

ORIGINAL RESEARCH

Climate adversity and resilience: the voice of rural Australia

FY Ng¹, LA Wilson², C Veitch¹

¹Faculty of Health Science, University of Sydney, Lidcombe, New South Wales, Australia

²School of Science and Health, University of Western Sydney, Penrith, New South Wales, Australia

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Ng FY, Wilson LA, Veitch C

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ABSTRACT

Introduction: Over the past decade, Australia has experienced prolonged drought and extensive flooding. It is argued that such events impact more significantly on rural communities than urban. Although there is a body of research investigating the effects of drought on mental and physical health in rural Australia, little research has examined the effects of flood and drought on wellbeing. This article explores the influence of drought and flood on the wellbeing of rural residents in New South Wales (NSW), Australia.

Methods: Forty-six individuals living in four rural communities in NSW were recruited and asked their experience of flood and drought using in-depth semi-structured face to face interviews or focus groups. The study used a grounded hermeneutic approach to contextualise participants' experiences within a rural social and cultural construct.

Results: Weather was found to be at the core of rural life, with flood and drought contributing to decreased wellbeing from stress, anxiety, loss and fear. Social connectedness was found to promote resilience in rural communities buffering the effects of flood and drought.

Conclusions: Flood and drought have negative impacts on an individual's wellbeing. Although these negative effects were seen to be buffered by individual and community resilience, the long term emotional impact of flood and drought on rural communities needs to be further considered.

Key words: climate change, health, qualitative research, weather, wellbeing.



Introduction

Over the past 20 years the worldwide incidence of extreme weather events has increased, as a result of global climate change¹. Weather events such as drought and floods are likely to impact not only physical health but also the mental health of populations worldwide². Until recently, there has been little quantitative evidence available on the effect of flood and drought on mental health; however, there are well established links between anxiety disorders and weather events^{3,4}. The most common extreme weather events are heatwaves, floods and drought⁵⁻⁷. Each of these is likely to lead to an increase in morbidity and/or mortality, with greater impact on socially disadvantaged or vulnerable communities, including those living in rural and remote areas^{2,8,9}. Floods and drought as a result of climate change have short and long term effects on wellbeing^{2,10}.

Worldwide, floods are the most common extreme weather event, responsible for almost half the victims of all global disasters^{6,9}. Floods are an acute disaster, causing upheaval, property loss and financial burden and necessitating rapid emergency response⁹. The short term effect of floods on wellbeing are evident, with high levels of morbidity and mortality, communicable disease, extensive property loss, high levels of psychological distress and increased stress/anxiety levels^{6,9,11}. The long term effects of flood include post-traumatic stress disorder and high levels of chronic anxiety.

Similarly, drought is associated with property loss, upheaval and financial hardship but the onset is slow and insidious, taking longer to require emergency intervention¹². The effects of drought on wellbeing are generally long term and include the development of chronic health conditions such as hypertension, cardiac disease and mental health conditions⁷. Horton and colleagues report a relationship between prolonged drought and poor physical and mental health in rural communities⁷. This is likely to be related to the stress associated with reliance on unpredictable agricultural crops or stock prices for income, the need to upsize farms to

increase income, financial pressures and social isolation^{13,14}. Recent research highlights the high level of young male suicide in rural areas, as a result of lack of employment opportunities and stress associated with the increasingly unpredictable lifestyle in rural centres¹⁵.

The impacts of flood and drought contribute significantly to an individual's wellbeing, as does the inextricable connection between the land and wellbeing¹⁶. This is especially true for rural residents who rely on the land for their livelihood, and for whom the land provides a strong sense of place¹⁶⁻¹⁸. The destruction of land due to flood or drought can have lasting social and financial consequences that can affect wellbeing.

Examination of the relationship between the natural environment and psychological wellbeing has led to new descriptors with regard to place¹⁹. 'Biophilia' refers to the connection between an individual and the natural environment²⁰ whilst 'solastalgia' refers to the distress associated with the destruction of an individual's place or environment¹⁹. The development of these terms highlights the increasing awareness of the impact of weather, and that weather patterns have a role in determining wellbeing in rural areas.

Australia is generally described as a dry, arid country with around 34% of the population residing in rural or remote communities²¹. Research has shown that rural residents have poorer health than their urban counterparts²², with this health differential the result of limited access to health services, hazardous work practices, financial insecurity, limited resources, geographical and social isolation and environmental hazards²³.

Over the past 5 years Australia has experienced extensive floods in conjunction with one of the longest periods of drought on record²⁴. Increasingly, quantitative research has highlighted the impact of flood and drought on the mental health of Australian rural residents^{12,25-27}; however, limited qualitative research has investigated the human impacts of flood and drought¹⁵ from the perspective of rural residents. Conducting research in rural areas presents unique and varied challenges for researchers²⁸⁻³⁰. These



include environmental and financial barriers, accessing representative populations, community engagement and ethical considerations. These factors, in addition to the recent nature of the weather events, the difficulties associated with data collection in areas of extreme flood damage and destruction, and the sensitive nature of the research, are the likely reasons for a limited evidence base as to how rural Australian residents respond to flood.

This study explored the perceptions and experiences of residents in rural New South Wales (NSW), Australia, who had experienced flood and/or drought during the past 5 years. Specifically, the study aimed to understand the impact that flood and drought have on the wellbeing of rural Australians.

Methods

Setting

NSW is one of the six Australian states and is situated on the eastern Australian seaboard. The NSW population lives predominantly on the coast; however, almost 75% of the state is classified as rural or remote. Administratively the state is divided into Local Government Areas (LGAs), each administered by a Local Council Authority. The primary focus of agriculture in NSW is cropping, sheep and cattle farming. NSW has experienced severe extended drought over the past 10 years, although many areas have also experienced severe flooding during the last 3 years.

Two regional centres (population < 10 000) and two rural villages (population ~300), each from one of two LGAs that had experienced drought followed by severe flood in the last 5 years, were chosen for the study. Regional centres and villages were a similar size and distance from each other. Rural regions were classified using the Rural, Remote and Metropolitan Areas classification²¹. For confidentiality reasons, the towns have been de-identified for this study.

Study design

This qualitative study used purposive and convenience sampling in four rural communities in two LGAs of NSW to

gather rich narrative data on rural residents' experiences of flood and drought. Data were collected using focus groups and face-to-face interviews.

Recruitment and sample

Key stakeholders and services in each LGA were approached and invited to participate in the study. Researchers worked in consultation with the community to collaboratively determine the focus of the study questions (Fig1). Collaborative community engagement assisted recruitment of study participants. Service providers were included in the sample at the suggestion of the community during preliminary consultations. Many people had dual roles as both farmers and service providers, a demographic reflected in rural communities. Residents and service providers known to have experienced flood and/or drought were invited to participate in the study directly (purposive sampling). All other residents and service providers were recruited using flyers and newspaper articles (convenience sampling).

Participants were eligible for study inclusion if they were aged 18 years or over and had lived or worked in one of the four communities for the past 5 years. All participants were given a study information sheet and asked to provide informed consent (including consent to audio-recording of focus groups and interviews) prior to enrolment in the study. All participants were asked to maintain confidentiality of any issues raised in the group setting, and interview data were known only to the interviewer.

Interviews and focus groups

Research has shown that disclosure of information in rural communities may be hindered by close community ties and a deep sense of personal privacy^{29,30}; therefore, participants were offered the choice of participating in a focus group or individual interview. Interviews were scheduled to suit both participant and researcher in a familiar, non-threatening location. Prior to interview or focus group, participants were asked to complete a demographic questionnaire. Focus groups and interviews were guided by a specifically designed and piloted interview schedule (Fig2) and lasted approximately 1 h. Participants were recruited into the study until data saturation was reached.



Interview questions surrounded an individual's perceptions about the extreme weather events (drought and flood) that they had experienced. All participants were reminded that the interview was voluntary and they were able to withdraw from the study at any time.

Questions included:

- How would you describe the weather in this community?
- Tell me about your health status?
- Do you think that the weather influences your health?
- Does the weather influence employment in this town?
- Does the weather influence how you engage with the community?
- What types of health services are available in the town?

Figure 1: Interview questions

The researcher will introduce themselves to the participant: *'Hi my name is and I am a student from the University of Sydney. Firstly, thank you very much for giving up your time to talk to us today and I'm sure you are aware that we are interested in your views about the weather in this region and also your health'*

Participants will then be provided with the participant information sheet and consent form. The researcher will go through the participant information sheet and consent form with the participant and address any concerns the participant may have.

Researchers will specifically remind participants: *'This interview is completely voluntary and confidential. We would like to audio record the interview, do you object to this? [Researchers to wait for response – if the participant is uncomfortable with the audio recording, the tape recorder will not be used and researchers will take notes]. If you wish to stop the interview at any time, please feel free to let us know. You may withdraw from the interview at any time before or after the interview and your audio recording or notes will be excluded. Do you have any questions?'*

If participants do not have any further questions the researcher will begin the interview: *'How would you describe the weather?'*

Depending on the response of the participant, researchers can probe in areas such as:

- Health
- Financial
- Employment
- Social life
- Participation in the community
- Health service provision in the community

Responses of participants will be integrated within the probes.

At the end of the interview, all participants will be asked: *'Do you mind if we ask you some questions about your health?'* Depending on the response, participants will either be asked a series of questions based on items from the National Health Survey or the interview will conclude.

At the end of the interview, all participants will be provided with a set (3) of questionnaires (the General Health Questionnaire, Impact of Events Scale and the Resilience Scale) in a reply paid envelope. Time permitting, participants will be requested to complete the questionnaires in the interview room. Otherwise, participants will be asked to complete the questionnaires in their own time and return the completed questionnaires to researchers.

Finally, all participants will be thanked for their time and advised of the contact details of the researchers, as per the participant information sheet.

Figure 2: Interview schedule

Analysis

A grounded hermeneutic approach was used for data analysis³¹. This method enables new theories that are

grounded in the data to emerge whilst allowing an interpretive hermeneutic paradigm to be employed^{31,32}. The aim of the analysis was to understand participants' experiences of flood and drought, and to locate these within a



framework of life experience, social context and underlying beliefs^{31,33}. The researchers immersed themselves in the data, reading and re-reading transcripts, notes and reflective journals. The circular process of analysis moved between key themes, reflection, reviewing notes and interviews, and coding the data. Key words and themes were identified and reviewed in each transcript. Themes were reviewed in context with other themes and subthemes that emerged. The data were transcribed verbatim and entered into NVivo 10 software (QSR International, <http://www.qsrinternational.com>). Coding was completed by each researcher and checked for similarity. Discrepancies were resolved through consensus. This analytical approach enabled researchers to investigate the broader social constructs occurring within rural communities and the interaction of flood and drought events in this context.

Ethics approval

The project was approved by the University of Sydney Human Research Ethics Committee (approval number: 2013/040).

Results

Demographics

Forty-six participants with an average age of 57.7 years were enrolled in the study (Table 1). More residents ($n=31$) than service providers and more females ($n=27$) than males participated in the study. Eight individual interviews and seven focus groups were conducted. Table 1 details the number of participants in each LGA and town centre. Table 2 outlines the combined demographic characteristics of study participants.

Qualitative findings

The study participants gave generously of their time, engaging actively in focus groups and interviews. On many occasions, due to lively discussion and detailed narrative, interviews and focus groups went over the allocated time. In general, participants were happy to discuss their experiences

and opinions of flood and drought as they had not previously been involved in research of this nature. This study was conducted 1 year following the most recent flood event; however, the emotion expressed by participants about the flood was still very raw. Some community members did not want to speak with the researchers as they felt they were still too traumatised to participate. Many spoke of the anger expressed by other community members, predominantly those who lost significant items such as homes and businesses in the flood and who were not insured.

Examination and analysis of the rich pool of narrative data elicited a number of emergent themes. These themes were similar across all four communities. The enormity of the impact of flood and drought was the central theme identified, with four subthemes emergent from the data. These included: (1) financial and emotional stress/anxiety; (2) fear; and (3) loss. These themes were interlinked such that the experience of any one of the themes contributed to experience of the other. The fourth subtheme, community cohesion and resilience, emerged as a buffer to the negative impact of flood and drought on wellbeing (Fig3). Participant quotes are identified by town and category.

The enormity of the impact of flood and drought

Questioned about the effect of weather in their communities, all participants commented that the weather is crucial to all aspects of rural life. Participants noted that weather, in particular bad weather (such as flood or drought), impacts not only an individual's self-reported level of health and wellbeing, but also life in general, playing a major role in determining significant life choices and daily practices. Irrespective of whether the event was flood or drought, rural residents felt that the impacts were similar in many ways.

Residents commented on economic and social factors associated with flood and drought, describing the importance of farming in community and social terms and how the increasing unpredictability of the weather impacts life as a farmer and as a rural town dweller. The unpredictability of the weather is exemplified by the following narratives.



(It) all revolves around the weather out here. The whole thing. Whether it is ... the economics of the farmer, whether he makes any money or not and then the people who rely on us to be a success and then of course ... the emotional side, the mental side ... what happens when you go broke, what happens with the social fall-out from the lack of success, family relationships, problems. (Farmer and Service Provider, Town 4)

You know the old saying 'put away in the good years for what is going to be happening in the crook years' ... this area really brings that home. 'Cause if you don't ... when the crook years come, you're gone ... If we lived in a place that was different and we could rely on the rain, we wouldn't be talking about all these problems ... Here the weather is hugely important. We live in a marginal area because of the weather... (Farmer, Town 4)

Participants other than farmers commented on the effects of weather on community and the sense of wellbeing in the region. Many discussed the implications of flood and drought on retail spending, mental health and community wellbeing generally.

You can tell it has rained when you walk down the street in a small rural community ... people's personality changes ... people are happy ... they are out and about and they are talking ... as it gets drier and drier you can see people withdrawing, some physically ... and people stop spending. (Resident, Town 1)

In a drought, there is not as much employment for people living in town ... so you make do ... you don't employ someone, they are not put on for as many hours ... but still making (some) employment for the ones living in town, so they are looking at the weather and the town people are saying you know 'am I going to be employed?' (Resident, Town 1)

Financial and emotional stress and anxiety: It was evident in participants' responses that flood and drought had profound effects on levels of financial and emotional stress and anxiety. This was most notably associated with unpredictability (of weather in the farming context, of employment, and of financial resources), pressure (of high levels of farmer debt and to increase the size of farming land) and reluctance (to

leave the land and of the younger generation to take up a farming career).

Once upon a time farmers were very wealthy people, they are employable and some of the most hard working people in Australia ... because there was never drought like this and there is a lot of money in farming, if you can get the right season ... but now ... we could be the poorest people in Australia. (Farmer and Service Provider, Town 3)

The high costs of sowing crops were raised not only by farmers but by their wives, town dwelling residents and service providers. Many participants used the analogy of 'gambling' to describe farming.

My grandfather was a farmer here and he always reckoned that he wasn't a gambler and someone laughed at him and said 'what's your profession' and he said 'I'm a farmer' and he said 'you're the biggest gambler of all because you've got to gamble on the weather'. (Farmer and Service Provider, Town 3)

The cost of farming, along with the risk of not making a return on the crop if the weather failed, had an impact on stress levels and subsequently the wellbeing of the town. Participants described the relationship between the unpredictability of weather and the stress of delivering a successful crop. International markets govern the pricing of wheat and grain; hence, many farmers may receive less return for their produce than anticipated. With large farming debts affecting not only farmers, but also retailers, banks and farm suppliers, fluctuations in the global market have far reaching economic consequences.

They say we're an eternal optimist being a farmer. It's a great lifestyle and I'm passionate about it but as I say to a lot of young blokes this costs so much money every year just to do it and if you don't get it and don't get a return on it you just go backwards so quick and you just can't afford to do that nowadays that's the trouble. It's like anything I suppose ... you've got to keep working. We're all happy doing the work and being busy, we don't want to make a million bucks but we just want to not have to go backwards or have to rely on the interest rate subsidies and those sorts of things just to get through. (Farmer, Town 4)



Table 1: Demographics of participants by Local Government Area (LGA) of residence

Characteristic	Service provider	Resident	Total
LGA 1 (n=30)			
Regional centre 1 (Town 1)	7 (29.2%)	17 (70.8%)	24
Village 1 (Town 2)	1 (16.7%)	5 (83.3%)	6
LGA 2 (n=16)			
Regional centre 2 (Town 3)	6 (75%)	2 (25%)	8
Village 2 (Town 4)	1 (12.5%)	7 (87.5%)	8
Total	15 (32.6%)	31 (67.4%)	46

Table 2: Participant characteristics

Demographic category	% (n=46)
Age (years)	
Mean	57.7
Standard deviation	16.8
Range	19–87
Gender	
Female	27 (58.7%)
Male	19 (41.3%)
Marital status	
Single	6 (13%)
Married	30 (65.2%)
Divorced	2 (4.3%)
Widowed	7 (15.2%)
Other	1 (2.2%)
Type of residence	
Owned private residence	38 (82.6%)
Rented private residence	5 (10.9%)
Other	3 (6.5%)
Number of people in household	
1	11 (23.9%)
2	15 (32.6%)
3	8 (17.4%)
≥4	12 (26.1%)
Time lived in area (years)	
Mean	33.8
Standard deviation	19.7
Range	5–76
Community group participation	
Yes	40 (87%)
No	5 (10.9%)
I don't know	1 (2.2%)
Occupation	
Agriculture/farming	9 (19.6%)
Retail/supply services	1 (2.2%)
Homemaker	4 (8.7%)
Professional	15 (32.6%)
Retired agriculture/farming	17 (37%)
Travel to nearest major centre	
Once a week	15 (32.6%)
Once a fortnight	7 (15.2%)
Once a month	11 (23.9%)
Other	13 (28.3%)

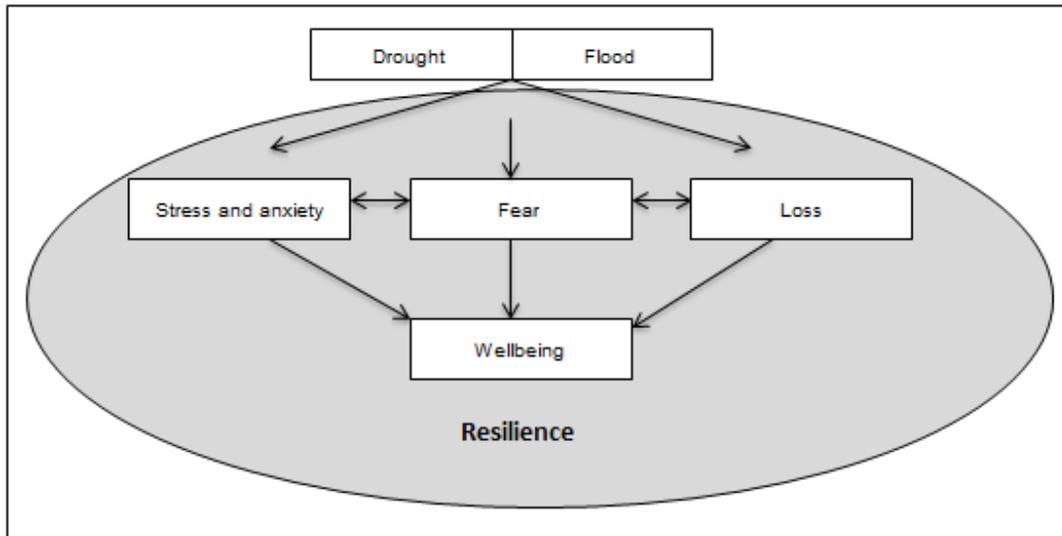


Figure 3: The rural flood and drought wellbeing model

Increased utility costs were raised by many participants as a source of stress, as was dealing with insurance companies after floods. In particular, rather than a necessity, airconditioning was seen as a luxury in summer as its use could mean the difference between paying the rent and the electricity bill. Similarly, the increased costs of fuel affected all sectors of the community. Sporting clubs lost players as families could not afford the fuel to travel to distant venues.

A lot of single parent families think about it ... I had to travel for sport an hour and half drive from here and a lot of the parents can't afford to go with the (cost of) fuel. So some choose not to and that makes an impact on the team and then you don't have enough kids coming to the football matches. A lot of them are single parents, they can't afford fuel. They can't afford a lot of things. Well farmers can't afford it. I think it is very difficult for them in this town. (Farmer and Service Provider, Town 3)

Participants who had experienced a flood described the financial and emotional stress associated with the recovery process after a flood.

I think the stress of the flood, when they got back it was the fact that you had to get the insurance ... and you fought

with that and then you have to get the building ... and you fought with that, then you had to get all this stuff and then some people got this and other people were denied and on and on it's gone and we are now to this stage and we are starting ... some of us in the town are starting ... to settle ... and it is not just us in town, all those people in other towns ... they had no choice, they lost fences, they lost cattle, they lost sheep, they lost everything and their lives have been hell ... the stress of what they have gone through now is probably worse than the stress of going through the drought. The stress levels have been really terrible around here. I think it has compounded: one thing on top of another. (Farmer and Service Provider, Town 1)

Many commented on the consecutive nature of the extreme events – drought and then flood. Farmers discussed the financial consequences of the drought, many noting the additional difficulties encountered when a flood broke the drought: commenting that recovery (from flood) was more difficult than the experience (of drought).

I keep saying that the flood was like a car crash ... it bangs and something has hit you. A drought is like a cancer ... it just keeps on going and sometimes the recovery is nearly worse



than what you have gone through. (Farmer and Service Provider, Town 1)

Fear: The fear generated from the experience of extreme weather events appeared to affect all sections of the community. Participants' fear was discussed in relation to recurrence of flood and drought. Most participants commented on the effects these events cause, including family breakups, loss of farms, changes to family life and the increasing need for health services. The uncertainty of weather patterns and the recent nature of events had placed the fear of recurrence at the forefront of participants' minds.

Participants' memories of flood and drought acted as a trigger for the fear of recurrence. The majority of participants in this study noted that a lack of rain, or heavy rain, could trigger feelings of fear or anticipatory anxiety. Some participants mentioned the impact floods have had on children. Many rural children were born during the decade-long drought and had not experienced heavy rain prior to the flood, leading to a fear of rain.

Some of the kids had never seen that much rain before in their lives, so they were very fearful of water ... a lot of nightmares have occurred. (Farmer and Service Provider, Town 3)

My little granddaughter is still very frightened for me, if it starts to rain she'll go 'if it starts to come up to flood you got to come to my place nanny' or if she doesn't come down for a couple days she'll say 'I've got to go see if my nanny is ok'. It is quite scary for a little kid. (Resident, Town 4)

Loss: The subtheme of loss consisted of four main areas. These were financial loss, loss of infrastructure and possessions, loss of community and a loss of identity. The areas of financial loss and loss of possessions overlapped with theme two – financial stress. A lack of confidence in global economic markets and the unpredictability of the weather were highlighted by participants as factors leading to a sense of loss. Farmers were quick to comment that investment in a crop did not necessitate an income. Two areas of loss that emerged from the data were the loss of status and loss of rural community structure, with both farmers and their wives

commenting on the change in the way farmers were viewed in the community. Many farmers commented that in the past, farming families were wealthy, but stressed that this was no longer the case. Increasingly, farmer's wives work in commercial settings to maintain a regular income and ensure bills can be paid. Similarly, the loss of employment as a result of poor crops and reduced community spending was a burning issue.

The loss of material possessions and physical infrastructure during floods was a major source of self-reported stress and anxiety. Road damage and closures affected aspects of daily life in all communities, including commuting to work, access to local businesses and daily routines. For many, the effect was long term as new relationships were built with other service providers and businesses and old ones never re-established. Those who had lost significant personal belongings or who had sustained major damage to homes and farming land were particularly affected, especially when dealing with insurance companies and government agencies became protracted. Land rezoning from previously 'non-flood zone' to 'flood zone' caused residents distress, particularly when the increased financial consequences of higher levels of, or inability to obtain, insurance were extensive.

Participants noticed a flow-on effect on other services, with many highlighting the loss of community services such as policing, education and health. Participants noted that the availability of services was dependent on the town population; however, due to corporatisation, the expansion of farms and the relocation of youth, populations had decreased. The loss of specific health services in the community concerned participants as many found it difficult to travel long distances due to their medical condition or lack of transportation.

For some, the loss of the family farm (as a result of debt), or the family heritage and generational history that went along with the farm, was almost too much to bear and would, or could, lead to a loss of identity and a loss of place.



I was born here, born on the farm ... I've lived my life here. It is coming up to 100 years that my family has had this farm ... In 1917 my grandfather got the farm that I'm on, so it is a family farm, so it is an emotional thing as well ... very, very emotional. For someone to say to me 'why don't you just sell up and get enough dough (money) to buy a nice house somewhere ... to grow roses' ... well ... I might end up getting a gun out and blowing my head off 'cause ... just what would I do? I would go insane. So if I lose my farm, it would cost me a marriage ... not because she's going to leave me, but because I won't be fit to live with. What am I going to do? I'll go insane. I just can't. I don't even like holidays. I don't even like fishing. (Farmer and Service Provider, Town 4)

Community cohesion and resilience: Community cohesion emerged as a subtheme with participants describing the positive aspects of receiving support from community members and the sense of 'community spirit'. Participants felt that community cohesion increased resilience, and was evident by 'a sense of belonging' to the community. Participation in local community groups, such as church groups, and assisting others during times of need was another aspect of rural life that promoted community cohesion and resilience. Community members commented on the social cohesion brought about by flood and drought, and the work of organisations such as the State Emergency Services, local churches and charity organisations. Although the term 'resilience' was not often expressed during discussion with participants, analysis of responses indicated a strong ability of individuals to recover after trauma associated with drought and floods. It appeared that both individual and community resilience had the ability to buffer the negative effects associated with flood and drought (Fig3).

We (rural people) are very resilient people, we have to be...
(Resident, Town 4)

Some participants saw the positive side of flood and drought, suggesting that rain after drought was psychologically beneficial as they gained a deeper appreciation of water.

I just remember in the drought, how beautiful water became and how refreshing to the soul it was and you started to really

realise how precious it was, not just for its practical reasons but its beauty. (Resident, Town 1)

An individual's connection with the land and identification of farming as a lifestyle was seen to positively influence rural workers' levels of stoicism and determination. A connection to the land and place was a factor that contributed to increased resilience in rural individuals.

Discussion

The findings of this study demonstrate the significant impact that flood and drought can have on wellbeing and reflect similar research investigating the effects of drought and flood on individuals living in rural communities²⁵⁻²⁷. The approach used in this study enabled participants' responses to be analysed within the rural social context – a community reliant on the land for not only livelihood but for a sense of place, identity and belonging. This being said, there is wide variation in how health is viewed in rural communities³⁴.

Although the enormity of the impact of drought and flood was the overarching emergent theme in this study, the context of rural social life and the significant multifactorial changes that have occurred to rural life over the past 20 years were clearly evident. Changes to global political economics and import and export policies have, in conjunction with corporatisation of farming and changing farming practices, led to changes in social status and socioeconomic and population demographics in rural communities^{35,36}. Although previous research has investigated the measurable effects of drought on health, qualitative research in this context provides a voice to the residents of rural communities who are increasingly experiencing unpredictable weather.

There is a large body of evidence outlining the importance of social connectedness and community cohesion on the level of community and individual resilience³⁷⁻³⁹. This was clearly evident in the responses from the majority of participants in this study who, although having experienced major trauma and loss from drought and/or flood, maintained a stoicism and determination to continue on the land or in their local community as a service provider. This project identified the



important role of community resilience in buffering the negative impact of drought and flood on wellbeing. Thus, the continual strengthening and promotion of community resilience and social capital through, for example, community groups, events and sport groups is pivotal to help adapt to extreme weather³⁷. Some participants noted that more professional assistance may have been useful following an extreme weather event. Research suggests that the timing of counselling following a disaster event is crucial, as providing this immediately following an event may not promote individual resilience or the activation of self-coping strategies and may be counterproductive⁴⁰. However, if counselling is delayed, mental health problems may have already developed⁴⁰.

No previous qualitative research known to the authors has investigated the effects of flood on wellbeing in rural communities. In this small study, investigation of past experiences with flood and drought found that the emotional impact associated with these events were similar. While the onset of flood and drought events differ dramatically, the major impacts on emotional wellbeing, including fear, loss and stress, had significant effects on rural living, the livelihood of the community and farmers' and community wellbeing. The similarities in the impact of flood and drought on emotional wellbeing may be related to the severity of the event and the community perception that the event is severe.

Strengths and limitations

The strengths of this study are the rich pool of narrative data gained, the variety of participant backgrounds and community perspectives from similar sized towns with similar experiences of flood and drought. The length of time the residents had lived in these communities and their age (indicating that they had seen a profound change in the community) were also strengths of the study. The high level of participant engagement, lively discussion and the opportunity for many participants to discuss openly how they felt about the effects of recent weather events provide an in-depth understanding of the social, emotional and environmental impact of drought and flood, and strengthens the study and the data it provides.

The study is limited by the proximity of the two rural LGAs investigated. Because of differences in climate, farming practices, community and rural culture this sample may not be generalisable to the broader rural population. Future research could investigate the health and wellbeing of rural Australian residents immediately following flood or drought using validated, quantified measures.

Conclusions

The strong 'community spirit', social cohesion and social connectedness in the communities under study promote individual and community resilience, buffering the negative effects of drought and floods. As drought and floods increase in frequency, severity and duration, rural health professionals need to consider the long term emotional impact of these events in rural communities.

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References

1. Garnaut R. *The Garnaut Review 2011: Australia in the global response to climate change*. Canberra: Commonwealth of Australia and Cambridge University Press, 2011.
2. Berry HL, Bowne K, Kjellstrom T. Climate change and mental health: a causal pathways framework. *International Journal of Public Health* 2010; 55: 123-132.
3. Salcioglou E, Basoglu M, Livanou M. Post-traumatic stress disorder and co-morbid depression among survivors of the 1999 earthquake in Turkey. *Disasters* 2007; 31(2): 115-129.
4. Fritze J, Blashki G, Burke S, Wiseman J. Hope, despair and transformation: climate change and the promotion of mental health and wellbeing. *International Journal of Mental Health Systems* 2008; 2(1): 13.
5. Bi P, Parton K. Effect of climate change on Australian rural and remote regions: what do we know and what do we need to know? *Australian Journal of Rural Health* 2008; 16: 2-4.



6. Ahern M, Kovats RS, Wilkinson P, Few R, Matthies F. Global health impacts of floods: epidemiologic evidence. *Epidemiologic Reviews* 2005; 27: 36-46.
7. Horton G, Hana L, Kelly B. Drought, drying and climate change: emerging health issues for ageing Australian in rural areas. *Australasian Journal on Ageing* 2010; 29(1): 2-7.
8. Berry H, Kelly B, Hanigan I, Coates J, McMichael A, Welsh J, Kjellstrom T. *Rural mental health impacts of climate change*. Submission to the Garnaut Climate Change Review. 2008. Available: [http://www.garnautreview.org.au/CA25734E0016A131/WebObj/03-DMentalhealth/\\$File/03-D%20Mental%20health.pdf](http://www.garnautreview.org.au/CA25734E0016A131/WebObj/03-DMentalhealth/$File/03-D%20Mental%20health.pdf) (Accessed 10 September 2014).
9. Alderman K, Turner LR, Tong S. Floods and human health: a systematic review. *Environment International* 2012; 47: 37-47.
10. Doocy S, Daniels A, Murray S, Kirsch TD. The human impact of floods: a historical review of events 1980-2009 and systematic literature review. *PLoS Currents: Disasters*. (Online) 2013. Available: <http://currents.plos.org/disasters/article/the-human-impact-of-floods-a-historical-review-of-events-1980-2009-and-systematic-literature-review/> (Accessed 10 September 2014).
11. Tunstall S, Tapsell S, Green C, Floyd P, George C. The health effects of flooding: social research results from England and Wales. *Journal of Water and Health* 2006; 4(3): 365-380.
12. Stain HJ, Kelly B, Carr VJ, Lewin TJ, Fitzgerald M, Fragar L. The psychological impact of chronic environmental adversity: responding to prolonged drought. *Social Science and Medicine* 2011; 73(11): 1593-1599.
13. Alston M. Rural male suicide in Australia. *Social Science and Medicine* 2010; 74(4): 515-522.
14. Alston M, Kent J. The big dry: the link between rural masculinities and poor health outcomes for farming men. *Journal of Sociology* 2008; 44(2): 133-147.
15. Sartore GM, Kelly B, Stain H, 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* 8(3): 950. (Online) 2008. Available: <http://www.rrh.org.au> (Accessed 15 May 2014)
16. Kilpatrick S, Willis K, Johns S, Peek K. Supporting farmer and fisher health and wellbeing in 'difficult times'. Communities of place and industry associations. *Rural Society Journal* 2012; 22(1): 31-44.
17. McEwen A, Bowers J, Saal T. *A human rights based approach to mental health promotion in the context of climate change in rural and remote Australia*. (Online) 2011. Available: <http://acrmmh.com.au/assets/Uploads/Human-Rights-MH-CC2.pdf> (Accessed 20 May 2013).
18. Stayner R. Sense of place, social capital and rural development. In: *Proceedings, Rural Australia: Toward 2000 Conference*; 4 July 1997; Wagga Wagga, Australia.
19. Albrecht G. 'Solastalgia': a new concept in health and identity. *PAN: Philosophy Activism Nature* 2005; 3: 41-55.
20. Wilson EO. *Biophilia*. Massachusetts: Harvard University Press; 1984.
21. Australian Institute of Health and Welfare. *Rural, Remote and Metropolitan Areas (RRMA) classification*. (Online.) Canberra: AIHW, 2013. Available: <http://www.aihw.gov.au/rural-health-rrma-classification/> (Accessed 10 October 2013).
22. Australian Institute of Health and Welfare. Australia's health 2008. (Online) Cat. no. AUS 99. Canberra: AIHW, 2008. Available: <http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=6442453674> (Accessed 15 May 2013).
23. Veitch C. Impact of rurality on environmental determinants and hazards. *Australian Journal of Rural Health* 2009; 17: 16-20.
24. Australian Bureau of Meteorology. Australian climate and weather extremes monitoring system. (Online) 2013. Available: <http://www.bom.gov.au/climate/extremes/> (Accessed 15 October 2013).
25. Hart CR, Berry HL, Tonna AM. Improving the mental health of rural New South Wales communities facing drought and other adversities. *Australian Journal of Rural Health* 2011; 19(5): 231-238.
26. O'Brien LV, Berry HL, Coleman C, Hanigan IC. Drought as a mental health exposure. *Environmental Research* 2014; 131: 181-187.
27. Turner LR, Alderman K, Tong S. The 2011 Brisbane floods affected residents' health. *Medical Journal of Australia* 2012; 197(4): 214-216.



28. Shreffler M. Culturally sensitive research methods of surveying rural/frontier residents. *Western Journal of Nursing Research* 1999; 21(3): 426-435.
29. Wilkes L. Metropolitan researchers undertaking rural research: benefits and pitfalls. *Australian Journal of Rural Health* 1999; 7: 181-185.
30. Pierce C, Scherra E. The challenges of data collection in rural dwelling samples. *Online Journal of Rural Nursing and Health Care* 2004; 4(2): 25-30.
31. Addison RB. Grounded hermeneutic research. In: BF Crabtree, WL Miller. *Doing qualitative research*. California: Sage Publications, 1992.
32. Annells M. Triangulation of qualitative approaches: hermeneutical phenomenology and grounded theory. *Journal of Advanced Nursing* 2006; 56(1): 55-61.
33. Charmaz K. *Constructing grounded theory: a practical guide through qualitative analysis*. London: SAGE Publications, 2006.
34. Bourke L, Taylor J, Humphreys JS, Wakerman J. Rural health is subjective, everyone sees it differently: understandings of rural health among Australian stakeholders. *Health and Place* 2013; 24: 65-72.
35. Pritchard B, McManus P (Eds). *Land of discontent: the dynamics of change in rural and regional Australia*. Sydney: University of New South Wales Press, 2000.
36. Tonts M, Argent N, Plummer P. Evolutionary perspectives on rural Australia. *Geographical Research* 2012; 50(3): 291-303.
37. Berry H, Welsh JA. Social capital and health in Australia: an overview from the household, income and labour dynamics in Australia survey. *Social Science and Medicine* 2010; 70(4): 588-596.
38. Hegney DG, Buikstra E, Baker P, Rogers-Clark C, Pearce S, Ross H, King C, Watson-Luke A. Individual resilience in rural people: a Queensland study, Australia. *Rural and Remote Health* 7(4): 620. (Online) 2007. Available: <http://www.rrh.org.au> (Accessed 5 May 2014).
39. McManus P, Walmsley J, Argent N, Baum S, Bourke L, Martin J, Pritchard B, Sorensen T. Rural community and rural resilience: what is important to farmers in keeping their country towns alive? *Journal of Rural Studies* 2012; 28(1): 20-29.
40. Rose SC, Bisson J, Churchill R, Wessely S. Psychological debriefing for preventing post traumatic stress disorder (PTSD). *The Cochrane Database of Systematic Reviews* 2002; (2): CD000560.
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