

Social and economic impacts of drought on farm families and rural communities

Submission to the Productivity Commission's
Inquiry into Government Drought Support

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1. Introduction

The Australian Institute of Family Studies is pleased to have the opportunity to make a submission to the Productivity Commission's Inquiry into Government Drought Support.

The Institute is currently undertaking a major study into the social and economic impact of drought on rural and regional families (the Regional and Rural Families Survey). This study involves a survey of 8,000 people living in rural and regional areas of Australia. To our knowledge it is the largest survey of the impacts of drought on people living in regional and rural Australia.¹

The material in this submission is drawn from a preliminary analysis of data from the Regional and Rural Families Survey and provides estimates of the social and economic impact of drought on families in regional and rural Australia. In order to identify the most appropriate, effective and efficient responses that could be taken by Commonwealth, state and territory governments to build self-reliance and preparedness to manage drought, it is important to understand the social and economic impacts of drought.

The Institute has also made the material in this submission available to the Expert Panel on the Social Impacts of Drought.

There is surprisingly little large-scale quantitative analysis of the *social* impacts of drought—the existing studies are small-scale quantitative or qualitative studies (Alston & Kent, 2004; Dean & Stain, 2007; Stehlik, Gray, & Lawrence, 1999). While there are more studies on the *economic* impacts, these tend to be estimates of the impact on particular regions or sectors of the agricultural industry (such as those produced by the Australian Bureau of Agricultural and Resource Economics) rather than the impact of drought at the family level or on those who are not actually employed in agriculture but are living in agricultural regions.

The existing studies of the social impacts of drought have several limitations: they have been restricted to a small number of communities in specific locations with relatively small sample sizes and are hence not generalisable; and most of them have been cross-sectional or have not collected information from similar communities that are not in drought, which makes identifying the effects of drought very difficult.

The Rural and Regional Families Survey provides information from a large-scale nationally representative sample of rural Australia that allows valid comparisons to be made between drought-affected and other areas.

This submission therefore provides information on the following areas:

- *community development and sustainability*—community social cohesion, participation in community organisations and the availability of key services;
- *residential mobility*—household members' rates of mobility out of the area in the last 3 years and respondents' rates of mobility between areas in the last 3 years;
- *financial wellbeing*—household incomes, levels of financial hardship and changes in financial position;
- *employment*;
- *economic impact on farmers*;
- *family relationships*—relationship separation, the quality of couple relationships, family functioning and family conflict; and
- *mental and physical health*.

¹ The Institute is collaborating on this research with Associate Professor Boyd Hunter from the Australian National University and Professor David de Vaus from La Trobe University.

1.1 Key points

While this submission provides detailed data on a number of relevant issues, the key points are:

- Using data from the large-scale Rural and Regional Families Survey, we have been able to estimate the social and economic impact of drought on families in regional and rural areas. Defining drought is difficult and sometimes contested and so we used two definitions of drought—rainfall deficit and a social definition. Generally, the results of these two measures were consistent, but the effects of drought were much more pronounced when the social definition was used. This creates challenges for the design of policies designed to build self-reliance and preparedness to manage drought.
- As would be expected, the largest impacts of drought appeared to be economic, with large effects on household income, the experience of financial hardship and deterioration in household financial position. Using the social definition of drought, being in drought was estimated to reduce farmers' equivalent household income by \$20,483 per annum, compared to those who had not experienced drought in the last 3 years. Having been in drought in the last year (but not being currently in drought) was estimated to reduce farmers' equivalent household income by \$10,784 per annum. Using the rainfall deficit measure of drought, being in severe drought was estimated to reduce farmers' equivalent household income by \$4,267 per annum, compared to being in an area that was not in drought but had been experiencing below average rainfall.
- There is statistical evidence that drought has negative social and health impacts. Respondents reported negative impacts of drought on their physical and mental health. Drought was also associated with a higher rate of closure of key services and more people reporting low levels of community social cohesion. However, drought was also associated with higher rates of membership of community organisations.
- There was no evidence that drought had a negative impact upon family relationships, as measured by separation, quality of the couple relationship, family functioning and family conflict.
- The effects of drought on residential mobility are quite hard to estimate. However, our analysis seems to indicate that households were adjusting to adverse circumstances in drought-affected areas, with some members of households probably moving (temporarily or otherwise) towards areas with greater economic opportunity. The lower level of respondent mobility, according to the social definition of drought, may be associated with members of the households with greater responsibilities (for the property, for instance) being less mobile and who therefore may stay behind.
- Farmers and farm managers reported that the current drought had reduced property output very substantially. Forty per cent of farmers currently in drought said that the drought had reduced their properties output to the lowest point ever or eliminated it completely. A further 32% said that it had reduced their properties' output substantially.
- Overall, 42.2% of farmers and farm managers said that if the weather conditions of the last 3 years continued their property was not viable in the short term and a further 14% said their property was not viable in the longer term. However, 47% of farmers and farm managers who were experiencing drought said that their property was not viable even under normal weather conditions.
- As expected, drought had a bigger negative impact upon farmers than others living in rural and regional areas. Importantly, there was also evidence that drought had a negative impact upon farm workers and on people who were employed in rural areas but not in agriculture. The effects for those who were employed but not in agriculture were largely financial, with a negative and statistically significant impact upon household income and a higher likelihood of saying that the financial position of their household had become worse over the last 3 years. There was some evidence of an increased rate of financial hardship for those who were employed but not in agriculture, but this depended upon whether the rainfall deficit or social definition of drought was used.

2. The Rural and Regional Families Survey methodology

The Rural and Regional Families Survey is a population-based study of 8,000 people living in areas of Australia that had at least 10% of the population employed in agriculture or a related service industry at the time of the 2001 Census (2001 was used because it was well before the current period of drought).² The interviews were conducted over September to December 2007 with people living in over 400 postcodes.³

The sample was interviewed in four groups of 2,000, according to whether they were currently in drought and the severity of the drought. The groups were:

- severe drought (0 to 5th percentile of rainfall compared to rainfall over the last 100 years);
- drought (6 to 10th percentile);
- below-average rainfall (11 to 49th percentile); and
- above-average rainfall (50 to 100th percentile).⁴

As noted by the CSIRO and Bureau of Meteorology (BOM), drought can be defined in many different ways (Hennessy et al., 2008). Note that there is no established consensus about the appropriate definition of drought, and hence we use the following two definitions:

- The **meteorological** definition of drought is based upon rainfall deficits in the area in the last 3 years compared to the last 100 years. The rainfall deficits were obtained from the BOM based on a specific period.⁵ We used the four-category definition outlined above.
- The **social** definition of drought is based on people's perceptions of whether they were currently or had been in drought in recent periods. The categories of drought that were derived were:
 - currently in drought;
 - in drought in the last year but not currently in drought;
 - in drought in the last 3 years but not in the last year; and
 - not in drought in the last 3 years.

The effects of drought were estimated using multivariate statistical modelling (regression analysis), which allows for the effects of drought after taking into account other differences between families and geographic areas. The regression models included information on the demographic characteristics of the respondent (gender, age, age squared, Indigenous status), the household (at least one child is in the household) and the area (remoteness and state/territory). The models were generally estimated using the entire sample. The main exception is for the labour market variables, which were estimated for the working age population (18–64 years).

² Areas in the peri-urban fringe (just outside the formal boundaries of cities) were excluded from the study because of their proximity to metropolitan labour markets and associated opportunities.

³ People were interviewed using computer-assisted telephone interviewing using random digit dialling.

⁴ The above-average rainfall area group should not be considered to be a group of individuals experiencing excessive rainfall. In fact, the median percentile for this group was the 58th percentile and 90% of the above-average rainfall group were below the 65th percentile.

⁵ Estimates were based on 2001 Census of Population and Housing Statistical Local Area geographical boundaries and were updated to be exactly three years prior to the month of interview.

3. Community development and sustainability

This section provides information on the impact of drought in the last 3 years on:

- community social cohesion;
- participation in community organisations; and
- availability of key services in the area.

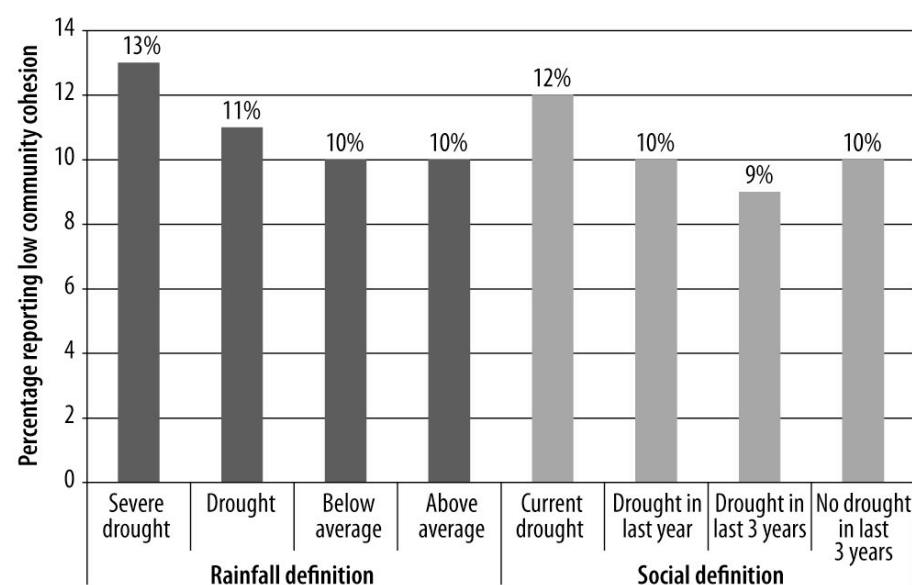
3.1 Community social cohesion and participation in community organisations

Community social cohesion was measured by asking people the extent to which they agreed or disagreed with the following statements:

- People in this community can be trusted.
- People around here are willing to help other members of the community.
- This is a close-knit community.
- People in this community generally get along with each other.
- People in this community share the same values.

Respondents who lived in drought areas were slightly more likely to say that their community had low community social cohesion than those in areas not affected by drought (Figure 1). When the rainfall deficit definition was used, it seems that it was only severe drought that had an effect on community social cohesion (the difference between severe drought and above-average rainfall was statistically significant).

According to the social definition of drought, respondents who were currently in drought were more likely to report low community social cohesion. There were few differences apparent between those who were not currently in drought but had been in drought in the last year or 3 years and those who had not been in drought over the last 3 years. This finding suggests that the effects of drought on social cohesion may not be lasting, although further work is required to test the robustness of this interpretation.



Note: Estimates derived from logistic regression.

Source: AIFS Rural and Regional Families Survey

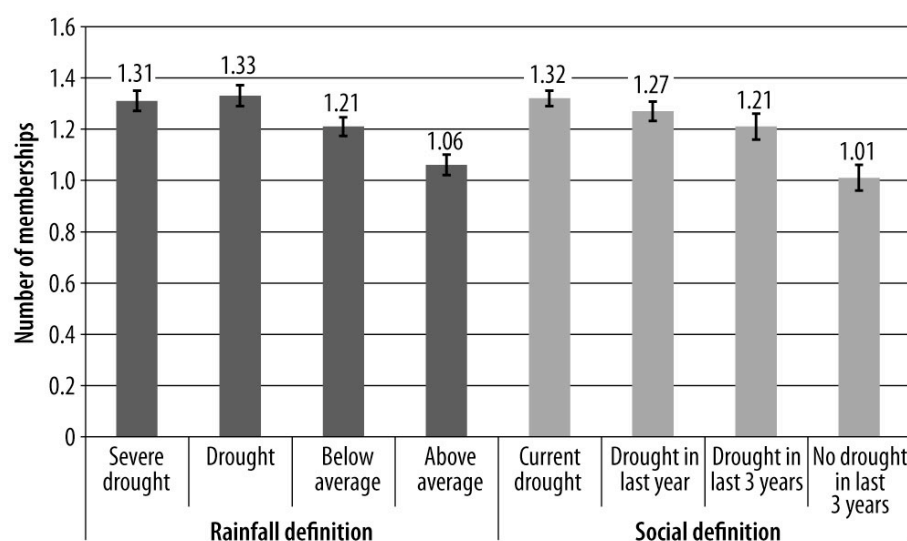
Figure 1. Community social cohesion, by drought definition

Respondents to the survey were asked of which organisations (from a list) they were members. We constructed a measure of the number of organisations of which each respondent was a member and this measure was used in the analysis.⁶

Interestingly, there were higher levels of membership of community organisations in drought-affected areas than non-drought affected areas (Figure 2). People in drought-affected and severely drought-affected areas, as measured by rainfall deficits, had a greater number of memberships of community organisations (1.31 and 1.33 respectively) than people living in below-average rainfall areas (1.21). Those living in above-average rainfall areas were members of the lowest number of organisations (1.05).

The results from the social definition of drought were consistent with those from the rainfall deficit definition. Respondents who had not been in drought in the last 3 years had fewer memberships of community organisations than those who were currently in drought. Although the number of group memberships was lower for those who were not currently in drought but had been in drought in the last year (1.27) and for those who had been in drought in the last 3 years (1.21), the largest difference was between those who had not been in drought in the last 3 years and those who had been (Figure 2).

This provides some evidence of communities “pulling together” in the face of adversity. Another possible explanation is that there were high rates of migration from drought-affected areas (see section 4, Residential Mobility) and that those who remained in drought-affected areas were more connected to community organisations than those who left.



Note: Estimates derived from Poisson regression. The \bar{I} s are confidence intervals. Bars with overlapping \bar{I} s are statistically significant at the 95% level of confidence.

Source: AIFS Rural and Regional Families Survey

Figure 2. Number of memberships to community organisations, by drought definition

3.2 Availability of key services in the area

One possible effect of drought and associated economic effects is the loss of services. The Rural and Regional Families Survey collected information about the closure of banks, schools, hospitals and medical practices in the last 3 years.⁷

When the social definition of drought was used, there was a very clear and substantial link between drought and the loss of services from the local area (Figure 3). Over 40% of people who said they were

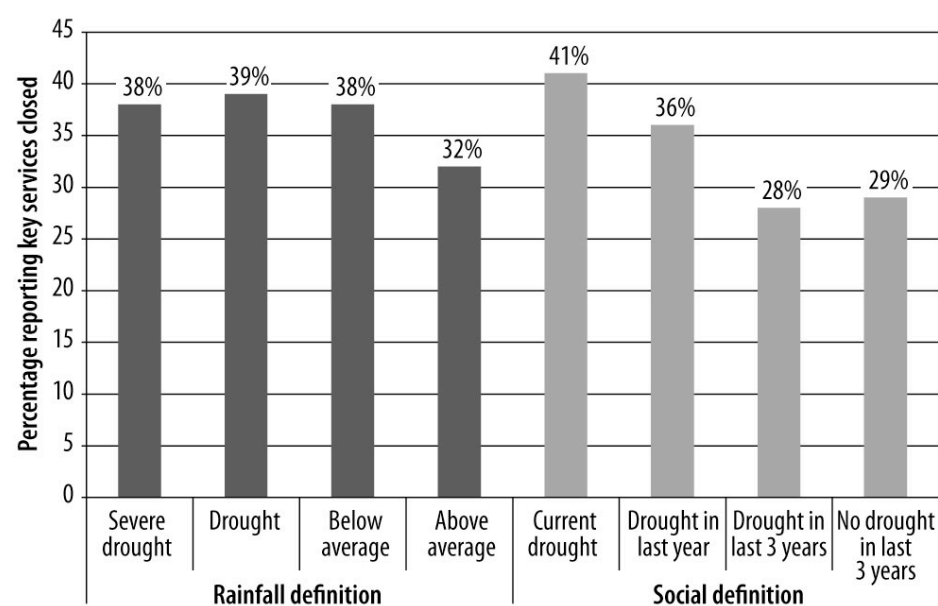
⁶ The types of organisations of which respondents were a member included Land Conservation, the Farmers' Association, a church, a sporting club and volunteer fire services.

⁷ We excluded from the analysis of this issue respondents who had lived in the area for less than 3 years because they may not have known what services had been lost before they started living in the area.

currently in drought reported the closure of at least one key service in the last 3 years, while 29% of those living in areas that had not experienced drought in the last 3 years reported key services closing down.

The picture was much less clear when the rainfall deficit measure was used. In areas that were in severe drought, drought or below-average rainfall, 38–39% of people said one or more key services had closed down in the last 3 years. In areas with above-average rainfall, 32% said that a key service had closed down (Figure 3).

People in below-average rainfall, drought-affected and severely drought-affected areas reported more closures of at least one key service in the last 3 years (6 or 7% more) than in above-average rainfall areas.



Note: Estimates derived from logistic regression.

Source: AIFS Rural and Regional Families Survey.

Figure 3. Closure of a key service in the last 3 years, by drought definition

4. Residential mobility

One of the impacts of drought is that it may result in increased rates of people moving away from the area. This could be because of the financial effects of drought, loss of services or perhaps because of the social effects and impact upon the general “mood” of the community.

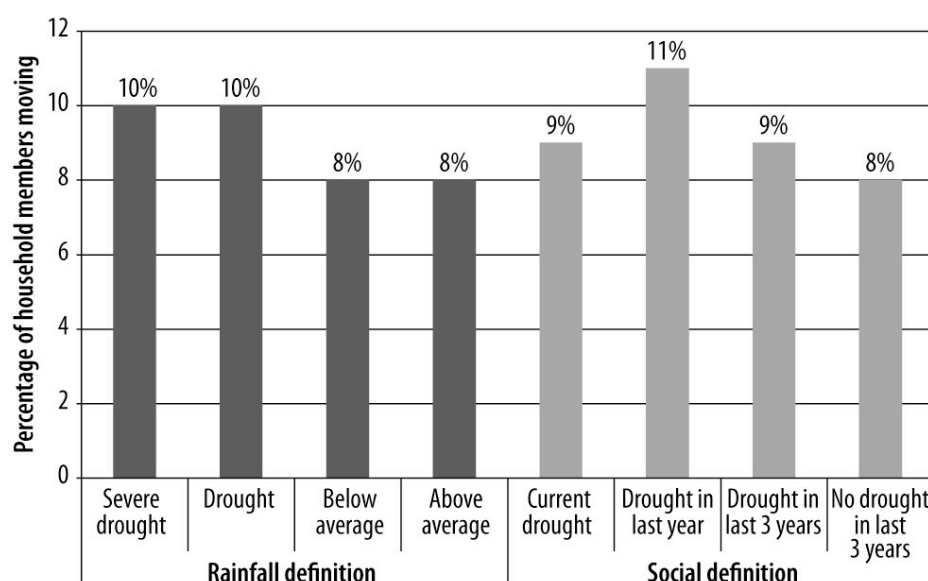
One of the difficulties in collecting information on the impacts of drought on residential mobility using a cross-sectional survey is that only those still living in the area at the time of the survey can be interviewed. This will tend to bias the sample towards those with a lower propensity to move.

The Rural and Regional Families Survey asked respondents whether anyone who had lived in their household had permanently moved out of the area in the last 3 years. Respondents were also asked how many times they personally had moved *between* areas in the last 3 years (moves *within* a particular area were excluded).

Drought was associated with a higher likelihood of having had a household member move out of the area in the last 3 years (Figure 4).

Rates of mobility out of an area were 2 percentage points higher over a 3-year period in drought-affected areas than in below- or above-average rainfall areas (using the rainfall deficit definition).

Rates of mobility out of the area using the social definition were highest for those respondents who said they had been in drought in the last year but were not currently in drought. Those who said they were currently in drought did not report household members moving out of the area at higher rates.



Note: Estimates derived from logistic regression.

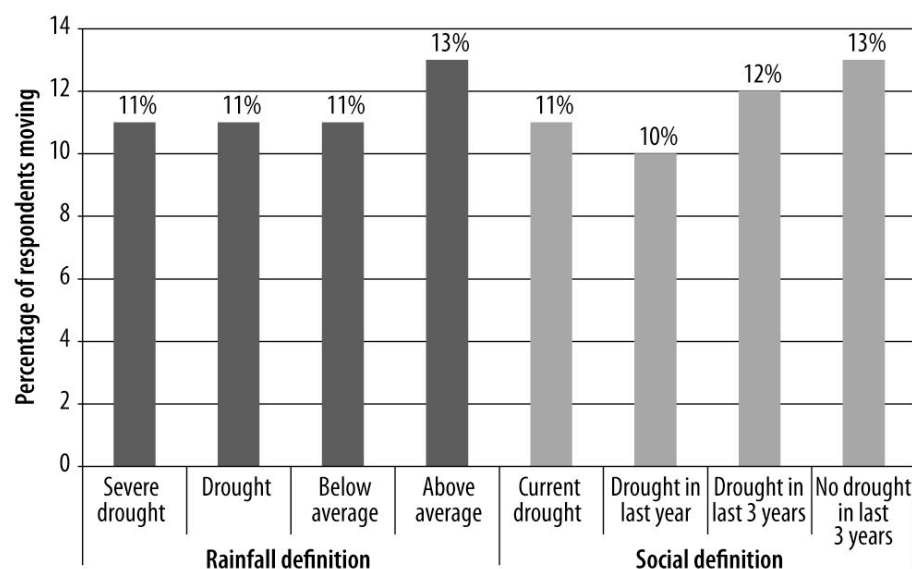
Source: AIFS Rural and Regional Families Survey

Figure 4. Households with at least one member moving out of the area in last 3 years, by drought definition

For respondents, residential mobility out of the area was not associated with drought. In fact, the only statistically significant association suggested that rates of mobility out of the area were highest for non-drought affected areas (Figure 5).

There were no statistically significant differences among respondents in rates of mobility out of the area for drought as defined by rainfall deficits. However, when the social definition was used, respondents who indicated that they had not been in drought in the last 3 years had significantly higher rates of mobility

out of their area than those who said they were currently in drought or had reported having been in drought the last 3 years.



Note: Estimates derived from logistic regression.

Source: AIFS Rural and Regional Families Survey

Figure 5. Respondents moving out of the area in last 3 years, by drought definition

Taken together, these findings on residential mobility seem to indicate that households were adjusting to adverse circumstances in drought-affected areas, with some members of households probably moving (temporarily or otherwise) towards areas with greater economic opportunity. The lower level of respondent mobility, according to the social definition of drought, may be associated with members of the household with greater responsibilities (for the property for instance) having lower mobility and therefore staying behind. This interpretation is consistent with the above findings, but it may change when, as is planned, more geographic mobility data is added to the analysis.

5. Financial wellbeing

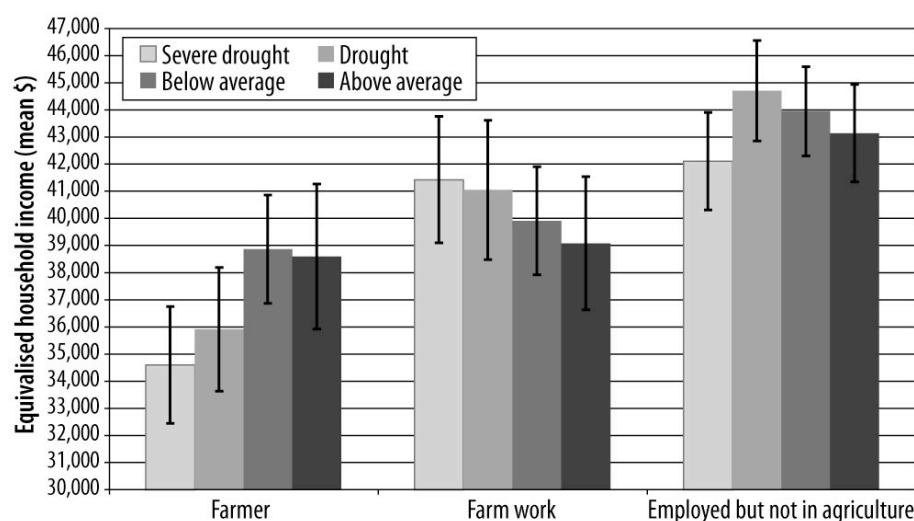
5.1 Equivalised household income

When comparing income levels between households, it is necessary to take into account differences in the costs of living associated with differences in household composition and size. This can be done through the application of an equivalence scale, which results in “equivalised household income”. Household income for the Rural and Regional Families Survey was equivalised using the OECD equivalence scale.⁸

We would expect that drought would have the largest financial impact upon farmers, followed by farm workers and then by those employed but not in agriculture. We therefore considered the financial effects of drought for these three groups separately.

Farmers were worst affected in terms of annual household income. Farming households in drought-affected areas were \$4,267 worse off than farming households in below-average rainfall areas (Figure 6).

Although not statistically significant, people who were employed but not in agriculture were also worse off (by \$1,512) than their counterparts in below-average rainfall areas (Figure 4).



Note: Estimates derived from ordinary least squares (OLS) regression. The \bar{I} s are confidence intervals. Bars with overlapping \bar{I} s are statistically significant at the 95% level of confidence.

Source: AIFS Rural and Regional Families Survey

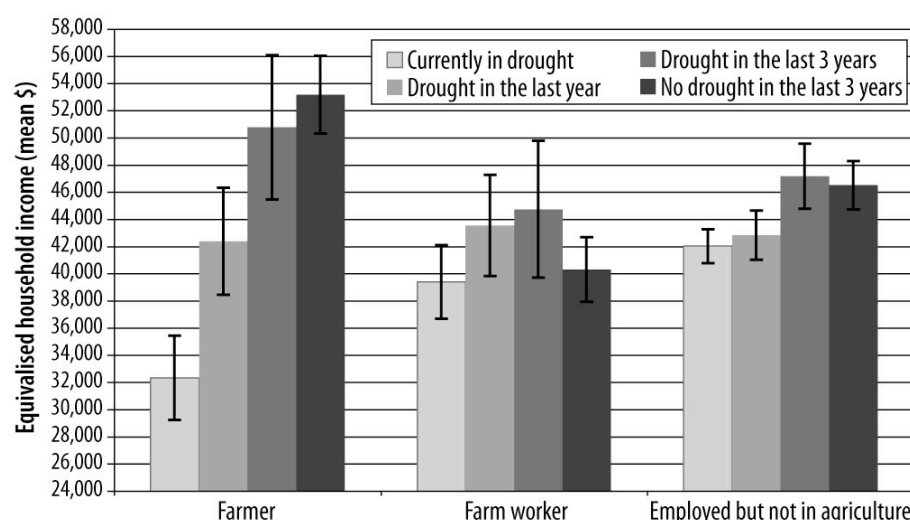
Figure 6. Equivalised household income, by rainfall deficit and type of employment

There were very large differences in household incomes for farmers when we used the social definition of drought (Figure 7). Farmers who indicated they were currently in drought were \$20,483 worse off than those who said they had not experienced drought in the last 3 years. Farmers who were not currently in drought but had been in the last year were \$10,784 worse off than farmers who had not been in drought in the last 3 years.

The household incomes of farm workers did not significantly differ when the social definition of drought was used.

In contrast to farm workers, the household incomes of those who were employed but not in agriculture were substantially lower for those who were currently in drought and those who had been in drought in the last year. Both of these groups were \$4,485 worse off than counterparts who lived in areas that had not experienced drought in the last 3 years.

⁸ This equivalence scale takes the value of 1 for the first adult and adds 0.5 for the second and each subsequent adult and 0.3 for each child.



Note: Estimates derived from OLS regression. The \bar{I} s are confidence intervals. Bars with overlapping \bar{I} s are statistically significant at the 95% level of confidence.

Source: AIFS Rural and Regional Families Survey

Figure 7. Equivalised household income, by social definition of drought and type of employment

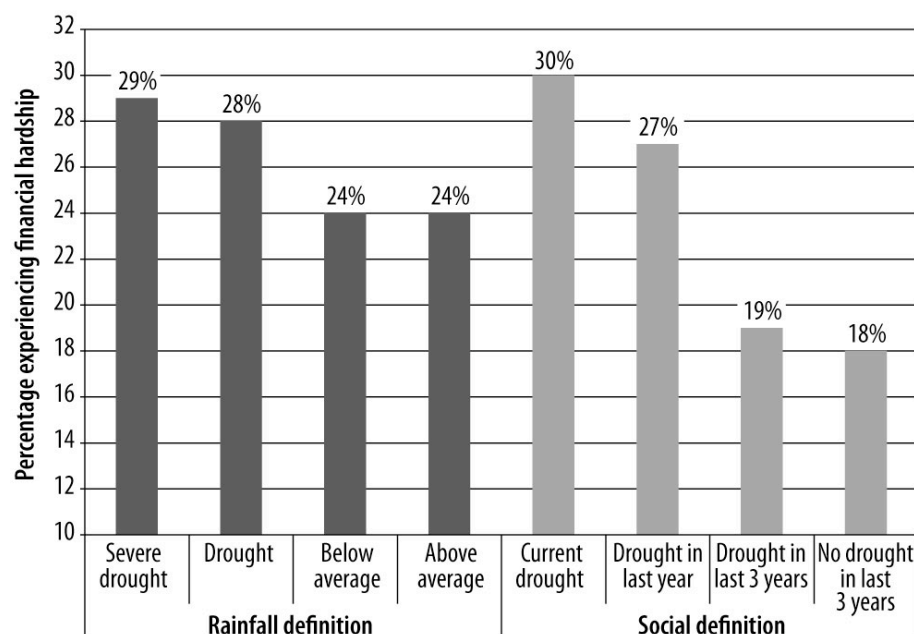
5.2 Financial hardship

Financial hardship was measured by asking participants whether their household had experienced six events. Respondents were asked, “In the last 12 months, did any of the following happen to your family because of a shortage of money? Could not pay electricity or the telephone bills on time; could not pay the mortgage or rent on time; pawned or sold something; went without meals; asked for financial help from friends or family; asked for help from welfare/community organisations”. The experience of one or more of these events was considered to be indicative of financial hardship.

Households in drought-affected areas were experiencing more financial hardship than in non-drought affected areas, regardless of the drought definition (Figure 8).

Households in severely drought-affected and drought-affected areas, as defined by rainfall, had rates of financial hardship that were 4 to 5 percentage points higher than in below- or above-average rainfall areas.

Differences between drought-affected and non-drought affected areas were most pronounced for the social definition of drought. Those who were currently in drought had rates of financial hardship 12 percentage points higher than those who had not been in drought in the last 3 years. The difference between those who had been in drought in the last year but not currently and those who had not been in drought in the last 3 years was also substantial (9 percentage points).



Note: Estimates derived from logistic regression.

Source: AIFS Rural and Regional Families Survey

Figure 8. Households that experienced financial hardship in the last 12 months, by drought definition

The results shown in Table 8 demonstrate that, irrespective of the level of drought and definition used, a much higher percentage of farmers were in financial hardship than those who are employed but not in agriculture (about double the rate, irrespective of level of drought):

- Almost half of the farmers in drought-affected areas are experiencing financial hardship compared to about one in three in areas of above-average rainfall.
- The difference in the percentage experiencing financial hardship between farmers currently in drought and those who have not been in drought in the last 3 years is even greater (47% compared to 25%).

Drought also impacts on the financial hardship experienced by farm workers. For example:

- A higher percentage of farm workers in areas of severe drought were in financial hardship than those in areas of above-average rainfall.
- Farm workers who indicated they were currently in drought also had much higher levels of financial hardship than those who said they had not been in drought in the last 3 years.

There was mixed evidence of the impact of drought on the experience of financial hardship of those employed but not in agriculture. According to the rainfall deficit definition, there was no clear link between drought and financial hardship. However, when the social definition was used, those who said they were currently in drought had higher levels of financial hardships than those who had not been in drought in the last 3 years.

Table 1. Experience of financial hardship, by drought definition and type of employment

Rainfall deficit definition	Drought experience			
	Severe drought	Drought	Below average	Above average
	%			
Farmer	45	45	41	35
Farm worker	36	25	28	23
Employed but not in agriculture	23	24	22	22

Social definition	Current drought	Drought in last year	Drought in last 3 years	No drought in last 3 years
	%			
Farmer	47	38	28	25
Farm worker	32	26	24	17
Employed but not in agriculture	25	25	16	18

Note: Estimates derived from logistic regression.

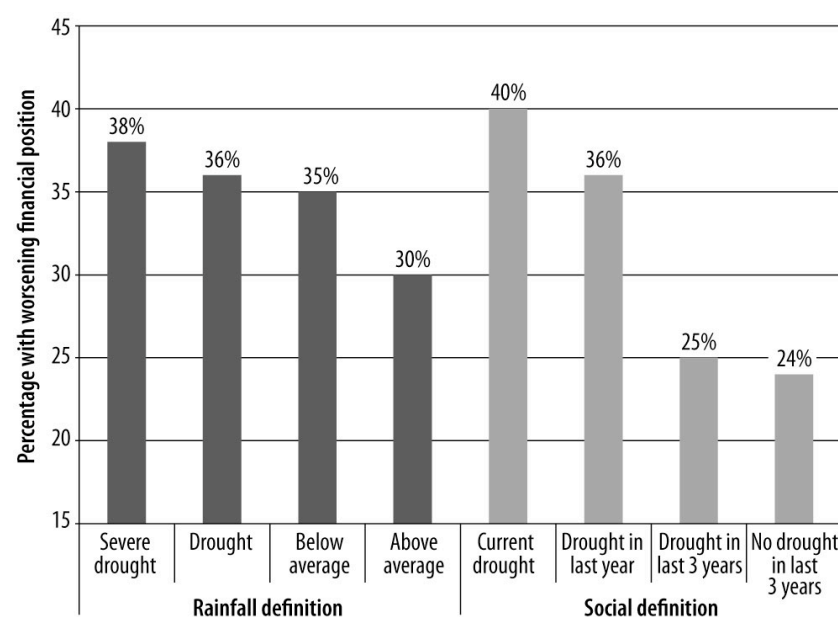
Source: AIFS Rural and Regional Families Survey

5.3 Change in financial position in the last 3 years

Respondents to the Rural and Regional Families Survey were asked whether they thought their household's financial position during the last 3 years had become worse, stayed the same or improved. Here we focus on reports of the household financial position becoming worse or much worse in the last 3 years.

Overall, respondents who were living in drought-affected areas were more likely to say that their households' financial position had become worse or much worse in the last 3 years than respondents in non-drought affected areas.

The size of the difference in worsening financial position between severely drought-affected areas and below-average rainfall areas was 3 percentage points. The difference in financial position between those who were currently in drought and those who had not experienced drought in the last 3 years was even greater when using the social definition (16 percentage points) (Figure 9).



Note: Estimates derived from logistic regression.

Source: AIFS Rural and Regional Families Survey

Figure 9. Worsening financial position in the last 3 years, by drought definition

The effects of drought on the household's financial positions were substantially greater for farmers than for farm workers and for those employed but not in agriculture (Table 2).

Overall, more than 50% of farmers said that their financial position had become worse or much worse over the last 3 years.

Two-thirds of farmers in severe drought as defined by rainfall deficits said that their financial position had become worse or much worse over the last 3 years, compared to 51% of those in areas that had experienced above-average rainfall. Similar differences existed between drought-affected farmers and those in above-average rainfall areas.

The effects of drought were much stronger when the social definition was used. Farmers who were currently in drought had almost twice the rate of worsening financial position than farmers who had not experienced drought in the last 3 years (66% and 35% of farmers in the respective areas).

Drought as defined by rainfall deficit had little impact on farm workers' financial positions in the last 3 years. However, using the social definition, farm workers who said they were currently in drought had almost double the rates of worsening financial position than those who said they had not experienced drought in the last 3 years (40% and 21% respectively).

For people who were employed but not in agriculture, their households' financial position was affected by drought regardless of the definition, although not to the same degree as farmers and farm workers. When the rainfall deficit measure was used, 30% of those employed but not in agriculture who were in severe drought said that their financial position had become worse or much worse over the last 3 years, compared to 24% of those in an above-average rainfall area. Using the social definition of drought, 32% of those employed but not in agriculture who were experiencing current drought said that their financial position had become worse or much worse over the last 3 years, compared to 22% of those who had not experienced drought in the last 3 years.

Table 2. Experience of worsening household financial position in the last 3 years, by drought definition and type of employment

Rainfall deficit definition	Drought experience			
	Severe drought	Drought	Below average	Above average
	%			
Farmer	67	61	56	51
Farm worker	37	35	35	31
Employed but not in agriculture	30	27	30	24
Social definition	Current drought	Drought in last year	Drought in last 3 years	No drought in last 3 years
	%			
Farmer	66	56	37	35
Farm worker	40	31	31	21
Employed but not in agriculture	32	30	22	22

Note: Estimates derived from logistic regression.

Source: AIFS Rural and Regional Families Survey

6. Employment

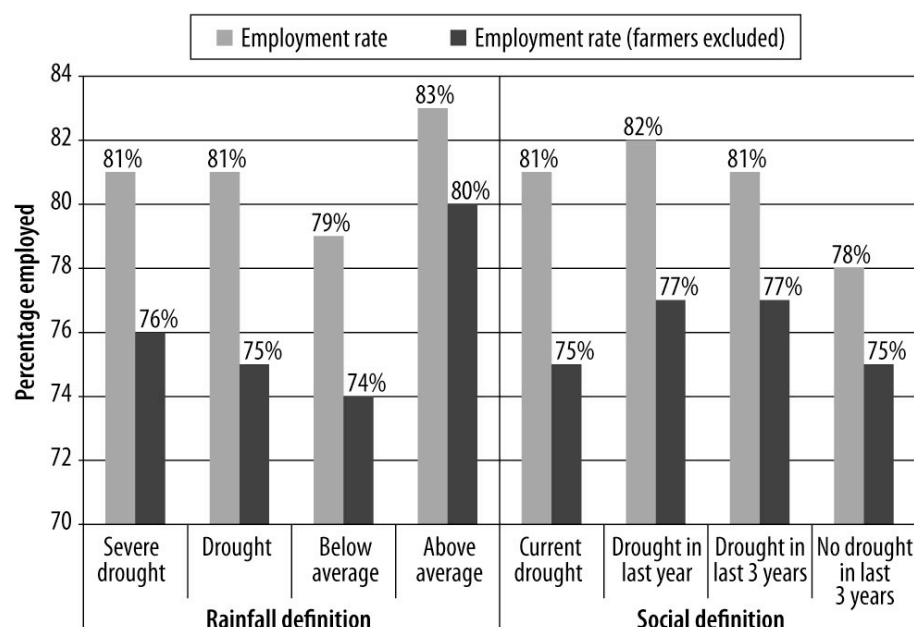
6.1 Employment status

To the extent that drought reduces farm output, it has a direct effect on the local economy and employment opportunities. To some extent, government transfer payments to farmers and residents living in areas classified as Exceptional Circumstances (EC) will counteract such tendencies. However, a priori, one would expect that drought is associated with the reduced employment opportunities historically associated with depressed regional economies. Again, declining population numbers and mobility could ultimately feed back and further depress such economies. In this section, we focus on employment rates (full- or part-time employment) of working-age respondents.

The impact of drought on overall employment rates was found to be small and limited to results defined by rainfall deficits (Figure 10). In drought-affected areas as defined by rainfall deficits, the employment rates were 2% lower than in above-average rainfall areas. The largest difference (4%) in employment rates was between below-average rainfall areas (79%) and above-average rainfall areas (83%).

One of the limitations of the analysis above is that farmers are much less likely to lose their jobs. They may go deeper in debt and cut the operating costs of running their farm, but unless they are forced to sell their property, they will not become jobless. As such, evaluating the impact of drought on the overall rates of employment may be relatively insensitive. To address this limitation, we conducted the same analysis excluding farmers.

When farmers were excluded from the analysis, there was a statistically significant impact of drought defined by rainfall deficits. The employment rate was 4 or 5 percentage points lower in drought-affected areas than in above-average rainfall areas. Rates of employment were similar in below-average areas and drought-affected areas.



Note: Estimates derived from logistic regression.

Source: AIFS Rural and Regional Families Survey

Figure 10. Overall employment rates and employment rates excluding farmers, by drought definition

7. Economic impact on farmers

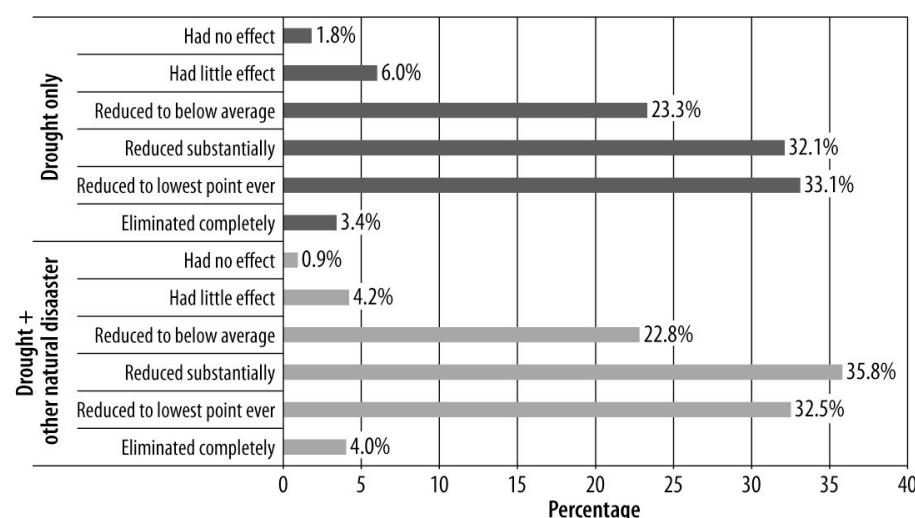
7.1 Farm property output

Farmers and farm managers who said that they were currently in drought were asked about the effect of drought on their property's output. For those who had also experienced another natural disaster like a bushfire, we asked what the combined effect of drought and the natural disasters had been on their property's output.

To understand the impact of drought as perceived by farmers and farm managers (the social definition of drought)⁹ we present the effects of drought separately for those whose properties were only drought-affected and those whose properties were drought-affected and had also experienced another natural disaster. The results are similar for the two groups (Figure 11). Nonetheless, the following discussion focuses on the results for the properties that were only drought-affected.

The current drought has had a large impact on agricultural production:

- Almost 40% of farmers and farm managers reported that drought had reduced property output to its lowest point ever or eliminated it completely (Figure 11).
- A further third said it had reduced property output substantially.
- Only about 8% of farmers said that their properties' output was not or only a little affected.



Source: AIFS Rural and Regional Families Survey

Figure 11. Farm productivity, by drought definition and natural disaster

7.2 Economic viability of farms

Do farmers think that their farm is economically viable? The Rural and Regional Families Survey asked farmers and farm managers whether they thought their property was economically viable: a) if current weather conditions continue, and b) under normal weather conditions.

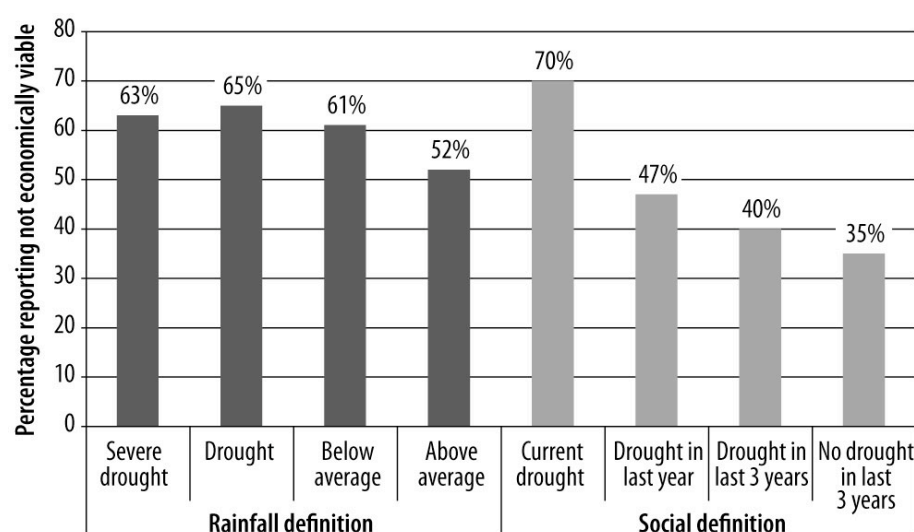
Overall, 42.4% of farmers and farm managers said their property was not economically viable in the short term if the current weather conditions continued. A further 13.5% of respondents who were running a

⁹ Property owners were asked directly whether drought had affected their property's output. This question was only asked of property owners who considered their area to be in drought, so farmers and farm managers who said they were not in drought were excluded from the analysis. It would therefore be difficult to accurately estimate the impact of drought as defined by rainfall deficits and any consequent estimates of the impact of drought would be biased. Consequently, estimates of the impact of drought as defined by rainfall deficits were not conducted.

farm said their property was not economically viable in the longer term if current weather conditions continue.

Farmers and farm managers in drought-affected areas were more likely than those not affected by drought to say that their property was not economically viable in the short or longer term (Figure 12). About two-thirds of properties in drought-affected and below-average rainfall areas were not considered to be economically viable if current weather conditions continued, compared to about half in above-average rainfall areas (Figure 12). Almost twice as many properties were not considered to be economically viable if current weather conditions continued in areas that were currently in drought (70%) compared to areas that were not considered to have been in drought for the last 3 years.

Almost half of those who said their property was not economically viable under current drought weather conditions said it would be economically viable under normal weather conditions (47%).



Note: Estimates derived from logistic regression.

Source: AIFS Rural and Regional Families Survey

Figure 12. Economic viability of farm properties, by drought definition

7.3 Engagement in off-farm work

A large percentage of farmers were employed in off-farm work and therefore were working fairly long hours given that they were also running their own farm. Thirty-five per cent of all farmers had a job off the farm (see Table 3). On average, these farmers worked 31 hours per week in their job off the farm. There was substantial variation in working hours however, with 56% working part-time hours (less than 35 hours per week) and the remaining 44% working full-time hours.

Eleven per cent of respondents had partners who were farmers. Thirty-three per cent of these farmers had taken a job off the farm. On average, these farmers worked 38 hours per week in their job off the farm. Forty-one per cent of these farmers were working part-time and 59% full-time.

For farmers who were respondents or the respondents' partner, there was no statistically significant association between having a job off the farm and drought. This finding was consistent regardless of the definition of drought.

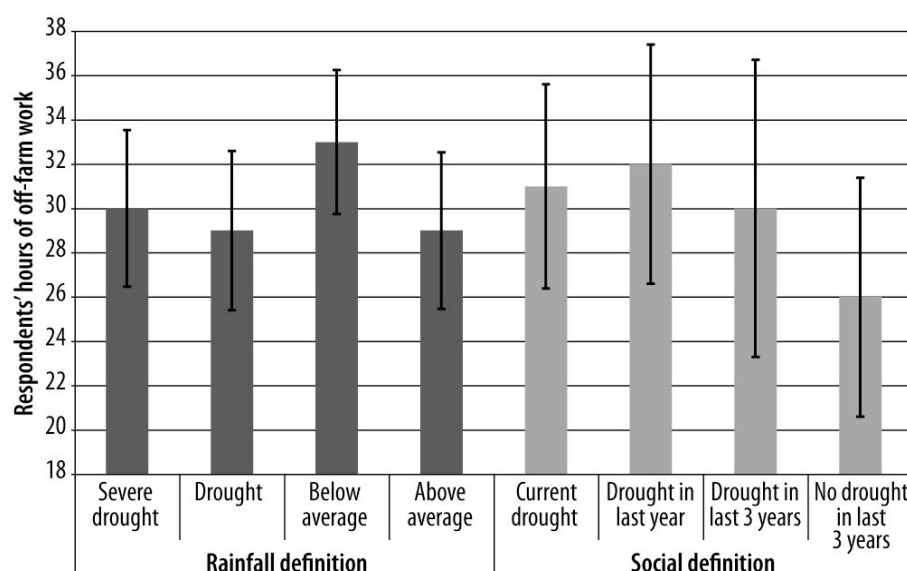
Table 3. The off-farm work of farmers

	Respondents	Partners of respondents
Working in a job off the farm	35	33
Working part-time (< 35 hours)	56	41
Working full-time (> 34 hours)	44	59
Average working hours (standard deviation)	30.78 (19.02)	37.58 (21.91)
Total	1,351	894

Source: AIFS Rural and Regional Families Survey

We estimated the impact of drought on off-farm work hours for respondents and respondents' partners separately. It should be noted that the sample sizes were relatively small in this instance, making it difficult to obtain statistically significant differences at the 95% level of confidence.

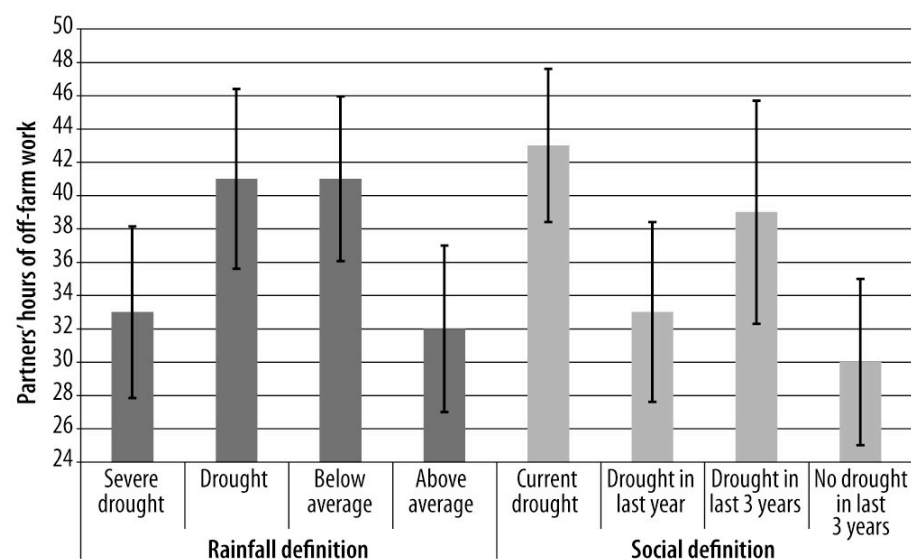
Overall, there was little association between drought and the number of hours of off-farm work by farmers and partners who were farmers (Figures 13 and 14). There was one exception, with partners who were farmers working 13 more hours off the farm when they were currently in drought than those who had not been in drought in the last 3 years (Figure 14).



Note: Estimates derived from OLS regression. The \bar{I} s are confidence intervals. Bars with overlapping \bar{I} s are statistically significant at the 95% level of confidence.

Source: AIFS Rural and Regional Families Survey

Figure 13. Hours of off-farm work of respondents, by drought definition



Note: Estimates derived from OLS regression. The \bar{I} s are confidence intervals. Bars with overlapping \bar{I} s are statistically significant at the 95% level of confidence.

Source: AIFS Rural and Regional Families Survey

Figure 14. Hours of off-farm work of partners, by drought definition

8. Family relationships

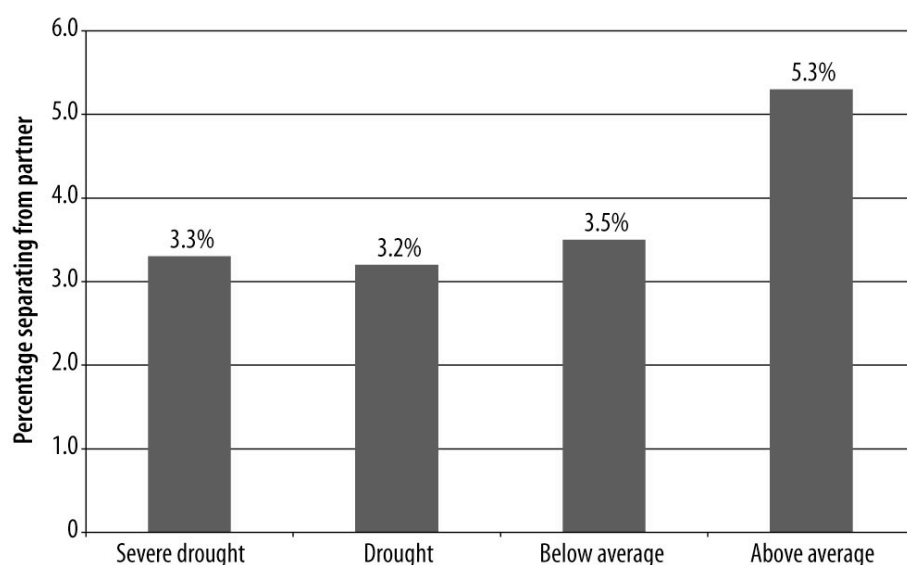
The Rural and Regional Families Survey collected detailed information about family relationships. In this section we consider relationship separation, quality of couple relationships and family functioning and family conflict.

8.1 Relationship separation

Overall, 4.7% of all respondents reported separating from their partner in the last 3 years (although 30% of respondents indicated they had ever separated from a spouse or long-term partner). Given that the focus of the study was on estimating the effects of drought, and our definition of drought used a 3-year time period, we examined the effects of drought on separation from a spouse or long-term partner in the last 3 years.

People in drought-affected and below-average rainfall areas were less likely to have experienced a relationship separation than those in above-average rainfall areas in the last 3 years. There was about a 2% difference between those in above-average rainfall areas compared with drought-affected and above-average rainfall areas (Figure 15).

There was no statistically significant association between the social definition of drought and recent relationship separation (results not shown).



Note: Estimates derived from logistic regression.

Source: AIFS Rural and Regional Families Survey

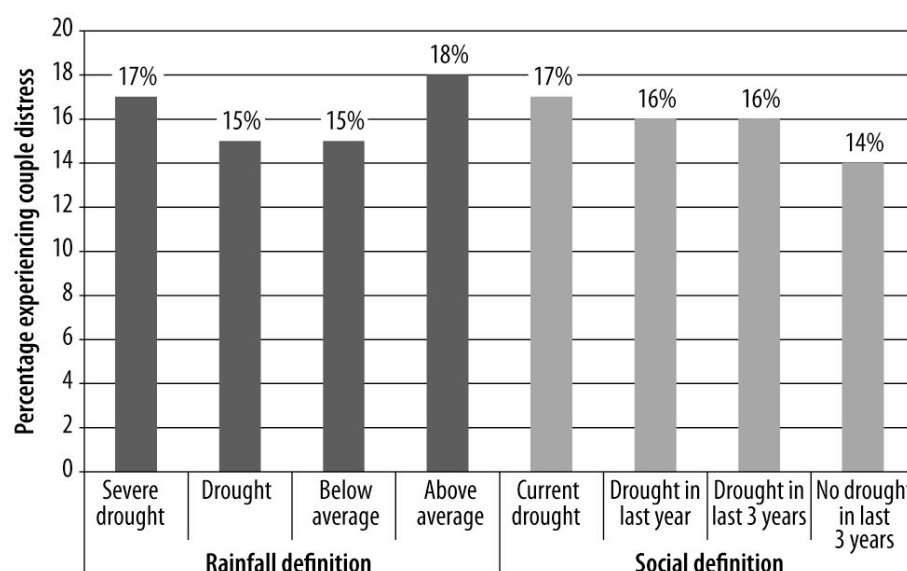
Figure 15. Separation from spouse or long-term partner in the last 3 years, by drought defined by rainfall deficits

8.2 Quality of couple relationships

The quality of couple relationships was captured using a measure of relationship distress.¹⁰ People were asked about how happy they were in their relationship, whether they confided in their partner and whether they had discussed separating. Of the 6,052 respondents who were partnered, 16.5% reported levels of relationship dissatisfaction that were indicative of relationship distress.

Overall, there was little relationship between the extent to which poor quality couple relationships were reported and the level of drought (Figure 16).

¹⁰ A short version of the well-known Dyadic Adjustment Scale was used (DAS-4; Sabourin, Valois, & Lussier, 2005).



Note: Estimates derived from logistic regression.

Source: AIFS Rural and Regional Families Survey

Figure 16. Couple distress for respondents with a partner, by drought definition

8.3 Family functioning and family conflict

Respondents who were living in households with three people or more (52% of respondents) were asked about:

- how close family members were and whether they supported one another;
- whether they talked openly and told each other about their personal problems; and
- whether there was a lot of conflict in the household.¹¹

These questions were combined into two scales. The first scale was a composite measure of conflict, cohesion and communication. The second was the level of conflict. The resulting scales have sound statistical properties. A measure of poor family functioning was constructed using the lowest 5% of families on this measure. A measure of high conflict was constructed using the 25% of families reporting the highest levels of conflict.

There was no statistically significant association between drought and low family functioning and between drought and high conflict in families, regardless of the drought definition used.

¹¹ All of the questions asked were based on a standard measure of family functioning that has been used in other Australian and international studies (Edwards & Clarke, 2005; Moos & Moos, 1996).

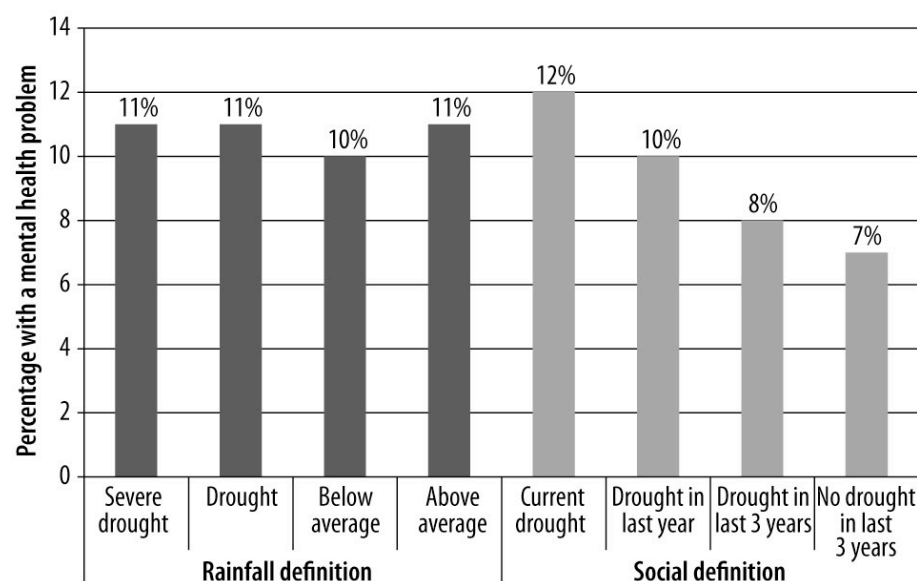
9. Mental and physical health

9.1 Mental health

Mental health was assessed by the Mental Health Inventory from the Medical Outcomes Study Short Form (SF-36), a widely used measure (Ware, Kosinski, & Gandek, 2002). Scores can range from 0 to 100, with higher scores indicating better mental health status. People who score less than 52 have been found to satisfy the clinical diagnostic criteria for depression (Berwick et al., 1991). We used this cut-off as an indicator of people who have mental health problems.

Drought impacted on the rates of mental health problems when the social definition of drought was used, but there were no statistically significant findings when using the rainfall deficits definition (Figure 17). People in areas that were currently in drought had almost twice the rate of mental health problems than in areas that had not been in drought in the last 3 years.

The significant association between the social definition of drought and mental health is understandable as there is an element of subjectivity inherent in both measures. Notwithstanding, individuals' definitions of drought were informed by an intimate knowledge of local conditions and, as has been demonstrated with other variables and with mental health problems, these are often the best predictor of the effects of drought, or rather, often associated with the largest effects. That is, we should not dismiss the social definition of drought since it is formed by the decisions of independent agents with knowledge of local conditions.



Note: Estimates derived from logistic regression.

Source: AIFS Rural and Regional Families Survey

Figure 17. Reports of mental health problems, by drought definition

Farmers who were currently in drought had over twice the rate of mental health problems than farmers who were not currently in drought (Table 4). There were no significant differences in rates of mental health problems by rainfall deficits.

For farm workers, there was some evidence that drought impacted on rates of mental health problems. Farm workers had higher rates of mental health problems in areas of severe drought than in drought-affected areas. There were no significant differences between farm workers in severe drought areas compared to those in below- and above-average rainfall areas. Farm workers who indicated they were

currently in drought had much higher rates of mental health problems than farm workers who had not experienced a drought in the last 3 years.

Drought did not impact on the rates of mental health problems of people who were employed but not in agriculture, regardless of the drought definition used. However, people who were employed but not in agriculture had significantly higher rates of mental health problems in above-average rainfall areas than in below-average rainfall areas.

Table 4. Reports of mental health problems, by drought definition and type of employment

Rainfall deficit definition	Drought experience			
	Severe drought	Drought	Below average	Above average
	%			
Farmer	16	17	14	17
Farm worker	13	5	9	8
Employed but not in agriculture	9	9	7	10

Social definition	Current drought	Drought in last year	Drought in last 3 years	No drought in last 3 years
	%			
Farmer	18	11	11	7
Farm worker	11	7	4	5
Employed but not in agriculture	9	8	8	7

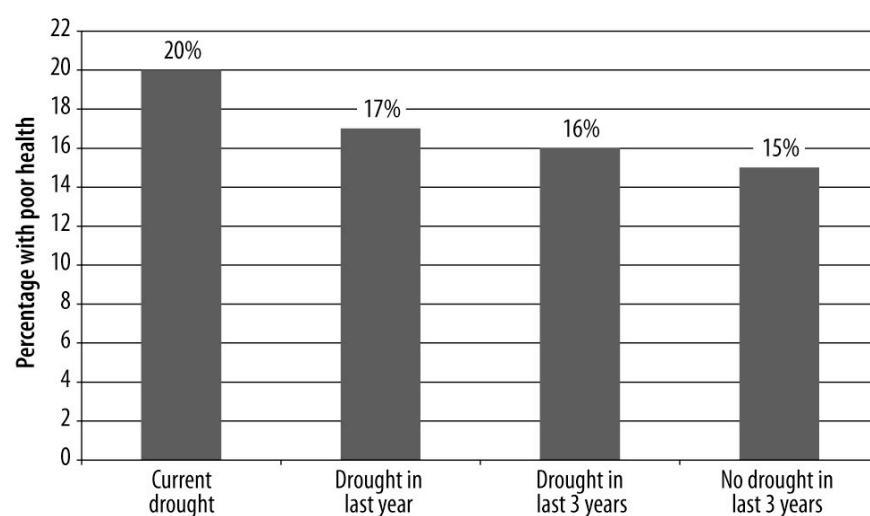
Note: Estimates derived from logistic regression.

Source: AIFS Rural and Regional Families Survey

9.2 General physical health

We asked people about their health in general using the following question: “In general, would you say your health is excellent, very good, fair or poor?” This question has been widely used, and self-rated health of this form has been found to be predictive of subsequent morbidity and mortality. Following the common accepted practice, we categorised people who said their health was fair or poor as having “poor health”. Twenty-one per cent of respondents reported being in fair or poor health.

People who were currently in drought had a 5% greater rate of poor health than those who said they had not been in drought in the last 3 years (Figure 18). There were no statistically significant associations between drought measured using rainfall deficits and poor health.



Note: Estimates derived from logistic regression.

Source: AIFS Rural and Regional Families Survey

Figure 18. Reports of poor health, by social definition of drought

10. Conclusion

It is difficult to measure the social and economic impacts of drought. The lack of consensus about how to measure drought in the first place ensures that such impacts can always be debated and contested. However, our study illustrates that there are substantial impacts of drought that cannot be ignored.

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