



THEME

GPs and the environment



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Climate change and primary health care

BACKGROUND

Climate change and rising average global temperatures threaten to disrupt the physical, biological and ecological life support systems on which human health depends.

OBJECTIVE

This article overviews the evidence for human induced climate change, the predicted health impacts, and the role of primary health care professionals in managing these impacts.

DISCUSSION

Climate change has substantial potential health effects. These include heat stress related to heatwaves; injuries related to extreme weather events such as storms, fires and floods; infectious disease outbreaks due to changing patterns of mosquito borne and water borne diseases; poor nutrition from reduced food availability and affordability; the psychosocial impact of drought; and the displacement of communities. Primary health care has an important role in preparing for and responding to these climate change related threats to human health.

Climate change is a global public health problem, with serious health impacts predicted to manifest in varying ways in different parts the world. Rising average global temperatures threaten to disrupt the physical, biological and ecological life support systems on which human health depends. As our understanding improves of the direct and indirect pathways by which climate change affects human health, we can better prepare to develop adaptive strategies. One important approach is to strengthen primary health care, especially in populations most vulnerable to the impacts of climate change.

Climate change

There is now a very strong scientific consensus that global warming is occurring,¹ that it is largely attributable to human emissions of greenhouse gases, that the effects are now observable, and that further warming will occur.² A recent report by the Intergovernmental Panel on Climate Change (IPCC) estimates current global warming to be almost 0.8°C above pre-industrial levels and project a further rise of 1.1–6.4°C by 2100.² The impacts of current global warming are now observable in physical systems

such as the rise of sea levels, glacial retreat, alterations in rainfall patterns; and in biological systems such as earlier spring activities of numerous plant and animal species.³ The most recent IPCC report confirms that it is human emission of greenhouse gases that has been mostly responsible for global warming over the past 50 years, and that even if emissions are greatly curtailed, the existing backlog of emissions has committed us to some degree of warming over the coming century.² Areas of Australia particularly vulnerable to warming include Alpine regions, the Great Barrier Reef and the Murray Darling river systems.⁴

Climate change and health

The health impacts of climate change can occur through a number of direct and indirect causal pathways, and the severity is in part determined by the adaptive capacity of the population.⁵ Those groups particularly at risk include poorer countries and communities, those geographically vulnerable to extreme weather events, and those highly dependent on agriculture for their livelihood. An overview of some of the pathways by which climate change can impact on health and potential primary health care adaptive

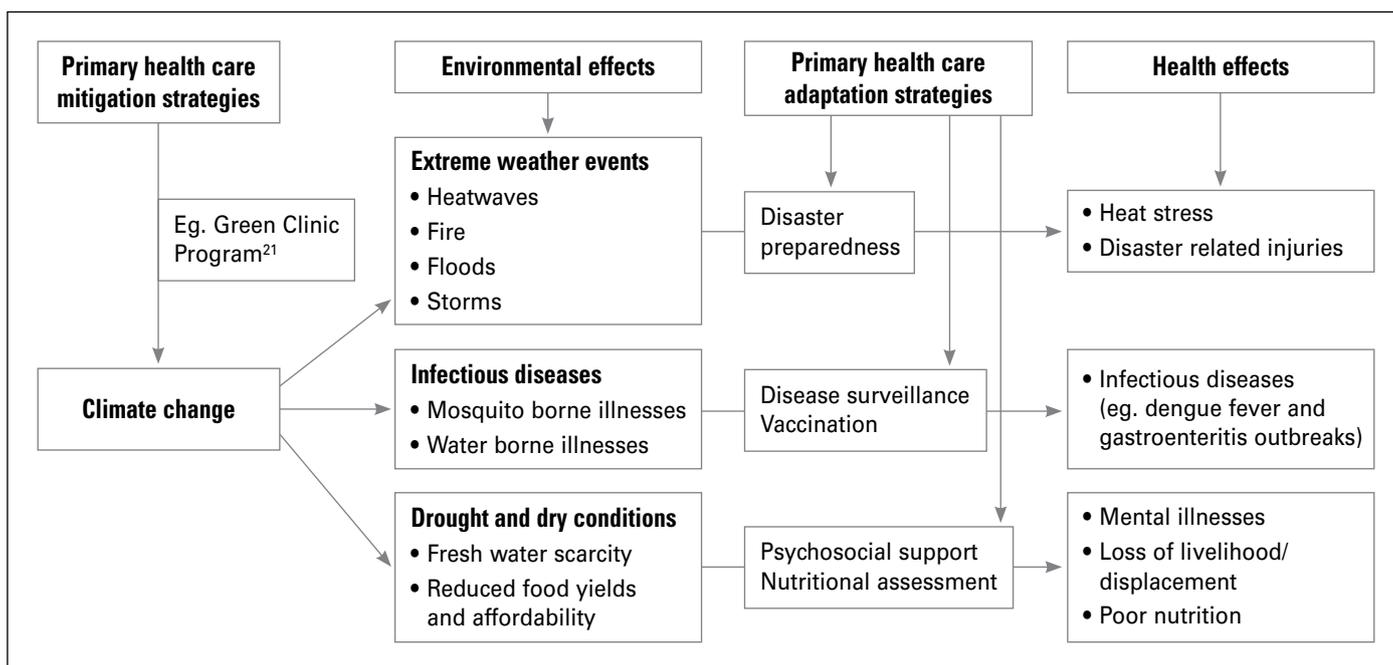


Figure 1. Pathways by which climate change can impact on health, and potential primary health care adaptive strategies (adapted from¹⁵)

strategies is shown in *Figure 1*.

Australia is especially vulnerable to health effects from climate change because it is dry, has substantial coastal populations, and has communities in rural and remote areas with a scarcity of fresh water. On the other hand, Australia is a high income earning country with a high adaptive capacity, a strong health system and a well developed scientific community with expertise in climate change. Key health impacts of climate change are considered from the perspective of extreme weather events, infectious diseases, and drought related problems (*Table 1*). There are numerous other potential health impacts of climate change such as the exacerbation of asthma from regional increases in the production of plant derived aeroallergens (eg. pollens, spores).⁶

Impact of extreme weather events

The potential impact of extreme weather events precipitated by climate change is perhaps the most direct example of how climate change may impact on health. In the Australian setting, heatwaves are predicted to be more frequent.⁷ The experience of Europe's heatwave in 2003 is a reminder of how vulnerable populations such as the elderly are particularly at risk.⁸ The CSIRO also predicts more frequent occurrence of extreme bushfire conditions in some regions of Australia, with accompanying increased risk of injury and loss of life.⁹

Climate change is also predicted to cause more flooding in some regions due to more frequent, heavy rainfall

Table 1. Summary of health risks from climate change in Australia

- Increased illness events and deaths from more frequent and severe heatwaves, especially in urban environments
- Increased injury, death and post-traumatic stress disorders from increases in extreme weather events (eg. floods, storms, cyclones, more extreme bushfires)
- Increased risks of gastroenteritis (eg. from *Salmonella*, *Campylobacter*, temperature sensitive vibrios)
- Change in the range and seasonality of outbreaks of mosquito borne infections (eg. dengue fever, Ross River virus, Barmah Forest virus)
- Adverse health impact of more severe droughts and long term drying conditions on rural/remote communities
 - exposure to extremes of heat, dust, smoke
 - fresh water shortages with consequences for hygiene and sanitation
 - mental health (depression and suicide)
 - child emotional and developmental experiences
- Regional increase in pollens and spores that cause/exacerbate asthma
- Increase in flow of environmental refugees

events.¹⁰ Coastal communities are especially vulnerable to coastal surges exacerbated by a combination of rising sea levels and more intense storms.² A striking regional example is the Pacific Islands, which are especially vulnerable to small increases in sea levels.¹¹ For Australia, potential extreme weather events in Asia are also of importance with the potential for environmental refugees (eg. from low lying regions of Bangladesh) which would have a profound impact both for refugees and host communities in Australia.

Notably in high latitude countries it is likely that there will be less extremes of cold, less frosts, less snow, and a reduction in cold related morbidity and mortality. However, the benefits for Australia will be less as our climate is already relatively warm for most of the year.

Impact of infectious diseases

Around the world, the relationship between microbes and human beings is changing in response to many factors: social, demographic, environmental and economic. Some of the change reflects rising average temperatures and is manifested in altered incidence rates, seasonality and geographic range of a number of infectious diseases. For example, malaria, a disease that makes an enormous contribution to the world's burden of disease, may be changing its transmission pattern – partly in response to global warming – including its extension to higher altitudes of Eastern and Southern Africa.¹² Other examples of change in infectious disease distribution include tick borne encephalitis in Sweden,¹³ and gastroenteritis due to *Campylobacter pylori*.¹⁴

In Australia, one disease thought to be particularly susceptible to climate change is dengue fever, which is difficult to treat and can be fatal. Australian epidemiologists have modelled the potential spread of the several mosquito borne infectious diseases, most of which are usually limited to northern Australia.¹⁵ With warmer temperatures, suitable regions for dengue fever are predicted to extend southward, possibly as far south as Sydney, although it is likely that a public health response in Australia would limit its transmission zone.¹⁵ Notably, an outbreak of dengue fever with 46 confirmed cases occurred in Townsville between March and August 2007.¹⁶

Table 2. Primary health care adaptation strategies

- Public education and awareness
- Early alert systems: impending weather extremes, infectious disease outbreaks
- Disaster preparedness, including increasing the health system's 'surge' capacity to respond to emergencies
- Enhanced infectious disease control programs
 - food safety, vaccine programs, vector control, case detection and treatment
- Improved surveillance
 - risk indicators (eg. mosquito numbers, aeroallergen concentration)
 - health outcomes (eg. infectious diseases outbreaks, rural suicides, seasonal asthma peaks)
- Appropriate health workforce training, including mid-career development (eg. updated understanding of climatic influences on health, training in public health)

Drought impact

Australia is a dry continent and vulnerable to drought, especially from changes in rainfall patterns and rising temperatures related to climate change. The CSIRO predict that climate change will result in Australia becoming warmer and drier, having less rainfall in the south, particularly in winter and spring, and increased evaporation and changes in rainfall resulting in net drying over all of Australia.¹⁷

The National Farmers Federation has identified climate change as potentially the biggest issue Australian agriculture has faced.¹⁸ Changes in regional climatic conditions, and in the pattern of occurrence of extreme weather events will affect agricultural, horticultural and livestock production – and, hence, food availability and affordability. This, in turn, will affect food choice and nutritional outcomes, especially in lower socioeconomic groups.

The flow on effects of drought have been recently illustrated, including the negative impact on primary industry, local economy, employment and morale in affected rural and regional areas. While the relationship between climate change, drought and mental health is complex,¹⁹ one report suggests that drought is associated with increased rates of mental illness and suicide.²⁰ However, current research in this field is limited and more studies are urgently needed. There is a danger that already sparse rural mental health and community support services could be overwhelmed by a population suffering the effects of persistent and recurring drought.

Role of primary health care professionals

Given the broad range of potential health impacts attributable to climate change, regional responses from the health profession will be required.

Disaster preparedness will be determined by the vulnerability of communities and might include – depending on the setting – preparation for heatwaves, bushfires, or coastal surges. In other regions, early monitoring for vector borne diseases or water borne illnesses may be an important role for primary health care practitioners. In communities vulnerable to drought, the focus may be on psychosocial care, for example availability of community support and mental health services. In the long term, policy makers need to consider workforce issues so we are well prepared for the predicted health impacts of climate change and begin to implement long term adaptive health policies. *Table 2* outlines some specific adaptation options that could be implemented in primary health care. Primary care may also have a role in mitigation of climate change through encouraging environmentally sustainable health care services.²¹

Conclusion

Climate change is a global public health problem which will manifest in Australia even more over coming decades. Key risks are extreme weather events, changing patterns of infectious diseases and the effects of long term drought. The primary health care system can respond in a number of ways by preparing for extreme events, monitoring and responding to infectious disease, and by providing extra support for communities. A particular challenge will be to support communities most vulnerable to climate change such as those in rural and regional areas. Mounting an appropriate adaptive response to inevitable climate change in the coming decades will require strong support from the primary health care workforce, especially in vulnerable regions of Australia.

Conflict of interest: none declared.

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