

Preparing Health Services for Climate Change in Australia

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Abstract

Although the implications of climate change for public health continue to be elucidated, we still require much work to guide the development of a comprehensive strategy to underpin the adaptation of the health system. Adaptation will be an evolving process as impacts emerge. The authors aim is to focus on the responses of the Australian health system to health risks from climate change, and in particular how best to prepare health services for predicted health risks from heat waves, bushfires, infectious diseases, diminished air quality, and the mental health impacts of climate change. In addition, the authors aim to provide some general principles for health system adaptation to climate change that may be applicable beyond the Australian setting. They present some guiding principles for preparing health systems and also overview some specific preparatory activities in relation to personnel, infrastructure, and coordination. Increases in extreme weather-related events superimposed on health effects arising from a gradually changing climate will place additional burdens on the health system and challenge existing capacity. Key characteristics of a climate change-prepared health system are that it should be flexible, strategically allocated, and robust. Long-term planning will also require close collaboration with the nonhealth sectors as part of a nationwide adaptive response.

Keywords

climate change, population health, health policy, health services

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Introduction

Climate change projections and the implications for health risks have been previously described in leading international journals,¹ international reports,²⁻⁴ and also in this issue. Rather than heralding a suite of new diseases, climate change is likely to amplify existing disorders and health inequities. Indications to date suggest that climate change will both increase the background demand for a range of health services and will also generate a shift in the intensity and frequency of service responses to prepare for, respond to, and recover from extreme events.⁵

In this article, our aim is to focus on the health system responses to both catastrophic and more passive health risks from climate change. In particular we discuss how best to prepare Australian health services for those health risks outlined in this issue: heat waves, fire risk, infectious diseases, poor air quality, and the mental health impacts of climate change. We present some guiding principles for preparing health services, which we have defined broadly to include acute health services as well as public health and health promotion activities. These include some specific preparatory activities both within the health sector and in conjunction with the nonhealth sector. We recognize that in this brief discussion we are unable to be comprehensive; for example, we have not dealt with health system responses to climate change-related migration, conflict, or the flow on effects of socioeconomic impacts. In addition, we recognize that the priorities for adaptation in other countries may differ markedly, for example, attending to sea level rise in low-lying regions of the Asia Pacific.

Before proceeding further, we would like to highlight that Australia has long invested in disaster preparedness through a range of national plans. For example, the Australian Health Protection Committee, as the apex national health emergency management committee, carries authority to plan, prepare, and coordinate the national health response to significant incidents. The Health All-Hazards Working Group involves the Disaster Preparedness and Management Unit and is facilitating development of a series of responses. The core of Australia's national response comprises plans for multiple eventualities: (a) Australian Government Disaster Response Plan, (b) National Response Plan for Mass Burn Casualty Incidents, (c) (AUSBURN-PLAN) Australian Medical Assistance Teams, and (d) Domestic Response Plan for Mass Casualty Incidents of National Consequence (AUSTRAMA Plan). Additional plans exist to manage mass evacuations. These overarching plans intersect with each other and form the basis for many of the emergency health service responses for climate change-related events.

Principles of Health System Adaptation

We propose 3 key principles to guide policy makers and planners in preparing the health system for climate change: (a) flexibility, (b) strategic allocation of resources, and (c) robustness of health services (see Figure 1).

Flexibility

Flexibility is important because of the inherent uncertainty in climate change predictions⁶ and health impact models⁷ and the limited predictive capacity of current climate models for small-scale geographical regions. It is predicted that Australia will experience more extreme weather events, hotter weather and more heat waves, and further drying across southern parts of the continent. More severe bushfires and infectious disease outbreaks are also likely. We cannot predict with any certainty exactly when these may occur, how frequently, where, or how intense they may be. The fires, floods, and heat waves in the summer of 2009 provided a preview of what the future may hold. Yet whether such a salvo of extreme disasters was a random occurrence or an

Flexibility

- Location of services
- Scale of response
- Type of services and service provider

Strategic Allocation of Resources

- Builds on existing services
- Prioritizes vulnerable regions and populations
- Equitable and just access

Robustness

- Resilient infrastructure
- Consistent services
- Sustainable workforce

Figure 1. Principles of health system responses to climate change

indication of what is to become the new norm or indeed the first step in an escalating trajectory of intensity is not certain at this stage.

Health service responsiveness to climate requires flexibility in order to meet varying demands in type and scale of service. Large bushfires provide a clear example of the need for flexibility. Up-scaling emergency and high acuity health services are needed to deal with the direct consequences in affected regions (eg, trauma, burns, and other injuries). Fires also increase demands for management of the longer term flow on effects from poor air quality due to increased density of smoke and particulates (eg, respiratory disease). The complex needs of displaced populations as well as posttrauma follow-up, such as psychological support for victims, their families, and communities and also the attending personnel.

Mobility of health services is another desirable quality in responding to climate-related disasters, and the possibility for multiple events to occur simultaneously must be considered in planning. In the case of extreme weather events, such as flooding or fires creating a mass casualty incident, health service response teams may need to be deployed quickly to the affected regions to provide emergency management, triage, and coordinate transfer to the appropriate facility. Similarly, flexibility in the type of services required and by whom they are delivered will be valuable. For example, in the case of infectious disease outbreaks, primary health care providers may need to take on more active acute diagnostic and management roles, which is beyond their current capacity.

Strategic Allocation of Resources

Strategic allocation of resources is necessary to prepare the health system for climate change. The imperative is to identify likely future scenarios and associated health sector demands and orientate health systems accordingly. It will be most efficient to build on existing services, to identify likely regional impacts and health sector response needs, and then prioritize vulnerable regions and populations. Boosting resilience and designing mechanisms to ensure delivery of appropriate health services is an overriding objective.

Climate-related illnesses overlay the substantial burden of high prevalence disorders in the community.⁸ Therefore, a guiding principle will be to strengthen existing health services for the additional burden of disease. For example, heat waves are expected to increase in frequency and intensity, and heat-related illnesses will exacerbate high prevalence disorders such as cardiovascular and respiratory diseases,⁹ especially among vulnerable groups such as those with limited mobility and those aged 65 years and older.¹⁰

In a budget-constrained environment, priority must be given to target health interventions to those populations that are most vulnerable to climate change,¹¹ such as the elderly, Indigenous communities, those who are unable to cool their living environment, and those living in regions that are heavily exposed to climate change impacts¹² (eg, alpine regions, Murray Darling basin, south east Queensland, Kakadu, southwest Australia). Principles of equity and service according to need should underpin all planning.^{13,14} The National Health and Hospitals Reform Commission lists equity as the first of 3 reform goals to achieve “A Healthier Future For All Australians.”¹⁵ In Australia and globally, poverty and inequality lead to greater exposure to climate change and a reduced adaptive capacity.¹

Climate change has the potential to expose and further exacerbate existing inequities within the health system and in health outcomes. One example is the existing inequities in access to specialist health services for rural and remote communities.¹⁶ These populations tend to have less access to health services than city dwellers. Absence of treatment options prolongs the period of unwellness, exacerbates the condition, and in turn can amplify underlying socioeconomic disadvantage.¹⁷

Robustness

An important lesson from the 2009 heat wave and bushfires in Victoria, Australia,¹⁸ is that future events may be vastly different to the past. Therefore, health systems in place must be robust enough to cope with increased capacity for climate change–related presentations/emergencies and be well coordinated with government and nongovernment organization response plans. Essential infrastructure, hospitals, and other services must be designed to withstand threats to energy supply (eg, during heat waves) and direct climatic and environmental impacts (eg, storms and floods). Consistency of services is important too, even under strained conditions, so coordinated planning and policy procedures need to be established in high-risk regions to manage climate-related contingencies and “surge capacity” demands.

A sustainable health workforce is the foundation of a robust health system. Senior clinicians and managers need to adopt emergency management principles and staff training as part of their core business. There needs to be a substantial numbers of skilled workforce maintained in high-risk areas, for example, in vulnerable rural and remote areas,¹⁶ as there is an upper limit on how health services can be redeployed to respond to climate-related events. Redeployment is difficult during multiple or widespread events and when interruptions to infrastructure such as power, communications, and transport occur. To this end, forward planning includes identification and prioritization of the high-risk events for a particular area (eg, coastal inundation in seaside areas, bushfire threats in rural bushland areas), adequate provision of training related to local climate-related health threats,¹⁹ support and critical debriefing, and the provision of adequate resources to enable the delivery of quality health services and local community health education.

Practical Health System Responses

Policy makers require practical options for adapting the health system for climate change, even where evidence is still incomplete.²⁰ Here, we briefly overview a suite of practical options for preparing the health system with a focus on (a) personnel, (b) infrastructure, and (c) coordination. Health personnel are a critical element of any response to climate change; changing roles and skills will be required, particularly among frontline primary health care workforce.²¹ Audits of climate disaster–related infrastructure must be undertaken to inform the development of detailed regional plans for modification or upgrades required to withstand climate change conditions and to allow the flexibility required of health system responses.

It will also be essential to ensure coordination of services contributing to the early detection and prevention of climate-related health threats and to link the various arms of the health system with the broader community. Nongovernmental organizations and private sectors, relevant industries, such as power suppliers and aged care agencies,²² will also need to be part of this coordinated approach. We overview several practical adaptations to personnel, infrastructure, and coordination in relation to health risks identified in the National Adaptation Research Plan as priorities for Australia²³: heat waves/fire risk, infectious diseases, poor air quality, and the mental health impacts of climate change (Table 1).

Responding to Heat Waves/Fire Risk

The Australian health system needs to prepare for an increase in the frequency and intensity of heat waves and heat-related mortality¹⁰ and morbidity (hospitalizations, emergency department visits, and ambulance call-outs)¹⁸ and for the accompanying hot dry conditions that provide fuel for bushfires and place great stress on the infrastructure of the health system.

Health personnel will need to be alert to symptoms of heat stress and associated health complications, particularly GPs, district nurses, and ambulance and emergency staff on the health care frontline. Health professionals are ideally positioned to play a critical role in delivering the health promotion messages on how to avoid heat stress and the health impacts of bushfires. Critical events may exceed past experiences. Bushfire-prone nations such as Australia need a prepared and mobile skilled workforce to respond immediately to critical bushfire events.

A National Heatwave Framework must include strategies to reduce power demand, prioritization of essential power needs, and extended duration back-up power supply options in case of a power grid failure,²⁴ plus the deployment of rescue teams for quick repair.

Effective heat wave warning systems will play a critical role, with prerecorded health messages to be distributed via the mass media. Social support networks, known to act as a protective factor against heat-related illnesses, will need to be supported and developed, such as community care options like buddy systems for the elderly and other vulnerable population groups.

There is a need for coordination between the health sector and the broader community to develop regional bushfire health response plans and to support community care options and social networks that have a protective effective,²⁵ such as buddy systems for the elderly and other vulnerable populations. The health sector can collaborate with urban planners and housing regulators to ensure housing and urban design provide a protective element during heat waves in keeping with human behaviors and health needs and reduce the "heat island" effect.¹

Responding to Infectious Diseases

Within a health system that has developed an increasing focus on noncommunicable diseases, climate-related infectious diseases will create adaptation challenges under conditions of increasing temperatures and humidity. The Australian health system will need to plan for an increase in infectious diseases such as gastrointestinal infections (eg, *Salmonella*) and vector-borne diseases such as dengue fever, which threatens to spread further south.²⁶ Many of the diseases will not be new to Australia but rather new to the area and to the local health service. In addition, outbreaks of infectious diseases can stem from climate-related disasters such as flooding²⁷ and infrastructure failures.

Health personnel will need the necessary skills to diagnose and manage a new realm of infectious disease outbreaks and to fulfill a critical role of delivering disease prevention education to the community. Community education will need to cover measures for personal, family, and community protection against infectious diseases, such as peridomestic sanitation to prevent the spread of dengue and food hygiene to prevent salmonella poisoning.

Table 1. Practical responses to preparing the health system for climate change

	Heat Wave/Fire Risk	Infectious Diseases	Poor Air Quality	Mental Health
Personnel	Prepare the frontline of health workforce (eg, ambulances and emergency services) to be prepared to manage the symptoms of heat stress	Prepare health personnel to deliver education messages for personal, family, and community protection against infectious diseases	Prepare the health workforce to manage the health effects of air pollutants and preventive measures that can be undertaken by the community	Increase awareness of the mental health effects of climate change among all health workers, including psychiatric and parapsychiatric services
	Prepare, equip, and make available mobile personnel ready to respond to critical bushfire events	Boost the capacity of health personnel to diagnose and manage and limit infectious disease outbreaks	Educate and manage those who are most vulnerable (eg, those with preexisting cardiorespiratory disease)	Utilize the mental health workforce to educate and prepare those communities most vulnerable to climate change
Infrastructure	Develop strategies to ensure essential back-up power supplies (eg, for crucial air conditioning)	Make available equipment for rapid testing and diagnosis in regions vulnerable to arboviruses	Support effective air quality surveillance systems	Invest in areas where mental health services are underresourced and where the mental health effects of climate change will be substantial
	Develop capacity to deploy temporary infrastructure to ensure delivery of the range of health services required to respond to fire in affected regions	Prioritize health and community facilities, especially facilities such as aged-care centers, to ensure adequate food practices and storage facilities	Employ strategies to limit emissions on poor air quality days	
Coordination	Develop fully integrated bushfire/heat wave health response plans (eg, Heatwave plan for Victoria)	Monitor outbreaks, especially sentinel populations, and utilize aggressive case finding measures	Support early warning systems for high aeroallergen periods	Support early introduction of debriefing and counseling, with follow-up as required
			Undertake tighter management of allergenic plant species	
			Coordinate regular communication to the public regarding air quality and personal health protection strategies (eg, tips to reduce pollen exposure)	

(continued)

Table 1. (continued)

Heat Wave/Fire Risk	Infectious Diseases	Poor Air Quality	Mental Health
Heat wave warning systems and the use of prerecorded health messages	Support communication between health care professionals, community agencies, and government personnel to control the spread of diseases	Forecast and publicize pollen, weed, and free pollen counts	Develop regional mental health response plans to enable emergency response and the building of social capital
Collaborate with urban planning and housing regulators to advocate for more appropriate housing design	Collaborate with Australia's neighbors in the Asia Pacific region for early detection of outbreaks	Provide early warning systems regarding dust storms (eg, for asthma and sufferers of other respiratory problems)	
Communication in workplaces to reduce occupation-related heat stress		Research the health impact of diminished air quality and also the interrelationship with other climate change impacts (eg, heat waves)	Work across the broader community, private, and government sectors to raise awareness of the mental health effects of climate change

In the case of infrastructure, health facilities such as hospitals and aged care residential centers will need adequate food storage, handling, and cooking facilities to prevent gastrointestinal illness among patients.¹¹ Health services will need equipment for rapid testing and detection of infectious diseases, particularly in regions vulnerable to arboviruses.

Surveillance and monitoring systems will be critical to enable early detection and containment of infectious disease outbreaks,¹¹ as will communication channels between health care professionals, public health, and government staff to manage outbreaks of infectious diseases. In the case of arboviruses, what is required is coordination with entomologists and epidemiologists to confirm diagnoses and liaise with the affected communities to deploy aggressive case-finding measures to prevent an epidemic.¹¹ Health care staff experienced in infectious diseases and the local government will be required to work with local communities to undertake vector control (eg, screening windows, etc) and water control to identify agricultural, drainage, and other potential breeding areas for mosquitoes.²⁸

Responding to Diminished Air Quality

Overall, air quality in Australia is relatively good. The Ambient Air Quality National Environment Protection Measure established ambient air quality standards and monitoring and reporting protocols for listed air pollutants, namely, CO₂, SO₂, lead, NO₂, photochemical oxidants (measured as ozone), and particulates (PM₁₀).²⁹ The measured values rarely exceed permissible limits,

and the values usually exceed on hot days and during dust storms and bushfires, events that are likely to increase with climate change. The likely effects of climate change on increased community exposure to levels of ozone and particulates will have adverse consequences for public health,^{30,31} including increased mortality and a range of respiratory and cardiovascular health effects.³² Vulnerability to air pollutants is highest in urban areas where exposure to vehicle and industrial emissions is greatest,³³ or in rural areas affected by bushfires and dust storms. Those most susceptible include young children, the elderly, and those with preexisting cardiorespiratory disease.^{34,35} Strategic planning is required to reduce the impacts of potential increases in air pollutants due to climate change.

Health agencies need to be prepared for increases in service needs related to asthma and other cardiorespiratory illnesses. At the primary care level, health practitioners need to be alert to the health effects of air pollutants and be able to educate vulnerable patients to take precautionary measures to prevent excessive exposure and to take prophylactic medications where appropriate.

Air quality alerts disseminated by public health units can increase health protective behaviours.³⁶ Continuous efforts to improve the modeling and forecasting of air quality will be necessary to provide more advanced and accurate warning, and the effective use of these will provide critical information to prepare health services and warn the broader community to avoid excessive exposure.

Work with the broader community is required to produce and disseminate air pollution health impact assessments that provide adaptation strategies and identification of vulnerable groups and regions, such as an assessment that was conducted in Western Australia.³⁷

Responding to Mental Health Impacts

Berry et al³⁸ have reported that climate change has important implications for mental health through increasing the likelihood of extreme weather events that directly (eg, loss and trauma arising from direct exposure or anxiety about the future in a world of potentially catastrophic climate change) and indirectly harm mental health. The latter includes disruption to the social determinants of mental health and well-being in vulnerable communities (such as economic security, social exclusion, and displacement). To respond, the Australian health system needs to understand the links between climate change and psychosocial well-being, promote this understanding, and increase preparedness for future events or situations that may harm mental health.

Efforts are required to raise the awareness of the mental health impacts of climate change in psychiatric and parapsychiatric services and in the primary health care and related workforce. We can utilize the mental health and related workforce to educate and prepare those groups, communities, and places most vulnerable to the effects of climate change.

Investment in community mental health infrastructure is required, especially in communities that may need greater support such as those in rural and remote areas and Indigenous communities, where mental health services are underresourced and where the effects of climate change on mental health will be substantial. Current shortfalls exist in the specialized support services for children witnessing parental stress and questioning their future prospects.³⁹

Mental health referral pathways need to be developed and integrated with the broader community sector, promoting equitable access to primary mental health care and coordinating a patient-centered focus. Coordination is required to engage and develop links with communities and organizations to build programs that provide mental health awareness and support and develop regional mental health response strategies. Supporting activities in vulnerable communities that work toward “climate-change proofing” could result in increased social connections that add a layer of protection against mental health problems.

Conclusion

Preparing the health system for climate change requires investment in personnel, infrastructure, and coordination. This needs to be done even in the context of uncertainty about the extent and nature of specific climate change effects on health. Key characteristics of a climate change-prepared health system are flexibility, robustness, and strategically allocated resources. Long-term planning will require close collaboration with the nonhealth sectors as part of a nationwide adaptive response. Additionally, the health sector can play a significant mitigation role by reducing its carbon emissions.⁴⁰

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