

# *Living on Climate-Changed Country: Indigenous Health, Well-Being and Climate Change in Remote Australian Communities*

**Donna Green & Liz Minchin**

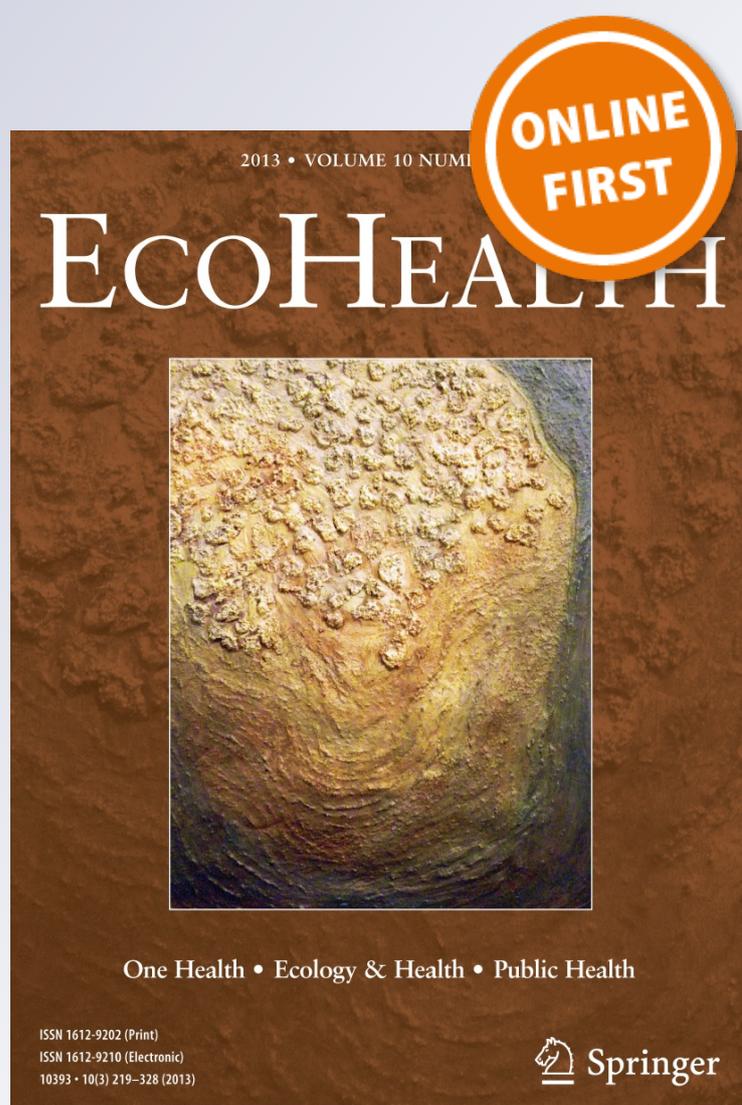
## **EcoHealth**

One Health - Ecology & Health - Public  
Health | Official journal of International  
Association for Ecology and Health

ISSN 1612-9202

EcoHealth

DOI 10.1007/s10393-013-0892-9



**Your article is protected by copyright and all rights are held exclusively by International Association for Ecology and Health. This e-offprint is for personal use only and shall not be self-archived in electronic repositories. If you wish to self-archive your article, please use the accepted manuscript version for posting on your own website. You may further deposit the accepted manuscript version in any repository, provided it is only made publicly available 12 months after official publication or later and provided acknowledgement is given to the original source of publication and a link is inserted to the published article on Springer's website. The link must be accompanied by the following text: "The final publication is available at [link.springer.com](http://link.springer.com)".**

*Original Contribution*

# Living on Climate-Changed Country: Indigenous Health, Well-Being and Climate Change in Remote Australian Communities

Donna Green<sup>1,2</sup> and Liz Minchin<sup>1</sup><sup>1</sup>Climate Change Research Centre, University of New South Wales, Kensington, NSW 2052, Australia<sup>2</sup>ARC Centre of Excellence for Climate System Science, University of New South Wales, Kensington, NSW 2052, Australia

**Abstract:** Closing the gap between the health and well-being status of Indigenous people living in remote areas of northern Australia and non-Indigenous Australians has long been a major target of federal health policy. With climate projections suggesting large increases in hot spells in desert regions and more extremes in rainfall in other areas of the north, direct and indirect impacts resulting from these changes are likely to further entrench this health and well-being disparity. This paper argues that it is time to explicitly draw on Indigenous definitions of health, which directly address the need to connect individual and community health to the health of their country, in order to develop effective climate adaptation and health strategies. We detail how current health policies overlook this 'missing' dimension of Indigenous connection to country, and why that is likely to be detrimental to the health and well-being of people living in remote communities in a climate-changed future.

**Keywords:** Indigenous health, psychosocial, health and well-being, climate impacts, Aboriginal Australia

## DEMOGRAPHICS AND HEALTH OF REMOTE INDIGENOUS AUSTRALIANS

### Indigenous Demography

Australia's Aboriginal people have lived and prospered for at least 50,000 years, adapting to continual climate and ecosystem change, with around 250 nations spread across the continent before the arrival of Europeans. Consequently, Indigenous people played, and continue to play, a critical role in shaping the natural landscape. Following British colonisation in the late eighteenth century, the country's Indigenous population was devastated by disease and dispossession (NAHSWP 1989; Jackson and Ward 1999; Campbell 2002). Two centuries later,

more than half a million Australians identify as being of Aboriginal and or Torres Strait Islander origin (ABS 2012).

Despite earlier dispossession, Indigenous Australians have reclaimed ownership of around 20% of Australia, and now own or manage nearly a quarter of the country's 103 million ha of protected conservation areas. This is particularly significant given that traditional Indigenous environmental management practices are increasingly being proven to have multiple social, economic and health co-benefits (Burgess and Morrison 2007).

Today, three-quarter of Australia's Indigenous people live in cities or regional towns, while the remaining quarter live in remote areas. It is crucial to take these geographic differences into account when trying to plan effective Indigenous health policy, as there can be marked differences in health outcomes depending on where people live.

Correspondence to: Donna Green, e-mail: donna.green@unsw.edu.au

## Health Disparities as Documented by Mainstream Literature

While Australians generally enjoy some of the best health conditions in the world (AIHW 2012), Indigenous Australians in general are the least healthy of all Indigenous populations within comparable industrialised nations (NATSIHC 2003; AIHW 2012). Indigenous Australians experience nearly twice the rates of chronic disease and hospitalisation compared to non-Indigenous Australians (Jorm et al. 2012).

It is well established that psychological distress is associated with worse health outcomes (Brunner and Marmot 2006). Torres Strait Islander adults with high or very high levels of distress were three times more likely than those with low to moderate levels of distress to report 'fair' or 'poor' health, and nearly twice as likely to have a disability or long-term health condition. Compounding this, such disabilities are often poorly treated when compared with non-Indigenous Australians due to multiple layers of discrimination (Drew et al. 2010).

Despite successive governments enacting policies that attempt to 'close the gap' on Indigenous health disparities, there remains a major difference in life expectancy, with an average Indigenous Australian likely to die 12 years earlier than a non-Indigenous Australian (AIHW 2012). Mental health and the broader issues of Indigenous well-being are not among the six current national Closing the Gap targets. Despite the federal and state governments promising billions of dollars more for mental health programs over the past few years, funding for Indigenous programs has been disproportionately low (Hunter 2007; Holland et al. 2013). This is a critical failing, given mental health illness runs a close second to cardiovascular disease as the leading driver for the observed health gap between Indigenous and non-Indigenous Australians (NMHC 2013).

Government spending on Indigenous health has increased over the past decade, with A\$4.6 billion or 3.7% of Australia's total health expenditure in 2010–2011 spent on Indigenous people, who make up 2.5% of the population (AIHW 2013). That translates to A\$1.47 for every A\$1.00 spent on services used by a non-Indigenous Australian. However, there remain significant areas where far less is spent on Indigenous Australians, particularly in areas that could prevent or avoid chronic ill health, including doctors' visits and prescribed medication. Further, if socioeconomic status and the disproportionately worse average health outcomes for Indigenous people are taken into account,

many have argued that Indigenous health remains seriously underfunded (Deeble 1998; Mayers 2002; Paul 2011; Holland et al. 2013).

Indigenous health statistics are not uniform around the country, with outcomes varying significantly depending on where people live, as well as their social and economic status. In the most recent National Aboriginal and Torres Strait Islander Social Survey, a detailed survey of more than 13,000 people, the majority of Indigenous adults reported feelings of positive well-being—and positive well-being rates were higher in remote areas, rather than in non-remote areas (ABS 2008). Among Torres Strait Islanders specifically, rates for all four indicators of positive well-being were higher among islander adults living in the Torres Strait region (84%) than for those living elsewhere (70%).

Climate change is expected to exacerbate current health disparities between Indigenous and non-Indigenous people (Fritze et al. 2008; Green et al. 2009). Climate change projections indicate significant increases in the frequency of hot spells (Alexander and Arblaster 2009), with the largest increases occurring in inland and northern areas (CSIRO and BoM 2007). For example, projections indicate a doubling of the number of days over 35°C in Alice Springs from the current 90 days per year, to up to 182 days per year by 2070 (CSIRO and BoM 2007). Garnaut (2008) identifies impacts on key regional ecosystems by 2100, including: 90% of the Kakadu wetland system being adversely affected by a sea level rise of 18–59 cm; the Great Barrier Reef no longer being dominated by corals and reduced biodiversity in its ecosystems; the Murray–Darling Basin's agricultural areas being greatly diminished; and more than half of the Eucalypt species habitat being lost.

Direct impacts of climate change include ill health, injury and mortality associated with extreme temperatures, as well as bushfires, floods and cyclones. Indirect impacts include increased rates of foodborne diseases, and increased rates of post-traumatic stress disorder in communities exposed to more frequent and severe natural disasters (AIHW 2012). Indigenous Australians in remote northern and central communities are also likely to be disproportionately affected for a range of reasons, including existing non-climate stresses, and a culture that integrates relationships between natural and human systems when it comes to the concept of health (Burgess and Morrison 2007; Kingsley et al. 2009).

## THE MISSING DIMENSION IN INDIGENOUS HEALTH AND WELL-BEING POLICY

---

A major barrier to effective Indigenous health policy is that Western and Indigenous concepts of health are fundamentally different (Johnston and Jacups 2007). The first National Aboriginal Health Strategy (NAHSWP 1989) came up with one of the most respected definitions of Indigenous health. Released after 2 years of community and government consultation, the Strategy was a rare example of policy developed by an Indigenous-dominated working party. Its preface bluntly describes the clash of two perspectives:

In Aboriginal society there was no word, term or expression for 'health' as it is understood in western society... In contemporary terms Aboriginal people are more concerned about the 'quality of life'. Traditional Aboriginal social systems include a three-dimensional model that provides a blueprint for living. Such a social system is based on inter-relationships between people and land, people and creator beings, and between people, which ideally stipulate inter-dependence within and between each set of relationships. Aboriginal spirituality was, and is essentially land-centred.

Land, spirituality and people: the three dimensions of healthy living for Indigenous Australians. That was the vital first page of context that preceded this condensed definition of Indigenous health:

Not just the physical well-being of the individual but the social, emotional and cultural well-being of the whole community. This is a whole-of-life view and it also includes the cyclical concept of life-death-life.

In 1990, federal, state and territory governments and Indigenous community groups endorsed the strategy, marking what could have been a watershed moment in improving Indigenous Australians' health outcomes. However, the simplistic use of the condensed definition ever since then, stripped of its first contextual statement, has meant that a vital component of Indigenous health—people's connections to land, or 'country'—has been largely ignored in policy. A review later found that the Strategy was never effectively implemented, and even what had been acted upon was grossly underfunded. Yet it remains widely cited decades later (Mayers 2002; NATSIHC 2003; Zubrick et al. 2010a).

Building on that work, some researchers have continued to stress that connections to country cannot be ignored in Indigenous health policy. A consultancy report for the federal government recommending ways forward for a National Aboriginal and Torres Strait Islander mental health policy outlined nine principles to guide future policies (Swan and Raphael 1995). Their starting principle was that the Aboriginal concept of health is holistic, and that land is central to well-being. Yet they, and others (Morrison 2002; Burgess et al. 2005; Green 2006; Ganesharajah 2009; Zubrick et al. 2010b; Bardsley and Wiseman 2012; Kingsley et al. 2013) remain the exceptions to the rule.

The need for a more 'holistic' approach to Indigenous health and well-being usually gets mentioned in major government health papers. However, too often it is a token gesture that does not translate into any recommendations for action (see CGC 2012, 2013). It is particularly troubling that connection to country has been treated so dismissively in successive national Indigenous health policies. Both the 2003–2013 and 2013–2023 National Strategic Frameworks begin with a preamble citing the 'landmark' 1989 Strategy and its definition of holistic health. Yet there was not a single reference to land or country in the 2003–2013 plan—a stark contrast to the three-dimensional approach of the 1989 Strategy. The latest 10-year plan is discussed in more detail in "[Can Western and Indigenous Perspectives on Health be Reconciled?](#)" section.

## CARING FOR COUNTRY AND CARING FOR PEOPLE

---

### What Evidence Is There That Connections to Country Can be Beneficial to Indigenous Australians' Health and Well-Being?

The inaccurately narrow concept of Indigenous health and well-being used in government health policies ignores decades of work. Peer-reviewed and documented work began more than 30 years ago, when *The Medical Journal of Australia* published a study by psychiatrist Rodney Morice. In it he observed the improvements in the psychosocial well-being of a group of 116 Aboriginal people after they moved away from a centralised, government-created township, to re-establish their own traditions in a small autonomous community (Morice 1976). A few years later, Reid (1982) explored the complex interplay between body, land and spirit and Aboriginal health in greater depth.

O'Dea (1984) reported how the health of Aboriginal people in the Kimberley with diabetes improved dramatically when they returned to traditional subsistence activities. Yet little changed within government to reflect this evidence. Throughout the 1990s, Indigenous connections to country were similarly ignored in national environment strategies. For example, the Howard government's flagship environment program, the National Heritage Trust, allocated just 3% of its funds to regional bodies based on Aboriginal land between 1996 and 2005 (Hill et al. 2008).

But among health professionals, the issue slowly began to win greater recognition. In 1997, a group of specialists from the Royal Australasian College of Physicians met in Darwin, and agreed on a communiqué accepting that 'the health of Aboriginal and Torres Strait Islander Australians is disastrously poor compared to other Australians, and that the fundamental cause is disempowerment, due to various factors including continued dispossession from land, cultural dislocation, poverty, poor education and unemployment' (RACP 1997).

Two years later, a prominent commentary in *The Medical Journal of Australia* (Jackson and Ward 1999) argued that appreciable improvements in Aboriginal health would only be seen after a national process of reconciliation between different world-views. And in 2005, the Australian Medical Association adopted new principles on Indigenous health, advocating a major change in government policy: breaking away from a fragmented, disease-based approach, to a more holistic, culturally appropriate approach.

Arguably the most influential research in this field has been the 'Healthy Country, Healthy People' studies (Burgess et al. 2005; Garnett and Sithole 2007; Garnett et al. 2009). They found that Indigenous people involved with environmental and cultural activities that involved 'caring for country' in Arnhem Land were more physically active, had better diets and suffered lower rates of obesity, diabetes, renal disease, cardiovascular disease and psychological stress—reducing the principal risks of premature death and disability for Indigenous Australians. Similarly, biomedical research in central Australia has shown an association between connection with homelands and lower prevalence of diabetes, hypertension and obesity and lower mortality and hospitalisation rates (Rowley et al. 2008).

A number of studies have highlighted potentially significant savings in Indigenous health spending, especially the rising costs of managing chronic disease, through the preventative benefits of Caring for Country activities (Burgess et al. 2008). One study of an Arnhem Land

community found that active participation in land management would deliver net savings of A\$268,000 per year for that community alone, owing to lower rates of chronic disease and reduced strain on primary health services (Campbell et al. 2011). Those findings built on earlier work (Campbell et al. 2008a) examining the economic case for relocating remote communities into larger centralised communities. It found that doing so may save money on service delivery alone, but it was likely to result in disengagement from traditional country, intercommunity conflict and poorer environmental, health and well-being outcomes—all of which could combine to reduce or even outweigh the initial service delivery savings. Similar economic research that considers how policies aimed at Indigenous Australians can unintentionally affect health and well-being is urgently needed, as many government strategies to reduce costs by relocating Indigenous people from their traditional lands have not been supported by adequate evidence (Scrimgeour 2007) and risk perverse outcomes (Biddle 2012).

Within the past 5 years, the success of several Indigenous environmental management initiatives from the North Australian Indigenous Land and Sea Management Alliance (Fitzsimons et al. 2012), the Northern Land Council (Weir et al. 2011) and others, coupled with 'Healthy Country, Healthy People' research, has triggered a policy shift in one area—not in health, but in environment policy. Since 2008, the federal environment department has spent A\$2.25 billion on Caring For Our Country projects, supporting communities, farmers and other land managers with environmental management programs. Indigenous communities in northern and remote Australia have been among the main beneficiaries of the funding, which the government at the time explicitly linked to its work on Closing the Gap on Indigenous disadvantage. A\$244 million has been spent on a Working on Country program, expanding the number of Indigenous rangers from around 100 rangers in 2007 to nearly 700 in 2013 (Commonwealth of Australia 2013).

The 'Caring For Our Country' process has not been flawless. There has been a shift to a more prescriptive funding approach, prioritising natural resources management at the expense of traditional cultural management activities (Gorman and Vemuri 2012). Self-determination has been found to be an important determinant of health and well-being, not only in Australian research (Ganesharajah 2009; Holland et al. 2013) but in international research into healthy First Nations communities (Cornell

et al. 2004). Policies that are too narrowly focused risk undermining Indigenous autonomy (Wiseman and Bardsley 2013) and consequently undermining the positive contribution they might make toward closing the gap in Indigenous health.

Developing integrated policies to tackle several areas simultaneously—such as improving health, environmental, economic and social outcomes—is fraught with difficulty. However, the federal environment department's effort to combine environmental and Indigenous health strategies is at least an attempt to improve on the more simplistic approaches of the past, which other departments, including health, have failed to match. That failure cannot continue any longer—especially when existing health problems in remote Indigenous communities are now being exacerbated by climate change.

### Health Impacts of Living on Climate Changed Country

Impacts of climate change on human health have been documented in many parts of the world (McMichael et al. 2006; IPCC 2012), with one study in *The Lancet* finding that even small increases in the risk for climate sensitive conditions, such as diarrhoea and malnutrition, could result in very large increases in the total disease burden (Costello et al. 2009). While most studies have focused on climate impacts at a national level (Hennessy et al. 2007; Salick and Byg 2007; Garnaut 2008), over the past decade there has been more research into climate impacts for Indigenous communities (Furgal and Séguin 2006; Guyot et al. 2006; Mercer et al. 2007; Turner and Clifton 2009; Galloway McLean 2010; Green et al. 2010; Weatherhead et al. 2010; Harper et al. 2012), including local observations of 'strange' environmental changes (Petheram et al. 2010).

A key gap in our knowledge about the health and well-being impacts of climate change has been about how climate extremes, such as heatwaves, could affect vulnerable sub-groups of the population. However, this is beginning to be redressed. Campbell et al. (2008b) concluded that climate change impacts in the 70% of Australia that is desert would profoundly affect the costs and demands for health care, particularly for those Aboriginal people and communities already dealing with pre-existing disadvantage. Such climate impacts include hotter mean temperatures, which can cause increased heat stroke, cramps, heat exhaustion and deaths (McMichael et al. 2003). Meanwhile, a forthcoming study (Green and Webb 2014) has found

clear links between ambient temperature and humidity on hospital admissions for heart disease among Indigenous and non-Indigenous populations in northern Australia in recent decades. This is significant, as ischaemic heart disease is currently the leading cause of premature death among Australians (ABS 2013). Further epidemiological investigations into other health and climate trends are vital for effective future health planning—especially given the observed trend of higher temperatures across Australia (CSIRO and BoM 2012). Until recently, researchers had given little attention to Indigenous vulnerability to climate change in northern Australia, despite evidence that this subpopulation was likely to be disproportionately impacted (Green et al. 2009; Hunter 2009; Berry et al. 2010a).

However, the need to respond to climate change does offer some new opportunities for Indigenous communities, particularly those actively managing their country. The Western Arnhem Land Fire Abatement (WALFA) project has dramatically reduced greenhouse-gas emissions from bushfires, while providing social and economic opportunities for local people (Green and Minchin 2012). Developed collaboratively between Indigenous elders, rangers and non-Indigenous scientists, WALFA applies traditional land-management practices that have been used since 38,000 years bp (Singh et al. 1981). WALFA and other projects in northern Australia such as the Fish River Fire Project use a 'two-toolkit' approach, seeking to combine the best of Indigenous and Western knowledge. The chief executive of *Aak Puul Ngantam*, Bruce Martin, is taking that a step further, applying a quadruple-bottom-line approach to his Queensland community's projects, considering cultural, economic, social and environmental risks and benefits. Such projects are practical applications of what Indigenous people have said for generations, and which is backed up by the Healthy Country, Healthy People literature: in caring for country, Indigenous people are also caring for the health of their community and themselves (Berry et al. 2010b).

### Social and Emotional Well-Being and Resilience to Climate Change

Without adaptive planning and action, climate change poses a particular threat to Indigenous Australians' sense of well-being (alternatively referred to as social and emotional well-being, or psychosocial health). If country becomes 'sick' through climate impacts, environmental degradation, or the traditional owners' inability to fulfil cultural activities

to care for country, people have reported how they feel this 'sickness' themselves (Rigby et al. 2011). As ecosystems change in response to biophysical impacts and extreme weather events, many traditional owners living in remote areas are likely to face increased physiological, psychological, economic and spiritual stress. Campbell et al. (2008b) discuss the indirect environmental and health effects of climate change in the desert, and how people would face added stress from increased incidence of climatic extremes and environmental uncertainty. While suicide rates are known to be higher among men living in rural areas, there is inadequate data on the likely impacts of climate change on people rural and remote areas, including Indigenous Australians (McMichael 2007).

The Australian Indigenous Psychologists Association has identified a number of protective factors for Indigenous well-being, including the strength of people's connections to land and culture, as well as remote living (Zubrick et al. 2010b). These protective factors help people cope better with stressful circumstances at an individual, family and community level (Kelly et al. 2009). Living on country has proved to be a source of great strength and resilience, not only for Indigenous Australians (Dockery 2010), but also for other Indigenous peoples. As Canadian researcher Nancy Turner and Gitga'at Nation elder Helen Clifton point out (Turner and Clifton 2009), Indigenous Canadians remain vulnerable to poor socioeconomic conditions and relatively poor health. Yet their connection to homelands and their traditional environmental knowledge make them more resilient than those used to constancy and predictability in their lives.

Canada's federal health department is well ahead of its Australian counterpart in trying to integrate climate change and health policy. Its national assessment of Canadians' health in a changing climate (Séguin 2008) concluded that in the case of some extreme events, less tangible psychosocial effects can do the most damage to people's health. It pointed to studies in Europe and America that established a correlation between flooding and subsequent increases in common mental disorders, including anxiety, depression and post-traumatic stress disorder (WHO 2002; Hutton 2005).

## CAN WESTERN AND INDIGENOUS PERSPECTIVES ON HEALTH BE RECONCILED?

---

Australia's federal government recently released its new 10-year National Aboriginal and Torres Strait Islander Health

Plan 2013–2023 (Australian Government 2013). The plan aims to be the blueprint for governments, Indigenous communities and health care organisations to close the gaps in Indigenous life expectancy and child mortality. It is therefore concerning that, like the previous plan, the connection between country and well-being is treated so perfunctorily. There are just ten references to 'land' or 'country' in the entire 66-page plan—three of which are in the artist's description of the report's front-page artwork. As we approach the 35th anniversary of the 1989 Strategy, it seems that its strong message about the need for a three-dimensional approach to Indigenous health is yet to sink in.

From a non-Indigenous perspective, the overwhelming focus on areas of poor Indigenous health in federal health strategies may seem logical. However, this approach inadvertently limits the funding and development of a less medical-focused, more holistic approach, such as schemes to support people to reconnect with kin and country (Mayers 2002; Zubrick et al. 2010a). That medicalised approach is ultimately bound to fail, as expressed by respected Aboriginal health leader Dr. Hunter: 'The "body parts" approach has been a complete failure in Aboriginal health. There is no use treating the heart or the ears alone, when the whole person is in danger of breaking down' (AMA 2005).

It is telling that the idea of 'healthy country, healthy people' is hardly considered in key policies that aim to improve Indigenous health, including the six nationally agreed Closing the Gap targets. It is equally telling that mental health and the broader concept of well-being are not among these targets (COAG 2008). The National Mental Health Commission has also criticised the 'conspicuous' absence of Indigenous mental health in these targets. It has recommended setting measurable goals for improvements in Indigenous mental health and well-being as an additional target, alongside the development of a new Aboriginal and Torres Strait Islander Mental and Social Emotional Well-being Plan. Both of those steps offer the potential to improve on current health outcomes. However, any new targets or new health and well-being plans should not be imposed from a solely Western perspective, but must better reflect what Indigenous people say matters most in keeping them well.

## CONCLUSION

---

This is a critical time in Australian Indigenous health policy. The growing body of Australian and international

literature about Indigenous health and well-being supports what many Indigenous people have consistently said about needing to apply a more holistic view of health. Programs that look after the health of land and culture, such as Caring for Country projects, should be considered a crucial part of long-term Indigenous health plans, rather than seen as an optional extra.

Climate change is an added impetus for action, as there is evidence of higher temperatures and other impacts exacerbating existing health problems for Indigenous Australians. However, there are also opportunities to adapt to climate change in ways that can benefit Indigenous health and well-being, through Indigenous-led initiatives on country. Such projects show how it is possible to see beyond one problem, such as health, and instead apply a quadruple-bottom-line approach that balances cultural, environmental, economic and social needs. This would also be far more in line with the 1989 National Strategy's three-dimensional blueprint for good health than current approaches.

Huge challenges and disparities remain in Indigenous health, and redressing the failure to consider 'country' in Indigenous policy would not be a simple panacea. But it is well past time to reconsider the 'body parts' approach to health, and devote more attention and funding to evidence-based activities that are known to make Aboriginal and Torres Strait Islander people stronger and more resilient.

## ACKNOWLEDGMENTS

The authors appreciate comments on this paper from P. Tait and J. Morrison. This study was funded by the NHMRC, Project 1011599.

## REFERENCES

- ABS (2008) National Aboriginal and Torres Strait Islander Social Survey, cited in Australian Institute of Health and Welfare (2011) *The health and welfare of Australia's Aboriginal and Torres Strait Islander people, An Overview*, Vol A44. Cat. no. IHW 42, Canberra: Australian Institute of Health and Welfare, p. 37
- ABS (2012) *2015.0—Census of Population and Housing—Counts of Aboriginal and Torres Strait Islander Australians, 2011*. <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/2015.0main+features32011>. Accessed 15 May 2013
- ABS (2013) *Causes of Death, Australia, 2011*, Canberra: Australian Bureau of Statistics. <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/3303.0Chapter42011>. Accessed 8 May 2013
- AIHW (2012) *Australia's Health 2012*. Australia's Health Series No. 13. Cat. no. AUS 156, Canberra: Australian Institute of Health and Welfare
- AIHW (2013) *Expenditure on Health for Aboriginal and Torres Strait Islander People 2010–2011*. Cat. no. HWE 57, Canberra: Australian Institute of Health and Welfare
- Alexander L, Arblaster J (2009) Assessing trends in observed and modeled climate extremes over Australia in relation to future projections. *International Journal of Climatology* 29(3):417–435
- AMA (2005) *Aboriginal and Torres Strait Islander Health*. <http://ama.com.au/position-statement/aboriginal-and-torres-strait-islander-health-2005>. Accessed 16 April 2013
- Australian Government (2013) *National Aboriginal and Torres Strait Islander Health Plan 2013–2023*, Canberra: Commonwealth of Australia
- Bardsley D, Wiseman N (2012) Climate change vulnerability and social development for remote indigenous communities of South Australia. *Global Environmental Change* 22:713–723
- Berry H, Bowen K, Kjellstrom T (2010) Climate change and mental health: a causal pathways framework. *International Journal of Public Health* 55:123–132. doi:10.1007/s00038-009-0112-0
- Berry H, Butler J, Burgess P, King U, Tsey K, Cadet-James Y, Rigby W, Raphael B (2010) Mind, body, spirit: co-benefits for mental health from climate change adaptation and caring for country in remote Aboriginal Australian communities. *New South Wales Public Health Bulletin* 21(6):139–145
- Biddle N (2012) Improving Indigenous health: Are mainstream determinants sufficient?. In: *Survey Analysis for Indigenous Policy in Australia: Social Science Perspectives*, Hunter B, Biddle N (editors), Canberra: ANU E-Press
- CSIRO and BoM (2012) *State of the Climate 2012*. <http://www.csiro.au/State-of-the-Climate-2012>. Accessed 8 May 2013
- Brunner E, Marmot M (2006) Social organisation, stress, and health. *Social Determinants of Health* 2:17–43
- Burgess P and Morrison J (2007) in Carson B, Dunbar T, Chenhall R and Bailie R eds. (2007) *Social Determinants of Indigenous Health*. Sydney: Allen & Unwin.
- Burgess P, Johnston F, Bowman D, Whitehead P (2005) Healthy country: healthy people? Exploring the health benefits of Indigenous natural resource management *Australian and New Zealand Journal of Public Health* 29:117–122. doi:10.1111/j.1467-842X.2005.tb00060.x
- Burgess P, Berry H, Gunthorpe W, Bailie R (2008) Development and preliminary validation of the 'Caring for Country' questionnaire: measurement of an Indigenous Australian health determinant. *International Journal of Equity in Health* 7:26
- Campbell J (2002) *Invisible Invaders: Smallpox and Other Diseases in Aboriginal Australia 1780–1880*, Carlton: Melbourne University Press
- Campbell D, Davies J, Wakerman J (2008) Facilitating complementary inputs and scoping economies in the joint supply of health and environmental services in Aboriginal central Australia. *Rural and Remote Health* 8:1010
- Campbell D, Stafford Smith M, Davies J, Kuipers P, Wakerman J, McGregor M (2008) Responding to health impacts of climate change in the Australian desert. *Rural and Remote Health* 8:1008
- Campbell D, Burgess C, Garnett S, Wakerman J (2011) Potential primary health care savings for chronic disease care associated with Australian Aboriginal involvement in land management. *Health Policy* 99:83–89

- CGC (2012) *What Works to Overcome Indigenous Disadvantage: Key Learnings and Gaps in the Evidence 2010–11*. Closing the Gap Clearinghouse, Canberra: Australian Institute of Health and Welfare and Melbourne: Australian Institute of Family Studies.
- CGC (2013) *Strategies and Practices for Promoting the Social and Emotional Well-Being of Aboriginal and Torres Strait Islander people*. Closing the Gap Clearinghouse. Resource Sheet No. 19, Canberra: Australian Institute of Health and Welfare and Melbourne: Australian Institute of Family Studies
- COAG (2008) *Closing the Gap on Indigenous Disadvantage*. Canberra: Department of Prime Minister and Cabinet. [http://www.coag.gov.au/closing\\_the\\_gap\\_in\\_indigenous\\_disadvantage](http://www.coag.gov.au/closing_the_gap_in_indigenous_disadvantage). Accessed 2 May 2013
- Commonwealth of Australia (2013) *Working on Country*. <http://www.environment.gov.au/indigenous/workingoncountry/index.html>. Accessed 13 May 2013
- Cornell S, Curtis C, Jorgensen M (2004) *The Concept of Governance and its Implications for First Nations: Joint Occasional Papers on Native Affairs No. 2004-02*. Tucson: Native Nations Institute and Cambridge: The Harvard Project on American Indian Economic Development. [http://udallcenter.org/jopna.net/pubs/jopna\\_2004-02\\_Governance.pdf](http://udallcenter.org/jopna.net/pubs/jopna_2004-02_Governance.pdf). Accessed 15 May 2013
- Costello A, Abbas M, Allen A, Ball S, Bell S, Bellamy R, et al. (2009) Managing the health effects of climate change. *Lancet* 373:1693–1733. doi:10.1016/S0140-6736(09)60935-1
- Deeble J (1998) *Expenditures on Health Services for Aboriginal and Torres Strait Islander People*, Canberra: Commonwealth of Australia
- DHA (2012) *Discussion Paper for the Development of the National Aboriginal and Torres Strait Islander Health Plan*. Publications approval number: D0890, Canberra: Department of Health and Ageing
- Dockery A (2010) Culture and wellbeing: the case of Indigenous Australians. *Social Indicators Research* 99:315–332
- Dodson M (1977) Land rights and social justice. In: *Our Land is Our Life: Land Rights Past, Present and Future*, Yunupingu G (editor), Brisbane: University of Queensland Press
- Drew N, Adams Y, Walker R (2010) Issues in mental health assessment with indigenous Australians. In: *Working Together: Aboriginal and Torres Strait Islander Mental Health and Well-being Principles and Practice*, Purdie N, Dudgeon P, Walker R (editors), Canberra: Department of Health and Ageing, pp 191–210
- Fitzsimons J, Russell-Smith J, James G, Vigilante T, Lipsett-Moore G, Morrison J, Looker M (2012) Insights into the biodiversity and social benchmarking components of the Northern Australian fire management and carbon abatement programmes. *Ecological Management & Restoration* 13:51–57
- Fritze J, Blashki G, Burke S, Wiseman J (2008) Hope, despair and transformation: climate change and the promotion of mental health and wellbeing. *International Journal of Mental Health Systems* 2:13. doi:10.1186/1752-4458-2-13
- Furgal C, Séguin S (2006) Climate change, health, and vulnerability in Canadian northern Aboriginal communities. *Environmental Health Perspectives* 114:1964–1970
- Galloway McLean K (2010) *Advance Guard: Climate Change Impacts, Adaptation, Mitigation and Indigenous Peoples—A Compendium of Case Studies*, Darwin: United Nations University
- Ganesharajah C (2009) *Indigenous Health and Wellbeing: The Importance of Country*, Canberra: Native Title Research Unit, Australian Institute of Aboriginal and Torres Strait Islander Studies
- Garnaut R (2008) *Climate Change Impacts on Australia*. Chapter 6. The Garnaut climate change review: final report, Port Melbourne: Cambridge University Press
- Garnett S, Sithole B (2007) *Sustainable Northern Landscapes and the Nexus with Indigenous Health: Healthy Country Health People*, Canberra: Department of Land and Water
- Garnett S, Sithole B, Whitehead P, Burgess P, Johnstone F, Lea T (2009) Healthy people, healthy country: policy implications of links between Indigenous human health and environmental condition in tropical Australia. *Australian Journal of Policy Review* 68:53–66
- Gorman J, Vemuri S (2012) Social implications of bridging the gap through ‘caring for country’ in remote Indigenous communities of the Northern Territory, Australia. *The Rangeland Journal* 34:63–73. doi:10.1071/RJ11037
- Green D (2006) *Climate Change and Health: Impacts on Remote Indigenous Communities in Northern Australia*, Aspendale: CSIRO
- Green D, Minchin L (2012) The co-benefits of carbon management on country. *Nature Climate Change* 2:641–643
- Green D, Webb L (2014) Climate change, health and well-being in Indigenous Australia. In: *Healthy People, Places and Planet: Reflections Based on Tony McMichael's Four Decades Contribution to Epidemiological Understanding*, Butler C, Dixon J, Capon A (editors), Canberra: ANU Press
- Green D, Jackson S, Morrison J (2009) *Risks from Climate Change to Indigenous Communities in the Tropical North of Australia*, Canberra: Department of Climate Change and Energy Efficiency
- Green D, Billy J, Tapim A (2010) Indigenous Australians' knowledge of weather and climate. *Climatic Change* 100:337–354
- Guyot M, Dickson C, Paci C, Furgal C, Chan H (2006) Local observations of climate change and impacts on traditional food security in two northern Aboriginal communities. *International Journal of Circumpolar Health* 65:403–415
- Harper S, Edge V, Cunsolowilox A, Rigolet Inuit Community Government (2012) Changing climate, changing health, changing stories: using an EcoHealth approach to explore impacts of climate change on Inuit health. *Ecohealth* 9:89–101. doi:10.1007/s10393-012-0762-x
- Hennessy K, Fitzharris B, Bates B, Harvey N, Howden S, Hughes L, et al. (2007) Australia and New Zealand. In: *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Parry M, Canziani O, Palutikof J, van der Linden P, Hanson C (editors). Cambridge, UK: Cambridge University Press, pp 507–540
- Hill R, Harding E, Edwards D, O'Dempsey J, Hill D, Martin A, McIntyre-Tamwoy S (2008) A cultural and conservation economy for northern Australia: Final Report. Canberra: Land and Water, cited in Gorman J and Vemuri S (2012) Social implications of bridging the gap through ‘caring for country’ in remote Indigenous communities of the Northern Territory, Australia. *The Rangeland Journal* 34:63–73
- Holland C, Dudgeon P, Milroy H (2013) *The Mental Health and Social and Emotional Wellbeing of Aboriginal and Torres Strait Islander Peoples, Families and Communities*, Canberra: National Mental Health Commission
- Hunter E (2007) Disadvantage and discontent: a review of issues relevant to the mental health of rural and remote Indigenous Australians. *Australian Journal of Rural Health* 15:88–93

- Hunter E (2009) 'Radical hope' and rain: climate change and the mental health of Indigenous residents of northern Australia. *Australasian Psychiatry* 17(6):445–452
- Hutton D (2005) *Psychosocial Aspects of Climate Change in Canada: A Review of Current Literature and Research Recommendations*. Research report prepared for the Climate Change and Health Office, Health Canada. Ottawa: Public Health Agency of Canada, Centre for Emergency Preparedness and Response
- IPCC (2012) *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change*, Cambridge, UK: Cambridge University Press
- Jackson L, Ward J (1999) Aboriginal health: why is reconciliation necessary? *Medical Journal of Australia* 170:437–440
- Johnston F, Jacups S (2007) Ecohealth and Aboriginal testimony of the nexus between human health and place. *EcoHealth* 4:489–499. doi:10.1007/s10393-007-0142-0
- Jorm A, Bourchier S, Cvetkovski S, Stewart G (2012) Mental health of Indigenous Australians: a review of findings from community surveys. *Medical Journal of Australia* 196:118–121. doi:10.5694/mja11.10041
- Kelly K, Dudgeon P, Gee G, Glaskin B (2009) *Living on the Edge: Social and Emotional Wellbeing and Risk and Protective Factors for Serious Psychological Distress among Aboriginal and Torres Strait Islander People*. Discussion Paper No. 10, Darwin: Cooperative Research Centre for Aboriginal Health
- Kingsley J, Townsend M, Phillip R, Aldousa D (2009) If the land is healthy it makes the people healthy: The relationship between caring for Country and health for the Yorta Yorta Nation, Boonwurrung and Bangerang Tribes. *Health & Place* 15(1):291–299
- Kingsley J, Townsend M, Henderson-Wilson C, Bolam B (2013) Developing an exploratory framework linking Australian Aboriginal peoples' connection to country and concepts of wellbeing. *International Journal of Environment Research and Public Health* 10:678–698. doi:10.3390/ijerph10020678
- Mayers N (2002) Aboriginal health in Australia: some historical observations and contemporary issues. *New Doctor* 77:3–5
- McKeon S, Alexander E, Brodaty H, Ferris B, Frazer I, Little M (2013) *Strategic Review of Health and Medical Research in Australia—Better Health Through Research*, Canberra: Department of Health, Commonwealth of Australia. <http://www.mckeonreview.org.au/>. Accessed 2 May 2013
- McMichael A (2007) Climate change, prolonged drought conditions and health: implications for rural Australia. In: *Proceedings of the 9th National Rural and Remote Health Conference, 7–10 March 2007*
- McMichael A, Woodruff R, Whetton P, Hennessy K, Nichols N, Hales S, et al. (2003) *Human Health and Climate Change in Oceania: A Risk Assessment*, Canberra: Department of Health and Ageing, Commonwealth of Australia
- McMichael A, Woodruff R, Hales S (2006) Climate change and human health: present and future risks. *Lancet* 367:859–869
- Mercer J, Dominey-Howes D, Kelman I, Lloyd K (2007) The potential for combining indigenous and western knowledge in reducing vulnerability to environmental hazards in small island developing states. *Environmental Hazards* 7:245–256
- Morice R (1976) Woman dancing dreaming: psychosocial benefits of the Aboriginal outstation movement. *Medical Journal of Australia* 2:939–942
- Morrison J (2002) Case study: building land management capacity through an Aboriginal worldview in south-east Arnhem Land from 1996–2001. *Ngukurr News*: 33
- NAHSWP (1989) *A National Aboriginal Health Strategy*, Canberra: National Aboriginal Health Strategy Working Party
- NATSIHC (2003) *National Strategic Framework for Aboriginal and Torres Strait Islander Health: Framework for action by Governments*, Canberra: National Aboriginal and Torres Strait Islander Health Council. [http://www.health.gov.au/internet/main/publishing.nsf/Content/2A9BFD59B83FD082CA25747300174526/\\$File/nsfatsihfinal.pdf](http://www.health.gov.au/internet/main/publishing.nsf/Content/2A9BFD59B83FD082CA25747300174526/$File/nsfatsihfinal.pdf). Accessed 19 April 2013
- NMHC (2013) 'Closing the Gap' Targets Must be Addressed. <http://www.mentalhealthcommission.gov.au/news-events/our-news/%E2%80%98closing-the-gap%E2%80%99-targets-must-be-addressed.aspx>. Accessed 13 May 2013
- O'Dea K (1984) Marked improvement in carbohydrate and lipid metabolism in diabetic Australian Aborigines after temporary reversion to traditional lifestyle. *Diabetes* 33(6):596–603
- Paul D (2011) Playing number games with Indigenous Australians' health. *The Conversation*. <http://theconversation.com/playing-number-games-with-indigenous-australians-health-1999>. Accessed 11 April 2013
- Petheram L, Zander K, Campbell B, High C, Stacey N (2010) 'Strange changes': Indigenous perspectives of climate change and adaptation in NE Arnhem Land (Australia). *Global Environmental Change* 20:681–692
- RACP (1997) Communiqué of the 1997 Cottrell Conference hosted by the Royal Australasian College of Physicians: Statement on the Delivery of Specialist Services to Remote and Rural Aboriginal and Torres Strait Islander Communities, cited in Jackson LR, Ward JE (1999) Aboriginal health: why is reconciliation necessary? *Medical Journal of Australia* 170:437–440
- Reid J (1982) *Body, Land and Spirit: Health and Healing in Aboriginal Society*, St Lucia: University of Queensland Press
- Rigby C, Rosen A, Berry H, Hart C (2011) 'If the land's sick, we're sick': The impact of prolonged drought on the social and emotional well-being of Aboriginal communities in rural New South Wales. *Australian Journal of Rural Health* 19:249–254
- Salick J, Byg A (2007) *Indigenous Peoples and Climate Change*, Oxford: Tyndall Centre for Climate Change Research
- Scrimgeour D (2007) Town or country: which is best for Australia's Indigenous peoples? *Medical Journal of Australia* 186:532–533
- Séguin J (2008) *Human Health in a Changing Climate: A Canadian Assessment of Vulnerabilities and Adaptive Capacity*, Ottawa: Health Canada
- Singh G, Kershaw A, Clark R (1981) Effects of fire on the invertebrate fauna of soil and litter of a eucalypt forest. In: *Fire and the Australian Biota*, Gill A, Groves R, Noble J (editors), Canberra: Australian Academy of Science
- Swan P, Raphael B (1995) *Ways Forward: Aboriginal and Torres Strait Islander Mental Health Policy*. National Consultancy Report. Canberra: Australian Government Publishing Service. <http://www.health.gov.au/internet/publications/publishing.nsf/Content/mental-pubs-w-wayforw-toc>. Accessed 20 April 2013
- Turner N, Clifton H (2009) It's so different today: climate change and indigenous lifeways in British Columbia, Canada. *Global Environmental Change* 19:180–190
- Weatherhead E, Gearheard S, Barry R (2010) Changes in weather persistence: insight from Inuit knowledge. *Global Environmental Change* 3:523–528
- Weir J, Stacey C, Youngetob K (2011) *The Benefits Associated with Caring for Country*, Canberra: Commonwealth of Australia

Donna Green and Liz Minchin

WHO (2002) *Floods: Climate Change and Adaptation Strategies for Human Health*. Report on a WHO meeting, London, UK, 30 June-2 July 2002, Copenhagen: World Health Organization

Wiseman N, Bardsley D (2013) Climate change and indigenous natural resource management: a review of socio-ecological interactions in the Alinytjara Wilurara NRM region. *Local Environment: The International Journal of Justice and Sustainability*. doi:[10.1080/13549839.2012.752799](https://doi.org/10.1080/13549839.2012.752799)

Zubrick S, Kelly K, Walker R (2010) The Policy Context of Aboriginal and Torres Strait Islander Mental Health. In: *Working Together: Aboriginal and Torres Strait Islander Mental Health and Wellbeing Principles and Practice*, Purdie N, Dud-

geon P, Walker R (editors), Canberra: Office of Aboriginal and Torres Strait Islander Health, pp 43–62

Zubrick S, Dudgeon P, Gee G, Glaskin B, Kelly K, Paradies Y, et al. (2010) Social Determinants of Aboriginal and Torres Strait Islander Social and Emotional Wellbeing. In: *Working Together: Aboriginal and Torres Strait Islander Mental Health and Wellbeing Principles and Practice*, Purdie N, Dudgeon P, Walker R (editors), Canberra: Office of Aboriginal and Torres Strait Islander Health, pp 75–90