

Drought-related stress among farmers: findings from the Australian Rural Mental Health Study

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The known Stress among farmers is influenced by drought and a range of socio-demographic and community factors that exacerbate stress related to their occupation and rural context.

The new The incidence of drought-related stress was higher among farmers who were younger, living and working on a farm, located in geographically remote areas, and experiencing financial hardship.

The implications Clarifying the relationship between drought, drought-related stress, and factors that modulate this stress will create opportunities for promoting adaptation by rural populations to climate adversity and for improving mental health support by general practitioners for farmers experiencing drought-related stress.

Drought and other extreme climate events threaten public health around the world.¹ The biophysical impacts of drought are intertwined with social and structural factors, exposing different social and demographic groups in diverse geographic locations to a variety of risks and sensitivities.² Australian rural communities are vulnerable to the socio-economic impacts of drought because they rely on primary production and water-intensive industries,^{3,4} as well as to the health effects associated with difficulties in accessing health care.⁵

Prolonged drought may pose risks to both physical and mental health.¹ Specific rural occupational health risks (eg, financial hardship) and moderating socio-demographic factors (eg, social capital) have been identified,¹ as well as the impact of drought on social networks,⁶ which have been identified as being key modulators of mental health in rural communities,⁷ including among people in farming.⁸ Associations between suicide in rural areas and drought,⁹ socio-economic hardship,¹⁰ and financial strain among farmers¹¹ have been reported. One investigation of the 2001–2007 Victorian drought did not detect such an association, but was limited by its short duration and the small number of relevant cases; its author suggested that drought should still be considered a suicide risk factor for farmers.¹² Drought has also been linked with reduced help-seeking behaviour and unemployment.¹³

Moderate to high psychological distress among farmers,¹⁴ including drought as a source of stress,¹⁵ has been reported. One study,¹⁴ while acknowledging that a large proportion of the farming population are men, did not specifically examine sex as a factor. The association between drought and mental health in women in drought-affected areas is not well researched.¹⁶

Quantifying the impact of drought on the mental health of farmers and the factors mediating these effects are largely unexplored. Few epidemiological studies have examined specific drought characteristics as predictors of mental health outcomes,¹⁷ particularly in

Abstract

Objectives: To investigate general and drought-related stress experienced by farmers at both the personal and community levels, and whether socio-demographic and community factors influence this stress.

Design: Multivariate analysis of data from the Australian Rural Mental Health Study (ARMHS), a longitudinal cohort study (2007–2013).

Setting: Non-metropolitan New South Wales.

Participants: Subset of 664 ARMHS participants (at baseline) who identified as living or working on a farm.

Main outcome measures: Personal drought-related stress (PDS), community drought-related stress (CDS), and general psychological distress (K10 score).

Results: Farmers who were under 35, both lived and worked on a farm, experienced greater financial hardship, and were in outer regional, remote or very remote NSW reported PDS particularly frequently. Of these factors, only being under 35 and increased remoteness were associated with higher incidence of CDS. Mild wet weather during the prior 12 months reduced PDS and CDS but increased general distress. Moderate or extreme wet weather did not affect PDS or general distress, but moderate wet weather was associated with increased CDS. Drought-related stress and general psychological distress were influenced by different socio-demographic and community factors.

Conclusions: Farmers in NSW experience significant stress about the effects of drought on themselves, their families, and their communities. Farmers who are younger, live and work on a farm, experience financial hardship, or are isolated are at particular risk of drought-related stress. Medical practitioners who provide assistance to farmers and farming communities can contribute to initiatives that relieve stress about drought.

farming populations. Additionally, there has been little empirical research into the effects of long term climatic extremes such as drought, as investigations are usually focused on short term events such as floods and bushfires.

We therefore analysed data from the Australian Rural Mental Health Study (ARMHS), a longitudinal cohort investigation of the determinants of mental health in non-metropolitan New South Wales. Data were collected during 2007–2013, a period that included the Millennium Drought (1997–2010), which caused severe environmental, social, and economic losses.¹⁸

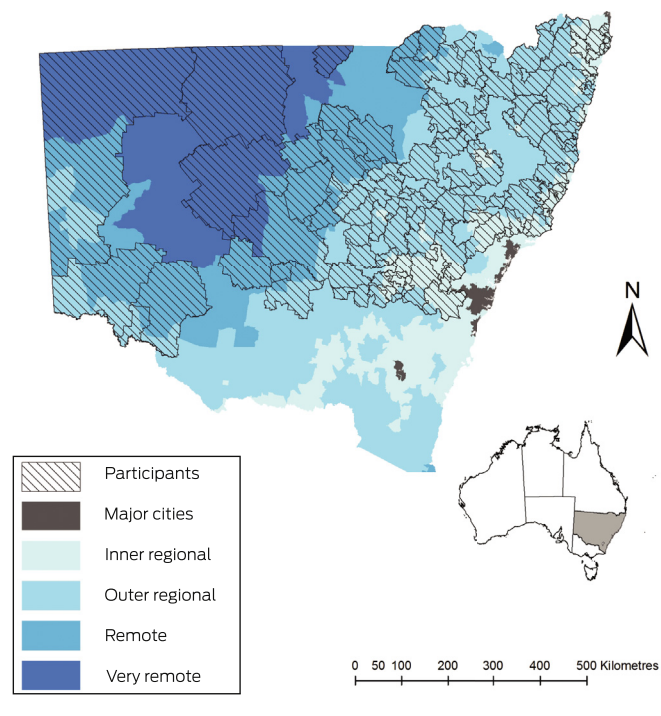
Our aim was to explore general and drought-related stress experienced by farmers at both the personal and community levels, and to establish whether socio-demographic and community factors influence this stress. The ARMHS dataset provides a unique resource for examining these factors, as data on a range of rural-

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Published online 30/07/2018

Podcast with Emma Austin and David Perkins available at <https://www.mja.com.au/podcasts>

1 Location of the study participants by postcode and Australian Standard Geographic Classification remoteness class



specific personal, social and community factors were collected repeatedly during a period that included both dry and wet conditions. Our study built on previous analyses of cross-sectional data that assessed the perceived community and personal impacts of drought longitudinally.⁸

Methods

Setting and participants

The ARMHS was conducted in non-metropolitan NSW as defined by the Australian Standard Geographic Classification (ASGC) using Accessibility/Remoteness Index of Australia (ARIA+) (Box 1).¹⁹ There were four waves of data collection during January 2007 – August 2013. Follow-ups at 1, 3 and 5 years consisted of single surveys, with an additional Water and Climate survey at 3 years. Three of the four ARMHS waves that included drought-related stress measures were analysed (baseline, 3- and 5-year follow-ups).

The study population comprised the subset of ARMHS participants who lived or worked on a farm (“farmers”). Living on a farm was determined by asking, “Do you currently live on a farm?” Participants were deemed to work on a farm if their self-reported occupation was categorised by the Australian and New Zealand Standard Classification of Occupations²⁰ as “farmers and farm managers” or “farm, forestry and garden workers”. To maximise the generalisability of our findings, we back-weighted our data to adjust for the geographic distribution of farmers in Australia; that is, we gave slightly less value to inner regional and slightly more to remote and very remote areas. Participants who did not provide a postcode or who resided in a postcode outside NSW were excluded, as were those who moved to a major city between survey waves or for whom data were incomplete. Data recorded included self-reported measures of current and past physical and mental health, health service use, and common determinants of mental health.²¹

2 Measures of factors that potentially influence stress in people in rural communities

Factor	Measure
Self-reported demographic information: age, sex, marital status, employment status, education, financial position	
Self-rating of overall physical health, mental health, and relationships	Five-point Likert scale, from “poor” to “excellent”
Personality (predisposition to distress)	Validated seven-item neuroticism subscale of the Eysenck Personality Questionnaire, short form (EPQN) ⁵
Adverse life events during previous 12 months	List of Threatening Experiences ²⁴
Connectedness to the local community (feeling that members belong and are important, and that their needs will be met through their commitment to the community)	Sense of Community Index; ²⁵ Sense of Place scale ²⁶

Definition of drought

As the impacts of drought vary significantly by place and time, spatial analysis is required. Each of the four main types of drought (meteorological, agricultural, ecological and hydrological) influence environmental and socio-economic conditions in a unique manner.¹⁸ More than 100 drought indices are available, but there is no consensus about which is most appropriate for a given circumstance.²² In our investigation, we applied a simple measure of “meteorological drought”, distinguishing between wet (non-drought) and dry conditions, as all types of drought are influenced by rainfall deficiencies.¹⁸

Drought conditions were assessed by comparing rainfall during the 12 months preceding the month in which a survey was completed with the long term average (1900–2016). For example, if the participant completed the survey in March 2008, mean monthly rainfall for March 2007 – February 2008 was expressed as a proportion of the long term average for March–February. Twelve months was chosen as the window to accommodate the time between ARMHS survey waves.

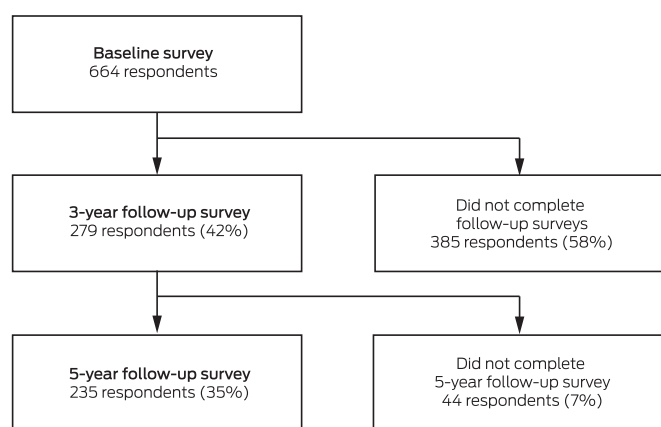
Outcome measures

The three primary outcome measures were personal drought-related stress (PDS), community drought-related stress (CDS), and general psychological distress. PDS and CDS are novel ARMHS measures developed on the basis of initial qualitative research⁶ and rural community consultation during the development of the ARMHS study. Respondents were asked to rate their level of worry or stress about drought (single Likert scale item). Those who reported experiencing worry or stress were asked to indicate whether they had experienced specific drought-linked effects related to PDS and CDS. The PDS consists of six items, the CDS of five. Scores were generated by counting the number of “yes” responses (no weighting). General psychological distress was assessed with the Kessler Psychological Distress Scale (K10),²³ a 10-item measure of general distress during the previous 4 weeks.

Further potential factors

Other potential factors — including neuroticism, adverse life events, social support, marital status, sense of community, and

3 Flow of study participants through the Australian Rural Mental Health Study waves



remoteness — relevant to the rural context and shown to contribute to drought-related stress and psychological distress were also assessed^{7,8} (Box 2).

Statistical analysis

Data were analysed in SPSS 24 (IBM). The primary method of data analysis was multivariate linear regression in the generalised estimating equations (GEE) framework. A negative binomial model with log link and multivariate adjustments was applied. This method is considered ideal for longitudinal analyses of data collected at multiple time points from the same participants.²⁷ Separate GEEs including drought and the other factors described above were calculated for each of the outcomes (PDS, CDS, K10). Exponentiated estimates from the models may be interpreted as incidence rate ratios (IRRs). Statistical significance was defined as the 95% confidence interval [CI] for the IRR not including 1.0.

Ethics approval

The study was approved by the Human Research Ethics Committee at the University of Newcastle (reference, H-145-1105a).

Results

The ARMHS sample selection process and characteristics have been reported previously.²¹ In brief, of 13 251 individuals invited to participate in the initial survey, 9681 individuals were deemed eligible; of these 2639 (from 1879 households) consented and completed the baseline survey (response rate, 27%). Our study population comprised at baseline 664 participants (473 households) who identified as living and/or working on a farm, and there were 1178 total responses across the three study waves (Box 3). Compared with participants who completed the baseline survey (Box 4), those who completed at least one follow-up survey were less likely to be aged 18–34 years (76% attrition rate; $P = 0.015$) and to work but not live on a farm (75% attrition rate; $P = 0.042$). Other demographic characteristics were statistically similar (data not shown).

The three major outcomes were found to be independent, with weak correlations between K10 scores and PDS ($r = 0.25$; $P < 0.001$) and CDS ($r = 0.17$; $P < 0.001$). The correlation between PDS and CDS was moderate ($r = 0.66$; $P < 0.001$).

4 Socio-demographic characteristics of the study participants at baseline

Characteristic	Participants
Total number of participants	664
Farm status	
Live and work	200 (28.4%)
Live	439 (67.9%)
Work	25 (3.6%)
Sex	
Women	374 (56.3%)
Men	290 (43.7%)
Age (years)	
18–34	66 (9.9%)
35–44	127 (13.1%)
45–54	161 (24.2%)
55–64	184 (27.7%)
65 or older	126 (19.0%)
Employment	
Employed/home duties/studying	540 (80.5%)
Unemployed/unable to work	24 (3.9%)
Retired	100 (15.6%)
Financial security	
Prosperous/very comfortable	86 (15%)
Reasonably comfortable	371 (49.0%)
Just getting along/poor/very poor	207 (36.0%)
Education	
Completed school	
Partial schooling	182 (27.4%)
Completed high school or higher	451 (67.9%)
Unknown	31 (4.7%)
Marital status	
Married/de facto	547 (82.5%)
Separated/divorced	37 (5.6%)
Widow	28 (4.1%)
Never married	52 (7.8%)
Remoteness (Australian Standard Geographic Classification)	
Inner regional	276 (41.6%)
Outer regional	323 (48.6%)
Remote	49 (7.4%)
Very remote	16 (2.4%)

The proportions of participants who experienced elements of PDS or CDS are shown in Box 5. Those who both lived and worked on a farm reported higher PDS (IRR, 1.50; 95% CI, 1.32–1.72) than those who only lived or only worked on a farm (Box 6); the differences for CDS and K10 were not significant. Our findings were similar for both unweighted and back-weighted data.

In the weighted model, the incidence of PDS was lower following mild wet periods (compared with average rainfall: IRR, 0.85; 95% CI, 0.73–0.99) and that of psychological distress was higher (IRR, 1.65; 95% CI, 1.01–2.69). The incidence of CDS was significantly increased by moderate dry (IRR, 1.26; 95% CI, 1.05–1.50)

5 Proportions of participants who experienced items of personal or community drought-related stress

Personal drought-related stress (PDS)

Has drought had any of these effects on you and your family?

Money/financial pressures	602 (57.3%)
Business pressures	522 (49.4%)
Loss of contact with friends	173 (16.4%)
Not going out as much	357 (33.9%)
More work to do	535 (50.7%)
Less time for family	295 (28.1%)
PDS score,* mean (SD)	2.1 (2.4)

Community drought-related stress (CDS)

Has drought had any of these effects on the district where you live?

People leaving the area	497 (45.2%)
Losing business and services in town	509 (46.0%)
Not getting together as much	392 (35.6%)
Countryside has changed	667 (60.2%)
Reduced water quality	483 (43.8%)
CDS score,* mean (SD)	1.9 (2.3)

SD = standard deviation. * Individual items were summed to give total scores. ♦

and moderate wet weather (IRR, 1.27; 95% CI, 1.03–1.57), and reduced by mild wet weather (IRR, 0.84; 95% CI, 0.72–0.97) (Box 6). Postcode areas in which average CDS was equal to or above the average (2.5) for total CDS by drought condition are depicted in the online Appendix, figure 1. No participants experienced “extreme dry” conditions during the study period.

Sex was not significantly related to drought-related stress, but men experienced significantly greater psychological distress. In contrast, 18–34-year-old farmers reported higher PDS and CDS scores than older respondents. The incidence of psychological distress was also significantly lower for participants aged 55 or more (Box 6).

The incidence of PDS was lower among retired than employed participants, and both PDS and psychological distress were lower among “prosperous” or “very comfortable” participants than for less financially secure respondents. Having experienced 4–6 adverse life events was associated with greater PDS, CDS and psychological distress. Never having married was associated with less PDS (Box 6).

Compared with inner regional areas, PDS was greater for participants in outer regional (IRR, 1.88; 95% CI, 1.59–2.23), remote (IRR, 2.02; 95% CI, 1.65–2.48) and very remote (IRR, 2.55; 95% CI, 1.97–3.30) areas. Similarly, CDS was greater in outer regional (IRR, 2.05; 95% CI, 1.76–2.38), remote (IRR, 2.17; 95% CI, 1.83–2.58) and very remote (IRR, 2.80; 95% CI, 2.26–3.47) areas than in inner regional areas, but general psychological distress was not influenced by remoteness (Box 6). Postcode areas in which average CDS was equal to or above the average (2.5) for total CDS are depicted by remoteness class in online Appendix, figure 2. Sense of place and of community did not influence PDS or CDS, but greater sense of community was associated with reduced general distress.

Higher trait neuroticism was associated with greater psychological distress, while good, very good or excellent overall mental health and relationships were associated with lower general distress (Box 6).

Discussion

Farmers who were under 35, both lived and worked on a farm, experienced greater financial hardship, and were in outer regional, remote or very remote NSW more frequently reported drought-related stress. This stress included worry about the impacts of drought on themselves and on their families and communities, and was influenced by socio-demographic and community factors that were different from the factors that influenced the incidence of general psychological distress. An earlier analysis of baseline cross-sectional ARMHS data found that only 9.8% of respondents in areas of high drought exposure with high levels of drought-related concerns had high K10 scores.⁸

Young people in rural communities are a vulnerable group with regard to mental health. It has been reported²⁷ that unemployed young people in rural and remote NSW were 12 times as likely to experience distress as employed people of the same age after controlling for financial security, sex, and relationship status. Younger people in rural areas are more likely to experience constriction of their social network as peers relocate for employment and educational opportunities.²⁸ Our findings underscore the importance of employment and social networks as protective factors for farmers in drought-affected areas. Understanding the relationship between drought, distress, and young people will enable programs and initiatives for promoting mental health among farmers to be targeted.

Moderately dry, mild dry, and moderately wet conditions were related to higher incidence of CDS, while mild wet conditions were associated with greater incidence of all three outcomes. The association between higher levels of drought-related stress and wet conditions is possibly related to much of the study area receiving high rainfall during September–November 2010, and suggests drought-related stress persists beyond the end of the drought.

The incidence of PDS was significantly greater for farmers who both lived and worked on a farm than for those who only worked or lived on one. For farmers, work and home are intimately linked, and drought adds another layer of complexity to their occupational, financial, community and personal stressors. The influence of adverse life events on PDS and CDS is consistent with drought compounding existing stress or contributing to adverse events — such as illness or injury to oneself or a close relative, marital separation, unemployment, and major financial crisis³ — by causing financial hardship, relationship strain, and risk of injury related to taking on physical tasks following the loss of other farm workers.⁶

Isolation further complicates the rural experience, with increased remoteness related to higher incidence of PDS and CDS. Remote areas experience drought more frequently than urban areas, as well as facing greater challenges related to water availability.^{3,4,18} Remoteness also affects the social networks that are essential for resilience and capacity building.¹⁵

Lower financial security was associated with higher incidence of PDS. Rural areas are experiencing increased demand for social security support,³ but many people do not seek financial assistance because of the perceived stigma associated with support and their qualities of resilience and stoicism. In the course of previous studies in rural and remote areas,^{3,4} we consistently heard that reduced financial security, lower resilience, and the pressures of family and relationships had a greater impact on younger and newer farmers.

Our findings regarding the differences in factors that influence PDS, CDS and general distress confirm previous cross-sectional analyses of baseline drought items data;⁸ that is, drought-related

6 Socio-demographic and drought conditions affecting drought-related stress and general psychological distress in farmers in rural New South Wales

	Personal drought-related stress		Community drought-related stress		Psychological distress (K10)	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)
Farmer status						
Live on farm	1	1	1	1	1	1
Work on farm	0.99 (0.67–1.48)	0.90 (0.62–1.3)	1.11 (0.80–1.52)	1.03 (0.77–1.38)	1.31 (0.34–5.08)	1.24 (0.37–4.13)
Live and work on farm	1.55 (1.35–1.78)	1.50 (1.32–1.72)	1.08 (0.94–1.24)	1.06 (0.93–1.21)	1.13 (0.64–2.00)	1.21 (0.70–2.10)
Drought condition (rainfall during 12 months prior to survey as proportion of long term average [1900–2016])						
Moderate dry (> 30–60%)	1.01 (0.79–1.28)	1.02 (0.82–1.28)	1.30 (1.07–1.57)	1.26 (1.05–1.50)	4.55 (0.55–38.0)	3.87 (0.50–29.7)
Mild dry (> 60–90%)	0.99 (0.84–1.16)	0.98 (0.84–1.14)	1.18 (1.03–1.35)	1.14 (1.00–1.30)	0.90 (0.54–1.52)	0.95 (0.57–1.57)
Average (> 90–120%)	1	1	1	1	1	1
Mild wet (> 120–150%)	0.85 (0.72–1.00)	0.85 (0.73–0.99)	0.87 (0.74–1.02)	0.84 (0.72–0.97)	1.59 (0.96–2.64)	1.65 (1.01–2.69)
Moderate wet (> 150–180%)	0.92 (0.69–1.23)	0.95 (0.72–1.25)	1.27 (1.02–1.59)	1.27 (1.03–1.57)	0.71 (0.36–1.39)	0.87 (0.43–1.73)
Extreme wet (> 180%)	0.86 (0.64–1.16)	0.79 (0.59–1.05)	1.18 (0.97–1.43)	1.08 (0.89–1.31)	1.19 (0.45–3.11)	0.99 (0.40–2.46)
Sex						
Men	1	1	1	1	1	1
Women	1.12 (0.96–1.31)	1.09 (0.94–1.27)	1.09 (0.95–1.26)	1.07 (0.93–1.22)	0.57 (0.35–0.94)	0.58 (0.36–0.95)
Age (years)						
18–34	1	1	1	1	1	1
35–44	0.71 (0.56–0.91)	0.71 (0.56–0.89)	0.71 (0.57–0.89)	0.72 (0.58–0.89)	1.20 (0.41–3.51)	1.02 (0.36–2.90)
45–54	0.57 (0.46–0.72)	0.56 (0.45–0.70)	0.66 (0.53–0.83)	0.66 (0.54–0.82)	0.39 (0.15–1.03)	0.39 (0.15–1.00)
55–64	0.58 (0.46–0.73)	0.57 (0.46–0.71)	0.67 (0.54–0.84)	0.68 (0.55–0.85)	0.24 (0.09–0.65)	0.25 (0.10–0.67)
65 or older	0.60 (0.45–0.80)	0.60 (0.46–0.77)	0.62 (0.48–0.82)	0.62 (0.48–0.80)	0.19 (0.06–0.57)	0.19 (0.07–0.56)
Employment						
Employed/home duties/studying	1	1	1	1	1	1
Unemployed/unable to work	0.88 (0.59–1.31)	0.87 (0.58–1.29)	1.06 (0.76–1.48)	1.05 (0.75–1.46)	4.87 (0.94–25.2)	5.29 (1.03–27.2)
Retired	0.68 (0.52–0.89)	0.66 (0.51–0.86)	0.88 (0.70–1.11)	0.86 (0.69–1.07)	0.76 (0.39–1.48)	0.75 (0.39–1.43)
Financial security						
Prosperous/very comfortable	1	1	1	1	1	1
Reasonably comfortable	1.32 (1.06–1.64)	1.30 (1.05–1.60)	1.07 (0.90–1.28)	1.07 (0.91–1.27)	1.19 (0.70–2.02)	1.12 (0.67–1.90)
Just getting along/poor/very poor	1.74 (1.39–2.18)	1.72 (1.38–2.14)	1.14 (0.95–1.38)	1.15 (0.96–1.38)	3.22 (1.62–6.40)	2.99 (1.52–5.89)
Adverse life events						
0	1	1	1	1	1	1
1–3	1.14 (0.98–1.32)	1.11 (0.96–1.28)	1.19 (1.05–1.36)	1.18 (1.04–1.33)	1.59 (1.08–2.35)	1.63 (1.11–2.38)
4–6	1.39 (1.11–1.74)	1.34 (1.08–1.66)	1.26 (1.02–1.55)	1.23 (1.01–1.51)	6.76 (2.32–19.7)	6.33 (2.27–17.6)
7–9	1.89 (0.93–3.85)	1.70 (0.87–3.32)	0.95 (0.46–1.99)	0.99 (0.53–1.87)	6.14 (0.33–115)	3.81 (0.23–63.0)
Education						
Completed school	1	1	1	1	1	1
Partial schooling	1	1	1	1	1	1
Completed high school or higher	1.02 (0.87–1.19)	1.03 (0.88–1.19)	1.00 (0.86–1.16)	1.00 (0.87–1.15)	0.86 (0.46–1.59)	0.91 (0.49–1.66)
Unknown	1.00 (0.62–1.63)	1.06 (0.69–1.63)	0.96 (0.69–1.34)	0.98 (0.73–1.31)	0.59 (0.15–2.39)	0.86 (0.22–3.31)
Marital status						
Married/de facto	1	1	1	1	1	1
Separated/divorced	1.06 (0.75–1.49)	1.03 (0.75–1.42)	1.00 (0.72–1.40)	1.00 (0.74–1.36)	1.21 (0.37–3.97)	1.12 (0.37–3.44)
Widow	1.03 (0.67–1.57)	1.12 (0.76–1.63)	0.99 (0.67–1.46)	1.03 (0.73–1.47)	2.22 (0.82–6.02)	2.45 (0.91–6.60)
Never married	0.71 (0.53–0.95)	0.68 (0.52–0.89)	0.82 (0.62–1.08)	0.82 (0.63–1.06)	0.61 (0.20–1.90)	0.63 (0.21–1.90)

(continued)

6 Socio-demographic and drought conditions affecting drought-related stress and general psychological distress in farmers in rural New South Wales (continued)

	Personal drought-related stress		Community drought-related stress		Psychological distress (K10)	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)
Remoteness (Australian Standard Geographic Classification)						
Inner regional	1	1	1	1	1	1
Outer regional	1.88 (1.59–2.22)	1.88 (1.59–2.23)	2.04 (1.76–2.38)	2.05 (1.76–2.38)	1.37 (0.81–2.31)	1.40 (0.83–2.35)
Remote	2.02 (1.58–2.58)	2.02 (1.65–2.48)	2.16 (1.77–2.63)	2.17 (1.83–2.58)	0.76 (0.29–1.99)	0.83 (0.39–1.78)
Very remote	2.50 (1.93–3.24)	2.55 (1.97–3.30)	2.75 (2.22–3.40)	2.80 (2.26–3.47)	3.23 (0.18–59.4)	3.64 (0.20–66.8)
Sense of place						
Below median	1	1	1	1	1	1
Median or above	1.00 (0.87–1.17)	0.98 (0.86–1.13)	1.07 (0.94–1.22)	1.05 (0.93–1.19)	1.66 (1.00–2.75)	1.58 (0.97–2.58)
Sense of community						
Below median	1	1	1	1	1	1
Median or above	0.95 (0.82–1.09)	0.96 (0.84–1.10)	0.99 (0.87–1.13)	1.01 (0.89–1.13)	0.33 (0.19–0.56)	0.33 (0.19–0.55)
Overall physical health						
Poor/fair	1	1	1	1	1	1
Good/very good/excellent	1.00 (0.83–1.21)	1.03 (0.86–1.24)	1.01 (0.87–1.17)	1.03 (0.89–1.18)	0.38 (0.18–0.83)	0.41 (0.20–0.85)
Overall mental health						
Poor/fair	1	1	1	1	1	1
Good/very good/excellent	1.02 (0.82–1.28)	0.98 (0.79–1.21)	0.87 (0.72–1.05)	0.85 (0.71–1.01)	0.01 (0.00–0.03)	0.01 (0.00–0.03)
Overall relationships						
Poor/fair	1	1	1	1	1	1
Good/very good/excellent	0.85 (0.65–1.10)	0.83 (0.65–1.06)	0.99 (0.81–1.23)	1.01 (0.83–1.23)	0.11 (0.02–0.56)	0.11 (0.02–0.52)
Trait neuroticism: EPQN score, per one-point increase in score	1.02 (0.98–1.07)	1.02 (0.98–1.07)	1.00 (0.96–1.05)	1.00 (0.96–1.05)	2.16 (1.76–2.64)	2.15 (1.77–2.62)

CI = confidence interval; EPQN = neuroticism subscale of the Eysenck Personality Questionnaire, short form; IRR = incidence rate ratio. Total number of respondents: 664; total number of responses, 1178. Analysis was adjusted for study phase, participant identification, and household identification, and for other factors in table. ♦

stress may contribute to general psychological distress, but is distinguishable from it.⁸ The slow onset of the impact of drought contrasts with the immediate effects of extremes such as cyclones and floods. Investigation of modulators of drought-related stress could inform community-based strategies for alleviating stress, promote drought preparedness, and guide community and government agencies providing support for people in rural areas.²⁹ General practitioners are in a unique position to contribute to programs and initiatives for relieving stress related to climate adversity and for supporting farmers experiencing stress.³⁰ Educating general practitioners about drought and stress in farming communities, as well as about practical approaches to supporting farmer health and safety, is critical.²⁹

Limitations

Study limitations include our application of a meteorological definition of drought. The impact of other types of drought (hydrological, agricultural) on drought-related stress among farmers should also be examined. The effects of different drought durations and the fluctuation between wet and dry epochs should also be investigated. Another limitation was that it was difficult to identify people who do not live on farms but had lost farm employment because of drought, exacerbating the consequences for rural communities of the financial and social impact of drought.

Conclusion

Farmers in NSW experience significant stress related to the impact of drought. Farmers who live and work on a farm, are younger, have less financial security, or are located remotely require particular support. Improving the mental health of farmers may enhance their adaptive capacity and resilience. We did not identify sex differences in PDS and CDS, but differences in the manner in which men and women seek help, discuss and understand problems, and engage in support networks and services should nonetheless be considered by initiatives for relieving drought-related stress.⁵ Programs of support for drought-affected communities should incorporate an understanding of the relationship between drought and mental health, and take factors into account that influence PDS and CDS.

Acknowledgements: We are grateful to the ARMHS participants for contributing their time to the study. The ARMHS was funded by the National Health and Medical Research Council (401241, 631061), and was also supported by the Australian Rural Health Research Collaboration. Emma Austin was supported by an Australian Government Research Training Program Scholarship. We thank Olivier Rey-Lescure (University of Newcastle) for technical assistance with mapping.

Competing interests: No relevant disclosures.

Received 5 Dec 2017, accepted 30 Apr 2018. ■

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