress (67 per cent).

Heat stress was the most highly recognised impact. Exposure to sun and heat for children was a concern, along with the ability of people in aged care to thermo-regulate. Other concerns related to increasing risks of levels and distribution of vector-, food- and water-borne disease outbreaks.

Locally specific mental health impacts of concern included farmers' mental distress from crop and stock losses from frequent extreme events in south-east Queensland, and impacts on vulnerable communities such as the aged and injecting drug users in far north Queensland. First responders such as health and emergency services were also noted to be vulnerable.

Stakeholders also voiced their concerns about food and water insecurity, malnutrition, worsening chronic, cardiovascular and respiratory conditions, and children's health and development. Increased extreme events threaten the capacity to provide good quality water. The supply of safe drinking water following a flood or cyclone is already a challenge for some regional areas. Rural water supply and treatment infrastructure is often old and difficult to restore after extreme events. Participants also identified future decreasing crop yields and decreased productivity across the agricultural sector, including the livestock and dairy industries. Cyclone Larry, for example, destroyed 90 per cent of the north Queensland banana crop in 2006, affecting supply for nine months and increasing prices by 500 per cent. During the 2011 Queensland floods, several towns, such as Rockhampton, were geographically isolated by high water from other areas for up to two weeks, preventing food resupply. Brisbane came within a day of running out of bread.

Stakeholders also described impacts on the social and environmental determinants of health that would further exacerbate health inequalities and social vulnerability. Specific areas of concern included rising poverty and inequality, socioeconomic disadvantage, breakdown of community and family networks, geographical access disadvantage, and access to insurance. Other areas of rising social vulnerability included the lack of access to sustainable, climate-resilient transport (especially in regional areas), affordable housing and energy options.

Theme 2 – Capacity to provide service continuity, safety and quality under changing circumstances

All groups recognised that climate impacts, including extreme weather events, threaten their capacity to provide continuous, accessible, safe and high-quality care when they are already struggling to deliver services with seriously constrained resources.

As the frequency and intensity of heatwaves increase in Queensland, its growing aging population will strain the capacity of already stretched hospital and aged care services, including emergency care. Early childhood services struggle to provide climate-controlled environments. Often providers do not own the buildings, and lack funding to install air-conditioning. This causes parental concern and complaints, and heat stress in children and staff, reducing

the capacity to deliver quality care. This is also a problem in aged care facilities.

Extreme weather events, especially flooding, prevent staff (and client) access to services and disrupts supply chains, and can result in service closures. As the frequency and intensity of extreme weather increases, it will also become difficult to attract and retain staff, especially in remote areas. Hospitals located on floodplains (e.g. Cairns Hospital, Sunshine Coast Hospital) and those in remote communities can become inaccessible during cyclones and floods.

Other concerns included:

- anticipated arrival of climate refugees / population movement (including long-term migration southwards out of increasingly hostile environments) putting pressure on health, housing, justice, child and aged care and all other social services
- impacts on staff and their families' health, wellbeing and safety
- infrastructure vulnerability and damage to assets from extreme events
- relocation of major infrastructure such as hospitals, aged care and early childhood care facilities from disaster-prone areas
- lack of political, legislative, policy or regulatory support to incentivise climate change planning or adaptation over 'business as usual'
- lack of knowledge to develop and implement strategies to enhance climate resilience in service operations
- finance and resourcing, including workforce preparation. This includes lack of funding to release staff to attend necessary professional development and planning (early childhood care).
- rising costs, including energy costs, and increasing difficulty in obtaining insurance
- lack of accurate, locally relevant climate health related data to inform adaptation planning
- risk and legal liability—while there was isolated concern about potential legal or fiscal liabilities (7 per cent of survey respondents), there were very low levels of risk assessment across all groups, and equally low levels of awareness of relevant legal opinion regarding business governance and legal and fiscal responsibilities.

Barriers to adapt to climate change

Theme 1 – Lack of leadership or political support (34 per cent)

- lack of clear political (ideally bipartisan) support, policy and financial commitment (the top barrier identified). There is reluctance for government and community-based organisations and services to commit to either planning or action for fear of policy reversal and withdrawal of resources
- lack of effective guidance from government about how to manage short-, medium- and long-term climate risks
- lack of consistent state government policy and clear whole-of-government support (e.g. government's pro-coal and gas development decisions contradict Q-CAS directions).

Theme 2 – Lack of effective communication of risk, available sector-specific information, awareness and capacity (24 per cent)

- not understanding how climate change will affect organisations
- lack of capacity to identify novel planning / policy / regulatory adaptation options
- pervasive, reactive and short-term approaches, lack of proactive, precautionary or preventive health promotion and longer term mindset or approach
- few services having undertaken climate change risk assessment
- lack of access to government-endorsed relevant information, approaches and lessons from others
- service provider difficulty understanding and managing the effects of interaction between climate change and other drivers / pressures that affect organisations (e.g. changing populations, increasing energy costs, availability of natural resources)

- lack of broader system awareness of legal liability.

Theme 3 – Prevailing societal knowledge and attitudes (20 per cent)

- low awareness of current and future risks in the community, the health and wellbeing workforce, and social service sector, including at senior executive levels
- community lack of understanding and sense of helplessness
- lack of clear, simple and consistent communication of climate risks and adaptation options, climate 'scepticism' and 'denialism'
- limited coverage of risks or solutions in the media
- public and organisational / institutional resistance to change and to the complexity of the problem
- politicisation of the issues and language around climate change.

Theme 4 – Funding and resourcing (14 per cent)

- competition for scarce resources (money, personnel, time)
- urgent day-to-day priorities prevent adaptation planning and action
- cost of adaptation, lack of funds
- lack of coordinated adaptation and mitigation funds across government / sectors
- infrastructure maintenance and replacement cost prevent proactive (preventive) practice
- low human capacity (knowledge, skills, numbers) for climate risk management
- difficulty building a business case for adaptation and mitigation action
- difficulty predicting future costs of adaptation and mitigation
- lack of awareness of economic costs of climate change on health and wellbeing, and of health co-benefits of climate adaptation and mitigation strategies
- climate risks not accounted for in organisational balance sheets. They are 'invisible', making it difficult to justify allocating scarce financial resources.

Theme 5 – Lack of cross-sectoral collaboration (five per cent)

- broader engagement with other sectors and communities at the local level to benefit from shared lessons, perspectives and resources
- a plethora of disconnected programs are confusing stakeholders.

Theme 6 – Lack of research and data, and uncertainty of impacts (three per cent)

- lack of access to accurate locally specific climate projections and real time epidemiological data
- lack of access to forward-looking climate risk and vulnerability assessment tools and expertise
- lack of information and action on psychological impacts of climate change on individuals and communities.

Opportunities (co-benefits) from adaptation and mitigation

Stakeholders identified the following potential health, financial and other co-benefits of climate change adaptation and mitigation.

Theme 1 – Increased resilience, health and wellbeing gains

- increased individual, community, organisational climate resilience (89 per cent)
- more comfortable, climate-sensitive buildings, infrastructure, public and urban spaces' (89 per cent). Better design will support thermal comfort, and mental and physical health (e.g. through energy efficient heating and cooling, natural light and ventilation, damp and mould resistance), as well as economic and environmental sustainability outcomes.
- improved air quality from cleaner energy and transport (80 per cent)
- opportunities to redesign healthcare delivery for vulnerable groups, including some regional Indigenous communities

- better development, infrastructure and land use planning, including a focus on long-term resilience through 'building back better' after extreme events .
- opportunities for local urban food gardens to enhance food security, nutrition and active lifestyles, improve community connectedness and resilience.
- increasing community connectedness, strength and empowerment (less helplessness).

Theme 2 – Increased sustainability

- enhance early childhood education and care curricula in line with their existing focus on learning in nature and sustainable practice
- waste reduction programs and other sustainability programs at work (e.g. energy efficiency, switching to renewable energy, food and procurement policies, transport and others). Health service stakeholders in particular were concerned by high levels of disposable, single use and non-recycled, often unused 'waste' going to landfill (e.g. surgical and obstetric packs).

Theme 3 – Financial and other co-benefits of mitigation and adaptation

- cost savings, energy security, thermal comfort and safety from energy efficiency, installation of renewable energy technologies (including solar and battery storage) and waste minimisation. The perception is that upfront costs preclude this.
- reduction in future rebuilding and maintenance costs through retrofitting for climate resilience and damage prevention.

What can be done to move adaptation forward?

Survey respondents identified the following to remove adaptation barriers:

- increasing awareness, advocacy and community engagement for resilience (21 per cent)
- bipartisan support from all governments for adaptation and mitigation (19 per cent)
- sufficient funding and incentives to implement adaptation strategies (10 per cent)
- staff training and capacity building for implementation of adaptation actions (7 per cent).

Some of the specific pathways discussed are highlighted below.

Funding

Stakeholders recommended a pathways approach (sequence of adaptation activities) so that adaptation funds can be spent over many years. They felt this will also reduce the initial high cost of adaptation. Better business intelligence and cost-benefit modelling are required to justify investment. It was suggested that financial and legal drivers need to be made more prominent to encourage decision-makers to allocate funds for adaptation and climate risk management. Treasury departments should be engaged so that appropriate funds are allocated for adaptation of health services. Private funding and philanthropy may be a way to get innovation underway.

Leadership and policymaking

Pragmatic action and coherent government policy are required on greenhouse gas mitigation and climate change adaptation by the health sector. Adaptation activities should be accommodated within the existing business practice of health services. It is important to promote innovation in managing climate risks within the sector. A national strategy is vital for coordination of adaptation and mitigation.

Infrastructure

Planning as a tool can be used better to build resilience to climate impacts in both hard (physical) and soft (community social assets) infrastructure. Urban planning that accounts for climate change can help address coastal hazards such as flooding, but should also protect against other hazards. Future urban planning decisions regarding siting of key infrastructure (e.g. hospitals, roads, water storage, sewage treatment plants) need to account for climate impacts. Investing in resilient communications infrastructure is vital to improve access to and prevent disconnection of regional and remote communities following extreme weather events.

Collaboration and engagement

There is a need for collaboration between councils, hospital and healthcare services and infrastructure operators,

for better long-term planning. For example, the Queensland Government's Coastal Hazard Adaptation Study (CHAS) process does not consider all hazards in the coastal zone (e.g. heatwave). Thus there is a need for collaboration between agencies and plans that address issues the CHAS does not. Often there is a distinct disjoint between what the community 'wants' and what the community 'needs'. Effective engagement with the community can drive change and build resilience. Creating a framework for cross-sectoral planning and response is vital for effective adaptation.

Education and awareness

Risk communication should be targeted and improved for greater community and health and wellbeing service awareness. Health and wellbeing organisations should learn from past disaster events. Building understanding of adaptation is dependent on issue engagement. Encouraging stakeholder engagement in climate adaptation also means empowering people. Psychological adaptation, or targeted marketing to motivate people to take action will help avoid hopelessness or helplessness. People are more inclined to change their behaviour when they perceive the individual impact of their actions. A focus on identifying synergies between mitigation and adaptation can be mutually beneficial. Leadership is also required to build a culture of engagement and empowerment

Increase resilience and adaptive capacity

Initiatives that build the capacity of health and wellbeing organisations to understand climate risks should be promoted, especially in in regional areas. The focus should be on increasing resilience, not just adapting to climate change (win-win, no-regrets actions). Proper training should be provided to people who are initiating and managing ongoing cross-sector collaborative projects.

Building community resilience to a range of stressors and shocks will support adaptation to climate change. Scenario planning and 'drills' can help build skills to anticipate and prepare for disasters. The use of arts (e.g. theatre, television) can be helpful in understanding how to respond in a disaster. A greater emphasis on wellness and prevention, and using a strengths-based approach, can build on existing assets and capacity.

Risk assessment

Health care and early childhood and aged care services should conduct climate change risk assessments to understand their risk. An understanding of the fiduciary responsibility and potential for personal liability of boards in relation to climate risk could drive change.

Participants suggested that there is a need for a consistent climate risk management framework that engages community and goes beyond traditional risk assessment approaches. Risk assessment should be iterative and supported by monitoring and evaluation. Data products and tools to support decision-making by health and wellbeing organisations should be developed to support climate risk management.

Research

Better data on threats and impacts at a local level would help support better decision-making. A better understanding of the carbon signature of all medical products would also help guide decision-making (e.g. undertaking lifecycle analysis and having carbon emissions ratings available to inform purchasing decisions).

More research is required to investigate, monitor and treat vector-, food- and water-borne diseases, including disease migration, to be better prepared to manage exotic diseases. This should include diseases transmitted from animals to humans, and humans to humans, and those transmitted by microbial vectors.

Appendix 4 – Frameworks, tools and resources

This table includes Australian, international and overseas policy and practice frameworks, tools and resources, as well as selected examples of good practice that can inform the H-CAP.

Name	Description	Developer / information
United Nations (UN) 2030 Agenda for Sustainable Development and Sustainable Development Goals (SDGs)	Australia has committed to the UN 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals (SDGs). The SDGs are an important framework for climate adaptation. Several SDGs are relevant to the H-CAP, as reflected during consultation. Climate change is a risk multiplier affecting all the SDGs, and most directly relating to: SDG 3 (Ensure healthy lives and promote wellbeing for all at all ages); SDG 2 (Zero Hunger), SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable Clean Energy), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), SDG 14 (Life below Water, including fisheries) and SDG 15 (Life on Land, including terrestrial ecosystems and food production). SDG 13 (climate action) includes targets to strengthen resilience and adaptive capacity to climate-related hazards and natural disasters, integrate climate change measures into national polices, strategies and planning, improve education, and raise awareness and individual and organisational capacity on climate change mitigation, adaptation, impact reduction and early warning.	United Nations https://sustainabledevelopment.un.org/?menu=1300
The Lancet Countdown on Health and Climate Change	The Lancet Countdown: Tracking Progress on Health and Climate Change is a global interdisciplinary project to monitor national and global efforts to tackle the impacts of climate change on human health and to optimise the health benefits that emerge from climate action. It reports annually in the medical journal The Lancet, with report findings drawn from an assessment of progress across 40 unique indicators and five thematic indicator groups: • climate change impacts, exposures and vulnerability • adaptation planning and resilience for health • mitigation actions and health co-benefits • economics and finance • public and political engagement.	The Lancet Countdown Research Collaboration (2017) http://www.lancetcountdown.org/
Global Green and Healthy Hospitals (GGHH)	GGHH is an international network of hospitals, healthcare facilities, health systems and health organisations dedicated to reducing their environmental footprint and promoting public and environmental health. The network connects and supports people leading the environmental agenda in healthcare institutions so they can share best practices and find solutions to common challenges. It also provides guidance and tools to support hospitals and health services to achieve 10 interconnected goals: leadership, chemicals, waste, energy, water, transportation, food, pharmaceuticals, buildings and purchasing.	Health Care Without Harm https://www.greenhospitals.net
Eco Smart for Early Childhood – a sustainability filter for quality improvement plans	Eco Smart for Early Childhood is an electronic tool to assist early childhood services develop a sustainable quality improvement plan.	Early Childhood Environmental Education Network https://www.eeec.org.au/product/ecosmart-for-early-childhood-a- sustainability-filter-for-quality- improvement-plans/
Heat-Ready:	This NCCARF report describes the heat-ready study to capture the	NCCARF (2013)

Adapting aged care facilities to prevent premature death in elderly Australians	knowledge, policy, preparedness and adaptive capacity related to heatwaves impacts in Australian aged care facilities. Adaptive strategies highlighted include: the development of facility-specific heatwave plans (as part of the Emergency / Disaster Plan); and in-service and educational training in heatwave preparedness, clinical protocols and assessment of adaptive capacity.	https://www.nccarf.edu.au/content/ heat-ready- adapting-aged- care-facilities- prevent-premature-death- elderly-australians
Building Resilience Against Climate Effects (BRACE) Framework (also available as US Climate Resilience Toolkit January, 2018)	The BRACE framework is a five step process to help health officials develop strategies and programs to help communities to prepare for the health effects of climate change. The five sequential steps are: Step 1: Anticipate climate impacts and assess vulnerabilities Step 2: Project the disease burden Step 3: Assess public health interventions Step 4: Develop and implement a climate and health adaptation plan Step 5: Evaluate impact and improve quality of activities.	US Centre for Disease Control https://www.cdc.gov/climateandhe alth/BRACE.htm Toolkit available at https://toolkit.climate.gov/tool/bui lding-resilience- against-climate- effects-brace-framework
Protecting health from climate change: vulnerability and adaptation assessment	This document provides guidance on conducting a national or sub-national assessment of current and future vulnerability (i.e., the susceptibility of a population or region to harm), to the health risks of climate change, and of policies and programs to increase resilience.	World Health Organisation 2013 http://www.who.int/globalchange/publications/vulnerability-adaptation/en/
UK Sustainable Development Strategy for the National Health Service (NHS)	The UK has undertaken sector specific action in implementing a Sustainable Development Strategy for the NHS. This strategy includes both mitigation and adaptation strategies, to: • reduce the environmental impact of the health sector • build capacity to respond to the health impacts of climate change and extreme weather events (adaptation) • improve the sector's economic, social and environmental sustainability.	NHS England and Public Health England 2014 https://www.sduhealth.org.uk/policy- strategy/engagement-resources.aspx
Hospital Safety Index	The Hospital Safety Index is a tool to assess the safety of hospitals, as they play critical roles in the response to emergencies and disasters. The HSI is not only a tool for making technical assessments, but also provides a critical approach to emergency and disaster risk management for the health sector, with a focus on prevention, mitigation and preparedness for emergency response and recovery.	World Health Organisation http://www.who.int/hac/techguidance/hospital_safety_index_evaluator s.pdf
Climate-Smart Healthcare	This tool mainly focuses on climate change risk reduction. It highlights how as hospitals and health systems are exploring opportunities for low carbon healthcare, they are finding significant overlap between mitigation or sustainability measures and climate change resilience interventions. To achieve a fast and long-lasting solution a climate sensitive resilient system is built by investing in two areas: health system strengthening and programmatic (e.g. disease-specific) responses.	World Bank Group http://documents.worldbank.org/curated/en/322251495434571418/pdf/113572-WP-PUBLIC-FINAL-WBG-Climate- smart-Healthcare- 002.pdf

The Sustainable and Climate-Resilient Health Care Facilities Toolkit	This toolkit consists of an overview guide and a suite of online tools and resources that highlight emerging best practices for developing sustainable and climate-resilient healthcare facilities. The toolkit has five elements: Element 1: Climate risks and community vulnerabilities assessment Element 2: Land use, building design, and regulatory frameworks Element 3: Infrastructure protection and resilience Element 4: Essential clinical care service delivery planning Element 5: Environmental protection and strengthening of ecosystems.	US Government https://toolkit.climate.gov/topics/h uman- health/building-climate- resilience-health-sector
Smart Hospitals Toolkit	A practical guide for hospital administrators, health disaster coordinators, health facility designers, engineers and maintenance staff to achieve (Climate) Smart Health Facilities by conserving resources, cutting costs, increasing efficiency in operations and reducing carbon emissions. This Toolkit is comprised of previously developed instruments such as the Hospital Safety Index. The Green Checklist and other accompanying tools support the Safe Hospitals Initiative and will guide health officials and hospital administrators in achieving smart health care facilities.	Pan American Health Organisation www.paho.org/disasters/index.php?option=com_docman&view=download&category_slug=smart-hospitals-toolkit&alias=2495-smart-hospitals-toolkit-2017-5&Itemid=1179&lang=en
The Climate Change Empowerment Handbook: Psychological strategies to tackle climate change	This handbook puts forward eight best practice insights from psychology to help people cope with the implications of climate change, so that they can stay engaged with the problem, see where their own behaviour plays a part, and participate in societal change to restore a safe climate. These eight insights make the acronym A.C.T.I.V.A.T.E: • Acknowledge feelings about climate change to yourself and others and learn ways of managing feelings so you can face and not avoid the reality of climate change. • Create social norms about protecting the environment so that people see that ‘everyone is doing it’ and ‘it’s normal to be green’. • Talk about climate change and break the collective silence so that more and more people see it as a risk that requires action • Inspire positive visions of a low-energy, sustainable, zero carbon world so that people know what we are working towards and can identify steps to get there. • Value it: Show people how their core values are often linked to other values that are about restoring a safe climate, and that caring about these issues reinforces their core values. • Act personally and collectively to contribute to climate change solutions and feel engaged and less despairing. • Time is now. Show people that climate change is here, now and for sure so they see it is timely	Australian Psychological Society (APS) 2017 https://www.psychology.org.au/getmedia/88ee1716-2604-44ce-b87a-ca0408dfaa12/Climate-change-empowerment-handbook.pdf

	and relevant to them and impacts the things that they care deeply about. • Engage with nature to restore your spirits and connect with the very places that you are trying to protect.	
Community Recovery Toolkit: Strategies and resources to assist organisations in application of: People with vulnerabilities in disasters	The purpose of this toolkit is to reduce the impact of disasters on people with vulnerabilities, or people who may become vulnerable in disasters, and to contribute to building resilient communities. The toolkit aims to: • assist local disaster management stakeholders to identify and engage with people who are vulnerable, or who may become vulnerable • enhance existing disaster management arrangements to more effectively support people with vulnerabilities • inform and drive actions • provide initiatives to improve preparedness and planning for people with vulnerabilities.	Department of Communities, Child Safety and Disability Services, October 2017 https://www.qld.gov.au/community/documents/disasters-emergencies/supporting-people- with- vulnerabilities-toolkit.pdf
Climate-Ready Communities: A guide to getting started	This guide supports communities to have their own conversations about how the things they value will be impacted by climate change and what they can do to continue to thrive. It is for anyone wanting to prepare for and adapt to the impacts of climate change, whether individuals, a self- organised community group, local council or community service provider.	Australian Red Cross (2017) https://www.redcross.org.au/climat e-ready- communities
Delivery of Healthy WA (2017). Health impacts on climate change: Adaptation strategies for Western Australia	A Health Impacts Assessment (HIA) framework was used to develop health adaptation strategies for Western Australia. Adaptation measures identified are: legislative or regulatory, public education and communication, surveillance and monitoring, ecosystem intervention, infrastructure development, technological or engineering intervention, and health intervention. This document includes a useful risk prioritisation approach categorising health risks as high, medium and low category, against which adaptation measures are assessed.	Department of Health Western Australia, 2017 http://ww2.health.wa.gov.au/~/media/Files/Corporate/general%20documents/Environmental%20health/Climate%20change/Health-impacts- of-climate-change.pdf
San Francisco's Climate and Health Adaptation Framework	This framework provides a menu of strategies and activities to improve public health through climate adaptation. It has three sections: • vulnerability assessments to summarise projected climate impacts, connect climate impacts to health outcomes, and recognise at-risk populations • identification of climate risks and responses, that is, potential adaptation and interventions (including indicators to measure the severity of the health risks associated with climate change) • preparedness, including an analysis of leadership perceptions of climate change • capacity to implement adaptation, and a spatial analysis of the vulnerability of San Francisco's public health facilities.	San Francisco Department of Public Health. (2017) https://extxfer.sfdph.org/gis/ClimateHealth/Reports%20and%20Research/SFDPH_ClimateHealthAdaptFramework2017a.pdf

Taiwan Adaptation Strategy to Climate Change	The main purpose of this strategy is to reduce the average DALY (disability adjusted life years) of the population. The adaptation strategies include the following guidelines: • enforcing laws and regulations on public health • improving the productivity and work division of environmental and public health agencies • ensuring every government department has drills for natural disasters and the prevention of epidemics • improving public knowledge of climate change and post-disaster epidemic prevention • conducting an ongoing assessment of the impact and adaptation of health issues • expanding the compilation of databases with disease-related assessments • strengthening the monitoring and surveillance system.	Council for Economic Planning and Development (2012, June) https://www.ndc.gov.tw/en/cp.aspx?n=97B9027210DBD173&s=BC5 D03206D9BE620
Florida Regional Climate Action Plan – Health Impact Assessment (HIA) – Minimizing the Health Effects of Climate Change in the South Florida Region	This HIA report provides six recommendations on how to incorporate health considerations into guidelines for policies and protocols related to sea level rise and heatwaves: • integrate public health planning with municipal and regional planning to prepare Southeast Florida for the broader impacts of climate change • educate the public and elected officials on health outcomes related to climate change • include heat vulnerability, health, and socio-economic factors when developing vulnerability mapping or determining priority zones • encourage and support investigative work to fully understand the impacts and economic costs attributed to climate change and health • establish health related metrics to use when planning for adaptation strategies to mitigate climate change effects • re-visit city and county development plans and revise based on heat vulnerability mapping and a specific amount of shade trees or canopy to increase safe active access to goods in extreme heat.	South East Florida Regional Partnership (2013) http://flhealthinnovation.org/wp-content/uploads/2015/02/HIA-Final_Report_10 1514-compressed.pdf
Mainstreaming climate adaptation in the megacity of São Paulo, Brazil	Sau Paolo, a megacity of Brazil, (which has a similar climate to Brisbane) has adopted a strategy of integrating climate adaptation planning within existing policies and actions such as urban planning, management of water resources, and public health.	Guilio, GMD, Martins, AMBB, Vasconcellos, MP, Rebeiro, WC & Lemos, MC (2018, February) Science Direct 72 (237-244). https://doi.org/10.1016/j.cities.2017.09.001

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