

Invited Opinion

Drought, drying and climate change: Emerging health issues for ageing Australians in rural areas

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Older Australians living in rural areas have long faced significant challenges in maintaining health. Their circumstances are shaped by the occupations, lifestyles, environments and remoteness which characterise the diversity of rural communities. Many rural regions face threats to future sustainability and greater proportions of the aged reside in these areas.

The emerging changes in Australia's climate over the past decade may be considered indicative of future trends, and herald amplification of these familiar challenges for rural communities. Such climate changes are likely to exacerbate existing health risks and compromise community infrastructure in some instances.

This paper discusses climate change-related health risks facing older people in rural areas, with an emphasis on the impact of heat, drought and drying on rural and remote regions. Adaptive health sector responses are identified to promote mitigation of this substantial emerging need as individuals and their communities experience the projected impact of climate change.

Key words: *aged, climate change health risks, climate change mitigation, environment, rural health.*

Introduction

Australian rural communities, and the agricultural sector in particular, are highly vulnerable to climate change. Health impacts of climate change on older people in rural regions will be increasingly significant in coming years. This paper begins by discussing challenges to healthy ageing in rural areas before considering the additional influences of the changing climate. The role of health professionals in helping older people to adapt to climate change is outlined, and a case is made for climate change mitigation as part of preventative health strategy.

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Ageing in rural Australia

The range of experiences of older people in rural Australia reflects the great diversity of its geographical and cultural environments. There are, however, commonalities which characterise the opportunities and challenges facing many in maintaining their health in rural areas. These are influenced by the regional predominance of certain primary industries such as agriculture and mining, and environmental adversities such as drought. While rural communities are often strengthened by well-established social networks and connectedness [1], many of them also face a rapidly changing demographic and service infrastructure [2]. In general, more older people live in non-urban communities than urban centres [3], and non-metropolitan coastal communities display the greatest growth in numbers of older persons. Aboriginal and Torres Strait Islander Australians represent a greater proportion of the population residing in rural and especially remote Australia than in urban areas [4]. Indigenous people are likely to be disproportionately affected by the social and economic effects of climate change, on the background of pre-existing health and social disadvantage [5].

Of particular significance to meeting the health-care needs of rural older people are the barriers to accessing health care in rural and remote regions in Australia [6]. Persistent health-care workforce shortages exacerbate disparities in health outcomes across a range of disease categories between rural and urban residents [7,8]. Data comparing rates of mental illness between rural and urban areas are conflicting; nevertheless there is a consistent pattern of elevated suicide rates in rural and remote regions in Australia as elsewhere in the world. The highest rates of suicide are among older men in Australia and other similar countries [9–11]. Factors consistently associated with suicide are the presence of mental illness (most commonly depression), substance misuse, in association with factors such as social isolation, physical ill health and economic hardship [12].

Agriculture is one of many industries of rural areas, but has been identified as a sector which, in Australia, is particularly vulnerable to climate change [13]. On average, people working in agriculture are becoming older [14], with poor and declining incomes, and live in more socially isolated circumstances. Accordingly, the number of families living and working on farms has been diminishing over many years. The latter has important effects on rural communities and availability of social networks. In consultative forums across rural and remote NSW as part of the NSW Government's Drought

Mental Health Assistance Program, ageing farmers have identified concerns regarding declining physical ability, decreased confidence in decision-making and loss of identity as a farmer [15]. Other themes include loss of a sense of contribution to the community, amassed during their working life, and the satisfaction and respect this brought. Others reported substantial financial loss and challenges faced in leaving farms and managing succession, and the perceived isolation from families and community networks. Chronic financial strain, family separation and social isolation can increase risk of mental health problems and lead to what has been described as a 'draining of strength and hope' [16,17].

The changing climate of rural Australia

Many who live in rural Australia have learned to adapt to extreme climates, but in recent years, it has become evident that warming and drying trends are apparent across much of Australia. Since 1950, most of southern Australia has experienced substantial rainfall declines [18] with below average falls across the south-west since 1970, and south-east Australia since 1997 [19]. The heatwave which hit Southern Australia in early 2009 was of unprecedented intensity and duration with maximum temperatures 12–15°C above normal for much of Victoria [20], and a 15-day heatwave (consecutive maximum temperatures above 35°C broke the previous record by 7 days. The bushfires which thereafter ravaged Victoria caused the greatest loss of life of any bushfire in Australia's recorded history where 173 people perished and over 2000 homes were destroyed.

Global climate change and future trends

While it is difficult to attribute any one particular weather event to global climate change caused by anthropogenic greenhouse gasses, the fact that this is occurring as a broad global trend is now unequivocal, and it is very likely caused by humanity. For many key parameters, the climate system is already moving beyond the patterns of natural variability within which our society and economy have developed and thrived, including global mean surface temperature, sea-level rise, ocean acidification and extreme climatic events [21]. This century we can expect temperature rises of between 1.8 and 4.0°C [22] and sea level rises 0.5–1.4 m above 1990 levels [23].

Climate change scenarios suggest that Australia is facing a future with fewer cold days and nights, warmer and more frequent hot days and nights, with an increase in frequency of extremely hot days. The shift will be more marked towards hotter days, than fewer cold nights. Further declines in rainfall are predicted, with more frequent and more intense bushfires. Climate change will therefore result in many parts of Australia becoming even warmer and drier [18]. Increased drought severity and reduction in agricultural productivity in southern Australia will further intensify economic burden and stress for agricultural communities. Tropical cyclone intensity and damaging heavy precipitation events are

expected to increase in northern Australia. Coastal communities are increasingly facing the projected sea-level 'risk' zones and for some, the impact of severe storm conditions and floods [13].

Health impacts of climate change for older Australians in rural areas

Heat stress presents a major health risk to older people; the effects of heatwaves include heat exhaustion, cramps, heart attacks and strokes. During the 2009 heatwave, there were 374 more Victorian deaths than expected for that time of year; most deaths occurred in those aged 75 years or older, representing a 64% increase [24]. A number of physiological factors contribute to the ageing's vulnerability to heat stress. Older people have an altered sense of satiation and reach a sense of satisfactory rehydration while still dehydrated. Older people have reduced ability to conserve sodium and water during dehydration as well as reduced glomerular filtration rates which contribute to high rates of hospital admissions with renal failure during heatwaves [25]. Thermoregulation in older people is impaired due to a decreased capacity to increase cardiac output as a cooling mechanism and the temperature at which sweating begins increases with age. Those older Australians at particular risk include those with pre-existing cardiorespiratory disease or other chronic illness (including mental disorder), those who live alone, have restricted mobility, less access to cooling or air-conditioning and are on multiple medications, including psycho-active agents [26,27].

Heatwaves are expected to increase bushfire risk, the health impacts of which include fatalities, injuries and burns. Under high global warming scenarios, extreme fire danger frequency across south-east Australia is likely to rise 15–65% by 2020 and 100–300% by 2050 compared to 1990 levels [28]. Older people are especially vulnerable during bushfires as many are dependent upon others to evacuate. Climate change may exacerbate respiratory diseases due to exposures to bushfire smoke, and the interaction between heat and the chemistry of air pollution (specifically ground level ozone) [29]. Prolongation of the pollen season with increased temperatures is also expected to increase the incidence of allergic respiratory disease [30].

Agriculture is a major contributor to many rural economies, and the health of communities servicing agricultural regions experiencing drought is adversely affected by the resultant drop in incomes [31]. While there is limited research regarding the mental health impacts of climate change and drought, emerging Australian evidence suggests a relationship between drought severity, environmental degradation and poorer mental health [32]. Studies have demonstrated a significance effect of community characteristics including socioeconomic hardship [33], social capital [34] and mental health. Australian data suggest an historical association between suicide among farmers and terms of trade [11], further indicating the importance of financial hardship alongside other critical

determinants. Recent financial loss, alongside depressive symptoms, can also promote suicidal ideation [35].

Solastalgia is a term that has been used to describe aspects of the distress experienced in response to adverse changes in familiar landscapes, as can occur in chronic drought conditions [36] and could apply also to the impact of recent bushfires. For people heavily committed to and connected with their land, district and community over many years, the changes of unremitting drought and the perception of future drought impact may evoke such forms of distress and loss, particularly when this occurs alongside social isolation or loss of key community infrastructure [16,37].

Remote Indigenous communities may suffer profound climate change impacts of thermal stress and increased stress on water resources and biodiversity, with indirect impacts on social and cultural cohesion. These communities often have inadequate infrastructure and health services, and social disadvantage may reduce adaptive capacity and resilience to climate emergencies [13]. It will be important to gain a better understanding of the impact of climate change-related effects on Aboriginal people already experiencing poorer health outcomes and with specific needs in housing, health care and economic resources.

Coastal and estuary inundation brings a new set of stressors for populations in coastal regions. Beyond the difficulties of evacuation, road closures and loss of power, there is the stress of property destruction, land devaluation in areas newly designated as sea level 'risk zones' and the substantial increase in home insurance. Evacuation is difficult for many older people, and capacity to repair and rebuild is often compromised. The intensity of extreme weather events such as cyclones, storms and heavy rain is expected to increase in Australia due to climate change [22]. Most deaths directly related to storms occur as a result of flooding. Indirect effects include gastroenteritis from contaminated floodwaters, and older people are especially vulnerable to these and injury.

In Australia, regions suitable for transmission of mosquito borne diseases such as Dengue Fever will expand southwards towards more populated areas with climate change. Whether this translates into more cases will depend on the efficacy of public health measures designed to contain risks and to educate the community about domestic strategies to reduce mosquito numbers. The 2009 outbreak of Dengue, with 931 confirmed cases and the death of an 82-year-old woman, highlighted the difficulties involved in limiting its spread, and the need for tailoring community awareness programs to ensure broad uptake, including by older people [38].

The size and location of rural communities vary from small isolated settlements to large inland and coastal regional centres, with corresponding variability in availability of social and economic resources to respond to and plan for the impacts of climate-related adversity. Social networks,

support and the quality of community environments have a demonstrable effect on health [39]. These factors are relevant specifically to the health needs of older people, who may be more vulnerable to the adverse effects of limited access to services, loss of community resources, and to social isolation. Decline in community populations and economic adversity as occurs in drought-affected communities negatively influences the availability of services [2]. Ramifications include potential loss of critical community infrastructure necessary to support people who choose not to (or for reasons of vulnerability, are unable to) leave, in adapting to the types of pressures presented by climate change. The result is service decline where need is greatest.

Health care responsive to the impacts of climate change on the aged

Evidence across the globe suggests that the health impacts of climate change are falling more heavily upon the vulnerable [40]. The diverse health-related threats to older people in rural areas call for a suite of strategies, to prevent harm and manage illness. A collaborative project is underway involving the Department of Climate Change, the enHealth Council and major stakeholders including the health sector to develop a National Heatwave Framework. Strategies need to be sensitive to the understanding and beliefs of older people and to their potential vulnerabilities, including reduced resilience, suboptimal nutrition, economic constraints, and possible restrictions on mobility and self-determination. For Indigenous Australians, support of and partnership with Aboriginal Community Controlled Organisations and related health services is critical to addressing the needs of ageing Aboriginal people.

Recognition of the significance of the environment as a health determinant has eroded with the rise in non-communicable diseases [41]. A new mindset is needed at the departmental and institutional level, health-care practice and also in training and curricula. Protecting older people from heat-related stress will require effective heatwave warning systems which link in with community support services to ensure that information reaches those who are most in need [24]. Education of older people and their carers at home and in residential care facilities needs to ensure that those at risk stay well hydrated, dress coolly, stay in the coolest part of their dwellings and avoid activity in the hottest part of the day. The importance of active cooling must be stressed, such as the use of fans and wet sheets. Reports from the 2009 heatwave indicated that older people were inclined to actively adopt their civic responsibility to conserve water and power, and turned off air-conditioning and fans. Older people and their carers must understand that in heat extremes, cooling needs of older people take priority over water shortages and attempts to conserve power. The onus is on the rest of the community to forgo their personal needs to ensure residual services are sufficient to protect the welfare of the vulnerable members of the community.

Health practitioners should be particularly vigilant during heatwaves when assessing patients on multiple medications and with co-morbidities. Cooperation is needed between the formal service sector and not for profit organisations such as Country Women's Associations, welfare organisations and social clubs in supporting older people with heat-related illness. When heatwaves are forecast, regular visits by family, friends and neighbours can serve to reinforce information about staying cool, as well as checking home facilities can cope with heat, especially as older housing may retain the heat and have poor ventilation.

Emergency response planning aiming to minimise casualties from bushfires needs to include the development of information targeted to the ageing as appears in Interim Recommendations of the 2009 Victorian Bushfires Royal Commission [42]. Health-care agencies receiving older patients from bushfire-affected areas require adequate facilities for management of burns and respiratory distress, while triaging ensures hospitals are not overwhelmed by minor injuries. Coordinated disaster planning will limit disease and injury from extreme weather events such as cyclones, storms and flooding. Increasing the surge capacity of the health system will ensure that appropriate treatment is available in the context of a sudden increase in patient numbers. Public health units need to link with community and primary care practitioners to monitor outbreaks of gastroenteritis in the wake of such events and increase awareness of the vulnerability of older people to dehydration.

There is scope to build environmental health capacity in the rural health workforce [41]. Monitoring of air pollution and aeroallergen concentrations could support health promotion by warning those at risk of symptoms to take precautions, and could enable local health agencies and providers to plan for increased presentations. Vector borne disease risk indicators such as mosquito numbers will need to be closely monitored by authorities and health practitioners will need to be vigilant for cases of Dengue fever and Ross River virus in affected rural areas.

Interventions for the mental health outcomes of drought on rural and Indigenous communities must enable access for the ageing and be well targeted. A coordinated approach involving primary care, specialist mental health services, and other community and not for profit organisations is needed to develop appropriate mental health components of climate change response strategies, including attention to the modifiable determinants of mental health (such as social connectedness and support) particularly for those facing relocation. Multicomponent collaborative community programs between health and social services, and community organisations provide opportunities to address realistic goals in prevention and early intervention for emerging mental health needs. The NSW Farmers Association Blueprint for Improving the Mental Health of People in Farming [43] is an example of collective planning aimed to assist one sector of

rural Australians – those in agriculture and related industry. Rural Financial Counsellors and other trusted 'front-line' services have regular and trusted contact with people in otherwise isolated circumstances, and hence are an important gateway to health care [44]. Drought programs such as the NSW Drought Mental Health Assistance Program provide community mental health promotion as well as providing health service orientation to the mental health impacts of drought [45]. The 'Farm-Link': National Suicide Prevention Strategy also provides pathways to care for distress and with early recognition and effective response to mental health problems by increasing local service networks and collaboration [15].

Opportunities for the health sector to mitigate against climate change

The 2009 Copenhagen conference on climate change was told that the worst case climate change trajectories are being realised [21], and there is a significant risk that many current trends will accelerate, leading to abrupt or irreversible climatic shift. Climate change is on the Australian agenda, but this urgency demands that all Australians step up to the challenge [46] and greenhouse gas emissions must be dramatically curbed. There are many opportunities for health care for the aged to be delivered in ways which mitigate against further climate change.

Initiatives such as GreenClinic developed by the Australian Conservation Foundation and Doctors for the Environment, Australia, encourage environmentally sustainable practices in the running of general practice clinics through such measures as installing low energy lighting and appliances, buying Greenpower and using recycled products [47]. The 'Green Hospitals' movement promotes hospitals reducing use of non-renewable energy and employing measures such as water recycling and conservation, waste minimisation, as well as site location and building materials selection. These planning principles apply equally well to hostels and residential care infrastructure and must include stakeholder input from those caring for the aged.

Health and environmental co-benefits can be utilised to encourage older people to stay healthy in ways which have lower environmental impact. Healthier diets with increased fruit, vegetables and legumes are less greenhouse intensive, and most people in western countries can consider reducing meat intake [48]. Many people can maintain good health by exercising in ways which have minimal environmental impact such as walking and yet improve cardiovascular fitness, obesity, diabetes, depression and optimise functioning in degenerative joint disease [49]. Mitigation strategies and co-benefit opportunities applicable to the general population will be suitable to older people if considered carefully and modified where required.

Public policy must address the need for our community to both adapt to and mitigate against further climate change.

The importance of engaging community members in the process cannot be overstated, as strategies must be practical and have community support [50]. Health professionals caring for older people can, and have a responsibility to, advocate for measures such as sustainable community design so that people are better able to live and work without expending large amounts of fossil fuel energy. The magnitude of the problem of climate change requires that all who understand the threats to health and who are in a position of influence, shape and strengthen the community's attempts to reduce greenhouse gas emissions, for example, developing position statements of professional colleges, writing submissions to government committees of enquiry, lobbying MPs and contributing to public and academic forums.

Conclusion

Older people in rural Australia are particularly vulnerable to the health impacts of climate change. Health professionals have a responsibility to prepare and educate themselves about climate change to guide practice and serve as health advisors, but also for their vital role as advocates to help drive mitigation and to develop adaptation strategies to minimise the health harm. There is much to be gained from concentrated effort on health promotion, re-engineering and evaluating our health facilities and processes in the wake of climate change, and for lobbying for strong mitigation as a critical health issue.

The response to climate change must sit within an overall approach to caring for the aged in rural areas. In planning for adverse impacts on the ageing in rural areas, it is crucial to take into account the social context of ageing in each community, as well as the community's infrastructure and resources so that maximum support can be given to those for whom impact is greatest and for whom adaptation is more difficult.

Strengthening community social networks and well-functioning social capital is likely to be effective in mitigating the strain imposed by the changes induced by protracted drought and environmental adversity. Efforts to address the impact of socioeconomic disadvantage among rural aged populations will be important. Overcoming social isolation, improving the recognition of needs of those with pre-existing chronic illness and vulnerability to heat stress, and increasing the availability of effective cooling strategies are likely to be effective. A range of adaptive measures will need to be trialled and tested for different scenarios, within health-care plans which comprehensively meet the needs of older people in rural Australia.

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