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# Climate Change and Farmers' Mental Health: Risks and Responses

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## Abstract

Climate change is exacerbating climate variability, evident in more frequent and severe weather-related disasters, such as droughts, fires, and floods. Most of what is known about the possible effects of climate change on rural mental health relates to prolonged drought. But though drought is known to be a disproportionate and general stressor, evidence is mixed and inconclusive. Over time, like drought other weather-related disasters may erode the social and economic bases on which farming communities depend. Rural vulnerability to mental health problems is greatly increased by socioeconomic disadvantage. Related factors may compound this, such as reduced access to health services as communities decline and a “stoical” culture that inhibits help-seeking. Australia has the world’s most variable climate and is a major global agricultural producer. Yet despite Australia’s (and, especially, rural communities’) dependence on farmers’ well-being and success, there is very little—and inconclusive—quantitative evidence about farmers’ mental health. The aim of this review is to consider, with a view to informing other countries, how climate change and related factors may affect farmers’ mental health in Australia. That information is a prerequisite to identifying, selecting, and evaluating adaptive strategies, to lessen the risks of adverse mental health outcomes. The authors identify the need for a systematic epidemiology of the mental health of farmers facing increasing climate change-related weather adversity.

## Keywords

mental health, climate change, farmers, rural, Australia, adaptive strategies

Climate change is beginning to exacerbate climate variability in Australia,<sup>1</sup> already the world’s most variable climate. Increasingly, climate change contributes to more frequent and intense droughts, floods, fires, and other weather-related disasters,<sup>2</sup> thereby affecting health, particularly

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in vulnerable places and among vulnerable people.<sup>3</sup> Because of their closeness to and direct reliance on land, such disasters may disproportionately affect farmers' health and well-being.<sup>4</sup> Media reports<sup>5</sup> and politicians frequently assert that climate change-related environmental adversity causes mental health problems. For example, the Australian Government's Minister for Agriculture spoke recently of how prolonged drought leads to depression and self-harm among Australian farmers.<sup>6</sup> However, studies that include measurement of the prevalence of mental health problems among farmers in Australia have only just been initiated.<sup>7,8</sup>

No scientific studies have examined associations between weather disasters and farmers' mental health in terms of different types of weather disasters, different types of farms, and different climate change-related factors. Our aims are to (a) describe how climate change may have an impact on farmers' mental health and, thereby, on Australia's capacity to feed itself and much of the rest of the world and (b) provide summary information that may assist other countries in their considerations of the same topic. We argue that the present state of scientific evidence is insufficient to use as a basis for definitive policy development. We have not, therefore, provided detailed policy analysis or proposed comprehensive adaptation strategies. However, where appropriate, we have drawn out implications for adaptation policy and practice. For Australia and other countries, such information will facilitate the identification, targeting, implementation, and evaluation of adaptive strategies, to lessen the adverse health impacts of climate change and its environmental and social sequelae.

A range of electronic scientific databases, such as MedLine, ProQuest, and Web of Science, were searched to locate peer-reviewed publications featuring key search terms in 3 domains: (a) climate change-related terms such as climate change, climate, weather, weather disaster, extreme weather event, drought, flood, cyclone, bushfire, and wildfire; AND (b) mental health-related terms such as mental, mental health, mental disorder, affective disorder, mood disorder, depression, anxiety, general psychological distress, psychosis, hopelessness, despair, helplessness, suicide and PTSD; AND (c) farmer-related terms such as farmer, farming, agriculture, and primary production. Because we wanted to produce a "case study"-style focus on Australia, recent relevant Australian government and nonprofit organization reports were also included.

The article commences with a review of the place of agriculture in the life of the Australian community and of the people who produce Australia's food and fiber. It then takes a step back to consider recent publicly expressed views about the relationship between climate and farmers' mental health before proceeding to look, first, at the prevalence and cost of mental health problems in Australia generally and, second, to examine mental health in its rural context. Risk factors associated with mental illness and the presence of such risks among Australian farmers are reviewed, before summing up the state of the science and future research needs regarding understanding the relationship between farming, climate change, and mental health.

## **Australian Agriculture, Climate Change, and Mental Health**

Agriculture is a vital part of Australia's economy<sup>9</sup> and of our way of life<sup>10</sup> (Box 1). Australian farming (including extensive pastoral lands) utilizes 54% of Australia's landmass,<sup>17</sup> generates up to \$39 billion in gross value each year,<sup>18</sup> contributes around 3% of Australia's gross domestic product (GDP),<sup>19</sup> and employs almost 320 000 people.<sup>17</sup> As Australia is 93% self-sufficient in food production,<sup>20</sup> reduced farm productivity is likely to compromise our capacity to feed ourselves. Australia is also a source of food for around 40 million people a day in other countries, with about 55% of these people living in developing countries.<sup>21</sup> Consequently, any loss of agricultural productivity in Australia could mean food shortages among some of the world's poorest

**Box 1. Drought and the Australian Economy**

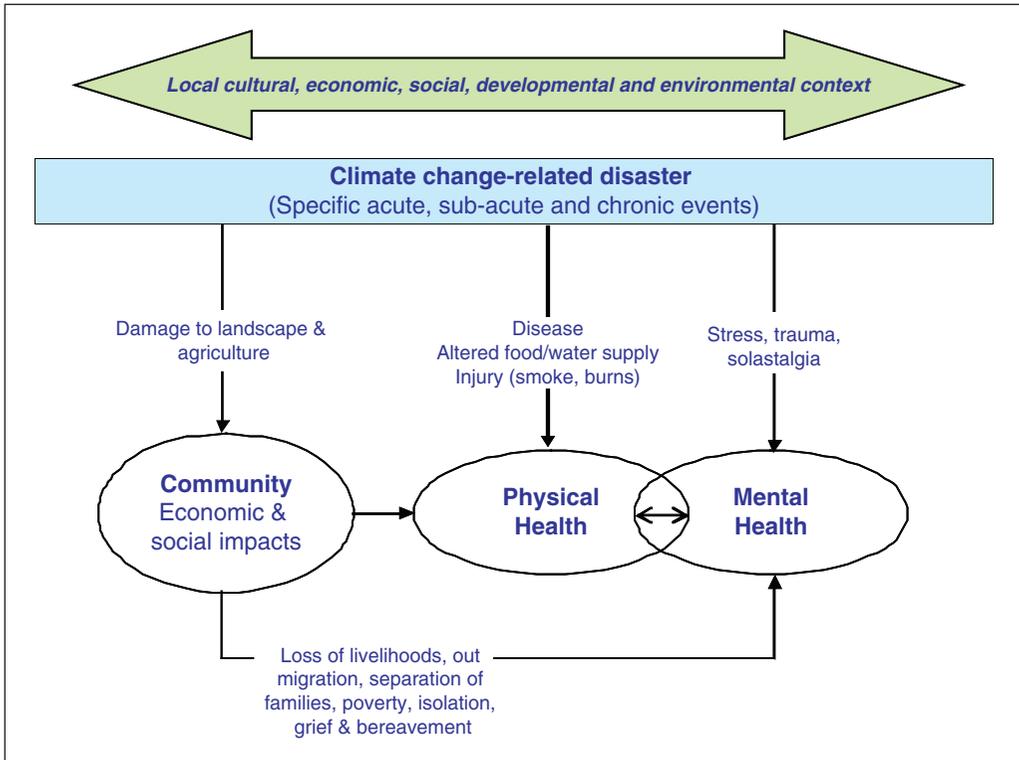
Drought has had a direct and considerable impact on the Australian economy. Between 2002 and 2003, a drought-related decrease in agricultural production resulted in a 1% fall in Australian gross domestic product (GDP) growth and a fall of 28.5% in the gross value added for the agricultural industry.<sup>11</sup> Should the frequency of drought continue as predicted, it is estimated that it will cost the Australian economy \$5.4 billion annually, with a projected ongoing reduction in GDP of 1% a year.<sup>12</sup> Although Australian rural dwellers are reportedly more drought prepared than ever before,<sup>13</sup> the cost of drought remains high in these areas and has significant economic flow-on effects.<sup>14-16</sup> Falling farm production has placed pressure on downstream industries, such as transport and wholesale trade, small businesses, and casual mobile labor, including shearers and farm hands.<sup>11</sup>

people. Anything that poses a substantial threat to Australian agriculture and its long-term viability must command research and policy attention.

Climate change poses one such threat.<sup>4</sup> In 2008, consistent with prevailing climatological theory, CSIRO scientists predicted greater climate variability in Australia, including more frequent and severe extreme weather events.<sup>1</sup> A few months later, extreme heat waves brought record temperatures to 87% of Victoria<sup>22</sup> and generated the nation's worst recorded fire event. Just a year later, southwest Queensland recorded its worst flooding in more than a century, whereas downstream, 44% of New South Wales and more than 95% of Victoria and South Australia were in drought.<sup>23</sup> Farmers do not always see floods as disasters, despite the hard work associated with ensuring the safety of stock. In outback Queensland and New South Wales, much agricultural production depends on periodic flooding. Nevertheless, floods are disastrous for some farmers and, certainly, for property and businesses in the rural communities, which sustain and depend on them. Over time, weather-related disasters can erode the social and economic base on which farming communities depend.<sup>4</sup>

Through its adverse impact on communities, climate change poses substantial (largely indirect) risks to mental health<sup>24</sup> (Figure 1). Most of what is known about the possible effects of climate change on rural mental health relates to prolonged drought, although a recent study has linked dryland salinity to increased rates of hospital admissions for depression.<sup>25</sup> Generally consistent with the drought-related findings of large annual government surveys of farm businesses across rural Australia,<sup>26</sup> small rural studies have reported widespread drought-related income erosion attributed to increased costs, decreased agricultural production, capital depreciation, loss of stock, and increased personal and business debt.<sup>27</sup> Farmers, who are often asset rich and cash flow poor,<sup>4</sup> particularly during times of drought, report especially severe drought-related economic hardship. To the extent that climate change increases these routine pressures, it will also place farmers at greater risk of developing the mental health problems with which these pressures may be associated. Indeed, should these increasing drought trends continue, a key issue for adaptation may be to support farmers financially and socially in managing a transition out of farming.<sup>4</sup>

Many rural and remote Australian communities are also service poor and resource poor, and these deprivations are strongly linked to health disparities.<sup>28</sup> Hardship flowing from climate change-related disasters can exacerbate these adversities by further limiting access to services.<sup>13</sup> As communities decline (Box 2), services (such as retail and trade outlets, schools, and health services) shrink with them. Drought and other weather-related challenges can thus exacerbate a lack of resources, while the lack of resources simultaneously hinders drought recovery.<sup>30</sup> People unable to access support or to leave these communities may become increasingly disadvantaged



**Figure 1.** Hypothesized pathways linking climate change and mental health<sup>24</sup>

### **Box 2.** Rural Decline and Mental Health

Social connectedness, which is generally high in rural areas,<sup>29</sup> where disasters such as drought often strengthen rural identity and cohesion,<sup>30</sup> is strongly protectively linked to mental health.<sup>31</sup> However, declining economic conditions have contributed to significant income losses, increased poverty, and an exceptional demand on charitable organizations.<sup>13</sup> This has been associated with rural community attrition, through the displacement of younger generations, a reluctance to take over failing family businesses, and loss of hope for future prosperity.<sup>16,32</sup> These factors have undermined cohesion in many communities,<sup>13,30,33</sup> and just living in a declining area is detrimental to mental health.<sup>34</sup>

as drought continues and community decline compounds,<sup>13</sup> with consequent excess risk to their mental health.

### **Public Discussion About Farmers' Mental Health: Informed Debate?**

The significance of farmers' circumstances, and their ramifications, is not lost on governments. On March 2, 2010, the Hon. Tony Burke, Minister for Agriculture, Fisheries and Forestry, opened the Australian Bureau of Agriculture and Resource Economics annual conference by emphasizing

that 2 leading challenges confront Australian agriculture: *globalization* and *climate change*.<sup>6</sup> He spoke about how structural factors have likely undermined farmers' adaptation to climate change: "for some [farmers], 7 years ago, and instead of helping them get out [of unviable farm businesses], we gave them just enough money to hold them in a [fundamentally untenable] situation." He went on to note the harm he felt such policies have caused: "I am not surprised by a whole lot of mental health challenges that we have . . . [or by] the number of times when I go into a town people talk about the latest act of self-harm."

This statement is a recent, and a particularly prominent, public linking of climate change, macro-agricultural policy, and mental health. There have been many others and there is no doubt that the weight of qualitative evidence and public opinion supports this notion: most studies identify drought as a disproportionate<sup>35</sup> and general<sup>13,36</sup> stressor for farmers. Yet few of these studies have demonstrated a link between general "stress" and mental disorders, and none has shown that any specific disorder is attributable to drought. Only 1 small qualitative study identified depressive and anxiety symptoms as stress-related themes for a group of drought-affected citrus farmers.<sup>27</sup> Furthermore, none of the publicly expressed views has been underpinned by nationally representative quantitative evidence linking climate change-related weather disasters to mental disorders among farmers.

Only 1 study has touched on farmers' mental health in terms of climate change, *indirectly*, via consideration of the impacts of prolonged drought. Edwards and colleagues<sup>14</sup> analyzed psychological distress among 6519 adults in rural and regional Australia for the period 2004 to 2007, linking the mental component of the Short Form-36 (SF-36) Health Survey to area-level rainfall. Although it did not consider climate change, the study enabled the rare quantitative comparison of mental health in drought-affected and non-drought-affected areas. Overall, economic hardship and mental health problems were greatest in areas of drought and among farmers compared with other rural dwellers. However, the authors failed to note that, at 17%, the prevalence of likely mental disorder found among farmers in the study was *below* the general Australian population prevalence of these problems, currently estimated at about 20% (excluding substance use disorders).<sup>37</sup> A study of psychological distress in rural communities across New South Wales, undertaken at the height of the current severe drought, found that although 34% of farmers demonstrated moderate and high scores using the Kessler 10-item measure of distress,<sup>38</sup> other rural occupational groups were not dissimilar.<sup>8</sup> However, though no particular occupational grouping stood out, unemployed people demonstrated far greater levels of distress, with 50% to 69% demonstrating moderate to high levels.

Such findings raise the question of what makes Australian farmers so resilient in the face of so much apparent adversity. One possibility is that they benefit from the high levels of social connectedness often found in rural communities,<sup>39</sup> which support good mental health.<sup>31</sup> From the point of view of adaptation, given that social capital is strongly protectively related to mental health,<sup>31,40</sup> prospectively supporting and enhancing this resource may prove beneficial.<sup>24</sup> The supportive role played by local advocacy organizations may also need to be considered. However, though some of these organizations have managed to undertake useful research and propose some solutions, these successes have not resulted in increased help-seeking behaviour.<sup>8</sup>

Other studies that have considered farmers' mental health separately from any associations with climate change factors have not presented conclusive evidence of significant (and certainly not substantial) differences in mental health between farmers and other Australians. However, Edwards et al<sup>14</sup> demonstrated that farmers' mental health was worse than that of other *rural dwellers* experiencing drought, even though it was not worse than the mental health of the general population.

A study reported by Hogan and colleagues,<sup>41</sup> which informed the recent "Kenny Report," *It's About People: Changing Perspectives on Dryness*,<sup>10</sup> investigated mental health among people in rural Australia compared with the urban population. This study analyzed data on people living in rural Australia identified in the Household, Income and Labour Dynamics in Australia Survey,

a nationally representative panel study of approximately 19 000 respondents. Using the SF-36 mental component score, consistent with the Edwards et al study, rural dwellers reported slightly but significantly *better* mental health than other Australians ( $M_{\text{rural}} = 75.6$  vs  $M_{\text{urban}} = 73.7$ ,  $P < .01$ ). A limitation of this study, and the study of Edwards and colleagues, was the use of the SF-36 as the screening instrument to gauge mental health. Though it is a fair indicator of the likely presence of mental health problems, the SF-36 does not diagnose or identify specific disorders or cases.

With respect to mental well-being, rather than to mental disorders, the life satisfaction of 500 farmers and farm workers in drought was compared with that of the general rural population in a national study of 1202 adults<sup>42</sup> using the Personal Wellbeing Index-Adult\* (PWI-A).<sup>43</sup> Statistically significant differences were evident between drought-affected farmers and the comparative sample of nonfarmers from rural Australia for 8 of the 9 domains of life satisfaction that comprise the PWI-A. Farmers reported feeling safer, having better personal relationships, being healthier, and feeling more part of their communities than did other rural Australians.

However, farmers also reported being less satisfied with their lives on the whole and with their levels of achievement, security about their future, and spirituality. These are important findings because of the relationship between a positive sense of the future (vs feelings of hopelessness about the future, discussed below) and mental health and well-being. The findings are also consistent with a very recent study of 3993 Australian farmers, in which almost 20% reported that they could not cope with any more change, 7% reported lacking confidence in their ability to cope generally, and 43% reported low levels of social trust (trust in others not personally known to you).<sup>44</sup> Confidence in the ability to cope (sometimes referred to as trait optimism or self-efficacy) and social trust are central components of social cohesion and strongly linked to better mental health in rural Australia.<sup>40</sup> Where confidence and trust are eroded, so too will be mental health. Significantly, for policies to be effective in promoting adaptation, they will need to convince farmers that their best interests have been considered (the basis of social trust<sup>40</sup>).

A further limitation of the few studies that have been published in this field is that none has taken account of the heterogeneity of rural communities and of agricultural businesses or examined differences among different groups of farmers (such as younger or older farmers, casual farm laborers, women, or Aboriginal and Torres Strait Islander peoples). However, a very recent report using cluster analytic techniques to develop statistically based “profiles” of different types of farmers identified 3 types with distinctively different farm-related and socioeconomic characteristics, climate change–related adaptive capacity, and self-rated health.<sup>44</sup> Though the study did not discuss mental health, it provided indicative evidence of health disparities *by type of farmer* (discussed further below).

Despite considerable uncertainty and lack of evidence about the extent and nature of the relationship between climate change, drought, and health, the findings of the Edwards and Kenny reports were widely presented in the media as conclusive evidence that drought and climate change are harming mental health.<sup>45</sup> This is not a criticism of the media, who are to be commended on taking up this important issue, but an indication of the need for better science to inform public debate.

## Prevalence and Costs of Mental Health Problems

Psychiatric disorders have been estimated to comprise at least 14% of global disease burden.<sup>46</sup> One in 5 Australian adults experiences a mental health problem each year (1 in 4 if substance use disorders are counted).<sup>37</sup> These problems have long been the leading cause of nonfatal disease

\*The Personal Wellbeing Index is a forerunner to the similarly named “Deakin Well-being Index.”

burden, accounting for nearly one third of years lost to disability, and are the second largest contributors to (lost) disability-adjusted life years.<sup>47</sup> The direct economic costs of mental health problems in most developed countries are substantial.<sup>48</sup> Service costs alone accounted for \$3 billion (6%) of Australia's total health care expenditure in 2001,<sup>49</sup> \$3.3 billion in 2007-2008.<sup>50</sup> At a human level, mental disorders are associated with profound suffering. Among 15 serious illnesses, severe depression has been ranked third in severity behind quadriplegia and being in the final year of a terminal illness.<sup>51</sup> Other costs of psychiatric disorders are documented in areas as diverse as education, housing, welfare, and the criminal justice system.<sup>48</sup>

Because of Australia's geography and population dispersion, there is growing research and policy interest in the mental health of people living in rural and remote areas (for a review of rural circumstances and climate change, see Hanna et al, this issue). Rural people live with substantial health disadvantage, most likely due to disadvantaged socioeconomic circumstances rather than to characteristics intrinsic to the rural setting.<sup>13</sup> This is not surprising, with the relationship between material hardship and poor mental health having long been documented.<sup>52,53</sup>

Significantly, most Australian farms are still family businesses,<sup>54</sup> so there are intergenerational implications with deterioration in economic conditions in rural areas over time associated with depression and demoralization among both parents<sup>55</sup> and children.<sup>56</sup> Mental health problems also place a great burden, financially and emotionally, on carers, some of whom are children: growing up in families with a parent with mental health problems confers a significantly increased risk of developing mental health problems or disordered behavior, both contemporaneously, as children and into adulthood.<sup>57</sup> This has implications for adaptation policy, which must take account of child and lifecourse development, family functioning, and intergenerational dynamics.<sup>58</sup>

## Mental Health, Drought, and Hopelessness in Rural Australia

Despite the heterogeneity of rural and remote communities, some general points apply. Vulnerability to mental health problems is highly dependent on sociodemographic factors,<sup>28</sup> including sex, age-group, and occupational classification.<sup>8</sup> Rural Australians experience very high levels of disadvantage,<sup>28</sup> and their disadvantage is strongly related to their physical and mental health.<sup>28,59</sup> They endure substantial inequality of psychiatric service provision, as well as difficulty and disproportionate expense in accessing these services.<sup>60</sup> Many rural Australians feel socially and politically marginalized.<sup>13,61,62</sup> Complicating this scenario, the mean age of the Australian farm workforce, at 58 years,<sup>10</sup> exceeds Australia's average retirement age of 52 years.<sup>63</sup> Climate change-related factors that exacerbate mental health problems will inevitably complicate the effects of cognitive decline and physical health problems that frequently accompany ageing. However, the higher average age of rural Australians may account, in part, for the findings that seem to suggest that rural Australians report *better* mental health than their urban counterparts, as the prevalence of most mental health problems declines with age.<sup>64</sup>

Drought-prone areas are chronically vulnerable to low socioeconomic status and educational attainment. Drought-related deterioration in socioeconomic circumstances in rural areas is linked to higher levels of distress and helplessness.<sup>65</sup> This is because, over time, people who are repeatedly exposed to uncontrollable negative life events learn to "give up," becoming helpless and, eventually, hopeless (Box 3), and this is strongly related to depression.<sup>66</sup> In somewhat of a contradiction, resilience has been found among farmers alongside hopelessness.<sup>30,36</sup> For example, Hogan et al<sup>42</sup> reported that while farmers and farm workers reported significantly better well-being than did nonfarmers on many aspects of life satisfaction, they also reported less hope for their future. Furthermore, although rural children (like their parents) appear to be resilient for a

**Box 3. Hopelessness and Mental Health**

Hopelessness can be defined as a system of negative expectations about one's future, coupled with a perceived inability to change these expectations (helplessness) and/or to achieve valued outcomes.<sup>68-70</sup> Clinical measures of hopelessness, such as the Beck Hopelessness Scale,<sup>68</sup> reflect a multidimensional view of hopelessness, including lack of agency ("I might as well give up because I can't make things better for myself"), an inability to imagine the future ("the future seems vague and uncertain to me"), and pessimism ("there's no use in trying to get something I want because I probably won't get it"). In this context, people experiencing hopelessness believe they will "never get well" and "have nothing to look forward to."<sup>68</sup> Hopelessness has been called a subtype of depression ("hopelessness depression"<sup>69</sup>), seen as the end result of a chain of negative inferences and feelings regarding particular life events. Prolonged hopelessness is prospectively linked to depression, substance misuse, other mental health issues, physical illness, and even suicide.<sup>68,70-75</sup> Notably, it has been identified as a significant predictor of suicide-related ideation.<sup>70,74</sup> In community samples, hopelessness in the form of pessimism has been associated with negative mood, low social support, and use of avoidant coping strategies for stress.<sup>75</sup>

**Box 4. Suicide**

Best estimates suggest suicides account for about 1.6% of all cause mortality,<sup>76</sup> around 80% occurring among men<sup>76</sup> and accounting for more than 5% of male fatal disease burden.<sup>47</sup> Male suicide rates are higher in rural and remote areas than in metropolitan areas, and disproportionately elevated rates of suicide are found among Aboriginal Australians in some states and territories.<sup>76</sup> Australian studies have shown men in farming occupations have higher rates of suicide compared with the wider rural population or men nationally.<sup>77,78</sup>

time to many of the adverse mental health effects of drought, with prolonged exposure, they also begin to give up hope.<sup>56</sup> Patel<sup>67</sup> has offered a possible explanation proposing that, in the face of limited options, many farmers have little choice but to persist with (and even invest further in) their current farming endeavor in the hope of trading their way out of their current situation. Such persistence may be confused with resilience. Whatever the explanation, lack of hope for the future among farmers and their children, despite apparently high levels of general life satisfaction and resilience, is a salient finding because hopelessness is prospectively linked to depression, even suicide (Boxes 3 and 4).

Hopelessness among farmers may be related to their concerns about the viability of their businesses: self-assessed financial viability is strongly predictive of farmer health.<sup>44</sup> In the Kenny report, some 45% of farmers reported that they did not consider themselves financially viable based on their financial performance for the past 5 years.<sup>41</sup>

**Stoicism and Help-Seeking Among Farmers**

The links between climate change, rural decline, hopelessness, and mental health are of continuing serious concern partly because of norms of stoical behavior among farmers and consequent lack of help-seeking. This has bearing on the choice of, and likely effectiveness of, community-level and household-level interventions, to lessen the risks to mental health from climate change

and its sequelae. Help-seeking is acknowledged to be important to successfully managing and recovering from mental health problems<sup>79,80</sup> and doing so promptly is especially relevant to prevention and early intervention.

Reluctance to acknowledge mental health problems is common, and although not unique to men or to rural Australia,<sup>81</sup> mental health stigma is widely reported among rural and remote-dwelling Australians.<sup>82</sup> For many farming men, drought-related adversity and vulnerability have been reported as threats to their sense of masculinity,<sup>13,36,83</sup> identity as a farmer,<sup>83</sup> or traditional role.<sup>83</sup> Some studies have linked stoicism to reluctance among farmers (particularly older farmers) to seek financial aid<sup>13</sup> and to increased social isolation<sup>36</sup> and a need to maintain an appearance of coping or self-reliance.<sup>84</sup> Recently, stoicism has been linked to lower quality of life, especially among rural Australian men, and to a general reluctance to seek help instead relying on oneself.<sup>85</sup>

In a study of drought-affected South Australian citrus farmers, self-reliance, social image, and lack of knowledge were all barriers to help-seeking.<sup>27</sup> An international review of rural literature also found stoicism, self-efficacy, and stigma created barriers to seeking professional help for mental health problems.<sup>86</sup> Many other factors in the rural and remote context also contribute to inhibited help-seeking. Sociodemographic and economic circumstances (eg, poverty), type and severity of mental health problem,<sup>86</sup> and limited accessibility and availability of appropriate services<sup>87</sup> all play a part. Thus, rural sociocultural factors have been associated with inhibited help-seeking, especially for mental health problems.<sup>83-87</sup> Furthermore, differences in farmer and nonfarmer attitudes toward help-seeking, mental health, and resilience might explain higher suicide rates among farmers.<sup>88</sup>

Importantly, some of the contradictory findings regarding farmers' mental health and well-being might be due to the failure of studies to account for heterogeneity among farmers. Farmers are a diverse population group comprising older Australians, women, Aboriginal and Torres Strait Islander peoples, and many different types of farming roles and tenure. A recent study investigating factors associated with Australian farmers' climate change-related adaptation used cluster analytic techniques to define and describe 3 different types of farmers: cash poor long-term adaptors, comfortable nonadaptors, and transitioners.<sup>44</sup> The study found systematic inequality in the on-farm conditions, number and range of farming-related pressures, distribution of resources, and access to services among the 3 types of farmers. The most disadvantaged group, the transitioners, also reported the poorest health, whereas the comfortable nonadaptors, who were the most advantaged group, reported few health problems.

## The State of the Science and Further Research Questions

Although there is a growing literature on farmers' circumstances, rurality, and possible links to mental health, currently there is inconclusive evidence for the proposition that (all) farmers have elevated rates of mental health problems, even in the face of extreme adversities. It is apparent that Australian farmers are resilient, but it is not evident what makes them so, or why they report substantial satisfaction in many domains of life and simultaneously report feeling hopeless. Further research needs both to investigate specific mental disorders (particularly the common disorders, such as anxiety and depression) alongside resilience and *good* mental health. Studies comparing farmers' mental health *and* well-being to that of other Australians would help elucidate these matters, as would investigating which climate change-related and other key health determinants are linked to their health outcomes, good and bad. Overall, it is still not clear whether some or all farmers have worse or better mental health than other Australians and, if so, to which climate change-related social, economic, demographic, and farm factors this may be attributed.

Additional topics that need to be examined to elucidate patterns of risk to mental health and to facilitate the choice of supportive or adaptive strategies include the following:

1. The prevalence of depression, anxiety, psychological distress, legal (alcohol and tobacco) substance misuse, hopelessness, happiness, and life satisfaction among Australian farmers.
2. Assessment of whether the prevalence of any of these mental health problems or indicators of well-being is greater or lesser among farmers than it is compared with the general population and other rural residents.
3. Climate change–related (if any) social and community, economic, demographic, and farm factors associated with mental health problems or indicators of well-being
4. The prevalence of mental health problems or indicators of well-being by type of farm, type of farmer, or type of climate factor.
5. The intergenerational transmission of disadvantage and its mental health consequences among farming populations.
6. The effects of climate change–related adversity on children and young people. As most mental disorders emerge during youth, the impact of climate-related hardship during this vulnerable life stage requires special consideration.
7. The consequences of climate change for casual farm workers. These workers, who are disproportionately Aboriginal,<sup>89</sup> experience considerable financial pressure as they are first to lose their jobs in times of economic downturn on farms.

## Conclusion

A great deal rests on the success and well-being of Australian farmers and there are clear and credible signs that their health and well-being may be compromised by climate change–related adversity. Drought, economic hardship, and out-migration (especially of the young) has left an aging farm population, altered the social structure of many rural communities,<sup>36</sup> and had an adverse impact on personal and community morale.<sup>30</sup> Additional climate change–related pressures facing farmers<sup>10</sup> exacerbate the stresses inherent in farming.<sup>62,90</sup> Farmers' poor sense of future is of considerable concern because of its possible links to hopelessness and suicide. While it is tempting to rush to causal inferences and, hence, policy interventions, we argue that farmers' mental health status, and its relationship to climate change–related factors, cannot be assumed but must be empirically studied. Emerging findings suggest that mental health problems might *not* be elevated among farmers as a group, relative to the general population—though averaged survey scores may mask systematic variation between types of farmer. Finally, the levels and sources of farmers' resilience must be considered, along with their place- and occupation-based vulnerability. The general population may have much to learn from rural Australia about maintaining well-being in the face of adversity.

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## References

1. Hennessy K, Fawcett R, Kirono D, et al. *An Assessment of the Impact of Climate Change on the Nature and Frequency of Exceptional Climatic Events*. Canberra, Australia: Bureau of Meteorology, Commonwealth of Australia; 2008.
2. Bi P, Parton KA. Effect of climate change on Australian rural and remote regions: what do we know and what do we need to know? *Aust J Rural Health*. 2008;16:2-4.
3. McMichael AJ, Friel S, Nyong A, Corvalan C. Global environmental change and health: impacts, inequalities, and the health sector. *BMJ*. 2008;336:191-194.
4. Berry HL, Kelly BJ, Hanigan IC, et al. *Rural Mental Health Impacts of Climate Change*. Canberra, Australia: Australian National University; 2008. (Commissioned report for the Garnaut Climate Change Review)
5. Price L. Rural taboo—talking about suicide and depression. *Country Hour—ABC Rural Victoria*. March 17, 2010.
6. ABARE Outlook Opening Address. *ABARE Outlook Conference*. Canberra, Australia: National Convention Centre; 2010.
7. Kelly BJ, Stain HJ, Coleman C, et al. Mental health and well-being within rural communities: the Australian Rural Mental Health Study. *Aust J Rural Health*. 2010;18:16-24.
8. Fragar L, Stain HJ, Perkins D, et al. Distress among rural residents: does employment and occupation make a difference? *Aust J Rural Health*. 2010;18:25-31.
9. Australian Bureau of Statistics. *Median Weekly Income by Industry of Employment—2006 Census of Population and Housing*. Canberra, Australia: Australian Bureau of Statistics; 2008.
10. Drought Policy Review Expert Social Panel. *It's About People: Changing Perspectives on Dryness—A Report to Government by an Expert Social Panel on Dryness*. Canberra, Australia: Commonwealth of Australia; 2008.
11. Australian Bureau of Statistics. *Yearbook Australia 2004—Economic Impact of Drought in 2002-03*. Canberra, Australia: Australian Bureau of Statistics; 2004.
12. Carroll N, Fritjers P, Shields MA. Quantifying the costs of drought: new evidence from life satisfaction data. *J Popul Econ*. 2007;20:445-461.
13. Alston M, Kent J. *Social Impacts of Drought: A Report to NSW Agriculture*. Wagga Wagga, Australia: Centre for Rural Social Research, Charles Sturt University; 2004.
14. Edwards B, Gray M, Hunter B. A sunburnt country: the economic and financial impact of drought on rural and regional families in Australia in an era of climate change. *Aust J Labour Dyn*. 2009;12:109-131.
15. ABARE. *Australian Farm Survey Results 2005-06 to 2007-08*. Canberra, Australia: Commonwealth of Australia; 2008.
16. Stehlik D, Gray I, Lawrence G. *Drought in the 1990s: Australian Farm Families' Experiences*. Kingston, Australia: Rural Industries Research and Development Corporation, Resilient Agricultural Systems Research and Development; 1999.
17. Australian Bureau of Statistics. *Labour Force, Australia, Detailed Quarterly*. Canberra, Australia: Australian Bureau of Statistics; 2008.
18. Australian Government Culture Portal. *Australian farms and farming communities*. Canberra, Australia: Commonwealth Government; 2008.
19. Australian Bureau of Statistics. *ABS Agriculture Statistics Collection Strategy—2008-09 and Beyond*. Canberra, Australia: Australian Bureau of Statistics; 2008.
20. CSIRO. *CSIRO and Food Production: Securing Our Food Future*. Clayton, Australia: CSIRO; 2009.
21. Department of Foreign Affairs and Trade. *Agriculture and the WTO*. Canberra, Australia: Commonwealth Government; 2010.

22. National Climate Centre. *Special Climate Statement 17: The exceptional January-February 2009 Heatwave in South-eastern Australia*. Melbourne, Australia: Bureau of Meteorology; 2009.
23. Bureau of Meteorology. *Drought Statement: Rainfall Deficits Ease Across Eastern Australia but Worsen in the West*. Canberra, Australia: Bureau of Meteorology; March 4, 2010.
24. Berry HL, Bowen K, Kjellstrom T. Climate change and mental health: a causal pathways framework. *Int J Public Health*. 2010;55:123-132.
25. Speldewinde PC, Cook A, Davies P, Weinstein P. A relationship between environmental degradation and mental health in rural Western Australia. *Health Place*. 2009;15:880-887.
26. ABARE. *Australian Farm Survey Results 2006-07 to 2008-09*. Canberra, Australia: Commonwealth of Australia; 2009.
27. Staniford AK, Dollard MF, Guerin B. Stress and help-seeking for drought-stricken citrus growers in the Riverland of South Australia. *Aust J Rural Health*. 2009;17:147-154.
28. Smith KB, Humphreys JS, Wilson MGA. Addressing the health disadvantage of rural populations: how does epidemiological evidence inform rural health policies and research? *Aust J Rural Health*. 2008;16:56-66.
29. Allan J. Determinants of mental health and well-being in rural communities: do we understand enough to influence planning and policy? *Aust J Rural Health*. 2010;18:3-4.
30. Sartore G, Kelly B, Stain HJ, Albrecht G, Higginbotham N. Control, uncertainty, and expectations for the future: a qualitative study of the impact of drought on a rural Australian community. *Rural Remote Health*. 2008;8:950.
31. Berry HL, Welsh JA. Social capital and health in Australia: an overview from the Household Income and Labour Dynamics in Australia Survey. *Soc Sci Med*. 2010;70:588-596.
32. Beard JR, Tomaska N, Earnest A, Summerhayes R, Morgan G. Influence of socioeconomic and cultural factors on rural health. *Aust J Rural Health*. 2009;17:10-15.
33. Alston M. "It's really not easy to get help": services to drought-affected families. *Aust Social Work*. 2007;60:421-435.
34. Fraser C, Jackson H, Judd F, et al. Changing places: the impact of rural restructuring on mental health in Australia. *Health Place*. 2005;11:157-171.
35. Crimp S, Howden M, Power B, Wang E, De Voil P. *Global Climate Change Impacts on Australia's Wheat Crops: Garnaut Climate Change Review*. Canberra, Australia: CSIRO Sustainable Ecosystems; 2008.
36. Hossain D, Eley R, Coutts J, Gorman D. Mental health of farmers in Southern Queensland: issues and support. *Aust J Rural Health*. 2008;16:343-348.
37. Australian Bureau of Statistics. *National Survey of Mental Health and Wellbeing: Summary of Results*. Canberra, Australia: Australian Bureau of Statistics; 2008.
38. Kessler RC, Andrews G, Colpe LJ, et al. Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychol Med*. 2002;32:959-976.
39. Wainer J, Chesters J. Rural mental health: neither romanticism nor despair. *Aust J Rural Health*. 2000;8:141-147.
40. Berry HL, Shipley M. *Longing to Belong: Personal Social Capital and Psychological Distress in an Australian Coastal Region*. Canberra, Australia: Commonwealth of Australia; 2009.
41. Hogan A, Hanslip M, Kancans R, Russell J, Maguire B. *Climate Risk and Adaptation Among Primary Producers: Topline Results Focusing on Primary Producers Reporting the Effects of Adverse Seasonal Conditions*. Canberra, Australia: Bureau of Rural Sciences; 2008.
42. Hogan A, Polidano C, Russell J, Stakelum P. *The Social Wellbeing of Rural Australians: An Analysis of the Household, Income and Labour Dynamics in Australia (HILDA) Longitudinal Dataset*. Canberra, Australia: Bureau of Rural Sciences; 2008.
43. International Wellbeing Group. *Personal Wellbeing Index*. 4th ed. Melbourne, Australia: Australian Centre on Quality of Life, Deakin University; 2006.

44. Hogan A, Berry HL, Ng SP, Bode A. *Farmers' Climate Change-Related Decision-Making*. Canberra, Australia: Australian National University; 2010.
45. Crystal JA. Study finds drought, mental health link. *Sydney Morning Herald*. July 9, 2009.
46. Prince M, Patel V, Saxena S, et al. No health without mental health. *Lancet*. 2007;370:859-877.
47. Begg S, Vos T, Barker B, Stevenson C, Stanley L, Lopez A. *The Burden of Disease and Injury in Australia 2003*. Canberra, Australia: Australian Institute of Health and Welfare; 2003.
48. Ingoglia CS. Caring for persons with mental illness: making policy decisions that are truly cost-effective. *Drug Benefit Trends*. 2003;15:5.
49. Australian Bureau of Statistics. *Mental Health in Australia: A Snapshot, 2004-05*. Canberra, Australia: Australian Bureau of Statistics; 2005.
50. Australian Institute of Health and Welfare. *Mental Health Services in Australia 2007-08*. Canberra, Australia: Australian Institute of Health and Welfare; 2010. (Mental Health Series No. 12)
51. Schwarzsinger M, Stouthard M, Burstrom K, Nord E. Cross-national agreement on disability weights: the European Disability Weights Project. *Popul Health Metr*. 2003;1:9.
52. Faris RE, Dunham HW. *Mental Disorders in Urban Areas: An Ecological Study of Schizophrenia and Other Psychoses*. Chicago, IL: University of Chicago Press; 1939.
53. Elder GH. Time, human agency, and social change: Perspectives on the life course. *Soc Psychol Q*. 1994;57:4-15.
54. Australian Bureau of Statistics. *Australian Social Trends*. Canberra, Australia: Australian Bureau of Statistics; 2003.
55. Conger RD, Conger KJ, Elder GH, Lorenz FO, Simons RL, Whitbeck LB. A family process model of economic hardship and adjustment of early adolescent boys. *Child Dev*. 1992;63:526-541.
56. Dean JG, Stain HJ. Mental health impact for adolescents living with prolonged drought. *Aust J Rural Health*. 2010;18:32-37.
57. Hinshaw SP. Parental mental disorder and children's functioning: silence and communication, stigma and resilience. *J Clin Child Adolesc Psychol*. 2004;33:400-411.
58. Berry HL, George E, Rodgers B, Butterworth P, Caldwell TM. *Intergenerational Transmission of Reliance on Income Support: Psychosocial Factors and Their Measurement*. Canberra, Australia: Commonwealth Government; 2007. (Social Policy Research Paper No. 31)
59. Phongsavan P, Chey T, Bauman A, Brooks R, Silove D. Social capital, socio-economic status and psychological distress among Australian adults. *Soc Sci Med*. 2006;63:2546-2561.
60. Iacono T, Davis R, Humphreys J, Chandler N. GP and support people's concerns and priorities for meeting the health care needs of individuals with developmental disabilities: a metropolitan and non-metropolitan comparison. *J Intellect Dev Disabil*. 2003;28:353-368.
61. Fragar L, Page A. Suicide in Australian farming 1988-1997. *Aust N Z J Psychiatry*. 2002;36:81-85.
62. Fraser C, Judd F, Jackson H, Murray G, Humphreys JS, Hodgins G. Does one size really fit all? Why the mental health issues of rural Australia requires further research. *Aust J Rural Health*. 2002;10:288-295.
63. Australian Bureau of Statistics. *Retirement and Retirement Intentions, Cat. No. 6238.0*. Canberra, Australia: Australian Bureau of Statistics; 2008.
64. Slade T, Johnston A, Teesson M, et al. *The Mental Health of Australians 2: Report on the 2007 National Survey of Mental Health and Well-being*. Canberra, Australia: Department of Health and Ageing; 2009.
65. Coelho A, Adair J, Mocellin J. Psychological responses to drought in northeast Brazil. *Interam J Psychol*. 2004;38:95-103.
66. Seligman MEP. *Learned Optimism*. New York, NY: Random House; 1991.
67. Patel R. *Stuffed and Starved: Markets, Power and the Hidden Battle for the World's Food System*. London, England: Portobello Books; 2007.
68. Beck AT, Weissman A, Lester D, Trexler L. Measurement of pessimism: Hopelessness Scale. *J Consult Clin Psychol*. 1974;42:861-865.

69. Abramson LY, Alloy LB, Metalsky GI. Hopelessness depression: a theory-based subtype of depression. *Psychol Rev.* 1989;96:358-372.
70. Neufeld E, O'Rourke N. Impulsivity and hopelessness as predictors of suicide-related ideation among older adults. *Can J Psychiatry.* 2009;54:684-692.
71. Beck AT, Brown G, Berchick RJ, Stewart BL, Steer RA. Relationship between hopelessness and ultimate suicide—a replication with psychiatric outpatients. *Am J Psychiatry.* 1990;147:190-195.
72. Ivanoff A, Jang SJ, Smyth NJ, Linehan MM. Fewer reasons for staying alive when you are thinking of killing yourself—the Brief Reasons for Living Inventory. *J Psychopathol Behav Assess.* 1994;16:1-13.
73. Aguilar EJ, Haas G, Manzanera FJ, et al. Hopelessness and first-episode psychosis: a longitudinal study. *Acta Psychiatr Scand.* 1997;96:25-30.
74. Britton PC, Duberstein PR, Conner KR, Heisel MJ, Hirsch JK, Conwell Y. Reasons for living, hopelessness, and suicide ideation among depressed adults 50 years or older. *Am J Geriatr Psychiatry.* 2008;16:736-741.
75. Steptoe A, O'Donnell K, Marmot M, Wardle J. Positive affect and psychosocial processes related to health. *Br J Psychol.* 2008;99:211-227.
76. Australian Bureau of Statistics. *Suicides, Australia, 1995-2005 (3309.0)*. Canberra, Australia: Australian Bureau of Statistics; 2007.
77. Fraser CE, Smith KB, Judd F, Humphreys JS, Fragar LJ, Henderson AS. Farming and mental health problems and mental illness. *Int J Soc Psychiatry.* 2005;51:340-349.
78. Page A, Fragar L. Suicide in Australian farming, 1988-1997. *Aust N Z J Psychiatry.* 2002;36:81-85.
79. Rickwood DJ, Deane FP, Wilson CJ. When and how do young people seek professional help for mental health problems? *Med J Aust.* 2007;187(7, suppl):S35-S39.
80. Rickwood DJ, Deane FP, Wilson CJ, Ciarrochi J. Young people's help-seeking for mental health problems. *Aust e-J Adv Mental Health.* 2005;4(3, suppl). [http://www.mentalhealthvic.org.au/index.php?id=142&tx\\_ttnews%5Btt\\_news%5D=11&cHash=0357ce71565b38a6cc23ec3decfd7d36](http://www.mentalhealthvic.org.au/index.php?id=142&tx_ttnews%5Btt_news%5D=11&cHash=0357ce71565b38a6cc23ec3decfd7d36) Accessed 24 March 2010.
81. Sartorius N. Stigma and mental health. *The Lancet.* 2007;370(9590):810-11.
82. Judd F, Jackson H, Fraser C, Murray G, Robins G, Komiti A. Understanding suicide in Australian farmers. *Soc Psychiatry Psychiatr Epidemiol.* 2006;41:1-10.
83. Alston M, Kent J. The Big Dry: the link between rural masculinities and poor health outcomes for farming men. *J Sociol.* 2008;44:133-147.
84. Alston M. "I'd like to just walk out of here": Australian women's experience of drought. *Sociol Ruralis.* 2006;46:154-170.
85. Murray G, Judd F, Jackson H, et al. Big boys don't cry: an investigation of stoicism and its mental health outcomes. *Pers Individ Dif.* 2008;44:1369-1381.
86. Jackson H, Judd F, Komiti A, et al. Mental health problems in rural contexts: What are the barriers to seeking help from professional providers? *Aust Psychol.* 2007;42:147-160.
87. Judd F. Progressing the agenda for rural mental health research. *Rural Remote Health.* 2006;6:615.
88. Judd F, Cooper AM, Fraser C, Davis JT. Rural suicide—people or place effects? *Aust N Z J Psychiatry.* 2006;40:208-216.
89. Rodriguez VB, Puangsumalee P, Griffiths G. *Indigenous People Working in Agriculture, Fisheries and Forestry*. Canberra, Australia: ABARE; 2006.
90. Fragar L, Kelly B, Henderson A, Tonna A, Peters M. Partnerships to promote mental health of NSW farmers—the New South Wales Farmers Blueprint for Mental Health. *Aust J Rural Health.* 2008;16:170-175.